Franklin is key

Texas road project to reflect art, mountains

By Travis McCarthy
Contributing Author

They say everything is bigger in Texas, and the Loop 375 Transmountain West roadway improvement project outside of El Paso seems intent on proving that point.

Sundt Construction Inc.'s $61 million project to widen a heavily utilized, 3.5-mile stretch of the road from two to four lanes includes the construction of two massive direct-connector bridges (linking Transmountain to eastbound and westbound I-10) that together measure more than a mile-and-a-half long. Each of the two-lane connectors is 28 ft wide and will accommodate one direction of traffic.

Sundt is self-performing the project's utility, earth and concrete work and expects to pour 21,000 cu yd of concrete for the concrete structures, which consist of foundations, columns, pier caps, poured-in-place bridge decks and barrier rail. The 24-month project for the Texas Department of Transportation (TxDOT) also includes the construction of four smaller street bridges, frontage roads, grade-separated intersections and exit and entrance ramps.

Imitating art

The majority of the 108 cast-in-place concrete columns that will support the bridge decks are hammerheads (spread footings with a single column and a hammer-shaped pier cap). There also are some straddle bents for those areas where a single column would obstruct the roadway.

Creating the rustication pattern on the columns has been one of the most challenging aspects of the project so far. The intricate geometric design was created by the project's artist to reflect the nearby Franklin Mountains and seemingly endless Texas sky. After 16 weeks of unexpected delays, the artwork was at last finalized—and discovered to be fairly challenging to implement.

"One of the biggest and most common challenges in construction is balancing the expectations of design with the reality of actual construction," said Tom Wedding, project manager from Sundt's Concrete Division. "Our concrete superintendent, Greg Prester, really went above and beyond in working with the artist to come up with a final product that was pleasing to her and the client, and at the same time was constructable."

There is a mere $\frac{1}{8}$-in. tolerance on the

detailed design. That requires a high level of precision when setting the concrete forms even under normal circumstances, which these are not. As the name suggests, the Transmountain area is hilly, which means that the columns vary widely in height as dictated by the undulating terrain. Getting near-perfect results on dozens of columns of unique heights essentially meant that each one was a custom job. And even though the concrete work began approximately four months later than planned, there was no adjustment to the original project completion date.

"Maintaining quality of the rustication pattern was very tough," explained Sundt Concrete General Superintendent Kent "Jay" Anderson. "There's a 16-in. smooth spot between the top of every column and the bottom of the pier cap. That has to be maintained on every column, so every time you have a column of a different height, you have to change the rustication. Essentially, it means that every column is unique."

How and where the columns meet the ground also affected the design, thereby adding complexity to the concrete operations.

"Because each column differed slightly from the prior one poured, all of the columns had to be laid out before construction to determine the correct amount of rusticated liner as well as the quantity of forms to be ordered," Wedding added. "The changes in the exposed area required every column form to be specific, and it took a great deal of planning to ensure that the sequencing flowed in the most efficient manner."

With simpler rustication patterns, the form can often be taken apart in two pieces that are joined by hinges and then reassembled in a similar fashion. But in this case, the form panels had to be taken apart in four pieces because of the depth of the design and then set as four individual pieces.

"The way we had to handle the form liners added a lot of time and labor units," Anderson noted. "We ordered extra sets of forms to help speed up the production process and allow for the four-day cure time for each column."

Altogether, it took 30 full-time Sundt concrete craft workers and four superintendents approximately five months to make the bridge columns using a standard TxDOT Class C concrete mix design. The column pier caps also required extensive customization.

"A typical installation allows for final adjustments in the bearing seats, but what we've done here, per the plan specifications, is take the pier caps and rotate them so the adjustment is in the slopes," Anderson explained. "It took a lot of extra work, and we ended up ordering extra pier-cap forms as well."

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Working within

There are other aspects of this project that have made it complex and well-suited for Sundt, with its heavy civil construction expertise and experience working in environments that are logistically challenging. Site access has been a top concern, since the project area is very tight and TxDOT has requested minimal—if any—road closures that might disrupt traffic on its way to and from a nearby outlet mall.

Many of the bridge columns are located between a live traffic lane on I-10 and an on-/off-ramp. Getting equipment and materials into those areas, with limited access, has taken extraordinary planning and coordination. Most of the time Sundt's crews worked from within the median, setting columns with four cranes ranging from 16 to 100 tons, with traffic rushing by just a few yards away.

The length of the connector bridges (3,840 and 3,454 lineal ft) also has introduced complications to the project, especially as crews work to set the 36 steel and 346 precast concrete girders for the bridge spans while creating the radius for each connector. Sundt's crews will set 33,000 lineal ft of precast beams throughout the project—some as long as 130 ft.

"Setting the girders on a radius is a hard operation to put together; it takes a lot of time and crane coordination," explained Javier Aviles, Sundt's heavy civil and overall project manager. "Whereas most bridge work is done in a linear fashion and is fairly repetitive, the radius requires the work to be constantly adjusted. The steel girders are slightly curved and fit together to create the radius sections of the bridges."

The girders are being set with Crane Service Inc.'s 140- and 250-ton cranes. Space to move and place the girders is essential, but since space is at a premium on this project—and road closures are a very occasional luxury—the team has had to work very hard to plan their operations carefully to maintain the schedule and keep the roadway safe for travelers.

"When we approach the superstructures, we're crossing over live traffic on

Sundt's crews have finished setting the steel girders on one of the Loop 375 Transmountain West direct connectors and are now in the midst of setting the concrete girders.

Transmountain and the westbound on-/off-ramps to I-10 and over the top of I-10, and they don't stop traffic underneath," added Anderson. "So we have to false deck it [where a temporary deck is placed on the bottom flange of the girders to allow crews to work while protecting live traffic below]. It's an important precaution to protect the traveling public, but it adds another step in the process for us."

Sundt's crews have finished setting the steel girders on one of the direct connectors and are now in the midst of setting the concrete girders, completing the remaining spans of the connectors. The two operations were run concurrently on the connector, requiring constant coordination and communication between the teams completing the work. At this point, it appears that the 16-week delay has been made up, and the project will be completed on schedule in spring 2014.

So it's true what they say: Things do tend to be bigger in Texas. On the Transmountain project, that has included connector bridges, concrete quantities, unexpected delays, coordination efforts and all types of construction headaches, to be sure. But on the flip side, the rewards of turning a challenging set of circumstances into a successful project also are oversized here, and Sundt is proud to be a part of that. CP

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