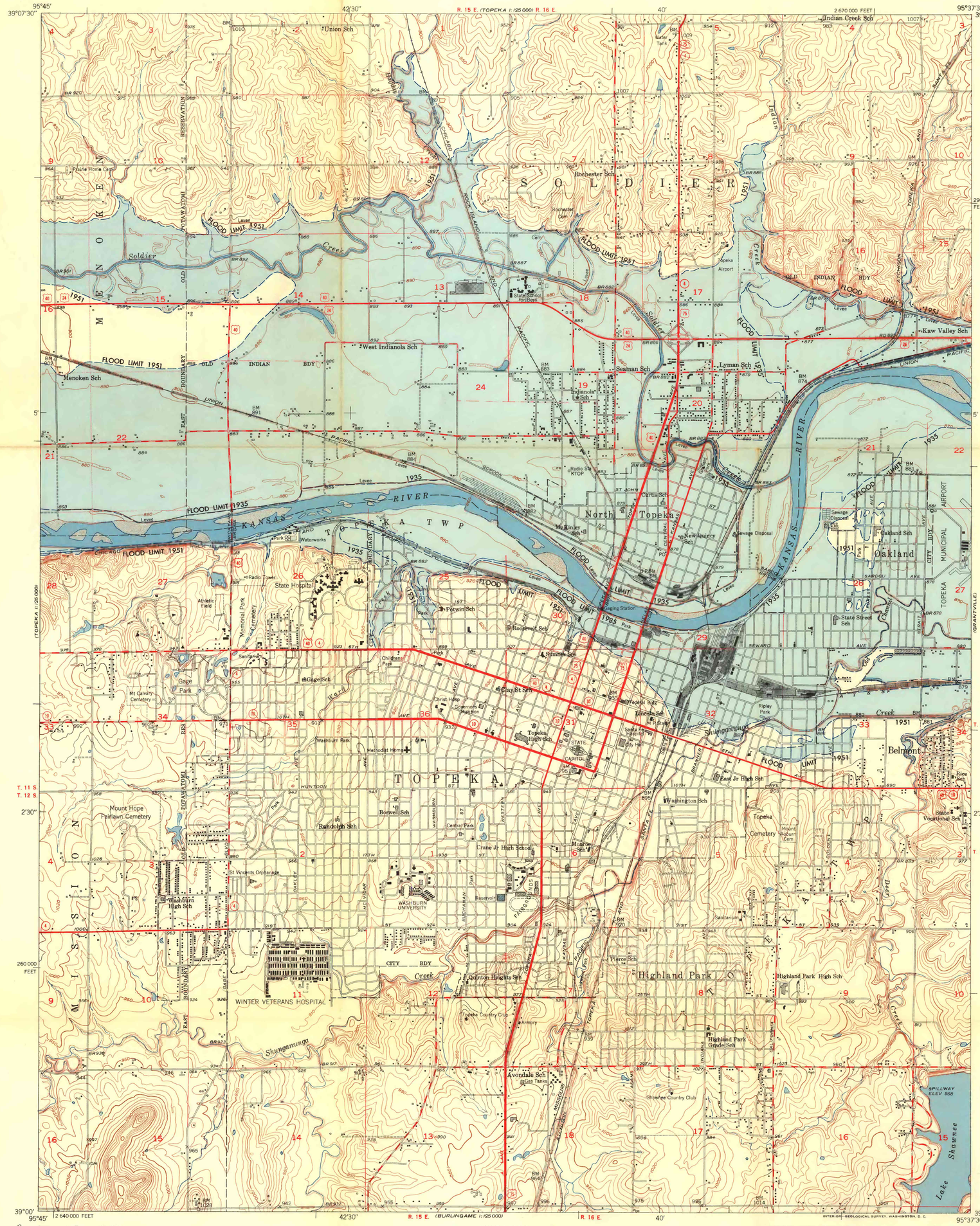

FLOODS OF THE KANSAS RIVER, TOPEKA, KANSAS IN 1935 AND 1951

This map shows the approximate area inundated by the Kansas River in the vicinity of Topeka, Kansas, at the peaks of two floods of record—the major flood of July 1951, and the moderate flood of June 1935. These floods are historic facts and are shown on a topographic map base to record flood hazards in graphic form. Greater floods are possible, but no attempt has been made to show their probable limits on this map. Protective works built after the flood of July 1951 can reduce the frequency of flooding but will not necessarily eliminate the possibility of floods in this area.

Frequency of flooding is derived from the historical record of floods at the Topeka Avenue Bridge gaging station of the United States Geological Survey. This record began in 1903 and is continuous to date. Flood heights at a gaging station are stated in terms of the gage height or stage. River stages at Topeka are measured on a gage whose zero point is about at the low part of the stream bed. The stage at Topeka is an indication of the approximate depth of water in the river.

Flood stage at this station is 21 feet—the gage height at which the river begins to cause or threaten damage. This mark was exceeded 17 times in 54 years of record. Figure 1 shows the gage heights and years of occurrence of those floods. The erratic nature of flood occurrence is evident. Although floods occurred on the average of about three per decade, only one was experienced in some decades, whereas eight occurred in the period 1941 to 1950.

