

Precast Aids Fast Track Bridge Replacement Again



Alabama construction team joins forces again to create a prestressed concrete bridge to replace a fire-damaged bridge within a half-mile of an earlier project

It was, as that sage Yogi Berra once noted, “*déjà vu* all over again.” Just two years ago, a general contracting joint venture of The Morris Group and Brasfield & Gorrie joined forces with precaster Sherman Prestressed Inc. to replace a fire-damaged Interstate bridge in Birmingham, Ala. In an eerily similar situation, the two groups were again called upon by the Alabama Department of Transportation (ALDOT), to perform their magic act — in record time — within a half-mile of the earlier site.

“It doesn’t seem possible,” says Fred Conway, chief bridge engineer for ALDOT, “but it happened again less than two years later, and less than a half mile from the earlier incident.” In that January 5, 2002 incident, a tanker truck loaded with gasoline crashed into a pier in the northbound lanes of Interstate 65 in downtown Birmingham, killing the driver. The fiery crash virtually destroyed the steel girder bridge carrying the I-65 southbound lanes directly over the northbound lanes. That project used a precast concrete design to replace the bridge in only 37 days. (For more on that replacement project, see the Summer 2002 issue of *ASCENT*.)

On October 21, 2004, it happened again. This time, a fully-loaded tanker truck turned over while attempting to negotiate a highway ramp carrying the eastbound lanes of I-20 and the

‘One of the advantages to using precast concrete was that we could begin site work while the components were being cast.’

northbound lanes of Route 59 over the southbound lanes of the two highways. Again, the tanker exploded in a ball of flame and severely damaged the bridge’s steel girders.

Seven-Mile Backup

The scene of the second mishap is literally visible from the site of the 2002 crash, Conway says, at what he calls the most critical traffic intersection in all of Birmingham. Almost instantaneously, a seven-mile backup developed in all directions at the complex interchange. In addition to softening the bridge’s steel girders, the fire’s heat caused the bridge deck’s concrete to powder. It quickly became apparent that the bridge would have to be replaced — and fast. Fortunately, the same team that replaced the earlier destroyed bridge was available.

Immediately, plans for a replacement



Sherman Prestressed Concrete shipped the massive girders on specially equipped 13-axle trucks. Along with the usual escort vehicles for oversized load, the Alabama State police provided additional escort for the 12-mile trip from factory to the site.

bridge were drawn up. ALDOT engineers, led by Bridge Design Section Supervisor Tim Colquett and John Black, drew on their earlier experience and quickly chose precast concrete for the job. “We gave only a cursory consideration to steel,” says Conway. “It would have taken far too long to replace the bridge with another steel-girder structure. Fabrication, erection and painting of the bridge would have required two to three months. We didn’t think we could afford that amount of time. This is perhaps the most important intersection in the entire state.”

Working feverishly, the ALDOT bridge designers completed plans for





Fact Sheet

Project Name: Replacement of Interstate 20/Route 59 Bridge

Location: Birmingham, Ala.

Owner/Designer: Alabama Department of Transportation

Contractor: Joint Venture: Brasfield & Gorrie and The Morris Group, a joint venture, Birmingham, Ala.

Precaster: Sherman Prestressed Concrete, Pelham, Ala.

Bridge Description: 413 feet with a 60-degree skew

Precast Components: Specially designed 66-inch bulb tees: 12 at 87'3", 12 at 151'3" and 12 at 163'9". The specially modified girders were three inches deeper and two inches wider than standard to allow additional prestressing steel. The longest girders required 66 steel prestressing strands at 0.6-inch diameter with a prestressing force of 43,942 pounds prestressed for a total force of 2,900,172 pounds.

Concrete strength required: 7,500 psi at release and 8,500 psi at 14 days

The new bridge carrying the southbound lanes of I-20 and Route 59 in Birmingham, Ala., was completed in just 36 days, earning the contractors a \$1.35 million incentive bonus. A fiery tanker truck crash destroyed the old bridge, cutting an important link through the city.

a new structure and released them for bids just six days after the accident. Two days later, bids were opened and the contracts were awarded. Again, the joint venture of Brasfield & Gorrie and The Morris Group submitted the

winning bid as general contractors and Sherman Prestressed Concrete got the nod to produce the concrete girders.

