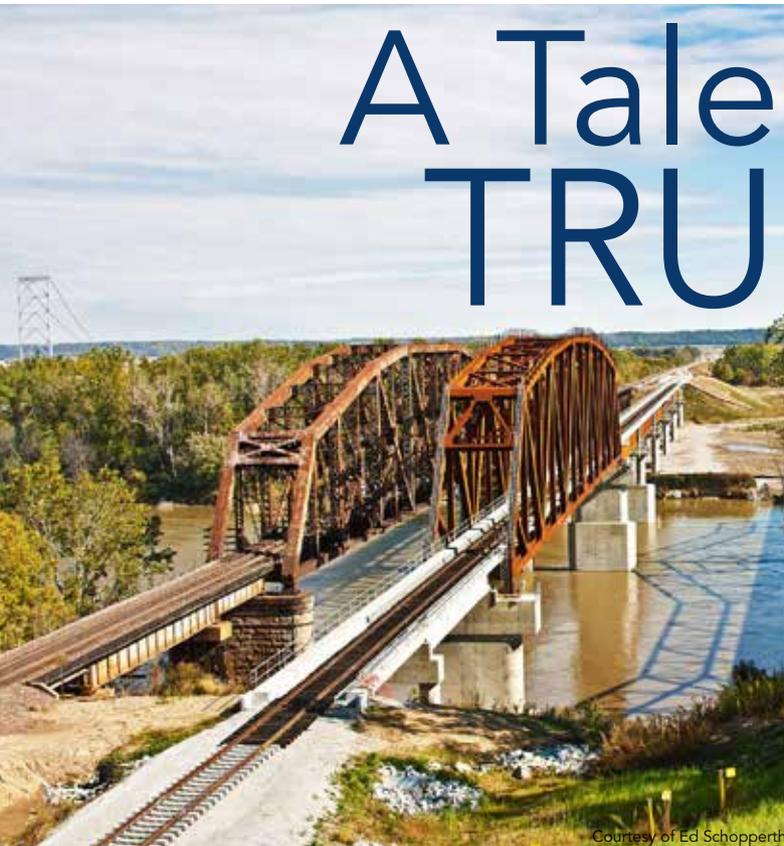
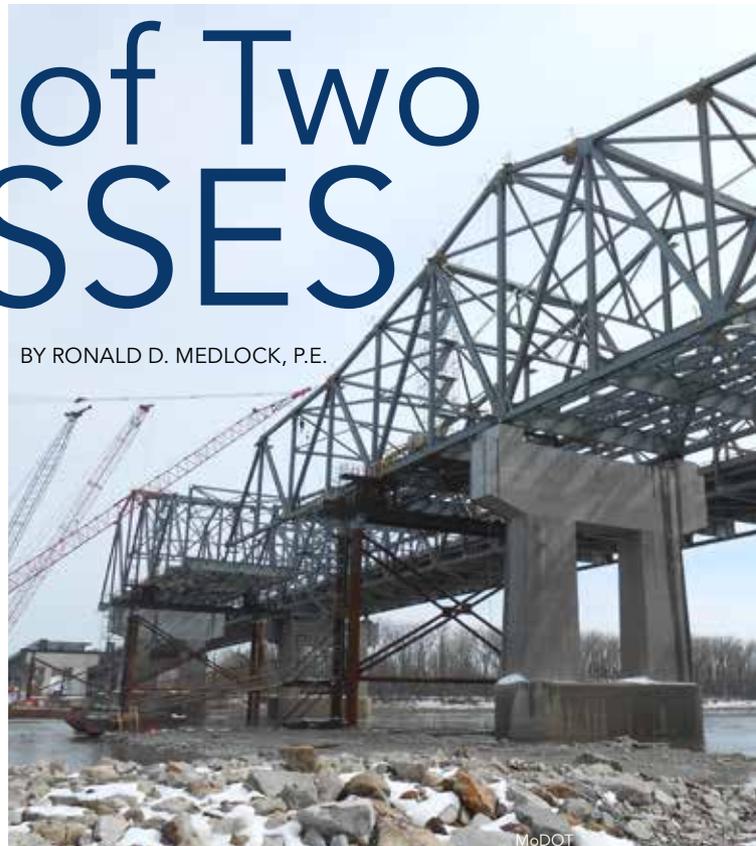


# A Tale of Two TRUSSES



Courtesy of Ed Schopperth



BY RONALD D. MEDLOCK, P.E.

MoDOT

The enduring nature of an “old-fashioned” design is put on prominent display in two truss bridges spanning the Missouri River.

**IN THE DAYS BEFORE** welded girders, truss bridges were often the design of choice for bridges needing to span lengths exceeding the span capacity of rolled beams. With the advent of welded girders, this trend changed and truss designs declined in popularity.

While some may consider truss bridges to be relegated to the category of “yesterday’s design,” in reality truss bridges are alive and well and for very good reasons. Two recent bridge construction projects that cross the Missouri River exemplify this: one for vehicular traffic and one a railroad bridge.



