Uninterrupted Transit Service

Eads Bridge Undergoes Complex, Four-Year Rehabilitation While Maintaining Service

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The Eads Bridge was originally just supposed to get a new coat of paint. But when a systematic inspection revealed extensive fatigue cracking to the rail deck floor system, those plans changed. Metro St. Louis Transit (Metro) quickly determined to rehabilitate the entire historic span across the Mississippi in a comprehensive manner.

The goals were simple: (1) extend the life of an iconic bridge, originally constructed in the 1870s and the oldest still in operation over the Mississippi River and (2) complete the work with little or no disruption to commuters.

It would be a challenge.

The upper deck contained a four-lane highway and the lower deck light rail transit for commuters between St. Louis, Missouri, and East St. Louis, Illinois. The bridge represented a vital link for both roadway traffic and rail passengers. Metro's passengers in particular depended on the rail line. Because Metro's rail system provided no easy alternative route, any disruption to this line would impact lives, jobs and commerce. It looked to TranSystems to help facilitate the rehab through all three phases.

A Multi-Faceted Rehabilitation Project

The project included replacing support steel dating from the 1870s, refinishing and repainting the bridge's superstructure using a rust-inhibiting coating, upgrading Metro's light rail system with an entirely new rail deck, replacing messenger and contract wires with new overhead conductor rail and restoring a brick archway under the bridge. The budget was $48 million.

Five Unique Project Challenges

In addition to minimizing disruption to commuters, the project faced many challenges with a bridge of this scope and age.

(1) There were up to nine coats of paint on the bridge, as well as a significant amount of rust. All of the paint and rust needed to be removed first, in order to allow more detailed bridge inspections to determine the true scope of the work.

(2) The steel arch ribs had excessive amounts of corrosion and section loss on the exterior in the areas located near the road deck expansion joints. *(During inspection, a boroscope was inserted into the hollow arch ribs to investigate whether this section loss and corrosion was occurring on the steel staves of the arch ribs.)*

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(3) The confined areas of the bridge restricted how materials could be fed to the work site. The floor system's stringer lengths were limited to what could be delivered through the column spandrels.

(4) The bridge's load carrying capacity was also a challenge. The design team analyzed and load rated the bridge, accounting for all potential loads during construction (highway, railway, pedestrian, equipment and paint containment loads). Paying careful attention to wind loads, the team could only tackle paint removal, inspection and recoating 40 feet at a time – across 1,600 feet of the bridge.

(5) The bridge's iconic stature within local communities meant that stakeholders beyond the Metro and the City of St. Louis expected the bridge to be preserved and respected during its rehabilitation. There were many eyes on the work, watching over the bridge's historically aesthetic elements.

Maintaining Traffic Flow

The best way to ensure quality rehabilitation for the Eads Bridge with minimal disruption to commuters was to perform work on one track – and run both eastbound and westbound trains on the other track.

To do that, Metro first constructed a new interlocking plant on the east side of the river by the Metro station. When used in conjunction with an existing crossover on the west side of the river, Metro was able to operate eastbound and westbound trains without delay to customers for the entire duration of the project, even during peak service times. The single-track solution worked so well that changes or delays to the construction schedule had no impact on Metro.

The solution gave crews access to the rail deck, so engineering and construction moved forward unimpeded. The project team completely replaced the Metro's flooring, including track supports, track, and rail ties. They also replaced old messenger and contact wires with new overhead conductor rail, state-of-the-art technology that powers trains more efficiently and reliably.

On the upper deck, during the active repair and construction phases, traditional traffic control methods were employed on the four-lane highway. Travel was restricted to one lane in each direction. In this way, commuter safety was maintained while allowing inspection and construction crews full access to work areas.

The one-way highway lanes also reduced the loads on the bridge during construction allowing the contractor more flexibility.

An Echo of the Original Construction

When the Eads Bridge was originally constructed (1867-1874), its cantilever design was specifically chosen to allow steamboat traffic to continue during construction. The bridge's first comprehensive rehabilitation was completed with the same care and attention to commuter and commercial traffic in our modern setting. Nearly 150 years old, the bridge's life has been extended for another 75 years.

The elements of this success included a thoughtful and thorough inspection program, a forward-looking client, design and construction solutions tailored to an historic bridge with many site and materials constraints – and a continuity of service solution focused squarely on Metro passengers.

Allen Smith is a senior project manager with TranSystems and worked on the Eads Bridge project from start to finish. TranSystems served as owner's representative to St. Louis Metro on all three phases of the rehabilitation, which included conducting bridge inspections, providing field engineering support, designing the deck replacement, and providing overall construction support and inspection.