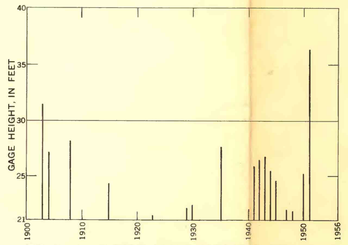

FIGURE 1.—FLOODS ABOVE 21-FOOT FLOOD STAGE AT TOPEKA, KANSAS, 1903–56

Recurrence intervals for flooding are calculated from gaging station and historical records. For example, there is historical evidence that the 1951 flood was the highest since 1844 when a flood of unknown height occurred. Using this fact to supplement the gage record, the estimated recurrence interval of the 1951 flood, as calculated in 1956, is 113 years. The second highest flood in the 112 years from 1845 to 1956 was that of 1903. The recurrence interval of this flood is estimated at 56 years.

Recurrence intervals of several floods are plotted in figure 2. A graph has been drawn to show the general relationship between gage height and recurrence interval at the Topeka Avenue gaging station. From this graph a table can be prepared showing the estimated frequency of floods on the Kansas River at Topeka, subject to change as longer-term records are obtained and flood-control projects are carried out.

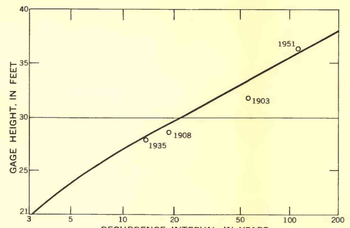

FIGURE 2.—FREQUENCY OF FLOODS ABOVE 21-FOOT FLOOD STAGE ON KANSAS RIVER AT TOPEKA, KANSAS

Gage height (feet)	Recurrence interval (years)
36	100
33	50
30	25
27	10
21 (flood stage)	3

It is emphasized that recurrence intervals are average figures—the average number of years in which floods of specified gage height will be equalled or exceeded. Thus, at Topeka, a flood that reaches a 36-foot stage is said to have a 100-year recurrence interval. However, because of the erratic nature of flood occurrence, the 36-foot stage may not be reached, or may be reached more than once, in any one century.

Flood profile.—Generally uniform flood characteristics prevail throughout the part of the Kansas River shown on this map; that is, the flood record at the gaging station is a satisfactory indication of flooding throughout this reach of river. However, in applying the flood record it must be recognized that the river surface at all times slopes downstreamward. Thus, although it is said that the river in this reach peaked at a stage of 36.3 feet in July 1951, its actual elevation was higher in the upper part of the reach than in the lower. Figure 3, constructed from marks left by floods of record, shows the profiles of the water surface as derived for several gage heights. Profiles of floods corresponding to other gage heights can be plotted on this diagram, parallel to those shown.

Depth of flooding at any point can be estimated by subtracting the ground elevation (shown by contours on the map) from the water-surface elevation indicated by the profile in figure 3.

Tributaries.—The Kansas River is the principal cause of major flooding at Topeka. However, tributaries that flow through the city, Soldier Creek, for example, also can overflow their banks when local floods occur or when their lower ends are invaded by flood water from the Kansas River. Because few data are available on overflows of the small tributaries such information is not shown on this map.

Additional information may be obtained at the office of the U. S. Geological Survey, 403 Federal Building, Topeka, Kansas, and from the following published reports:

Water Resources Division, 1952; Kansas–Missouri Floods of July 1951, U. S. Geol. Survey Water-Supply Paper 1139.

Hydrologic Services Division, 1952; Kansas–Missouri Floods of June–July 1951, U. S. Weather Bureau Technical Paper No. 17.

The flood map was prepared by G. W. Edelen of the Water Resources Division and L. W. Goodman of the Topographic Division. The explanatory text was written by W. B. Langbein and W. P. Somers.

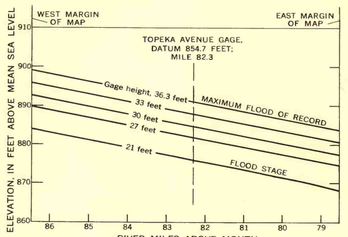

FIGURE 3.—FLOOD PROFILES OF KANSAS RIVER

Photograph by Corps of Engineers

AERIAL VIEW OF FLOODED TOPEKA, KANSAS, JULY 12, 1951

KANSAS RIVER FLOOD AREA

This map shows the area covered by 1951 flood on Kansas River, the highest since 1844. Heavy blue dashed lines represent approximate limits of Kansas River floods of 1935 and 1951. Indicated stages are for the Topeka Avenue Bridge gaging station.

STAGE (FEET)	DATE OF FLOOD
36.3	July 13, 1951
31.7*	May 30, 1903
27.7	June 5, 1935

*Limits of 1903 flood not shown because of subsequent channel changes.

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FLOODS AT TOPEKA, KANSAS

For sale by U. S. Geological Survey, price 75 cents