DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

PREPARED IN COOPERATION WITH
THE NORTHEASTERN ILLINOIS METROPOLITAN
AREA PLANNING COMMISSION

HYDROLOGIC INVESTIGATIONS
ATLAS HA-85

FLOODS IN PARK RIDGE QUADRANGLE, ILLINOIS

This report presents hydrologic data about the depth and frequency of flooding that can be used in planning the economic development of flood plains. No recommendations or suggestions for land-use regulations are made and no solutions of existing flood problems are proposed. This is the seventh of many such reports planned for northeastern Illinois.

The approximate areas inundated by floods along streams in the Park Ridge 7 1/2-minute quadrangle are delineated on the map. The quadrangle location is shown in figure 1. Inundated areas are shown along the North Branch Chicago River, the West Fork of North Branch Chicago River, and the Des Plaines River for the floods of July 1938; along the Skokie River for the floods of July 1938 and March 1960; and along the small tributaries to West Fork of North Branch Chicago River for the floods of July 1957. The 1938 flood was the greatest since 1913 or earlier on West Fork of North Branch Chicago River at Northbrook and it was the greatest since 1919 or earlier on Des Plaines River near Des Plaines.

Above mile 24 on the Skokie River the inundation pattern of the 1938 flood was affected by temporary dikes and diversion channels associated with the development of the Skokie Lagoons by the Forest Preserve District of Cook County. The lagoons were formed by excavating low swampy areas of the flood plain, constructing dikes along the edges of the flood plain, and constructing a series of four dams. The lagoons provide about 1,500 acre-feet of storage that is available for flood control. All floods that occurred after the project was completed in 1940 were contained within the dikes. Diversion ditches on the outside of the dikes accommodate local runoff.

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 1938, 1957, and 1960 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 Park Ridge 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 or for areas along the small streams that are in underground conduits and for which no flood data are available.

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 7 1/2-minute quadrangles shown in figure 1. Areal limits of the program include parts of Cook, Kane, McHenry, and Lake Counties, and all of DuPage and Will Counties. Six counties cooperate in the program financially through separate agreements with the Planning Commission. The Park Ridge quadrangle is in Cook County. 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 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 Park

Ridge 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; the Forest Preserve District of Cook County; the Department of Highways of Cook County; and the Metropolitan Sanitary District of Greater Chicago. The Division of Waterways also furnished 2-foot-contour-interval maps along the Des Plaines River.

Additional data were obtained from officials of municipalities located in the area, particularly Winnetka, Northbrook, Northfield, and Glenview; from Greeley and Hansen, Hydraulic and Sanitary Engineers, Chicago; from 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 Park Ridge 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 given in the table. Drainage divides are shown on the map.

Gaging station	Type of gage	Datum of gage above mean sea level (feet)	Drainage area (square miles)
North Branch Chicago River:			
At Northfield (Willow Road)_	C	622.68	24.6
At Glenview (Glenview Road)_	C	615.79	33.3
At Morton Grove (Beckwith Road)_	C	611.40	91.7
At Niles (Touhy Avenue)_	R	601.99	102
Skokie River:			
At Northfield (Willow Road)_	C	619.42	28.7
West Fork of North Branch Chicago River:			
At Glenview (West Lake Avenue)_	C	620.60	21.8
Des Plaines River:			
At Park Ridge (Touhy Avenue)_	C	620.60	407

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 610-foot elevation at the gaging station on North Branch Chicago River at Niles during the period 1948–61 are shown in figure 2. The irregular occurrence of floods is evident from figure 2 which shows that the 610-foot elevation was exceeded on the average of once every 3 years, but there was a 5-year period when that elevation was not reached and 2 years in succession when it was exceeded.
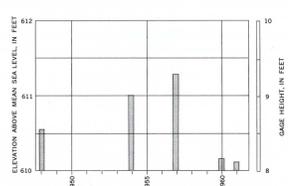
Flood discharge.—The rate of discharge of a stream is the volume of flow that passes a particular location in a given period of time. Usually discharge rates are expressed in units of cubic feet per second (cfs). Peak discharge is the maximum discharge attained by a flood. The peak discharge during a 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 North Branch Chicago River at Niles and West Fork of North Branch Chicago River at Northbrook was derived from streamflow records at the stations combined with the regional flood-frequency relation for streams in northern Illinois (Mitchell, 1954). The Northbrook gaging station is located at Dundee Road, about 1 mile north of the Park Ridge quadrangle, and at mile 27.2. 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.
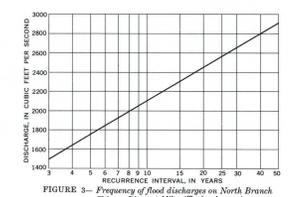
Recurrence intervals.—As applied to flood events, recurrence interval is the average interval of time within which a given flood will be equaled or exceeded once. Frequencies of floods may be stated in terms of their probabilities of occurrence (reciprocals of their recurrence intervals). For example, 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.

