Major North-South Corridor Project

Reconstruction boosts traffic flow and improves safety.

By Jim Zufall and Marc Devos

Constructed in 1961, I-25 is a four-lane divided highway that provides the only north-south interstate corridor in the mountain region, linking Mexico and the United States all the way through northern Montana. As a vital regional link, it carries considerable truck traffic. In Colorado, I-25 runs through the four largest metropolitan areas in the state, carrying significant commuter traffic.

Regional population growth north of Denver spurred the Colorado Department of Transportation (CDOT) to commission an environmental impact statement to evaluate improvements to 40 miles of Interstate 25. The Interstate was beset by problems. Traffic volume was increasing, with commuters from northern communities driving to work in the Denver metropolitan area, and accidents were becoming more frequent. The infrastructure was also aging, evidenced by large areas of pavement deterioration in the corridor. Since the "North 40" corridor is instrumental in the economic development along Colorado's north Front Range, CDOT determined that reconstruction and expansion were required on that section of the highway.

The aim of the reconstruction was to provide safety and mobility improvements with a multi-modal focus on the future. Results of the environmental impact statement (EIS) determined that an additional lane was needed in each direction and that provisions should be made to allow for that lane to be an HOV lane. The plan also called for widening the medians to provide greater separation between directions of travel, while providing space for future widening. An additional element to be integrated into the corridor was reservation of a 30-ft envelope at the edge of the mainline that could serve future transit needs. Motorists were provided with real-time camera information offering news of travel conditions on variable message signs. The added capacity also allows semi-truck traffic to operate with less impact on other users.

New mainline pavement construction occurred directly adjacent to traffic. Four lanes of through traffic at 65 mph were kept open during reconstruction of the Interstate.

The Project

In 2002, CDOT began construction on the first two segments north of Denver, totaling eight miles. While those segments were under construction, CDOT selected URS (www.urscorp.com) to design the third segment. That segment covered five miles between State Highways 52 and 119 and included two bridges over a county road as well as reconstruction of frontage roads on both sides of the interstate, which provided access to area businesses. The conceptual design contemplated in the EIS had the widened highway and frontage road staying on the existing highway alignment.

The design team proposed realigning the highway to the east, which would keep the west side frontage road in its current location and preserve existing businesses on the west side that otherwise would have been a project casualty. This proposal saved CDOT $3 million in right-of-way acquisition and business relocation costs. It also preserved the businesses that comprised the commercial development for the small town of Frederick.

At the completion of the design of Segment 3, CDOT, which had begun designing Segment 4 in-house, asked URS to join its own engineers in a blended team. I-25 in this segment involved a river crossing, a county road crossing, and complete reconstruction of the SH 66 interchange, including the reconstruction of one mile of SH 66. In addition, drainage facilities and utility relocations also were required. A Park-n-Ride (a bus stop with a parking area) was also included in Segment 4.

Maintaining Traffic Flow

One of the principal challenges was developing a construction phasing plan that would maintain the existing two lanes of traffic in each direction at a speed of 65 mph while work proceeded. The new paved width of I-25 is significantly wider and has an improved horizontal and vertical alignment that added to the difficulty of maintaining the flow of traffic and continuous access at existing interchanges.

The problem was resolved by identi-

Unique bridge abutment design provides 14-ft maintenance ramp access to I-25 median.

fying a logical sequence between the segments of work and preparing detailed construction phasing plans that would minimize delay and provide safety during nighttime hours of operation. The goal of the phasing plan was to build as much usable new pavement as possible without interfering with the existing lanes. Initial new construction had to be wide enough to support at least two lanes of traffic.

Further complicating the task of managing the physical aspects of construction was the need to balance the earthwork between the phases of construction. Multiple earthwork models representing the various phases of construction were developed, allowing the actual volume of earthwork that was required to complete a phase of work to be matched to the volume available within work units. This often meant adjusting the limits of the various planned phases of construction to make the earthwork balance. Once the final limits were established so that the earthwork would be balanced, crossovers were designed to tie the existing lanes to the new pavement. Traffic was then shifted onto the new stretch of pavement, allowing the existing pavement to be removed so that the remainder of the new pavement could be constructed in a subsequent phase.

Innovative Solutions

One of the unique design features was the use of long, tub-style girders, spanning a distance of nearly 200 ft on the SH 66 Bridge. Also known as prestressed, post-tension girders, tub-style girders have flared sides and an open top. Their use eliminated the need for a supporting pier in the median of I-25. Such piers can be a hazard to vehicular travel and usually require crash protection, which adds to the long-term maintenance cost of the project.

Completed construction showing variable message signs, cable safety barrier to avoid cross over accidents, and wider shoulders to allow for the HOV lane buffer.

Safe access to the median area of I-25 for routine maintenance activities was provided by the use of a special MSE wall abutment configuration at the under-crossing county road. The new configuration results in a 14-ft wide ramp that connects the under-crossing roadway to the Interstate median area. This access keeps CDOT maintenance workers from having to access the median from the left lane of the Interstate. Slowing a truck down to access the unimproved median for mowing or other maintenance would be a hazard to both the workers and the traveling public.

The third and fourth segments of the project contained a total of seven bridges. Keeping bridges ice-free in the midst of severe Colorado winters is a challenge to designers. Without the ground below to provide insulation, bridges ice up faster than roadways.

To combat this problem, CDOT has a program to install anti-icing systems on every newly constructed bridge. These systems apply magnesium chloride to the bridge deck via sprayers. Magnesium chloride has a lower freezing point than water and therefore keeps the bridge deck from icing up as quickly. These systems are designed to be activated in three different ways. As part of the project, a weather monitoring station was installed that tracks air temperature, wind, precipitation, and also measures pavement temperatures. The information from the weather monitoring station can activate the anti-icing system. The anti-icing system is also tied into the CDOT traffic control center, which gets the weather station information as well as the video monitoring information and can activate the system remotely. The system is also designed to be operated by hand held remote control by a maintenance worker if the system needs to be activated.

The reconstruction and expansion of I-25 has enhanced the safety and mobility of the highway. In addition, the provision for multi-modal options assures congestion relief well into the future.

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