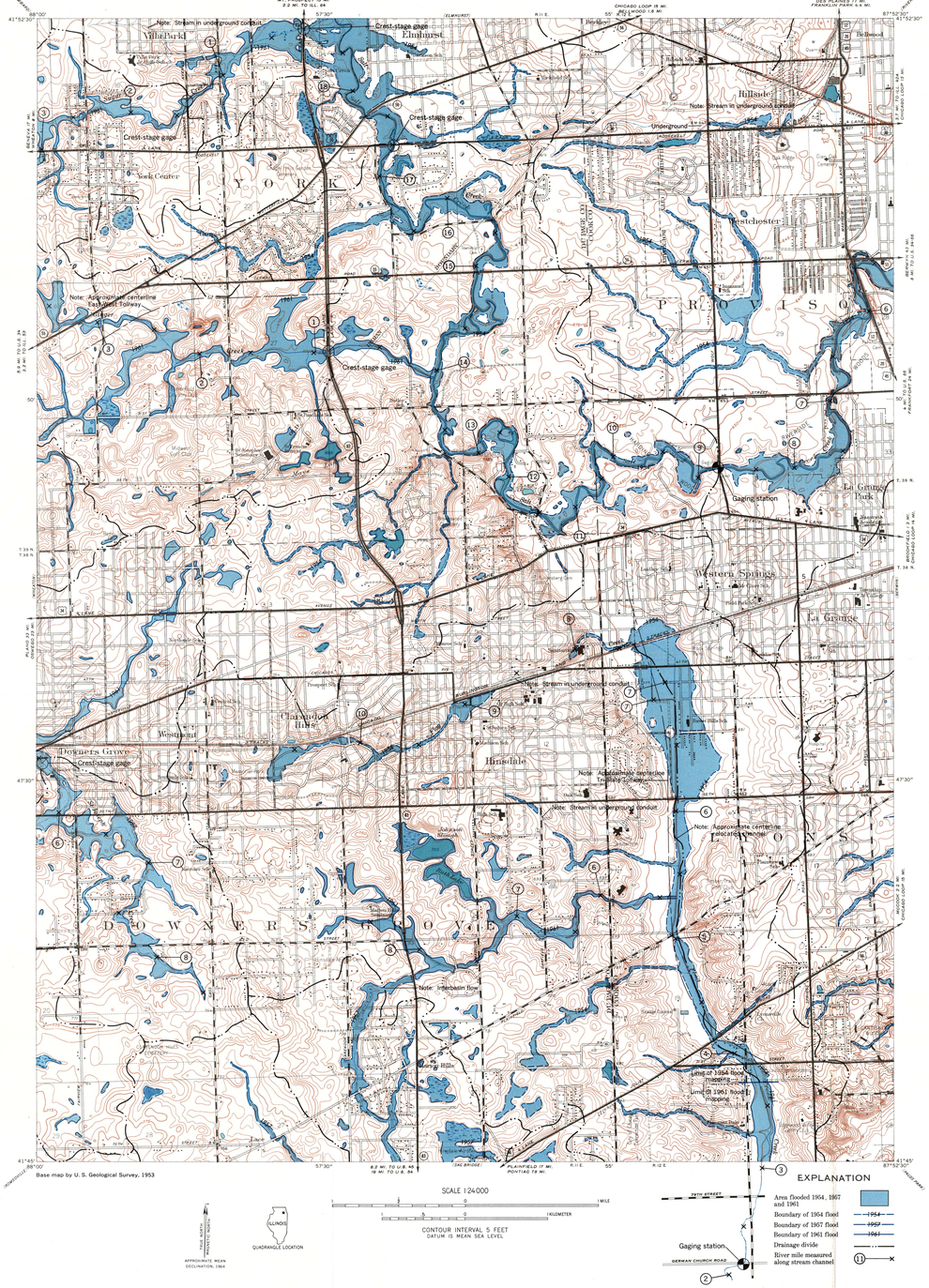
DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

PREPARED IN COOPERATION WITH
THE NORTHEASTERN ILLINOIS METROPOLITAN
AREA PLANNING COMMISSION

HYDROLOGIC INVESTIGATIONS
ATLAS HA-86



FLOODS IN HINSDALE QUADRANGLE, ILLINOIS

Hydrologic data to evaluate the depth and frequency of flooding that affect the economic development of flood plains is presented in this report. No recommendations or suggestions for land-use regulations are made and no solutions of existing flood problems are proposed. This is the eighth of many such reports planned for northeastern Illinois.

The approximate areas inundated by floods along streams in the Hinsdale 7½-minute quadrangle are delineated on the map. The quadrangle location is shown in figure 1. Inundated areas are shown along Salt Creek for the flood of October 1954; along Flag Creek for the flood of October 1954 above mile 3.7 and for the flood of September 1961 below mile 3.7; along Sugar Creek and Ginger Creek for the flood of September 1961; and along St. Joseph Creek for the flood of July 1957.

