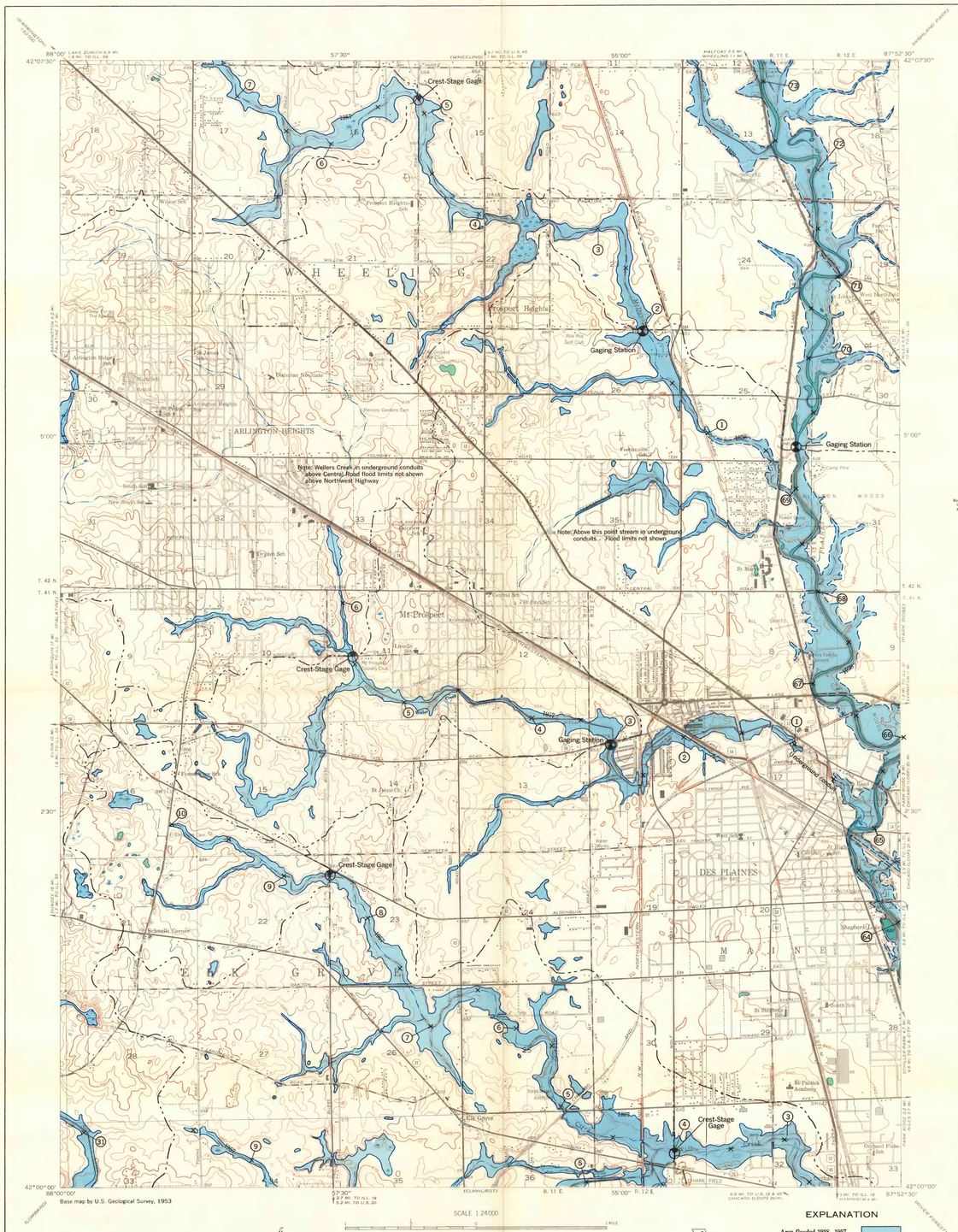
DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

PREPARED IN COOPERATION WITH
THE NORTHEASTERN ILLINOIS METROPOLITAN
AREA PLANNING COMMISSION

HYDROLOGIC INVESTIGATIONS
ATLAS HA-67



FLOODS IN ARLINGTON HEIGHTS QUADRANGLE ILLINOIS

This is the first of many reports pertaining to floodflow characteristics of streams in northeastern Illinois. It presents hydrologic data for the evaluation of flood conditions to minimize the flood hazard in 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 the Des Plaines River and its tributaries are delineated on the Arlington Heights 7½-minute quadrangle. Location of the Arlington Heights quadrangle is shown in figure 1.

