Dewberry last fall completed a $6 million federally funded project for the New Jersey Department of Transportation (NJDOT) utilizing accelerated bridge construction techniques. The project, which included resurfacing and drainage improvements in a heavily congested mile-long section of U.S. Route 9 in Woodbridge Township, New Jersey (near Staten Island, New York) involved a bridge superstructure replacement.

There were several constraints and challenges associated with the project's location. The crossing carries three lanes of Route 9 southbound traffic over the road's northbound ramp (Green Street), with an estimated 31,000 vehicles using the bridge daily. The circa 1937 bridge was a single span concrete encased rolled steel beam superstructure. The abutments were constructed at different skew angles (45 degrees at the south abutment and 37 degrees at the north abutment), resulting in a varying span length between 47.5 feet and 56.5 feet. The bridge was in desperate need of a new concrete deck.

Originally, the Route 9 southbound bridge was slated to be replaced as part of a larger roadway improvement project. However, NJDOT performed a “value engineering” review of the project and recommended reducing the scope to include only deck replacement. During preliminary engineering, it became evident that conventional staged construction with a cast-in-place deck slab would result in major traffic disruptions for at least a year. Accelerated bridge construction techniques were explored to reduce the construction period.

Engineers decided on a complete superstructure replacement utilizing prefabricated bridge superstructure units with steel beams. They also recommended closing southbound Route 9 traffic while the existing superstructure was removed and the prefabricated units installed. But the contractor EIW Construction Group was only permitted to shut down the roadway for a weekend to complete the demolition and install the new superstructure. The construction also had to be planned around the year-end holiday shopping season due to the bridge being located near the busy Woodbridge Center shopping mall.

In order to successfully complete the construction within the given time constraints, construction methods and durations were taken into consideration. Very early strength latex modified concrete, with a cure time of about four hours, was used as a closure pour to span between the new superstructure units and the existing approach slabs that were left in place. Details were also developed to simplify construction and account for the variable geometry of the existing substructures that would support the new superstructure units.

Beginning at 9 p.m. on Friday, Oct. 17, 2014, the contractor shut down the southbound lanes and began demolition. By 6 a.m. on Monday, Oct. 20, the bridge was reopened to traffic in time for the morning commute. Parapet and sidewalk construction as well as the final surfacing were completed in a subsequent stage with limited traffic disruptions.

Because of the detailing and planning done before the road was closed, risks associated with this type of construction were minimized and the contractor was able to complete the work effectively, resulting in a new superstructure that will extend the life of this structure for NJDOT.

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