Placing the preeminent piece of a transit project puzzle.

Big Roll

BY DIANE CAMPIONE, S.E., PE.

Images courtesy of Alfred Benesch & Company

A MAJOR INTERSECTION improvement project on Chicago's South Side hit a major project milestone this past year—and also set a record.

Crews rolled in a massive piece of the transit project puzzle in late summer—a 394-ft-long, 2,375-ton steel truss railroad bridge. The structure is believed to be the largest steel truss bridge span ever rolled into place.

The new bridge is a key component of the 130th Street and Torrence Avenue reconfiguration, a $101 million effort by the Chicago Department of Transportation (CDOT) as part of the Building a New Chicago infrastructure program. The project as a whole includes a total of six new bridges—three railroad, one roadway, one pedestrian-only and one pedestrian/bicyclist—along with a mixed-use path, retaining walls (over 9,000 linear ft), a new drainage system, street lighting, traffic signals, roadway pavement, extensive landscaping and more.

The project is also a part of the CREATE (Chicago Region Environmental and Transportation Efficiency) program, which is a partnership between the U.S. Department of Transportation, the State of Illinois, the City of Chicago, Metra (the Chicago area's suburban commuter train system) Amtrak, and the nation's freight railroads. CREATE aims to invest in improvements to boost the efficiency of the region's deteriorating passenger and freight rail infrastructure.

Busy Intersection

The 130th Street and Torrence Avenue intersection serves approximately 38,000 vehicles daily, including freight trains and passenger trains via the Norfolk Southern Railroad (NS) and the Chicago, South Shore & South Bend Railroad (CSS&SB). The goal of the project, including the addition of the new steel truss railroad bridge, is to resolve significant traffic congestion issues, which increased when the adjacent Ford Motor Company decided to expand the Chicago Assembly Plant and create the Chicago Manufacturing Campus.

The project solution entailed a grade separation designed to eliminate the two NS at-grade crossings with the two roadways to improve traffic flow. Both the NS and CSS&SB railroads are constructed on offset alignments. "By creating the grade separation, we are hoping it will attract new businesses and industries to the area, because the vehicle and truck traffic will flow much more smoothly, uninterrupted by the 52 daily trains," said Soliman Khudeira, project director for CDOT.

According to Khudeira, when it came to the steel truss rail-

▲ The various crossings of the 30th Street and Torrence Avenue reconfiguration.

◀ The new bridge spans over Norfolk Southern Railroad tracks.

▼ The 43-ft-wide, 67-ft-high structure was rolled into place using four self-propelled mobile transporters.

▼ The new bridge, fully operational and train-ready.

road bridge, one option was to build the bridge offsite, near its final alignment, and roll it into place. Another was to build one half of the bridge at a time, then connect the halves into place. The third option was the conventional way of building it one beam at a time onsite over the NS tracks.

The latter option would have increased costs affiliated with staging, safety and labor hours, so the offsite option was selected. This approach significantly reduced the risk of injury, as it kept crews and stakeholders away from potential dangers both on and above the live railroad tracks. Other advantages of the roll-in option included continuous assembly of the truss span, enabling the contractor to control the erection schedule. With two-thirds of the truss spaning over the NS tracks, a built-in-place option would have extended the erection schedule due to limited track closure windows imposed by NS. Quality control was another benefit to off-site truss assembly, which made site access safer and easier for inspectors to test bolts, connections and more. In addition, the large open space for the on-site assembly allowed for an easier, more cost-effective roll-in process using self-propelled mobile transporters (SPMT) technology.

"The staging area for assembly was designed with temporary foundations to support the truss at points of intersecting steel," said Doug West, resident engineer with Alfred Benesch & Company (the bridge's structural engineer), who oversaw construction management of the project. "The truss was assembled day by day when materials were delivered. The schedule of material delivery and assembly were critical to keep everything going smoothly and avoid delays."

It took four months to assemble and paint the truss bridge offsite. Once complete, the 43-ft-wide, 67-ft-high structure was rolled into place using four SPMTs, which took approximately

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▲ Rolling in the 394-ft-long, 2,375-ton steel truss railroad bridge on SPMTs.

two hours. It took another two hours to align and set the bearings in their final locations.

The new double-track, through truss bridge has a ballasted deck and includes five approach spans consisting of 54-in.-deep prestressed box beams. It was determined that steel was the best, most durable and economical material for building the bridge. As it was designed for 100-plus years of service, long-term maintenance was taken into consideration for the design, including the use of high-performance, weathering steel to extend the bridge's life.

The roll-in of the truss structure entailed extensive planning and public involvement, given the project's overall complexity. Benesch's field crew worked with the City to ensure that local residents, businesses, public transit agencies and others were kept informed of the project's progress and how it would impact their daily lives. The company also worked with CDOT to assist with public meetings and distribute flyers.

With the roll-in completed, the next steps were to coordinate with the CSS&SB and Northern Indiana Commuter Transportation District (NICTD) railroads to build the new tracks and tie into their existing tracks to shift the train traffic onto the new truss and approach spans. The first train over the

Rolling the truss in.

A rendering of the final layout of the Torrence Ave.-!30th St. intersection.

Assembling the truss.

new truss span occurred on October 25, 2012, and single-track operation continued until November 8, when both tracks on the new truss span were operational. The next tasks are demolishing the existing CSS&SB bridge then constructing the new NS bridges on their new alignments. Before building the new bridges, the excavation 25 ft to 30 ft below the existing grade will need to be done for the new realigned Torrence Avenue and 130th Street roadways, which will allow vehicular traffic to flow unimpeded near the completion of the project. The depressed new roadways also require a new drainage system, complete with a detention chamber (located below the new 130th street), a 9,000-gpm tri-plex pumping station and a settling basin to adequately manage storm water. Scheduled completion for the entire 130th Street and Torrence Avenue project is slated for 2016. MSC

Owner
Chicago Department of Transportation

General Contractor
Walsh Construction, Chicago

Structural Engineer
Alfred Benesch & Company, Chicago