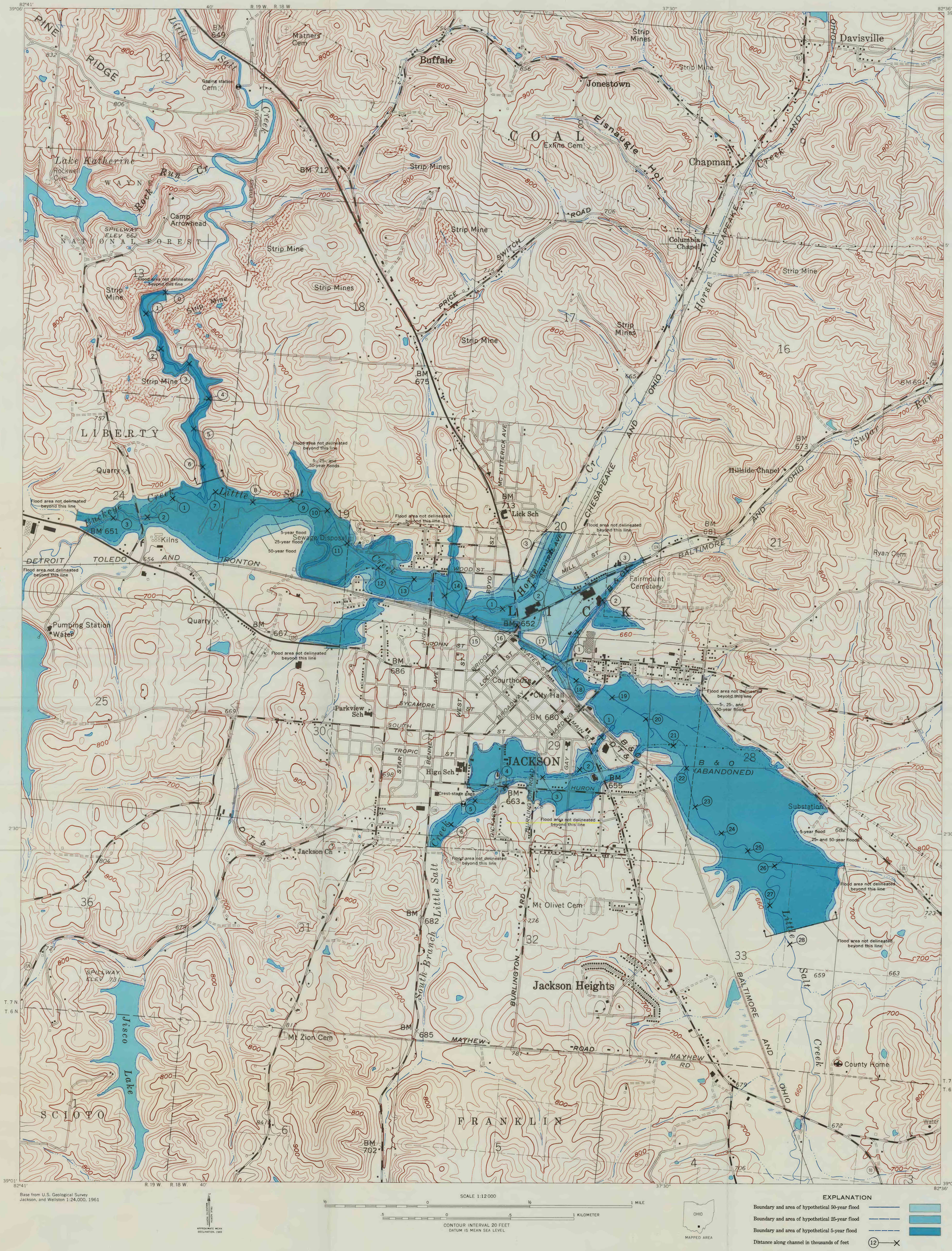

FLOODS AT JACKSON, OHIO

By
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This report was prepared by the U.S. Geological Survey to further the objectives of the Appalachian Regional Commission. It provides technical guidance for those who plan the economic uses of flood plain lands. Hydrologic data are presented that can be used to evaluate the extent and depth of flooding that may be expected along Little Salt Creek and its major tributaries in the vicinity of Jackson, Jackson County, Ohio. The approximate boundaries of inundation by floods having average recurrence intervals of 5 years, 25 years, and 50 years on Little Salt Creek and its major tributaries, South Branch Little Salt Creek, Sugar Run, Horse Creek, and Buckeye Creek, are outlined on the topographic map.

