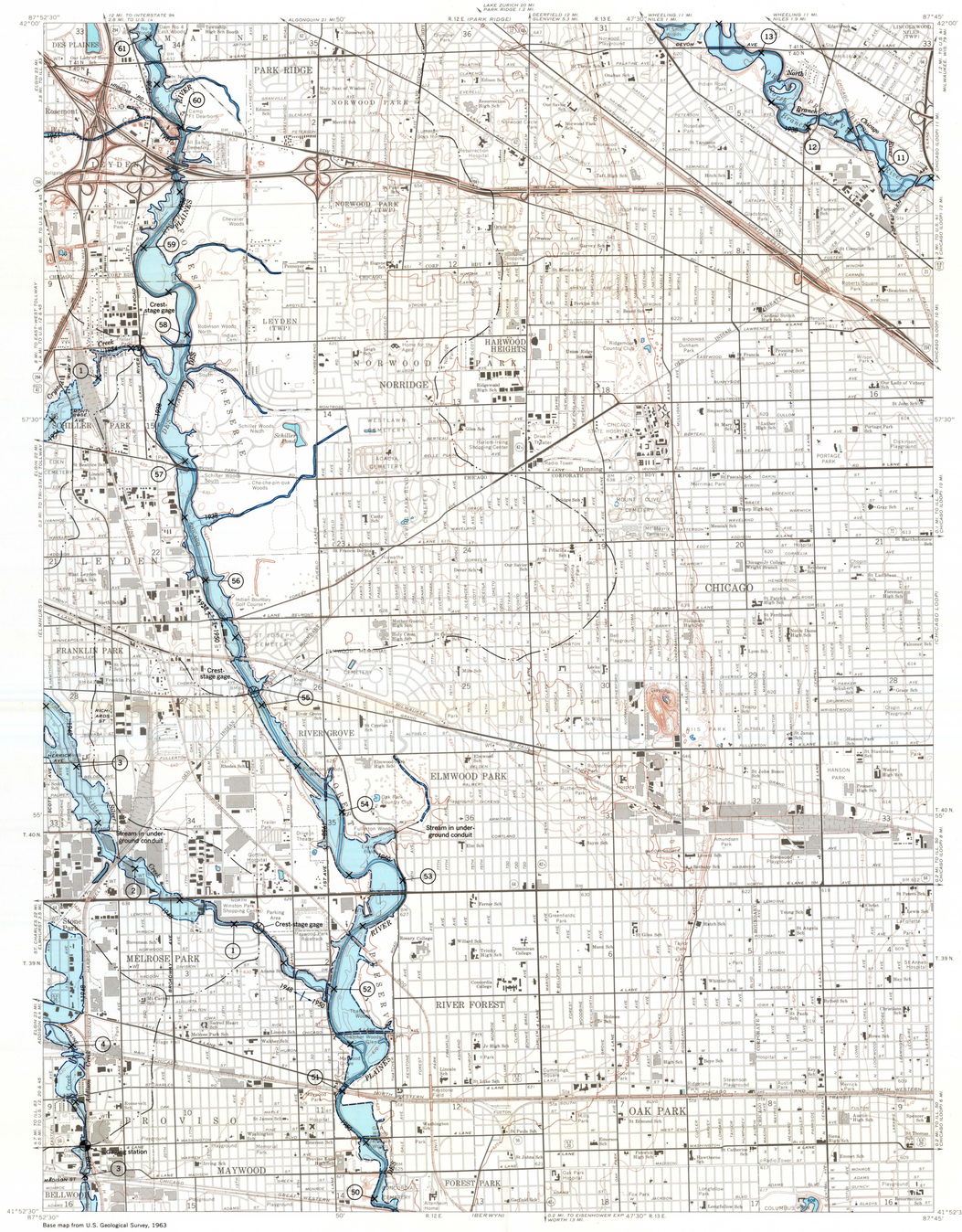
DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