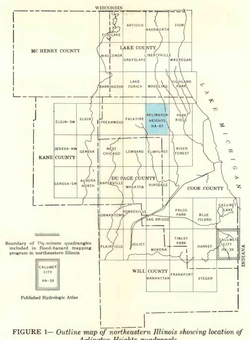


FIGURE 1—*Outline map of northeastern Illinois showing location of Arlington Heights quadrangle.*

Inundated areas are shown along the Des Plaines River for the flood of July 1938, which was the greatest since at least 1919 near Des Plaines. Inundated areas are shown along McDonald Creek, Feehanville Ditch, Weller Creek, Willow Creek, Higgins Creek, and Salt Creek for the flood of July 1957. The 1957 flood was the highest since at least 1936 on McDonald Creek at Prospect Heights, and the greatest flood in 25 years on Weller Creek at Des Plaines. These floods are not necessarily the highest expected along those streams. Greater floods are possible, but definition of their probable overflow limits is not within the scope of this report.

Flood limits are not defined in the headwaters of Feehanville Ditch nor in Weller Creek basin upstream from Northwest Highway because these reaches were placed in underground conduits before the 1957 flood. Street and basement flooding owing to backup in storm drains occurs in several areas in the Arlington Heights quadrangle but limits of such flooding are not defined in this report.

Protective works built after 1957 can reduce 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 of stream channels, and other cultural changes made after 1957.

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 whereby 43 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 Du Page and Lake Counties. The six counties cooperate financially in the program through separate agreements with the Planning Commission. Agencies in Cook County that provided financial support for preparation of the Arlington Heights flood inundation map are 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 Paul Oppermann, Executive Director, and is directly managed 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 Arlington Heights flood map was prepared by Howard E. Allen and Allen W. Noehre.

Acknowledgment is made to the following agencies who supplied some of the flood data on which this report is based: Illinois Division of Waterways, Department of Public Works and Buildings; Department of Highways, Cook County; and the Forest Preserve District of Cook County. The Division of Waterways also furnished 2-foot contour maps along Des Plaines River, Weller Creek, Willow Creek, and Higgins Creek.

Additional data were obtained from personal interviews with muncipal officials and many private citizens.

Flood height.--The height of a flood at a gaging station is usually 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 in the Arlington Heights quadrangle can be converted to elevations above mean sea level by adding the gage height to the appropriate datum of gage listed below. Size of drainage area and type of gage at each station are also included. Drainage divides are marked on the map.

Gaging station	Type of gage[1]	Datum of gage, above mean sea level (feet)	Drainage area (square miles)
Des Plaines River near Des Plaines (Dam No. 2)	R	626.31	359.00
McDonald Creek near Wheeling (Schoenbeck Road)	C	658.85	4.22
McDonald Creek near Mount Prospect (Camp McDonald Road)	R	638.12	7.52
Weller Creek at Mount Prospect (Lincoln Street)	C	657.25	9.00
Weller Creek at Des Plaines (Golf Road)	R	635.02	13.10
Higgins Creek near Mount Prospect (Busse Road)	C	672.34	2.21
Willow Creek near Des Plaines (Wolf Road)	C	638.42	17.20

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

Gage height and year of occurrence of each annual flood (highest peak discharge in each year) above 630-foot elevation at the gaging station on Des Plaines River near Des Plaines during the period 1938-61 are shown in figure 2. The irregular occurrence of floods is evident (fig. 2).

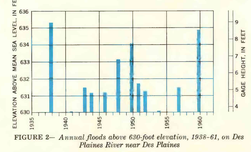


FIGURE 2—*Annual floods above 630-foot elevation, 1938-61, on Des Plaines River near Des Plaines*

Flood frequency.--Frequency of floods at the Geological Survey gaging stations on Des Plaines River near Des Plaines, McDonald Creek near Mount Prospect, and Weller Creek at Des Plaines, was derived from streamflow records at the stations combined with the regional flood-frequency relation for streams in northern Illinois (Mitchell, 1954). Extrapolation of the curves beyond the limits shown is not recommended because of the possibility of large errors. The relation between flood height and frequency is dependent on the relation of flood height to discharge which is affected by changes in physical conditions of channels and constrictions. The frequency curves are based on channel conditions existing in 1962. Longer records and changes in channel conditions may in the future define somewhat different flood-frequency curves.

Recurrence intervals.--As applied to flood events, recurrence interval is the average interval of time within which a given flood height 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.

