DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

PREPARED IN COOPERATION WITH
THE NORTHEASTERN ILLINOIS METROPOLITAN
AREA PLANNING COMMISSION

HYDROLOGIC INVESTIGATIONS
ATLAS HA-153

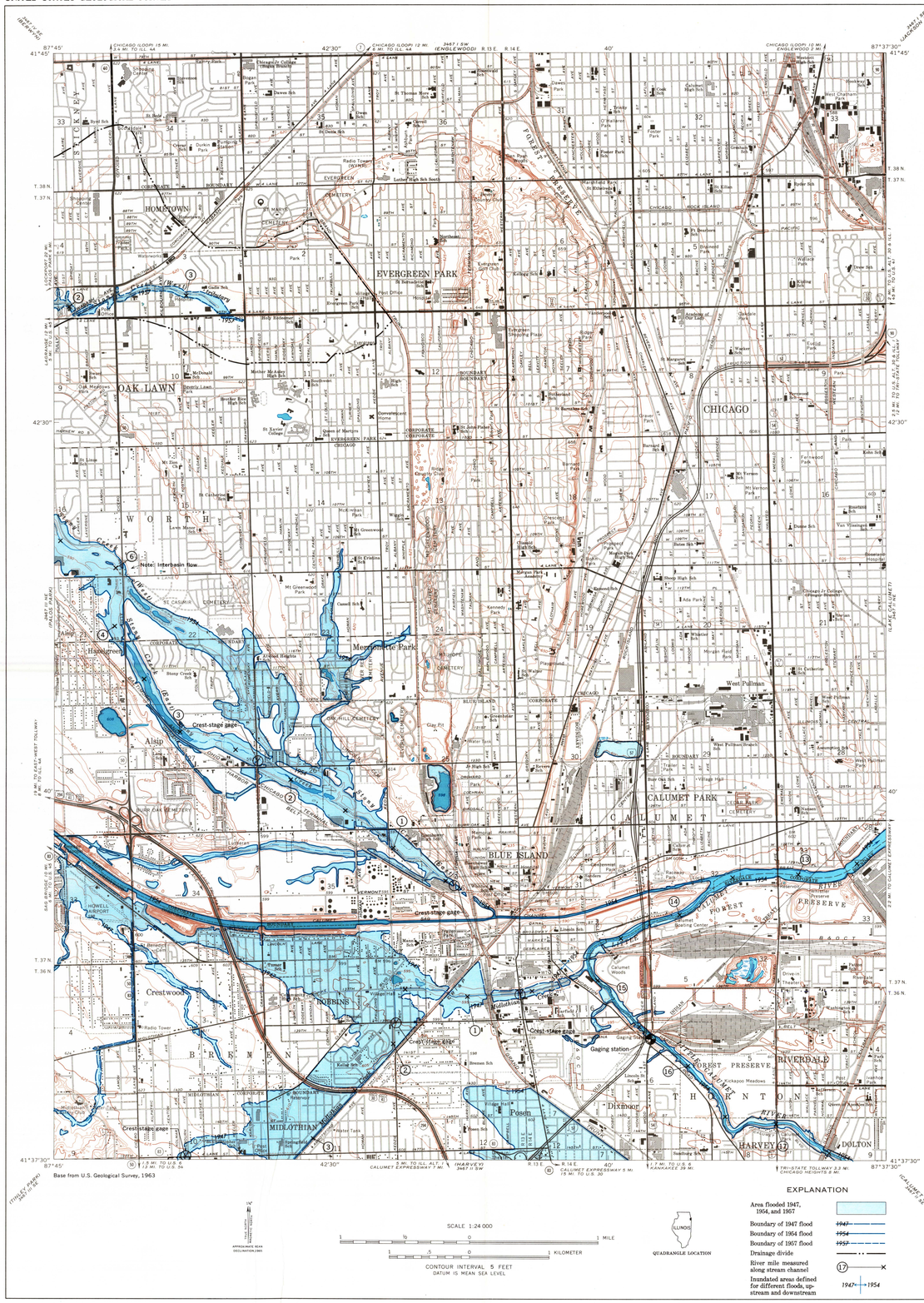
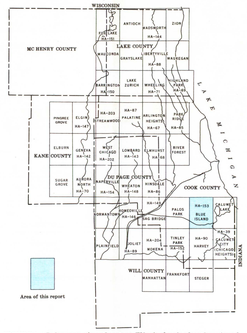


FIGURE 1.—*Index map of northeastern Illinois showing location of quadrangles included in the flood hazard mapping program.*

FLOODS IN BLUE ISLAND QUADRANGLE NORTHEASTERN ILLINOIS

This report presents hydrologic data which can 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 Blue Island 7 1/2-minute quadrangle are delineated on a topographic map. The quadrangle location is shown in figure 1.



Inundated areas are shown along Midlothian Creek and tributaries for flood of April 1947; along Little Calumet River, Calumet Sag Channel, Stony Creek (West), and Stony Creek (East) for flood of October 1954, and along Stony Creek (West) tributary for flood of July 1957.

The general procedure used in defining flood limits was to construct 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 limits 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 flood limits 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 flood limits shown reflect channel conditions existing when the floods occurred. No appraisals are made of the effect of 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 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.

There are numerous depressions or lowland areas in the Blue Island 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 limits are shown for many of these areas, but there may have been other flooded areas that were not detected during this investigation.

Flood limits are not defined for areas that are inundated as a result of backup in storm drains. Basement and street flooding occurs frequently throughout the Blue Island quadrangle.