The general relation between recurrence interval and flood height at gaging stations on North Branch Chicago River at Niles (fig. 5) and West Fork of North Branch Chicago River at Northbrook (fig. 6) is tabulated below:

Recurrence interval (years)	Elevation above mean sea level (feet)	
	North Branch Chicago River at Niles (Touhy Avenue)	West Fork of North Branch Chicago River at Northbrook (Dundee Road)
50	613.2	647.9
40	612.9	647.7
30	612.7	647.4
20	612.3	647.0
10	611.7	646.4
5	611.0	645.7
2	610.5	645.1

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 July 1938, March 1948, April 1950, October 1954, July 1957, and March and April 1960, are shown in figures 7–10. 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.

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 7–10. 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 Park Ridge 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, 1961, Report on plan for flood control and drainage development, Des Plaines River.

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

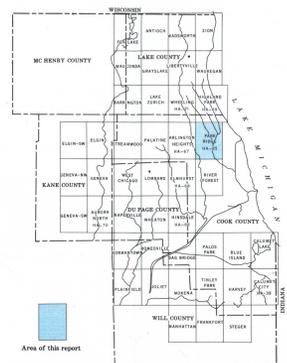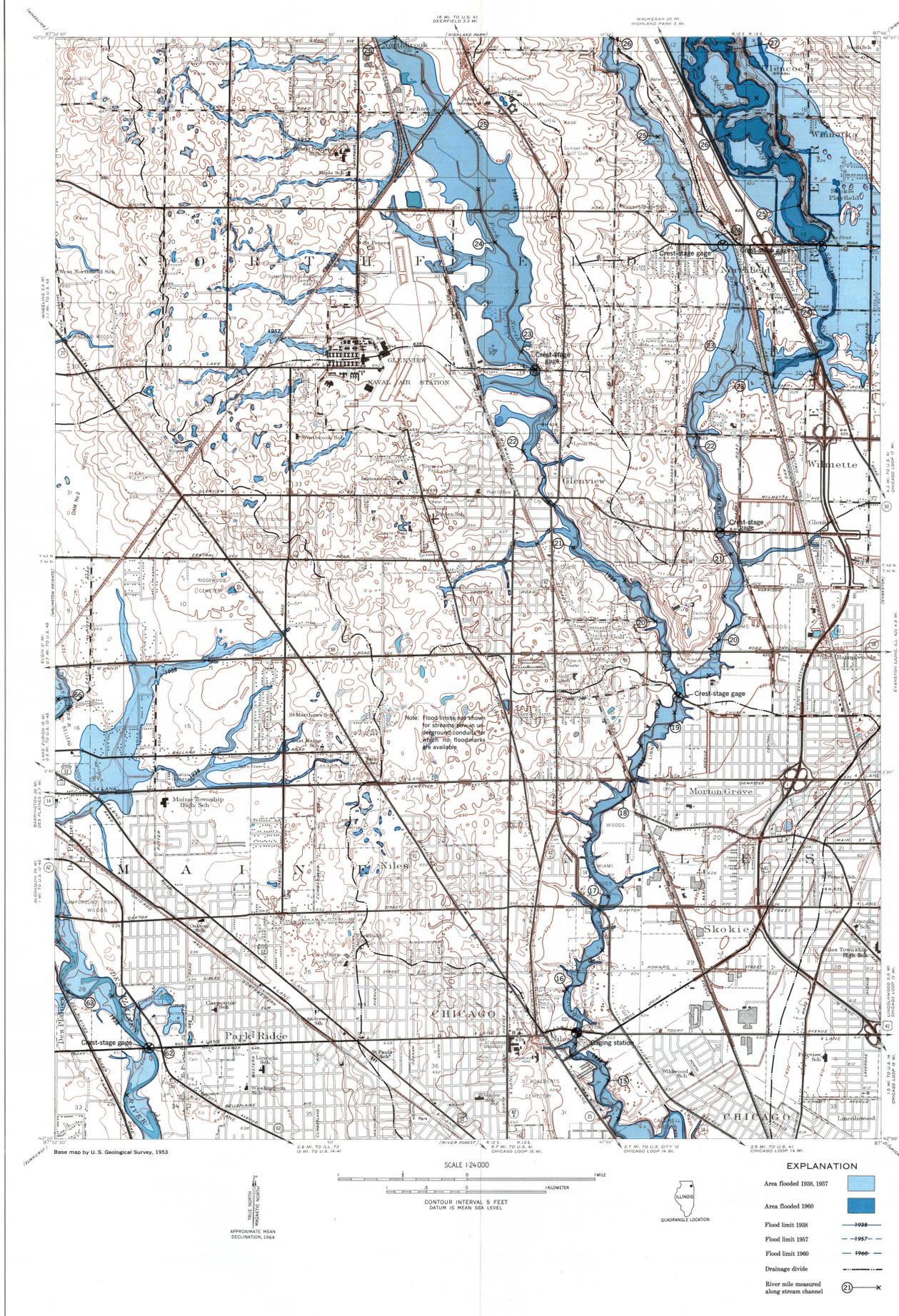Ramey, H. P., 1959, Storm water drainage in the Chicago area: Am. Soc. Civil Engineers Proc., v. 85, no. HY 4, p. 11–37.