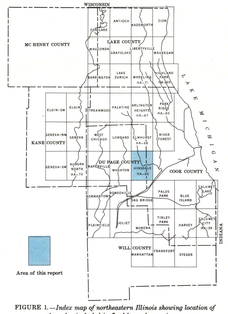


FIGURE 1.—*Index map of northeastern Illinois showing location of quadrangles included in flood-hazard mapping programs*

During construction of the Tri-State Tollway in 1957, Flag Creek was relocated in an improved channel from mile 3.7 to 7.6 as shown on the flood map. The new channel has contained all floods that occurred after it was constructed. Above mile 7.6 Flag Creek was placed in underground conduits prior to the 1961 flood.

The flood limits shown on the map are not necessarily those of 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 reflect channel conditions that existed when the floods occurred, and no attempt was made to appraise the effect of channel changes that may have been made later. Protective works built after the floods of 1954, 1957, and 1961 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.

There are numerous depressions or lowland areas in the Hinsdale quadrangle where surface water accumulates. Flood limits are shown for many such areas, but there may be others that were not detected in this investigation.

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

Cooperation and acknowledgment --The preparation of this report is 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, whereby flood maps will be prepared for the 7½-minute quadrangles shown in figure 1. Areal limits of the program include parts of Cook, Kane, McHenry, and Will Counties, and all of DuPage and Lake Counties. The six counties cooperate in the program financially through separate agreements with the Planning Commission. DuPage County provided financial support for the preparation of this report.

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

The flood maps are prepared by the 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. The Hinsdale flood map was prepared by Howard E. Allen and Allen W. Noehre with assistance from other staff members of the Oak Park subdistrict office.

Acknowledgment is made to the following agencies, which supplied some of the flood data on which this report is based: the State of Illinois Department of Public Works and Buildings, Division of Waterways, and the Department of Highways of Cook County. The Division of Waterways also furnished 2-foot-contour-interval maps along Salt Creek.

Additional data were obtained from officials of municipalities in the area, particularly of Villa Park, who supplied 2-foot-contour maps along Sugar Creek, Downers Grove, Hinsdale, and Clarendon Hills; from personal interviews with private citizens; 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 for gaging stations located in the Hinsdale 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 drainage area and type of gage at each station also are shown in the table. Drainage divides are shown on the map.

Gaging station	Type of gage[1]	Datum of gage above mean sea level (feet)	Drainage area (square miles)
Salt Creek:			
At Oakbrook (Roosevelt Road)	C	655.71	100
At Western Springs (Wolf Road)	R	624.93	114
Sugar Creek:			
At York Center (Ardmore Avenue)	C	676.53	2.62
At Villa Park (State Highway 83)	C	659.08	4.19
Ginger Creek:			
At Oakbrook (State Highway 83)	C	664.55	4.57
St. Joseph Creek:			
At Downers Grove (Blodgett Avenue)	C	711.73	3.25

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

Gage height and year of occurrence of each annual flood (highest peak discharge in each calendar year) above 632-foot elevation at the gaging station on Salt Creek at Western Springs during the period 1946-61 are shown in figure 2. The irregular occurrence of floods is evident.

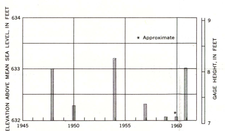


FIGURE 2.—*Annual floods above 632-foot elevation, 1946-61, Salt Creek at Western Springs (Wolf Road).*

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. Usually discharge rates are expressed in units of cubic feet per second (cfs). Peak discharge is the maximum discharge attained by a flood. The peak discharge during a flood generally occurs at the time of the maximum height of the flood, but if the stream is affected by variable backwater, the peak discharge may not coincide with maximum stage.

Flood frequency --Frequency of floods at the Geological Survey gaging stations on Salt Creek at Western Springs and Flag Creek near Willow Springs was derived from streamflow records for those stations combined with records for other nearby stations and with the regional flood-frequency relation for streams in northern Illinois (Mitchell, 1954). The Willow Springs gage is located at German Church Road, 0.8 mile south of the Hinsdale quadrangle, and at mile 2.25. The general relation between frequency and discharge is shown in figures 3 and 4, and the general relation between frequency and stage is shown in figures 5 and 6. The relation between flood stage and frequency is dependent on the relation of flood stage to discharge, which is affected by changes in physical conditions of channels and constrictions. The frequency curves shown in figures 5 and 6 are based on channel conditions existing in 1962. 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 because of the possibility of large errors.

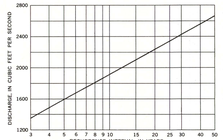


FIGURE 3.—*Frequency of flood discharges on Salt Creek at Western Springs (Wolf Road).*

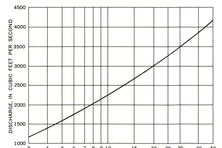


FIGURE 4.—*Frequency of flood discharges on Flag Creek near Willow Springs (German Church Road).*

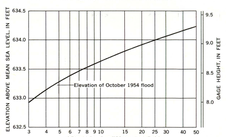


FIGURE 5.—*Frequency of flood stages on Salt Creek at Western Springs (Wolf Road).*

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 may be stated in terms of their probabilities of occurrence (reciprocals of their recurrence intervals). 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.