PREPARED IN COOPERATION WITH
THE NORTHEASTERN ILLINOIS METROPOLITAN
AREA PLANNING COMMISSION

HYDROLOGIC INVESTIGATIONS
ATLAS HA-206




## FLOODS IN RIVER FOREST QUADRANGLE NORTHEASTERN ILLINOIS

This report presents hydrologic data which may 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 River Forest quadrangle are delineated on a topographic map. The quadrangle location is shown in figure 1. Inundated areas are shown for the flood of July 1938 along North Branch Chicago River and along Des Plaines River upstream from Belmont Avenue; for the flood of March 1948 along Silver Creek and Addison Creek; for the flood of April 1950 along Des Plaines River downstream from Belmont Avenue; for the flood of October 1954 along Crystal Creek; and for the flood of September 1961 along Willow Creek.

The general procedure used in defining flooded areas was to develop flood profiles on the basis of all 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 flood boundaries 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 flooded areas 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 flooded areas shown reflect channel conditions existing when the floods occurred. No appraisals are made of the effect of changes in channel conditions, 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.

Street and basement flooding caused by backup in storm drains occurs in several areas in the River Forest 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 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 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.

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 projects.

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; the Forest Preserve District of Cook County; and the Metropolitan Sanitary District of Greater Chicago.

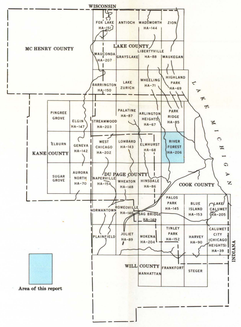



FIGURE 1.—*Index map of northeastern Illinois showing location of quadrangles included in flood-hazard mapping program.*

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 River Forest 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. Those drainage divides are based on contours on the map and do not indicate drainage through underground storm sewers.

| Gaging station | Type of gage[1] | Datum of gage above mean sea level (feet) | Drainage area (square miles) |
|---|---|---|---|
| Des Plaines River at River Grove (Grand Avenue) | C | 612.93 | 449 |
| Crystal Creek at Schiller Park (River Road) | C | 621.84 | 4.72 |
| Silver Creek at Melrose Park (9th Avenue) | C | 617.45[2] | 11.1 |
| Addison Creek at Bellwood (Washington Boulevard) | R | 617.65 | 18.2 |

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

Gage height and year of occurrence of each annual flood (highest peak stage in each calendar year) above 602-foot elevation at the gaging station, Des Plaines River at Riverside, Ill., for the periods 1887–1889 and 1892–1964 are shown in figure 2. The gaging station at Riverside is 500 feet downstream from Hoffman Dam, about 3 1/2 miles south of River Forest quadrangle, and 44.3 miles upstream from the mouth of Des Plaines River. The irregular occurrence of floods is evident.

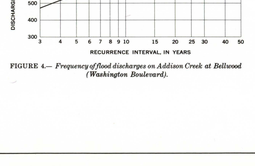



FIGURE 2.—*Annual floods above 602-foot elevation, 1887–1889, 1892–1964, Des Plaines River at Riverside, Ill. (500 feet downstream from Hoffman Dam).*

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

*Flood frequency.*— Frequencies of floods at the Geological Survey gaging stations, Des Plaines River at Forest Park and Addison Creek at Bellwood were derived from streamflow records at these stations combined with records of other nearby stations and with the regional flood-frequency relation for streams in northern Illinois (Mitchell, 1954). The gaging station at Forest Park is at Forest Home Cemetery bridge, half a mile south of the River Forest quadrangle and 49.2 miles upstream from the mouth of Des Plaines River. The relations between frequency and discharge at the two gaging stations are shown in figures 3 and 4, and the relations between frequency and stage 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 physical conditions of channels and constrictions. The stage frequency curves shown in figures 5 and 6 are 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 Des Plaines River at Forest Park, Ill. (Forest Home Cemetery bridge).*




FIGURE 4.— *Frequency of flood discharges on Addison Creek at Bellwood (Washington Boulevard).*