Work began immediately on the project. Brasfield & Gorrie crews rapidly dismantled the old bridge and

removed the wreckage as Sherman Prestressed began production of the precast components. "One of the advantages to using precast concrete was that we could begin site work while the components were being cast," says John Chambliss, chief engineer for Brasfield & Gorrie and chief engineer for the



The last girders on the Birmingham bridge were erected less than a month after the accident that destroyed its predecessor.

The girders' size required special transportation and handling considerations.

joint-venture company. The contractors had plenty of reason to speed their work even over and above the need to get the interchange reopened. The contract included an incentive clause that awarded the contractor \$50,000 per day for each day prior to December 31 that the job was completed — and cost the firm that much for every day after that date it added.



Speed was of the essence, since some lanes of the existing road had to be closed for a short time to allow the cranes to set up and perform their task. The work was completed four full weeks ahead of schedule.

ALDOT's Longest Girder

The precast concrete girders specified for the bridge replacement required a special design. The 66-inch bulb tees included 12 each at 87'3", 151'3", and 163'9". That final length created the longest girders ever shipped in the state by 25 feet. The components were specially

modified HPC AASHTO-PCI modified bulb tee 63 girders, to which 2 inches of width and 3 inches of depth were added for strength and to allow additional prestressing steel to be included.

"At 2.9 million pounds, the prestressing was the highest force we ever pulled," says Dwain Hamby, engineering manager

for Sherman Prestressed Concrete. "We were concerned about the stability of the beams. We especially wanted to make sure that they would withstand shipping and erection." To ensure that, Sherman conducted transportation tests in its yard prior to shipping the components the 12 miles to the site.



A special design was used for the precast concrete girders. Some of the 66-inch bulb tees were nearly 164 feet long, the longest girders ever shipped in the state.

***'At 2.9 million pounds,
the prestressing was
the highest force
we ever pulled.'***

As casting went on at Sherman's plant in the Birmingham suburb of Pelham, the contractors removed the old bridge and began construction of the substructure of the new bridge. The on-site work included sinking steel pilings, then in-place casting of columns, caps and fittings. With the precaster and contractor working in concert, the first girders were delivered and set in place just 16 days after the contracts were let. The final girders went into place just three days later.



Two cranes, picking from either end, swing the girders into place atop the poured-in-place columns and caps. A third crane stands ready to assist at the limited access site.

Special Handling Required

The girders' size required special transportation and handling considerations for Sherman, says Chambliss. The precaster used special 13-axle vehicles to deliver the beams to the site. The Alabama State Police provided escort service in addition to the usual escorts required for transit of oversize loads.

At the site, three cranes were used to swing the girders into place rather than the usual two, which would each pick

from one end of the girders, Chambliss says. This also was dictated by the 60-degree skew of the bridge that required the girders to be maneuvered into place. On some of the girders, two cranes lifted the units from the trucks. Then a third moved into place and replaced one of the other cranes to complete the installation.

The lanes carrying southbound 59 and westbound I-20 had been reopened shortly after the accident while the northbound 59 and eastbound I-20

lanes were detoured. During erection of the girders, it was necessary also to shut down the south and westbound lanes for a short period. The entire job was completed and the bridge reopened to all traffic on Dec. 3 — 26 days after the accident and a full four weeks ahead of schedule. This earned the contractors a \$1.35-million incentive bonus, by \$50,000 the largest ever awarded in Alabama. The earlier record was set — you might have guessed — on the earlier bridge replacement two years before. ■

— Wayne A. Endicott



The intersection at which fire destroyed the bridge is perhaps the busiest in Alabama, carrying more than 100,000 cars daily.

 **pci.org**

Click For More...

For additional information on this story, visit www.pci.org/pdf/knowledgebank/bridges05.pdf. (Adobe Acrobat version 5 or greater required.)

To learn more about **spliced-girder precast concrete bridges**, visit the Designer's Knowledge Bank by clicking on the DKB icon at www.pci.org or at your local precaster's Web site.

ASCENT CASE STUDY



CASE STUDY

ASCENT



ASCENT, SPRING 2005

ASCENT CASE STUDY



ASCENT, SPRING 2005