Residents of Jackson reported that the flood of March 1963 was the highest in recent years. This study indicates that a flood equivalent to that of 1963 will recur, on the average, about once every 40 years. Greater floods than the 50-year flood outlined on the map are possible, and changes in channel waterways (natural and manmade) could change the flood outlines designated on the map.

Forty-four cross sections and 1963 floodmarks were surveyed and used in a computerized step-backwater study to develop the 5-, 25-, and 50-year flood profiles on the main stem, Little Salt Creek. Flood profiles on the major tributaries were developed from surveyed 1963 high-water marks and low-water slopes. The boundaries of the floods were located at each of the 44 cross sections using elevations from the profiles. Between sections the delineation was based on the map contours and from field inspection. Elevations are in feet above mean sea level.

Flood elevation, discharge, and frequency.—Systematic records of flood elevation and discharge have been obtained at two gaging station sites, the locations of which are listed in table 1 and plotted on the map. These data supplemented by data in Cross and Webber (1959) and Speer and Gamble (1965) were used to compute peak discharges, in cubic feet per second (cfs), for 5-, 25-, 50-year, and March 1963 floods at the sites listed in table 2. Peak discharge for the flood of March 1963 at the Harding Street bridge was estimated on the basis of a contracted-opening computation.

TABLE 1.—*Annual peak discharge stations.*

Station	Location	Drainage area (sq mi)	Datum of gage above mean sea level (feet)	Period of record
South Branch Little Salt Creek at Jackson, crest-stage gage	At bridge 2200 feet above mouth	3.76	648.1	Jan. 1947 to Sept. 1965
Little Salt Creek near Jackson, gaging station	At bridge 3½ miles northwest of Jackson and half a mile below Rock Run	76.1	619.4	July 1921 to Sept. 1932

The 44 surveyed cross sections were used in a computerized step-backwater analysis to compute elevations for 5-, 25-, 50-year, and March 1963 floods on Little Salt Creek from Buckeye Creek (station 6,700) upstream through Jackson to station 27,700. Initial discharges and elevations at station 0 on Little Salt Creek were estimated by slope-conveyance methods. Elevation versus recurrence interval graphs for three locations are shown in figure 1. These graphs, for locations where reliable stage-frequency relations were developed, show the difference in elevation to be expected for floods between the 5-year and 50-year recurrence intervals. Three natural valley sections, plotted in figure 2, show the channel shape variation. The eight bridges between High Street and Harding Street create some backwater at high stages as shown by the relatively steeper profiles in this reach (figure 3). However, the low-water profile is also steeper in this reach which indicates the natural channel slope is a factor. Although characteristics of the eight bridge openings were used in the backwater analysis, only typical natural valley cross sections are shown in figure 2.

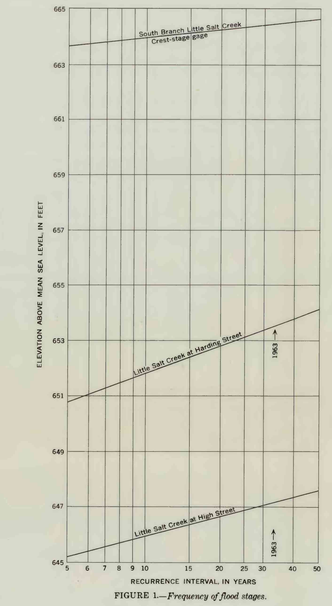

FIGURE 1.—*Frequency of flood stages.*

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 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. Recurrence intervals are, however, only average figures. The fact that a major flood is experienced in one year does not reduce the probability that a flood of equal or greater magnitude may occur in the next year.

Flood profiles.—Flood and low-water profiles for Little Salt Creek are presented in figure 3. The March 1963 flood profile, as shown, was computed by step-backwater analysis. As the high-water marks throughout the reach plot close to this profile, it was considered as a partial check on the selection of roughness coefficients used in the step-backwater analysis.

