

BUILT FOR SPEED AND

Virginia's 95 Express Lanes project transforms one of the country's most-congested highways to an efficient managed-lanes system



When the Virginia Department of Transportation announced the 95 Express Lanes Project — an expansion of 29 miles of northern Virginia's Interstate-395/95 high-occupancy-vehicle (HOV) lanes — in late 2011, they said the project would address “one of Virginia's most critical transportation needs.” With more than

200,000 vehicles traveling the segment daily, it was among the nation's most-congested roadways.

The \$700 million design-build project originated from an unsolicited bid submitted by construction joint-venture team Fluor-Lane 95 LLC and concessionaire Transurban (USA) Operations Inc.

HNTB had provided design services for the 495 Express Lanes located along the Capital Beltway, an earlier P3 project completed by the Virginia Department of Transportation, working alongside Fluor-Lane. Tapped to also design the 95 Express Lanes, HNTB drew on lessons learned from its 495 work to assemble a team that combined the wisdom of a crafty veteran with a hard-working attitude.

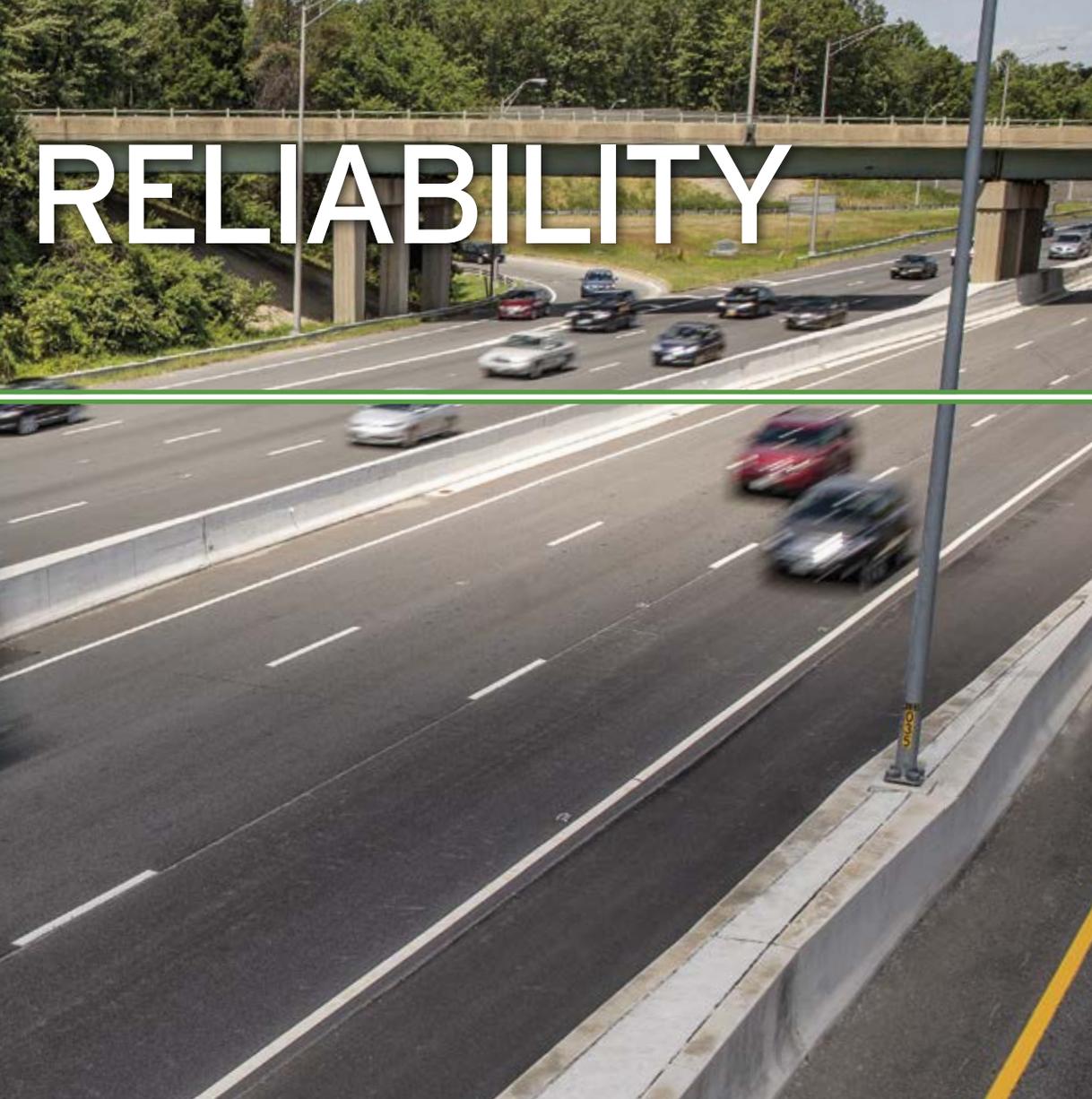
“Fluor-Lane had worked with a lot of the same HNTB designers on 495, and when the 95 Express Lanes project was developing, we were already a well-seasoned team with integrated solutions available for the client,” said Jeff Taylor, Fluor-Lane 95 deputy project director. “HNTB brought the right people to the table from the design side who worked on 495 and those with design-build experience from other parts of the country.”

