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REGION'S BEST PROJECTS

MassDOT's I-93 Fast 14 Takes Top Honors



NEW YORK'S BEST OVERALL PROJECT

Making Short Work Of Long Spans

Using prefabricated components and quick-setting concrete, MassDOT builds 14 bridges in record time **BY CAROLINA WORRELL**

What's the best way to keep 200,000 drivers from getting road rage while regularly disrupting their commutes?

If you're the Massachusetts Dept. of Transportation with a goal of building 14 bridges in less than three months, you join the social media bandwagon and tweet about it:

Traffic Alert: 14 bridges to be completed in 10 weekends in Medford, Mass.

It was frequent tweets like that, combined with other social media techniques, that helped the agency keep drivers in the loop.

In fact, the agency did such a good job of publicizing its Medford demolition and replacement project of 14 bridges along I-93—a major thoroughfare that carries about 200,000 vehicles a day—that onlookers gathered nearby with lawn chairs to watch the work.

Before the project was even conceived, however, MassDOT had begun a paving project on I-93 in 2010 that also included repairing several decks on the former bridges. It was during that year-long repair work that MassDOT found structural deficiencies and determined that all 14 needed to be replaced rather than repaired, says Michael McGrath, deputy chief engineer for construction at MassDOT. Problems found included partial deck failure on one bridge that required emergency repair.

To avoid making more emergency repairs, MassDOT came up with a permanent solution—demolish and replace the bridges, which ranged in length from 90 ft to 360 ft. It also opted for an ambitious schedule to complete construction in just 10 weekends—the project team would build at least one bridge a weekend and build two bridges at once for several of the 10 weekends.

"We had already disrupted traffic for a year during the bridge deck repairs so we wanted to get this done as quickly as possible," McGrath says. Traditional construction would have taken four to five years, he adds.

I-93 FAST 14 RAPID BRIDGE REPLACEMENT PROJECT

Medford, Mass.

KEY PLAYERS

Owner/Developer: Mass. Dept. of Transportation
General Contractor/Construction Manager: JV of J.F. White Contracting Co.; Kiewit Corp.
Structural Engineer: Gill Engineering Associates; Dewberry-Goodkind
Lead Designer & Civil Engineer: Tetra Tech Rizzo

SUBMITTED BY J.F. White Contracting Co.; Mass. Dept. of Transportation; Kiewit Infrastructure Group

The agency opted to use 252 pieces of prefabricated bridge units consisting of Grade 50 weathering steel plate girders and precast concrete decks, which were chosen for their light weight, inherent properties and rapid fabrication. A special concrete mix design was developed that allowed for traffic to be on the bridge deck roughly four hours after it was placed, McGrath says.

Tapping Massachusetts Gov. Deval Patrick's eight-year, \$3-billion Accelerated Bridge Program for \$93 million in funding, plus an additional \$5 million in federal funding, the project was approved in February 2011.

RAPID RECOVERY

The JV team demolished and replaced 14 bridges in 10 weekends using prefabricated units that were stored and repositioned off site.



PHOTO COURTESY OF THE MASSACHUSETTS DEPT. OF TRANSPORTATION



PHOTOS: (LEFT) COURTESY OF THE MASSACHUSETTS DEPT. OF TRANSPORTATION; (RIGHT) COURTESY OF TETRA TECH RIZZO

The design/build team, a joint venture of Kiewit, New York, and J.F. White, Framingham, Mass., was given just four months to prepare for the project. Their advance work included completing the design, prefabricating the sections and making substructure repairs to the bridges. That included jacking the decks so the team could fabricate new concrete pedestals to support the new deck beams, McGrath says.

"The first bridge was going to be built the first weekend in June 2011 and it wasn't even designed yet," says Peter Rapp, project manager at J.F. White.

Starting at 8 p.m. every Friday night for the next 10 weeks, the contractor would move a zipper lane barrier to the middle of one side of I-93, McGrath says. Traffic was routed to opposite lanes while the bridge switch-outs took place, then routed back to the proper side a few days later.

The crew would then demolish at least one bridge and transport the prepositioned units to the site. Their work would end Monday mornings at 5.

"If the road wasn't opened by Monday morning, you would have 10-15 miles of backed up traffic," McGrath says. "It's very important not to disrupt that."

Besides its Twitter feed, the agency used other platforms including email blasts and text messages. It also organized public meetings, alerted municipalities, attracted local news coverage and installed a regional traffic media system on highways that gave estimated travel times throughout construction zones.

"The public was able to plan ahead for their weekend, and they knew that when they woke up Monday morning, a new bridge would be there," McGrath says.

If at any point, all four lanes were not accessible, the JV team would have been fined \$3.23 million, McGrath says. But, he adds, the team met its quota and even earned a \$7-million incentive for its efforts.

But those efforts were no small feat. To meet the



TAKING A DETOUR Traffic on I-93, which carries about 200,000 vehicles a day, was rerouted to alternate lanes during the bridge switch-outs.

deadline, the project team worked 55 hours during the weekend. Separately, two shifts of workers labored seven days a week to prepare for those weekends, says Jim Cahill, assistant project manager at J.F. White.

"The planning effort was the ticket to completing each bridge on time," Cahill says.

However, even with the planning, "there were so many individual aspects to the project that any one of them could have failed," Rapp says. He adds that there were some near misses, including an instance in which a load of precast material coming from New Jersey nearly missed its delivery deadline. In another instance, 11 of the 252 precast pieces were so large that they required specialized trailers. At one point there were 68 trailers at once on the jobsite, Rapp says.

After the bridge building, the next and final milestone included substructure repairs, reinstating roadways and paving four miles of roadway. This took an additional six weeks to complete, Rapp adds.

The judges of ENR New York's Best Projects were impressed and named the project the region's best this year. One judge lauded the "incredible coordination" among all team players, and another called the accelerated schedule and technique "trendsetting."

"This kind of innovation is exactly what President Obama means when he asks us to be smarter in the way we do business," said U.S. Transportation Secretary Ray LaHood following the Federal Highway Administration review of the project. The project won the Grand Conceptor award from the American Council of Engineering Cos. of Massachusetts for its "uniqueness and originality, technical complexity, social and economic value and public awareness."

MassDOT will use the same methods to replace the Commonwealth Avenue bridge deck that spans the Massachusetts Turnpike near Fenway Park and Boston University. This project, also scheduled for 10 weeks, is set to start in the summer of 2014, McGrath says. The agency also used the concept to complete a single bridge deck replacement in Fairhaven.

The project's methodology is already being "mimicked" in other states like Virginia, Rapp says. He adds that so far "nobody has ever undertaken a project of this magnitude."

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