Similar profiles for the four major tributaries are presented in figures 4–7. These profiles were developed by surveying low water and 1963 high-water marks and estimating the 5-, 25-, and 50-year flood elevations based on known relationship at mouth (Little Salt Creek) and correlation with low water and 1963 high water. The 19-year annual peak discharge record on South Branch Little Salt Creek was used to define flood profiles for this tributary in the upper reaches, but, in general, the four tributary flood profiles are less accurate than the profile developed for the main stem by the step-backwater method.

Flood depths.—Depths of flooding by 5-, 25-, and 50-year floods at three selected cross sections are shown in figure 2. Depth of flooding at any point may be estimated by subtracting ground elevations, interpolated from the 20-foot contour lines on the map, from the water-surface elevations on figures 3–7. More accurate flood depths may be obtained by leveling to selected points on the ground from nearby bench marks.

Acknowledgments.—The selection of the site for this project was made in collaboration with the Appalachian Regional Commission and the Ohio Department of Natural Resources. Coordination of planning with the district office of the Corps of Engineers was accomplished through the Office of Appalachian Studies, Corps of Engineers.

Acknowledgement is made to officials of the U.S. Soil Conservation Service, the State of Ohio, and of the city of Jackson for hydrologic data, and to many local residents for information concerning the 1963 flood.

REFERENCES

Cross, W. P., and Webber, E. E., 1959, Floods in Ohio, magnitude and frequency: Ohio Department of Natural Resources, Division of Water, Bull. 32, 325 p.

Speer, P. R., and Gamble, C. R., 1965, Magnitude and frequency of floods in the United States: U.S. Geological Survey Water-Supply Paper 1675, 630 p.

TABLE 2.—*Frequency of floods, elevation and discharge*

Location	Drainage area (sq mi)	5-year Elevation (ft, msl)	5-year Discharge (cfs)	25-year Elevation (ft, msl)	25-year Discharge (cfs)	March 1963 Elevation (ft, msl)	March 1963 Discharge (cfs)	50-year Elevation (ft, msl)	50-year Discharge (cfs)
South Branch Little Salt Creek at crest-stage gage	3.76	663.7	1,050	664.3	1,680	663.2	734	664.6	1,950
Little Salt Creek above Harding Street	33.6	650.8	1,780	653.2	2,750	653.5	2,900	654.1	3,150
Little Salt Creek above Bridge Street	37.7	648.1	1,870	649.6	2,870	649.8	3,040	650.1	3,300
Little Salt Creek above High Street	43.2	645.2	2,030	646.9	3,120	647.2	3,300	647.6	3,600
Little Salt Creek below mouth of Buckeye Creek	70.6	642.5	2,840	643.4	4,200	643.8	4,550	644.4	4,920