COMPLEX DESIGN, SHORT TIMETABLE

The 95 Express Lanes project included retrofitting the existing, fully reversible two-lane HOV system with a third lane and incorporating high-occupancy tolling (HOT) technology throughout the 29-mile segment. VDOT mandated that the variable-priced HOT lanes be open for business by the end of 2014. To meet the aggressive deadline, HNTB worked with Fluor-Lane 95 to develop a schedule that allowed the contractor to begin construction early and phase it efficiently as design packages were finalized.

Design, which included geometric layout, drainage and flood plain analysis, traffic modeling and roadway, intelligent transportation system and toll system design, began in January 2012 and was 99

RELIABILITY



percent complete in 12 months. Fluor-Lane 95 started construction in August 2012, operating under a mantra of “build 29 miles in just 29 months.”

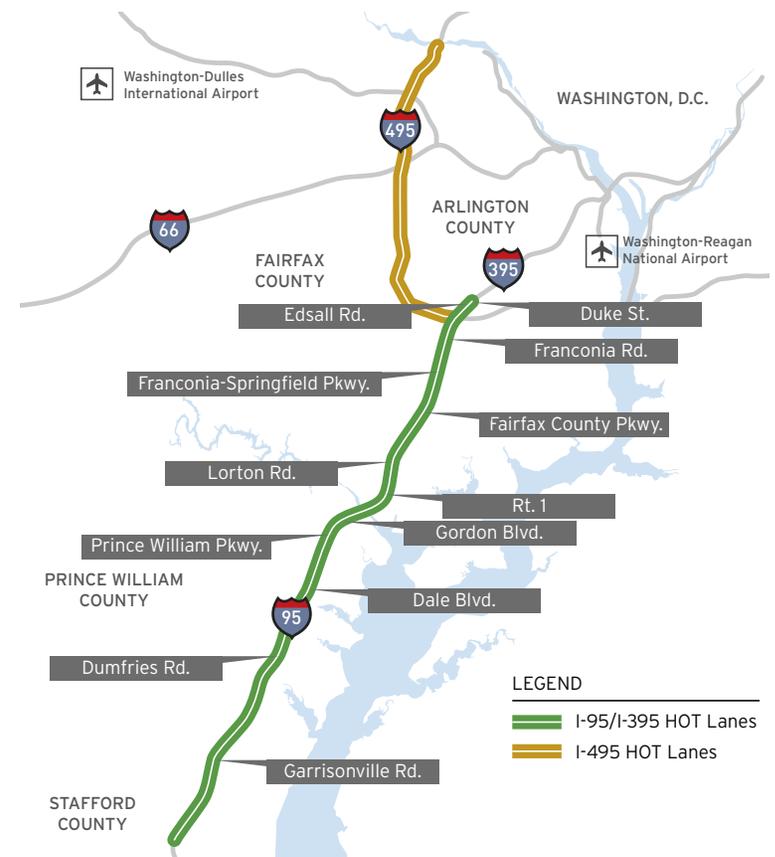
For the first eight months of design work, while Fluor-Lane 95 finalized its project office agreement, HNTB hosted the entire design-build team in its Arlington, Virginia, office. The team then moved to the project office and remained co-located throughout the rest of the design process.

“Co-locating allowed team members to work collaboratively under one roof,” said Adam Dayhoff, HNTB project manager. “We were full speed as soon as everyone was together, and it gave us a good head start. Focusing on the same challenges from the beginning meant there was no lag time and created a camaraderie that stayed for the whole project.”

