

The treacherous nature of the Missouri "bottom," together with constant changes which occur in the channel, rendered it necessary that the piers should be placed on the bed rock, and that the lowness of the banks settled the question of a high or low bridge, in favor of the latter.

The masonry of the bridge, as built, consists of one small abutment on east bank, and five river piers; the former placed on the top of the bank and founded at a depth of 3 feet below the natural surface; the five latter piers built upon inverted caissons, and sunk, during building, to bed rock, at a depth of 45-ft. to 48-ft. below ordinary water (low).

The superstructure is of wrought iron, of the form known as the "Pratt Truss," and carries a "through" single line of R.R. track and carriage way combined, at a level of 12 feet above the highest water or of 80 feet above bed rock.

The spans are as follows:

Each shore span, 80-ft. from centre to centre of piers; pivot draw-span, 364 feet over all, giving two openings of 160 feet each.

Three Fixed spans, 300 feet centre to centre of piers.

From the above description of the bridge, it is seen that the total width of the natural channel at low water, is only 350 feet; and the whole of this channel is covered by the 364 feet draw-span; the pivot pier being placed exactly in the centre of the low water channel, a clear opening of 160 feet is given, on either side, for the passage of vessels.

It is evident, therefore, that in order to preserve uninterrupted navigation of the river, the low water channel must be controlled, and compelled to run through the draw span; the high water channel must also be watched, and means taken to prevent a cut-off or any serious change taking place. This involves the supervision of the river for some miles above the bridge. Equal care is not required below the bridge, where, only at one point, can any danger be anticipated. This would occur, only in case of the neck of the main "bend," at a distance of $3\frac{1}{2}$ miles below the bridge, being gradually cut away; an occurrence to be apprehended only in the distant future.

The accompanying map shews a portion of the Missouri River, surveyed in connection with the bridge works proper, as well as with the work for the diversion and controlling of the river in the vicinity of the bridge.

The length of the river surveyed was in all, about $13\frac{1}{2}$ miles, comprising one complete "bend," representing the general character of this river for a great portion of its length.

The river at this point runs through a valley of from four to six miles in width, enclosed by ranges of bluffs or rolling, knolly hillsides of from seventy-five to two hundred feet in height above the river water.

The bluffs on the Missouri bank are composed of stiff clay, while on the Kansas bank, rock crops out at Belmont and Wathena.

The clay banks, when excavated and exposed to the weather, stand for a long time with little change; this was instanced in St. Joseph, in 1871-73, where many streets were graded down to a depth of 30 to 40 feet, while the lots, with houses built upon them, were left standing, the only means of access to and from the street, being by stairways placed in very nearly vertical position in front of each house.

The nature of these clay bluffs is such that they are affected but slowly by the action of the elements, and are not subject to sudden changes.