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## The Blanchette Bridge

A continuous three-span truss bridge measuring 1,360 ft long, the Blanchette Bridge crosses the Missouri River west-bound on I-70 at St. Charles, Mo. Built in the late 1950s, in recent years the Blanchette Bridge required frequent repairs. It became apparent that the 55-year-old bridge needed major refurbishment to keep it operational and safe.

According to Thomas J. Evers, P.E., Missouri Department of Transportation’s area engineer for St. Charles County, this project had an aggressive schedule from the very beginning.

“During the design phase, we had originally considered simply rehabilitating all of the existing steel in place,” he said. “But after doing a cost analysis, we determined that replacement of most of the structural steel would save in future maintenance costs and extend the overall life of the bridge by 25 more years than originally thought.”

The \$64 million rehabilitation began in November 2012. Fabricator High Steel Structures, LLC, supplied the entire truss structure above the bridge bearings, a total of more than 3,355 tons of steel. (In a separate contract, DeLong’s, Inc., supplied the steel for the approach spans.)

The steel used was A572 Grade 50 with an inorganic zinc primer applied in the shop; the second and third coats of paint were applied in the field once the bridge was erected. The project was detailed by Candraft Detailing, Inc., and High Steel fabricat-



All images on this page: MoDOT

- ◀ ▲ The 1,360-ft-long Blanchette Bridge crosses the Missouri River westbound on I-70 at St. Charles, Mo.
- ◀ ▲ **Far left:** The Burlington Northern Santa Fe Railway has crossed the Missouri River at the Plattsmouth Bridge since 1879.

ed it with CNC equipment. (High Steel fulfilled its role in fabricating, painting and shipping the truss members by March 2013.)

Transportation required considerable coordination by High Steel's transportation team, High Transit. Fortunately, typical truss bridge design reduces the cost of shipping freight, as a larger percentage of members can be transported on conventional equipment that doesn't require escort vehicles. High Transit used its own drivers on some of the longer specialized trailer loads and also used independent carriers to handle the high volume of loads and the long cycle time involved in the distance to and from the project site.

Crews installed approximately 2,200 pieces of steel for a total weight of 3,250 tons in the truss and 750 tons in the approach girders.

During construction, the Missouri Department of Transportation applauded the contractor, Walsh Construction Company, for all of their hard work under difficult weather conditions.

"We opened this bridge less than 10 months after we closed it," explained Evers, "During those months, this team fought record-low Missouri River levels in December 2012, which prevented the use of barges and forced the construction of a causeway. This team also had fought near record spring flood levels in early 2013, forcing them out of the water and out from under the bridge entirely. The spring also brought a tornado through the project, which caused some minor damage."

The bridge opened to traffic nearly three months ahead of schedule on August 24, 2013.



- ▲ ▼ Taking down the original Blanchette Bridge. The new bridge opened less than 10 months after the original was closed.



- ▲ ▼ Crews installed approximately 2,200 pieces of steel for a total weight of 3,250 tons in the truss and 750 tons in the approach girders for the Blanchette Bridge project.





High Steel



Courtesy of Ed Schopperth

▲ The original Plattsmouth Bridge, built in 1879, was renovated in 1903, and in 1976 the west approach was replaced and the alignment was straightened to eliminate a 12° curve by building a new deep cut.

### The Plattsmouth Bridge

The Burlington Northern Santa Fe Railway has crossed the Missouri River at the Plattsmouth Bridge since 1879, the year it replaced a ferry operation with the completion of two Whipple Through-Truss spans. The original bridge was renovated in 1903, and in 1976 the west approach was replaced and the alignment was straightened to eliminate a 12° curve by building a new deep cut.

After numerous renovations and updates over more than a century, it was time to replace the railroad bridge as it crosses from Plattsmouth, Neb., to Pacific Junction, Iowa. According to BNSF, the total project cost was \$46 million, which includes funds allocated to bridge design in 2011 and construction in 2012 and 2013.

“For this project, constructing a new bridge was more cost-effective than restoring the existing bridge,” said BNSF project engineer Mike Schaefer. “Over the past century we’ve seen tremendous improvements in construction and materials.”

According to Larry D. Woodley, director of bridge construction over the project for BNSF, the railroad typically specifies a truss design for any bridge span greater than 200 ft long, so the 400-ft navigation channel of the Plattsmouth Bridge necessitated using a truss.

The bridge has a concrete deck-plate girder approach and was stick-built on site on the new piers. To help improve velocity, switches were installed on each end of the new bridge to