After construction was underway, work was carefully managed to meet VDOT’s requirement that the existing HOV system remain open to commuters during normal rush-hour periods. The work zone, restricted to the existing HOV footprint of two 12-foot lanes with shoulders separated from the general purpose lanes by a traffic

Design of the 95 Express Lanes project began in January 2012 and was 99 percent complete in just 12 months. Co-location of the project team and collaboration among all partners fast-tracked completion of the project.

I-95 HOT Lanes System





barrier, was established along the west barrier by shifting traffic closer to the east barrier.

After work was completed on the west barrier, a major traffic shift moved the work zone to the east side — two months ahead of schedule — allowing the remainder of the corridor to be completed.

ADDING QUALITY AND REDUCING COST

Because the existing I-95 lanes remained open during construction, traditional on-site surveys were not an option. Instead, HNTB used LiDAR to create a highly accurate, highly detailed 3-D model of the facility. The data then was placed in the cloud for access by HNTB designers across the country.

“While we were obtaining the LiDAR scans, snapshots of the roadway corridor were also taken,” said Jim VanWormer, who served as HNTB’s 95 Express Lanes project manager during the design phase. “Essentially, we had a movie by section and could match the

scans to what we saw in the photos. The amount of detail it provided gave us the basis for our design.”

Among other benefits of this approach, HNTB could rely on LiDAR data to minimize the depth of asphalt overlays, saving the contractor time and money. The LiDAR scans also aided in meticulous staging and building within the project’s complex constraints.

SAFE AND SUCCESSFUL

Opened December 14, 2014, the new 95 Express Lanes connect directly to the 495 Express Lanes, creating a 40-mile tolled highway network that stretches from the outer suburbs to Washington, D.C.

“Commuters are experiencing 10 to 20 minutes less time round trip on their daily commutes, and not just in the express lanes,” Taylor said. “Drivers in the general purpose lanes also are seeing improved mobility.”

The greatest value of the project was its safety culture, said VDOT Program Manager H.S. Warraich. The 95 Express Lanes was one of the nation’s safest heavy civil jobs, achieving more than 4 million safe work hours without a lost time incident.

“It was one of the safest projects I’ve ever worked on,” Warraich said. “The team didn’t just talk about safety, but really practiced it.” ■

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— **JEFF TAYLOR**
95 DEPUTY PROJECT DIRECTOR, FLUOR-LANE

INTELLIGENT INSTALLATION

To allow for HOT-lane tolling, the 95 Express Lanes project required installation of an all-new intelligent transportation system. HNTB designed the infrastructure for toll signs, dynamic messaging boards, communication and power for the 29-mile segment.

“Price-managed lanes projects require complex ITS design,” said Matt Devery, HNTB ITS lead for the project. The 95 Express Lanes presented a particular challenge because traffic flows one way during morning rush hour and is reversed to accommodate end-of-work-day commuters, using a series of gates to open and close lanes depending on the direction of traffic. This highly dynamic system remained open through construction.

HNTB designed the gates and their relevant dynamic message signs, as well as two types of closed-circuit televisions that use automated cameras to ensure that all vehicles have exited before the lanes are reversed. The cameras also assist Transurban, the concessionaire, by sensing when there is a stopped vehicle, an accident or debris in the roadway.

“This approach contributed to very efficient operations,” Devery said.



The ITS scope included installing 700 miles of cable, 1,000 tolling and traffic management devices and 15 tolling sites with 30 toll gantries. Sign and ITS pole foundations generally are designed by the vendor. On this project, however, HNTB designed



many of the sign foundations to speed up construction, allowing the contractor, Fluor-Lane 95, to begin sign construction without the vendor having completed its portion of the design.

The 130 new sign structures posed another key challenge.

“The area already was overloaded with signage, so we had to find the balance between giving people enough information, but not so much that they would be overwhelmed,” said Adam Dayhoff, HNTB project manager. With advance planning and



engagement in the process from Fluor-Lane 95, Transurban, VDOT and the Federal Highway Administration, HNTB replaced the old high-occupancy vehicle lanes signage and about 25 percent of the general purpose lanes signs.

“All project partners worked together to deliver the appropriate amount of signage in the corridor,” Dayhoff said. “The signage helps attract people to the corridor.”

To meet the requirements of the tolling equipment, HNTB designed the toll gantries with minimal movement and with frequency analysis to ensure the readers and cameras would function even under high wind conditions.

“The ITS system had to be designed in a short time frame and was very complex in the context of the existing HOV system,” Devery said. “HNTB had the experience to deliver in that time frame and with quality.” ■