Photo Courtesy of Illinois Tollway

Reconstructing Illinois' Mile-Long Bridge

Spanning 187 feet in length, giant prestressed beams play a key role in helping to ease traffic congestion on Illinois Tollway's busiest roadway.

By Bridget McCrea

Photo courtesy of County Materials

County Materials manufactured the single heaviest bridge beams ever produced in the Midwest for a project in Chicago.

There isn't anything easy or straightforward about the Illinois Tollway's Mile-Long Bridge project. The job has its share of complexities, from incorporating a 1950s-era structure to extending over private property, but that hasn't stopped engineers, designers and contractors from making good progress on a project that's been in the planning stages since 2017.

Scheduled to open to traffic in 2023, the project incorporates the construction of two new, wider bridge structures plus numerous stormwater and drainage improvements. Because the state didn't own any of the land beneath the bridge, the project required extra coordination with the businesses and property owners in the area. The bridge also spans the Des Plaines River and the Chicago Ship and Sanitary Canal.

"This bridge basically has an entire 'city' underneath it, including a very busy railyard and numerous other businesses," said Lanyea Griffin, executive project engineer. "The original bridge was built in the 1950s and then added onto in the 1990s, so the two structures aren't necessarily operating in unison."

From a structural engineering standpoint, the whole idea of getting a project of this size planned out, designed, and underway was a monumental undertaking.

TRAFFIC RELIEF

Designed to give commuters relief from traffic congestion, the Mile-Long Bridge – which, incidentally, isn't quite one full mile in length at 4,608 total feet – is one component of a larger, $4 billion Central Tri-State Tollway (I-294) Project. A system of five roadways, the Tollway is being reconstructed and widened to meet current and future transportation demands while also addressing regional needs. Currently, up to 150,000 vehicles use the Mile-Long Bridge on a daily basis. The bridge reconstruction also will increase its capacity from four lanes to five lanes in both directions, with inside shoulders for "flex lanes" that can be used for a variety of safety-related purposes.

The current Mile-Long Bridge includes 27 spans supported by 26 piers. The new bridge's spans will support nearly 600 beams of various lengths and will be built with fewer piers in order to reduce the environmental impact on the waterways and industrial areas below.

The prestressed concrete beams are being manufactured by County Materials. Each beam measures up to 187 feet long, up to 7-and-a-half-feet tall and weighs up to 245,000 pounds.

Gary Courneya, County Materials' prestress operations manager, said the company has worked on numerous bridge girder projects for Illinois Tollway and won this project through a competitive bid process. Prestressed concrete became the choice material thanks to its minimal maintenance over the life of the bridge.

"A concrete bridge beam not only requires less maintenance but is also a bit more user-friendly from a lead-time and cost perspective," Courneya said.

For County Materials, the biggest challenge on this project was the sheer size of the concrete beams they manufactured. In fact, Courneya noted it was a "milestone project" for the company in that the end products were the single heaviest bridge beams ever produced in the Midwest. With some of the beams weighing up to 245,000 pounds, the company had to enhance its cranes' lifting capabilities in order to accommodate that weight.

"Additional safety measures also were implemented because the size of the beams (could have introduced) new hazards for a workforce working at an elevated level," Courneya said.

The project has gone smoothly to date. Courneya noted the company is looking forward to the opportunity to participate in the second phase of this project, which will include the southbound lanes of the Mile-Long Bridge.

Concrete beams were chosen for the project for their strict, quality-controlled production and cost-effectiveness.

RECONSTRUCT OVER REHAB

Once completed, the new I-294 bridge will include two, side-by-side 4,800-foot-long structures, with improvements including water main replacements and new water retention and detention enhancements. When drawing out the plans for the overall Central Tri-State Tollway Project, engineers considered different options for the Mile-Long Bridge aspect of the project.

"We looked at what we could do with this bridge and decided to reconstruct it versus continuing to rehab it," Griffin said. "The biggest regional benefit of this project is the additional capacity that we're adding. The flex lane will potentially be able to carry transit accommodations across the bridge."

CONCRETE RISES TO THE CHALLENGE

While Illinois Tollway's initial plans included rehabilitation and redecking, the plan morphed into a complete reconstruction and widening initiative, and the team decided to break the project up into several different sub-projects. These included the demolition work plus the construction of the northbound and southbound bridges.

According to Griffin, the bridge designer made the decision to incorporate concrete in the new structure. Concrete made for an attractive choice because it didn't require splicing or temporary shoring. In addition, the pieces would be manufactured off-site and in a controlled environment, then shipped directly to the jobsite.

"We had a group of very smart structural engineers sit down and evaluate the use of these beams," said Griffin, who was drawn to prestressed concrete for its ease of use and quality control processes. "When you've got a project that has to move really fast, it helps tremendously to have the (components) built off site; you can then just bring them in and erect it."

Cindy Williams, deputy chief of program implementation for Illinois Tollway, concurred and noted prestressed concrete supports quick turnaround from a fabrication standpoint and reduced maintenance over time.

"You don't have to clean and paint at an elevation, which is another big benefit," she said, while also noting that concrete was used for the project's new drainage system, stormwater treatment structures and retaining walls.

KEEP THEM IN THE LOOP

Speaking with project owners, designers or engineers who are overseeing major bridge or highway projects, Griffin noted early outreach goes a long way in making the overall project a success. For the Mile-Long Bridge project, Illinois Tollway held its very first pre-bid meeting to kick off the planning and design process.

"We typically use a different format, but for this one we let the contractors, sub-contractors, and precasters know what we had in mind," Griffin recalled. "Up until that point, no one really knew what we were thinking."

The entire Mile-Long Bridge project is scheduled to be complete by 2023.

From that exercise, Illinois Tollway received good bids and cooperation early on from the contracting community. During those early conversations, the tollway team discussed its material selection options and focused on finding the best solution for the Mile-Long Bridge project.

"There are some agencies, even in this area, that don't look to precast, and I'm not sure why that is," Williams said. "Maybe it's just that they're unaware of some of the benefits of other options that are out there."

A GOOD START

Like any extensive municipal project, the Mile-Long Bridge will take several years to complete, but Griffin said the progress to date has been good. Illinois Tollway has received the concrete beams on schedule and has been getting them erected efficiently.

"We advertised the northbound bridge last year and are anticipating completion on that toward the end of this year, with some work finishing up early next year," Griffin said. "Then the southbound bridge and a portion of the demolition is scheduled to be advertised within a month. We anticipate that will be complete by the end of 2022 or in early 2023." PS

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