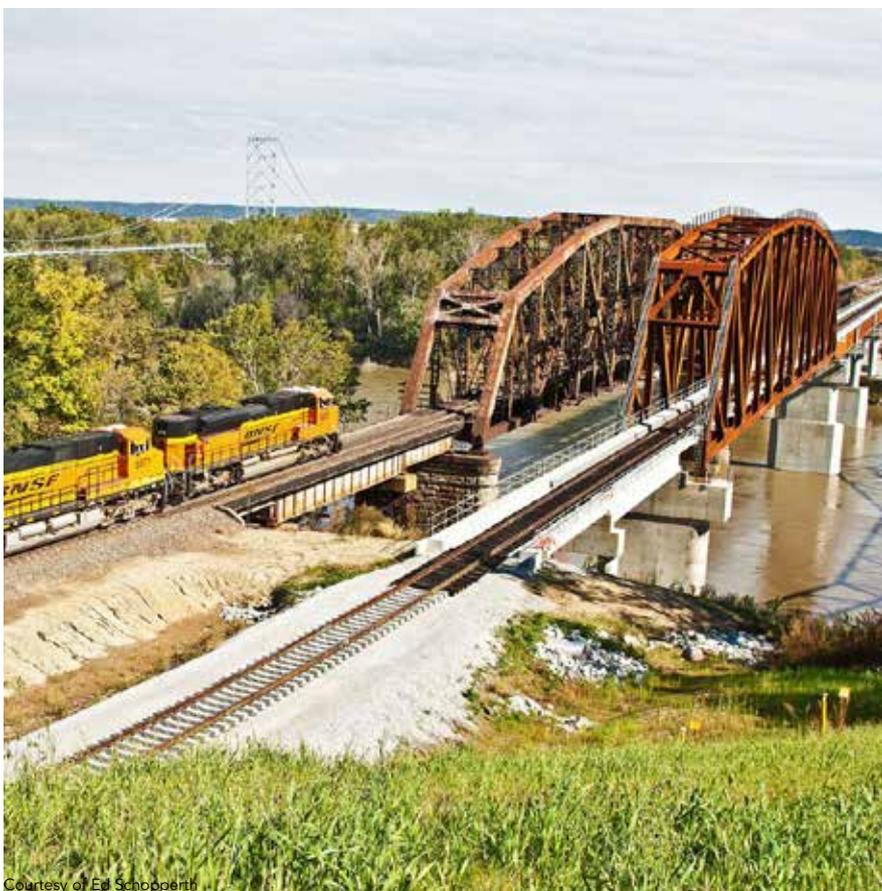
allow lighter, empty trains to use the existing bridge.

Ames Construction was awarded the contract to build the new 1,683-ft bridge 60 ft north of the existing bridge. High Steel Structures provided 1,213 tons of A588 Grade 50W fracture-critical steel for the railroad truss, while Capital Contractors, Inc., provided 2,046 tons of plate girders for the approach spans.

High Steel began work on the 400-ft truss bridge span in March 2012 and the last delivery was completed February 2013. The company provided all of the truss bridge components, including the truss girders, floor system, sway framing, upper bearing block and bridge inspection rails. At the customer’s request, High Steel also performed a 100% check assembly of the rocker pin bearing assemblies in the shop prior to shipment and installation in the field.

One of the key challenges was completing the check assembly on the truss sides in the yard prior to disassembly and shipment to Nebraska. Delivery was coordinated with the project field assembly teams, with shipments leaving three days prior to the need-by dates at the site.

Weather was another concern. With winter approaching, deliveries started the last week of October 2012 and continued throughout the winter until February, when the last of more than 60 trailer loads were delivered to the job site. The loads traveled through seven states and logged more than 1,200 miles to the site each way.



Courtesy of Ed Schoppert

▲ The new Plattsmouth Bridge carries nearly 50 trains daily and provides approximately 400 ft of clearance for river traffic.

▲ High Steel provided 1,213 tons of fracture-critical steel for the railroad truss, while Capital Contractors provided 2,046 tons of plate girders for the approach spans.

The new Plattsmouth Bridge carries nearly 50 trains daily, including coal, mixed freight, intermodal and Amtrak and provides approximately 400 ft of clearance for river traffic.

As we can see by looking at these two Missouri River bridges, trusses remain an impressively relevant and economical choice for vehicular and railroad bridges with longer span lengths. ■

#### **Blanchette Bridge**

##### **Owner**

Missouri Department of Transportation (MoDOT)

##### **General Contractor**

Walsh Construction Co.

##### **Structural Engineer**

Jacobs Engineering Group, Inc.

##### **Erection Engineer**

Collins Engineers, Chicago

##### **Steel Team**

###### **Fabricators**

Truss spans: High Steel Structures, LLC, Lancaster, Pa. (AISC Member/AISC Certified Fabricator/NSBA Member)

Approach spans: Delongs, Inc., Jefferson City, Mo. (AISC Member/AISC Certified Fabricator/NSBA Member)

###### **Detailer**

Candraft Detailing, Inc., New Westminster, B.C., Canada (AISC Member)

#### **Plattsmouth Bridge**

##### **Owner**

BNSF Railroad, Fort Worth, Texas

##### **General Contractor**

Ames Construction, Burnsville, Minn.

##### **Structural Engineer**

TranSystems, Kansas City, Mo.

##### **Steel Team**

###### **Fabricators**

Truss spans: High Steel Structures High Steel Structures, LLC, Lancaster, Pa. (AISC Member/AISC Certified Fabricator/NSBA Member)

Approach spans: Capital Contractors, Inc., Lincoln, Neb. (AISC Member/AISC Certified Fabricator/NSBA Member)

###### **Erector**

Davis Erection, Omaha, Neb. (AISC Member)

###### **Detailer**

Tensor Engineering, Indian Harbour Beach, Fla. (AISC Member)