Expanding History

BY MICHAEL W. CARROLL, P.E.

Photos: Harrington & Cortelyou, Inc.

A replacement span over the Missouri River provides much-needed extra room, scenic overlooks, and historic reverence.

FOR EIGHT DECADES, THE STEEL TRUSS BRIDGE SPANNING THE MISSOURI RIVER IN HERMANN, MO. had served its community well. But like many older bridges, it began requiring continual maintenance later in its life. In addition, the roadway was only 20 ft wide, and wide vehicles such as trucks, buses, and farm and emergency equipment had difficulty crossing the bridge against oncoming traffic; the bridge deck was often littered with broken side mirrors.

The replacement span, the new 2,244-ft Christopher S. Bond Bridge (named for the current U.S. Senator from Missouri), has expanded the roadway width to 44 ft and also includes an 8-ft protected bikeway, which provides a safe river crossing for access to the nearby Katy Trail. Three scenic overlook areas were provided on the bikeway of the $30-million bridge to allow pedestrians to look out over the river without obstructing the bikeway.

Span and Piers

The four-span main river unit of the bridge is composed of parallel-flange steel plate girders spanning up to 460 ft across the river. The long spans safely accommodate barge traffic on the river and helped minimize construction of costly piers. The river unit cross section is composed of six girder lines spaced at 9 ft, 8 in. with an 8.5-in. concrete deck. The steel plate girders have a web depth of 11.5 ft and were designed to use the maximum depth that could be handled and reasonably transported to the site. Girder depths were also sized to avoid the use of expensive horizontally welded web splices.

High-performance steel (HPS) was used for the negative moment flange plates over the piers; Grade 70W HPS helped economize the girder sections and allowed the use of parallel flanges instead of expensive haunched webs over the piers. Flange plates up to 3.25 in. thick and 40 in. wide were necessary for the long spans. Grade 50W steel was used for the positive moment flanges, web plates, and cross frames.

Steel erection in the Missouri River and handling large steel girders with barge cranes presented complex challenges. Design of the girder sections took into account the desirable lengths, weights, and stability of the individual steel segments. Field sections were sized for ease of shipping by truck and for handling during erection. The girder design was also optimized for ease of fabrication, which provided additional cost savings. In addition, thicker web plates eliminated the need for expensive welding of web stiffeners. Foundations for the river piers include 7-ft-diameter concrete drilled shafts that extend up to 80 ft into sound bedrock; the massive base shafts are designed to resist barge impact loads.

Ornamental pedestrian fence and handrails made from hollow structural sections adorn the new Christopher S. Bond Bridge.

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Preserving History

An essential part of the project was to provide aesthetic enhancements that would allow the new bridge to blend with the historic character of Hermann. The bridge is located within the Historic Hermann District and many notable buildings are located near the bridge. The contractor was required to use special construction techniques and had to monitor ground vibrations at nearby structures so as not to threaten them. Driven piling was not allowed on the south side of the river within the city limits. End Bent 1, Bent 2, and Pier 3, all on the south side of the river, used drilled shaft foundations. In addition, no blasting was allowed on the south side of the river for any rock excavation or for removal of the existing bridge.

Ornamental pedestrian fence and handrails made from hollow structural sections adorn the new bridge. The fence and handrail provide protection over the Missouri River and Union Pacific Rail tracks, but also provide a visual impact, and decorative roadway and pier lighting were also put in place.

The pedestrian fence used 6-in. x 6-in. structural steel tubes for the posts, 2-in. x 6-in. tubes for the lower rails, and 3.5-in.-diameter pipe for the top rail. The handrail on the barrier used 4-in. x 4-in. steel tubes for the posts, 2-in. x 4-in. tubes for the lower rail, and 2.5-in. pipe for the upper rail. Pickets are 0.75-in.- and 1-in.-square steel bars.

The black steel railing, limestone-block concrete form liner for the piers, and decorative lighting all project a vision of strength, character, and pride that reflects well on the area. The new bridge serves as a vital transportation link over the river and also as a magnificent gateway to the historic town of Hermann. MSC

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