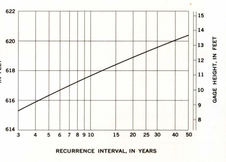



FIGURE 5.—*Frequency of flood stages on Des Plaines River at Forest Park, Ill. (Forest Home Cemetery bridge).*

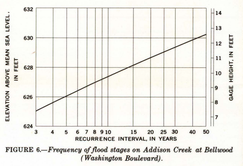



FIGURE 6.—*Frequency of flood stages on Addison Creek at Bellwood (Washington Boulevard).*

The general relation between recurrence interval and flood height at gaging stations on Des Plaines River at Forest Park (fig. 5) and Addison Creek at Bellwood (fig. 6) is tabulated below:

| Recurrence interval (years) | Elevation above mean sea level (feet) | |
|---|---|---|
| | Des Plaines River at Forest Park | Addison Creek at Bellwood |
| 50 | 620.4 | 630.3 |
| 30 | 619.6 | 629.4 |
| 20 | 618.9 | 628.7 |
| 10 | 617.6 | 627.4 |
| 5 | 616.8 | 626.1 |
| 3 | 615.3 | 625.1 |

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 July 1938, March 1948, April 1950, October 1954, and April 1960, are shown in figures 7–10. 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 7–10. The approximate ground elevation can be determined from contours on the map; however, more accurate elevations can be obtained by leveling from nearby bench marks.

*Additional data.*— Other information pertaining to floods in the River Forest 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.
_____, 1955, Survey report for flood control, Silver Creek, 19 p.
_____, 1961, Report on plan for flood control and drainage development, Willow-Higgins Creek, 47 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.

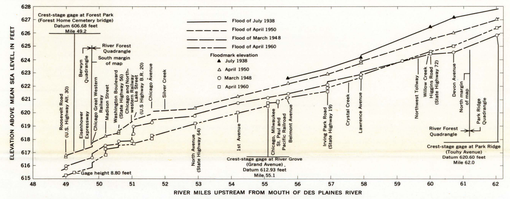



FIGURE 7.—*Profiles of floods on Des Plaines River.*

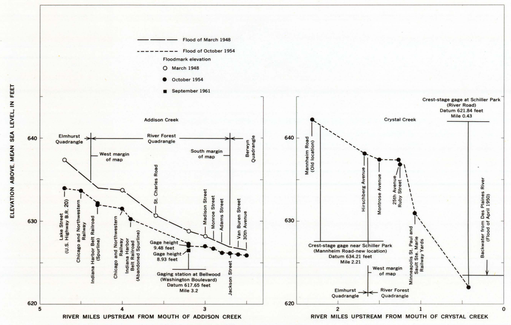



FIGURE 8.—*Profiles of floods on Addison Creek and Crystal Creek.*

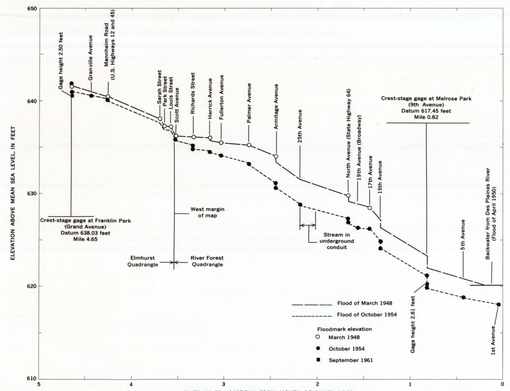



FIGURE 9.—*Profiles of floods on Silver Creek.*

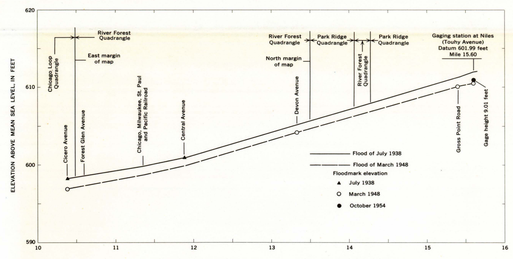



FIGURE 10.—*Profiles of floods on North Branch Chicago River.*

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