

comes the mountain rise from the upper river, which usually attains its greatest height early in July ; it is the most certain, and except on rare occasions the highest flood of the year. By the 1st of August the river has begun to subside, and it continues to fall, with few or no disturbances, till the low winter stage is reached. The best working season is from the middle of August to the middle of December, the winter work being made extra hazardous by the dangers from ice, and the spring freshets greatly curtailing the amount of work which can be done before the end of the summer.

Observations taken to determine the speed of the current showed a minimum velocity in the channel of two miles an hour—this being in the early part of February, 1868, when the river was frozen and the water extremely low. The greatest velocity accurately observed was in April, 1867, being at the rate of 12.7 feet per second, or a little more than eight miles and a half an hour. As the speed of the current is largely dependent on the rapidity with which a flood rises, and as the river has been known to rise at other times and places much more rapidly than was observed at Kansas City during the building of the bridge, it is likely that the maximum speed is considerably in excess of that given above, and it may be as great as 12 miles an hour.

The unstable condition of the river bottom was fully confirmed by soundings taken in the spring of 1867, at four successive times, from which cross-sections of the river were carefully plotted.* Changes continued to take place with equally marked effect during the two following years, but as their very frequency made each individual change unimportant no record was kept of the subsequent changes, beyond the soundings taken from time to time at the several pier sites and for special purposes.

In selecting a location for the bridge, it was necessary not only to place it where it should best fulfil its commercial requirements, and to see that it formed as slight an obstruction to navigation as was possible, but also to locate it at a point where a moderate amount of artificial shore protection would suffice to hold the channel permanently at the draw. As the bridge was designed to accommodate the high way travel as well as the railroad, it was necessary that it should be opposite the city, and a very favorable location four miles below

* See Plate II.