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

FIGURE 2.—Annual floods above 610-foot elevation, 1948–61, North Branch Chicago River at Niles (Touhy Avenue).

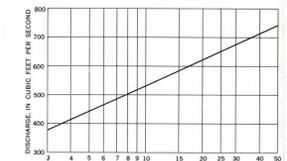FIGURE 3.—Frequency of flood discharges on North Branch Chicago River at Niles (Touhy Avenue).

FIGURE 4.—Frequency of flood discharges on West Fork of North Branch Chicago River at Northbrook (Dundee Road).
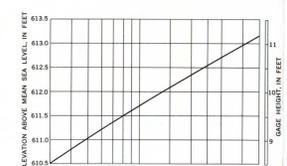

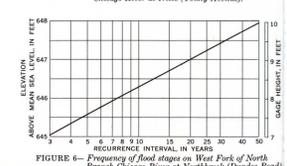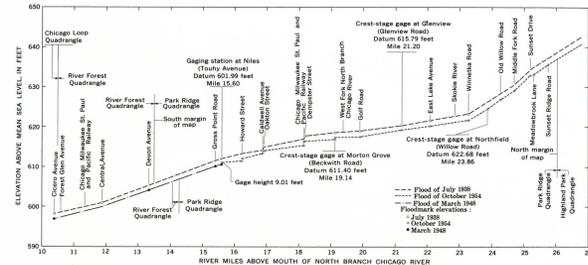FIGURE 5.—Frequency of flood stages on North Branch Chicago River at Niles (Touhy Avenue).

FIGURE 6.—Frequency of flood stages on West Fork of North Branch Chicago River at Northbrook (Dundee Road).

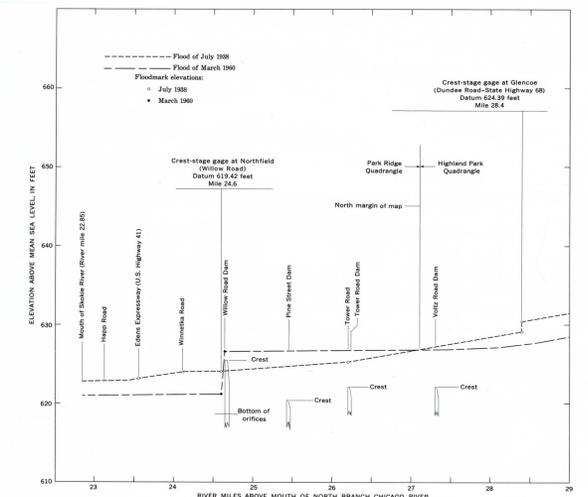FIGURE 7.—Profiles of floods on North Branch Chicago River.

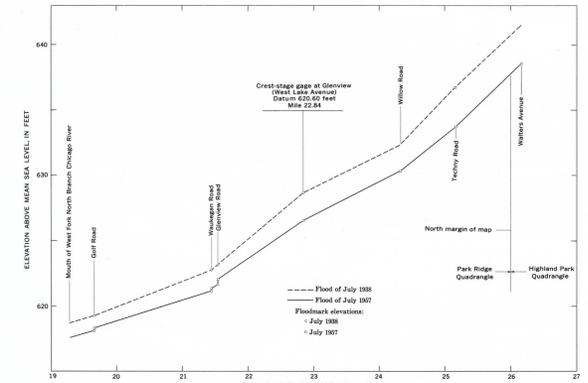FIGURE 8.—Profiles of floods on Skokie River.

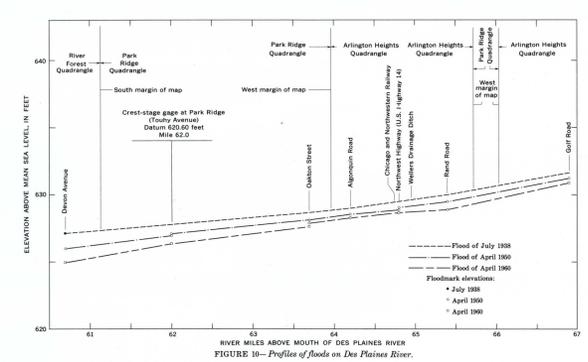FIGURE 9.—Profiles of floods on West Fork of North Branch Chicago River.

FIGURE 10.—Profiles of floods on Des Plaines River.

EXPLANATION

Area flooded 1938, 1957

Area flooded 1960

Flood limit 1938 — — — 1938 — —

Flood limit 1957 — — 1957 — —

Flood limit 1960 — — 1960 — —

Drainage divide

River mile measured along stream channel — 21 — ×

SCALE 1:24 000

CONTOUR INTERVAL 5 FEET
DATUM IS MEAN SEA LEVEL

Base map by U.S. Geological Survey, 1953

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