# Over the River and More

BY CRAIG A. MATTOX, P.E.

Using various styles of steel beams and girders helped engineers avoid conflicts with existing streets and buried utilities as well as maintain clearances.

Photos by Craig Mattox.

## The new Topeka Boulevard Bridge spans a river, a railroad, a flood protection levee system, and local streets.

**PRELIMINARY DESIGN STUDIES** for this bridge replacement looked at composite steel girder spans and precast prestressed girder spans. The final structure needed to carry 23,000 vehicles per day on a viaduct spanning a number of different obstacles: the Kansas River, four side streets, the U.S. Corps of Engineers Kansas River levee system and three tracks of the Union Pacific's mainline carrying 120+ trains per day.

The design was to be flexible enough to be readily widened in the foreseeable future should traffic growth continue at its current pace. In addition, the design would have to be able to accommodate carrying two 24-in. water mains and a 10-in. high pressure gas line supplying the metropolitan area north of the river. The result of the design study was for a steel superstructure 3,209.56 ft long on a substructure widened to accommodate future expansion. The new bridge is four lanes wide with room for an additional lane to be added to each side. Both sides of the roadway have a 6-ft-wide sidewalk that meets ADA requirements.

Aesthetic improvements were added to the structure based on public comments. A steel sign truss spans gateway towers located at each river levee. At this same location, an observation deck extension on a simple span welded girder was added to the bridge to offset the widened substructure. The exterior girders and exposed bearing devices were painted for aesthetic reasons. The red color was selected and presented to the public in a series of public meetings.

Steel erection took place over an eight-month period, including several delays due to flooding. The project required 22 months to construct and was opened to traffic in August 2008.

This bridge illustrates the flexibility offered by structural steel. The structure used three types of steel spans. Composite rolled (40-in.) beam sections were used for Units 1 and 3, each with five spans ranging from 70 ft to 95 ft. Composite uniform depth welded plate girders were used for Unit 4, where the five spans were between 103 ft and 141 ft. The composite haunched welded plate girders used for the nine spans in Unit 2 ranged from 146 ft to 215 ft. The use of each these different solutions allowed flexibility in avoiding

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Divided into four units for planning purposes, the 3,210-ft Topeka Boulevard Bridge includes 24 spans ranging from as little as 70.5 ft to as much as 215 ft.

At least partly to maintain good aesthetics, observation deck extensions were added to the bridge at the gateway tower piers at the levee on each side of the river to harmonize with the widened substructure.

Although the bridge is constructed of weathering steel, the exterior girders and exposed bearing devices were painted for aesthetic reasons.

conflict with existing streets and buried underground obstructions. Their use also helped in maintaining vertical and horizontal clearance requirements set forth by the Corps of Engineers for the levee and by the railroad for its mainline tracks. This, in turn, equated to structural economy. MSC

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City of Topeka, Kan.

**Designer**
Finney & Turnipseed, Transportation and Civil Engineering, Topeka, Kan.

**General Contractor**
Joint Venture of United Contractors, Johnston, Ia., and Hawkins Construction Co. Inc., Omaha, Neb.

**Steel Detailer & Fabricator**
AFCO Steel, Little Rock, Ark. (AISC/NSBA Member)