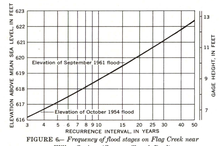


FIGURE 6.—*Frequency of flood stages on Flag Creek near Willow Springs (German Church Road).*

The general relation between recurrence interval and flood height at gaging stations on Salt Creek at Western Springs (fig. 5) and Flag Creek near Willow Springs (fig. 6) is tabulated below:

Recurrence interval (years)	Elevation above mean sea level (feet)	
	Salt Creek at Western Springs (Wolf Road)	Flag Creek near Willow Springs (German Church Road)
50	634.2	622.4
40	634.1	621.9
30	634.0	621.2
20	633.9	620.2
10	633.6	618.7
5	633.3	617.2
3	632.9	616.3

It is emphasized that recurrence intervals are average figures--the average number of years that will elapse 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 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, September 1961, and March 1962, are shown in figures 7-11. Where flood-marks could not be identified, the profiles were constructed on basis of elevations of lower floods and streambeds, and the extent of overflows determined from photographs and reports of local residents. River miles used for the profiles correspond to those marked along the streams on the flood map. River mile 7 is shown on the map for both the original and new locations of Flag Creek.

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 produced by channel constrictions. The drop in water surface through bridge openings during future floods may be different from those 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 indicated by the profiles in figures 7-11. The approximate ground elevation can be determined from information indicated by contours on the map, although more accurate elevations can be obtained by leveling to nearby bench marks.

Additional data --Other information pertaining to floods in the Hinsdale quadrangle may 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.

Illinois Department of Public Works and Buildings, Division of Waterways, 1958, Report on plan for flood control and drainage development, Salt Creek.

Mitchell, W. D., 1954, Floods in Illinois, magnitude and frequency: Illinois Dept. Public Works and Buildings, Div. Waterways.

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

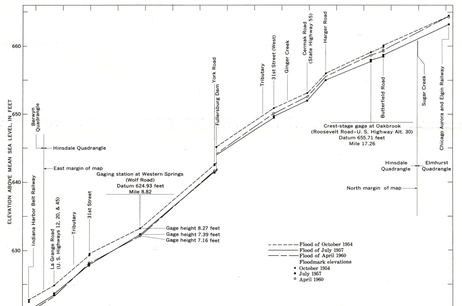


FIGURE 7.—*Profiles of floods on Salt Creek.*

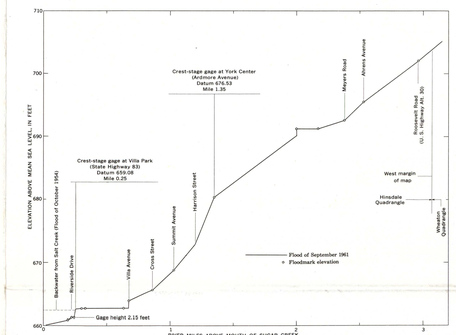


FIGURE 9.—*Profile of floods on Sugar Creek.*

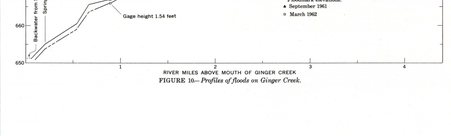


FIGURE 10.—*Profiles of floods on Ginger Creek.*

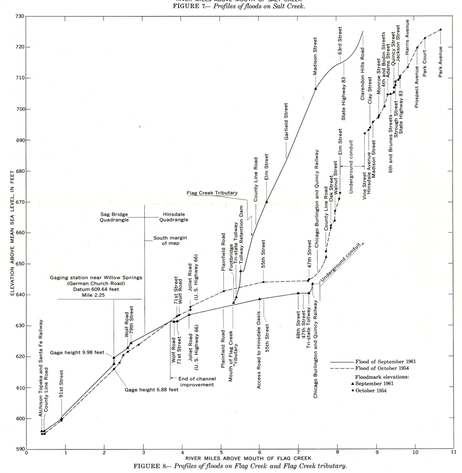


FIGURE 8.—*Profiles of floods on Flag Creek and Flag Creek tributary.*

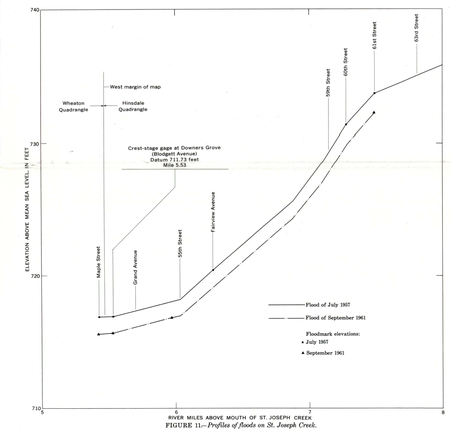


FIGURE 11.—*Profiles of floods on St. Joseph Creek.*

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