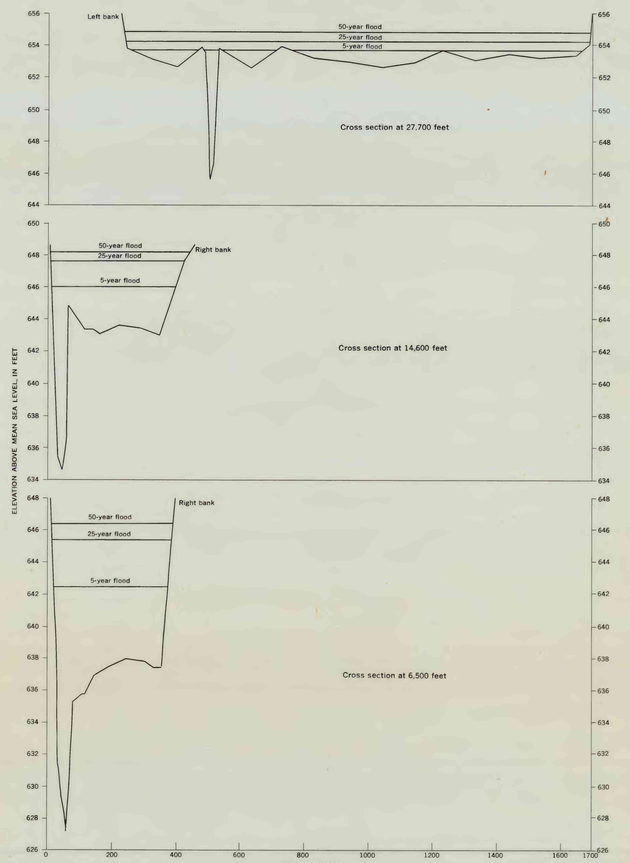

FIGURE 2.—*Cross sections of Little Salt Creek and flood plain.*

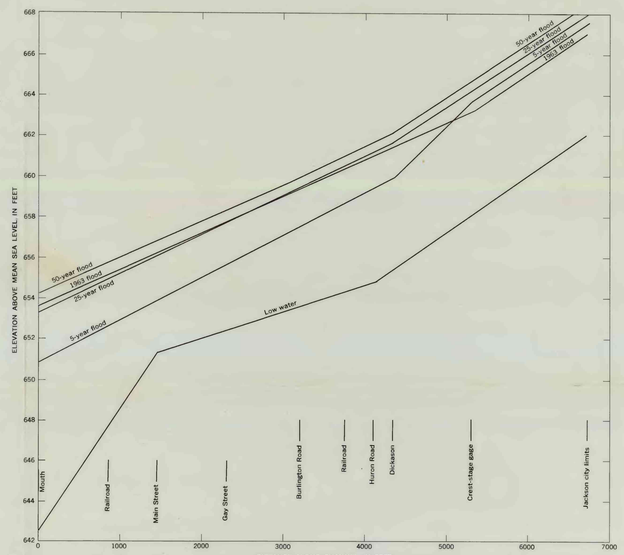

FIGURE 4.—*South Branch Little Salt Creek profiles.*

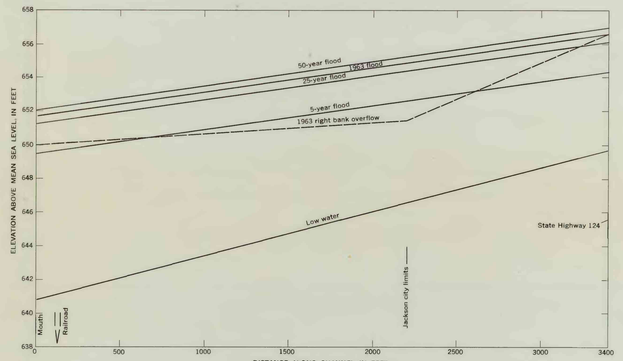

FIGURE 5.—*Sugar Run profiles.*

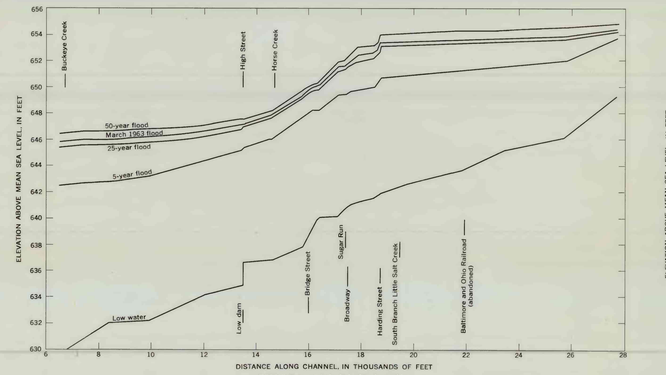

FIGURE 3.—*Little Salt Creek profiles.*

FIGURE 6.—*Horse Creek profiles.*

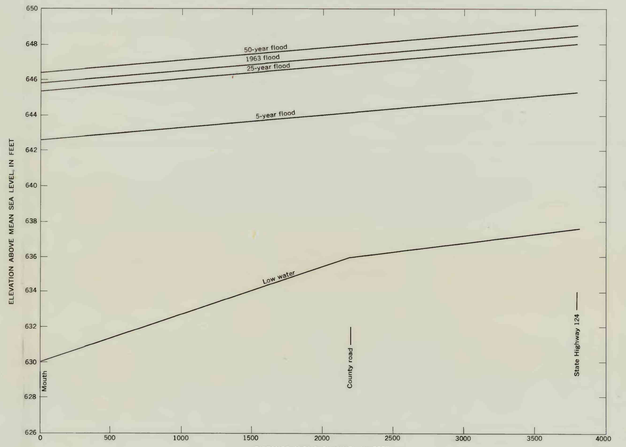

FIGURE 7.—*Buckeye Creek profiles.*

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