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 located 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 of 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 Blue Island 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.

Gaging station	Type of gage[1]	Datum of gage above mean sea level (feet)
Little Calumet River at Dixmoor (Ashland Avenue)	R	575.00
Midlothian Creek: At Robbins (139th Street)	C	595.99
At Blue Island (Western Avenue)	C	589.21
Midlothian Creek tributary at Midlothian (147th Street)[2]	C	623.24
Stony Creek (East): At Alsip (Crawford Avenue)	C	587.20
At Blue Island (California Avenue)	C	579.66

[1] R, Water-stage recorder; C, Crest-stage gage.
[2] Drainage area is 2.86 square miles.

Gage height and year of occurrence of each annual flood (highest peak stage in each calendar year) above 584-foot elevation at the gaging station, Little Calumet River at Dixmoor (Ashland Avenue), during the period 1947-64 are shown in figure 2. The irregular occurrence of floods is evident.

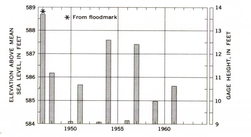


FIGURE 2.—*Annual floods above 584-foot elevation, 1947-64, Little Calumet River at Dixmoor, Illinois (Ashland Avenue).*

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 Midlothian Creek at Oak Forest, Ill., was derived from streamflow records of this station combined with records of nearby stations and with the regional flood-frequency relation for streams in northern Illinois (Mitchell, 1954). The Midlothian Creek gaging station is at Kilbourn Avenue about 3/4 mile south of Blue Island quadrangle, and at river mile 4.38.

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 shown in figure 4 is based on channel conditions existing in 1964. 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.

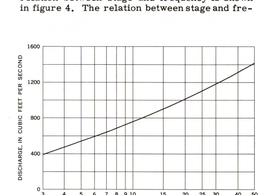


FIGURE 3.—*Frequency of flood discharges on Midlothian Creek at Oak Forest, Illinois (Kilbourn Avenue).*

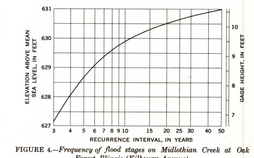


FIGURE 4.—*Frequency of flood stages on Midlothian Creek at Oak Forest, Illinois (Kilbourn Avenue).*

Recurrence intervals—As applied to flood events, recurrence intervals 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 Midlothian Creek at Oak Forest, Ill. (fig. 4) is tabulated below.

Recurrence interval (years)	Elevation above mean sea level (feet)
50	631.0
40	630.9
30	630.8
20	630.5
10	629.9
5	628.7
3	627.2

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 April 1947, October 1954, July 1957, September 1961, and July 1963 are shown in figures 5-8. Where floodmarks could not be obtained, the profiles were constructed on the basis of flood crests determined from photographs and 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 5-8. The approximate ground elevation can be determined from contours on the map, although more nearly accurate elevations can be obtained by leveling to nearby bench marks.

Additional data—Other information pertaining to floods in the Blue Island 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.
Mitchell, W. D., 1954, Floods in Illinois, magnitude and frequency: Illinois Dept. of 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.

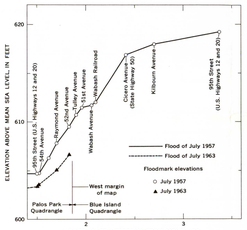


FIGURE 8.—*Profiles of floods on Stony Creek (West) tributary.*

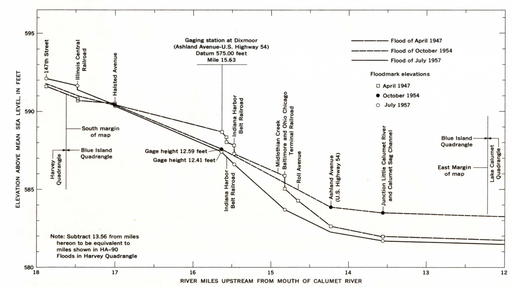


FIGURE 5.—*Profiles of floods on Little Calumet River.*

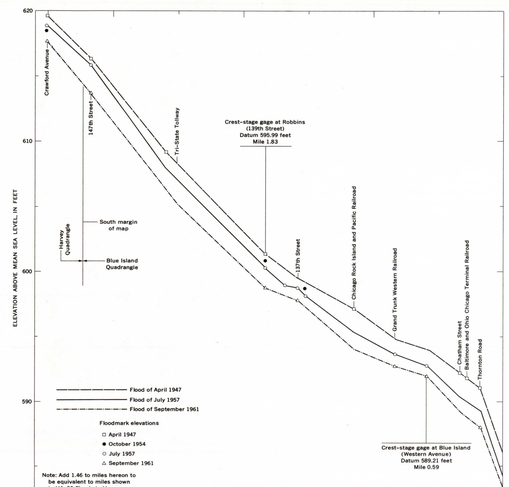


FIGURE 6.—*Profiles of floods on Midlothian Creek.*

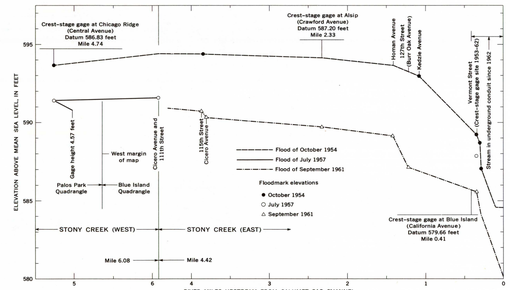


FIGURE 7.—*Profiles of floods on Stony Creek (East) and Stony Creek (West).*

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By
Howard E. Allen

1966

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