



Steel Speeds Recovery

Scott L. Melnick

Steel industry coordination permitted the Webbers Falls Bridge to reopen just two months after being damaged.

Exremely rapid steel fabrication and erection helped ensure that the Webbers Falls I-40 Bridge in Oklahoma reopened ahead of an incredibly ambitious schedule. Despite the initial doubts of transportation officials, 210 tons of steel were delivered ahead of schedule to allow the damaged bridge to reopen just two months after it was knocked down by a pair of errant barges.

The bridge was struck on May 26 by two barges moving upstream outside the marked channel of the Arkansas River navigation system. In response to the disaster, the Oklahoma Department of Transportation set in place an emergency response team to plan for the reconstruction of nearly 600 feet of damaged bridge.

According to Bob Rusch, ODOT's Bridge Engineer, he immediately decided to replace much of the existing steel bridge with concrete. "From day one we anticipated that steel couldn't meet our aggressive schedule." The aggressive schedule called for traffic to be moving again just 57 days after the contract was awarded. To ensure the timetable was taken seriously, the general contractor was provided with a \$6,000/hour penalty for missing the deadline—and a \$6,000/hour bonus for beating it. Working together, the project team succeeded in beating the schedule by 10 days, with the bridge reopening on July 29.

The National Steel Bridge Alliance (NSBA) and several steel fabricators were in contact with Rusch and assured him that steel could meet his am-



The last girder is transported to the job site.

bitious schedule, but he wasn't convinced. However, because the plan was to reuse a portion of the longest span, he needed to use steel for that portion of the project.

Knowing the urgency of this project, the steel industry quickly swung into action. Walter Gatti, the industry's premier bridge detailer, arrived in Oklahoma on June 2. "The project's engineer wanted design drawings by June 5, and we made his schedule," Gatti said. "We worked closely with the project's engineer, White & Associates of Oklahoma City, to take advantage of new design methods to improve the bridge. For example, we put heavier webs in to eliminate the need for most of the stiffeners, which ultimately helped speed fabrication and erection." Also, to help speed the process drawings were sent via email, with the approvals also coming via email.

Gatti's firm, Tensor Engineering, sent the mill orders to the fabricator the same day the job was bid and awarded. In turn, the fabricator placed the mill order that same day. "Shop detail drawings were completed over the next five days and were approved within the same day by Gerald Mooney, a transportation specialist with the Oklahoma Department of Transportation," Gatti said. "The shop drawings were approved in the shop in less than a week from the bid date."

"Steel beat the schedule by six days," added Stan Mediate, area-manager-in-charge for Gilbert Central Corp., a unit of Peter Kiewit Sons', Inc., the project's general contractor. "It wasn't surprising, though. I've never had problems with any projects being delayed because of steel fabrication," he added.

"The bridge was a three-span continuous haunched girder bridge with a 330' main span," explained Ron White of White Engineering Associates, Inc., in Oklahoma City. "One end crumpled 75' from the pier. Our contract called for rebuilding the 125' portion that came down. We rebuilt back to a pier splice." White noted that he was careful to work with the fabricator to ensure that the design called for plate material that would be easily obtainable. The steel work included four replacement girders plus 12 crossframes, four lines of stringer beams and lateral bracing for a total of approximately 210 tons. "We needed to do a lot of re-design work since the older design emphasized placing a lot of stiffeners," he added.

One of the main concerns was how to match the existing field splice, which was not damaged but was about 8' from the area where the girder span bent downwards but did not fail. The fabricator requested and received from the contractor the last 5' of the existing damaged girders and used the splice

plates and end to match-drill new splice plates. These were bolted into position on the new girders in the shop and then erected without any problem—a solution only possible with steel construction. "If the original bridge had been concrete, the entire structure would have had to have been replaced," Gatti stated. "With steel, much of the original structure could be retained, which helped speed the re-opening."

In addition to the steel portion, three spans beyond the main span also fell, but those were redesigned in pre-cast concrete. The concrete work was far simpler than the steel work, however, since that portion could pretty much rely on off-the-shelf details while the steel portion required reworking a bridge to match the existing portion—but with improvements. One concern that Rusch did have regarding the concrete portion, though, was the potential for shrinkage cracking due to the need to achieve strength quickly. "The contractor is using maturity meters to track cracking, but we're always aware of strength and curing issues whenever we fast-track a concrete job," he explained. This extra monitoring proved critical as three of the first nine concrete beams were rejected due to problems.

The steel was bid and awarded on June 12 with the contract going to NSBA-member Trinity Industries, Inc. "We delivered temporary steel to the site on June 19. These roadway stringer supports were needed so that demolition of the damaged portion could continue," explained Thomas Guzek, Trinity's vice president.

"We took a lot of care removing the damaged steel portion to reduce the stress on the undamaged adjacent span," Rusch emphasized. In addition, consultant Dan Holt of International Straightening, Inc. of Bismarck, ND, was called in to utilize heat straightening for about 75' of girder that cantilevered out from one of the remaining piers.

Key to the rebuilding effort was Bethlehem Steel Co.'s willingness to disrupt their rolling schedules to pro-

vide the needed material. "We got the order on a Wednesday and shipped the steel the following Monday," explained Bob Insetta, sales manager with Bethlehem Lukens Plate Products. "Bethlehem and U.S. Steel were both committed to doing what was needed to get the job done. In this case, we got the order. We had the slab stock available and were able to put it in the furnace the day we got the order. Because we had alerted the mill operators in advance that this order might come in, we were able to produce the needed steel without impacting any other projects."

Added White: "It's amazing what you can do when you have to. We were given 16 days to develop plans and we finished the plan in just 12. Everyone worked together to achieve a common goal and we were able to do things out of the normal sequence, such as getting the shop drawings started prior to completing design."

"We told ODOT that we could furnish steel to the jobsite on the portion that went concrete four weeks after receiving the contract," Guzek said. "They were skeptical, but our performance on the steel portion proved our ability to meet deadlines."



Workers install lateral bracing for the girders.



The last bridge girder is lifted into place.