The general relation between recurrence interval and flood height at gaging stations on Des Plaines River near Des Plaines, McDonald Creek near Mount Prospect, and Weller Creek at Des Plaines is shown graphically in figures 3-5, respectively, and is tabulated below:

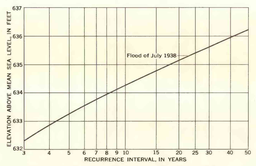


FIGURE 3—*Frequency of floods on Des Plaines River near Des Plaines (Item No. 8).*

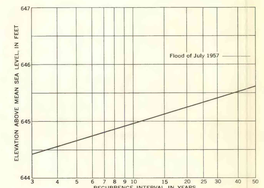


FIGURE 4—*Frequency of floods on McDonald Creek near Mount Prospect (Camp McDonald Road).*

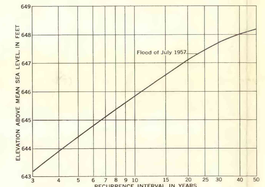


FIGURE 5—*Frequency of floods on Weller Creek at Des Plaines (Golf Road).*

Recurrence interval (years)	Elevation above mean sea level (feet)		
	Des Plaines River near Des Plaines, Ill.	McDonald Creek near Mount Prospect, Ill.	Weller Creek at Des Plaines, Ill.
50	636.2	645.6	648.2
40	635.9	645.5	648.0
30	635.6	645.4	647.6
20	635.1	645.2	647.1
10	634.2	645.0	645.8
5	633.2	644.7	644.4
3	632.3	644.4	643.2

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 was experienced in one year, such as the flood of July 1957 on McDonald Creek, 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 gaging station records and elevations of marks left by floods, are shown in figures 6-9. Where definite floodmarks could not be identified, the profiles were constructed on basis of elevations of lower floods and streambeds, and the extent of overflows determined from flood-damage reports, newspaper articles, and from local residents. 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. These differences reflect the relative capacities of waterway areas of bridge openings and those of channels and flood plains. The drop in water-surface elevation 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 6-9. 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 Arlington Heights quadrangle may be obtained at the office of the U. S. Geological Survey, Oak Park, Ill., and from the following published reports:

Mitchell, W. D., 1954, Floods in Illinois, magnitude and frequency: Illinois Div. Waterways, Dept. of Public Works and Buildings.
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.
Ramey, H. P., 1959, Storm water drainage in the Chicago area: Am. Soc. Civil Engineers Proc., v. 85, no. HY 4, p. 11-37.
Illinois Div. of Waterways, Dept. of Public Works and Buildings, 1961a, Report on plan for flood control and drainage development, Des Plaines River.
------1961b, Report on plan for flood control and drainage development, Weller Creek.
------1961c, Report on plan for flood control and drainage development, Willow-Higgins Creek.

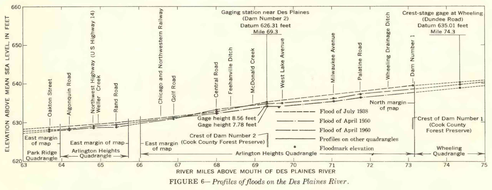


FIGURE 6—*Profiles of floods on the Des Plaines River.*

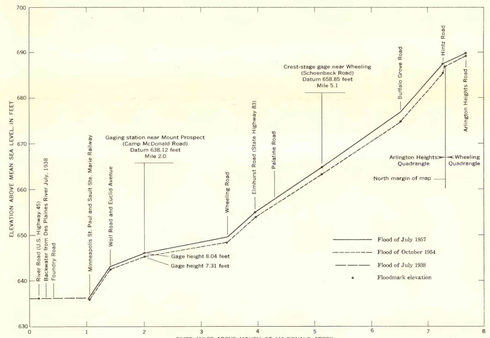


FIGURE 7—*Profiles of floods on McDonald Creek.*

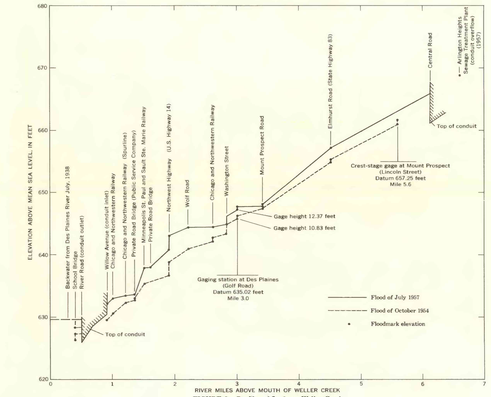


FIGURE 8—*Profiles of floods on Weller Creek.*

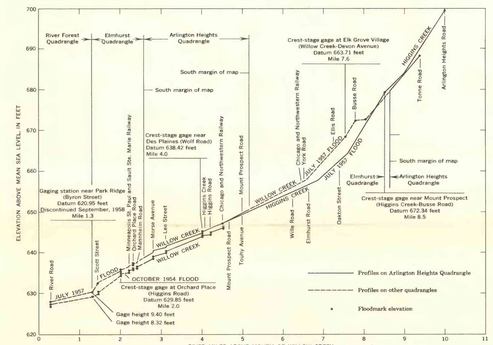


FIGURE 9—*Profiles of floods on Willow and Higgins Creeks.*

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By

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1963

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