More direct

Tampa connection will help motorists, trucks

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The Florida Department of Transportation (FDOT), in cooperation with Florida's Turnpike Enterprise, the Tampa Hillsborough Expressway Authority (THEA) and the Federal Highway Administration, has designed the I-4/Selmon Expressway Interchange, known as the "Connector."

This improvement is a segment of enhancements identified and approved in the Tampa Interstate Study/Final Environmental Impact Statement.

The Connector design features a limited-access interchange that extends from the Selmon Expressway north along the west side of 31st Street to I-4. The elevated design includes a series of separate ramps created to improve the regional movement of traffic throughout the Tampa Bay area. It serves to route commercial traffic and hazardous cargo away from the Ybor historic district, while providing direct access for trucks from I-4 to the port of Tampa. The project completes an important regional link in the Tampa interstate system and provides an alternative route for commuters from the west and downtown Tampa. It also provides an additional hurricane evacuation route and will aid emergency-response providers.

The I-4/Selmon Expressway Connector was conceived in the late 1990s as a high-speed route between south Tampa and Orlando, as well as from Lutz to Brandon. Planning for the project was completed in late 2008, with funding secured in summer 2009. The American Recovery and Reinvestment Act of 2009 provided about $105 million, allowing the project to begin construction in March 2010. In November 2009, the contract was awarded to a joint venture (JV) partnership between PCL Civil Constructors Inc. and Archer Western Contractors Ltd. for $389 million; construction began on March 1, 2010.

Thirty-five bridge structures are involved in this undertaking, including: deck replacements and widening of existing structures, new construction of steel-beam spans, Type IV AASHTO beam spans, bulb-T spans, Florida U-beam spans and 12 precast segmental box-girder structures (utilizing both balanced-cantilever and span-by-span construction methods).

Pilot part of project

Drilled shafts, socketed into sound limestone, provide the primary foundation element for the new multibridge project. The majority of the 1,131 drilled shafts on the project range in diameter from 36 to 54 in. and vary in length from 49 to 183 ft with rock sockets from 3 to 61 ft. Because of the wide variance in subsurface conditions, pilot holes were advanced at every drilled-shaft location. Typical footings are classified into four types and are supported by at least four drilled shafts.

From the bottom

More than 300 concrete substructure units, consisting primarily of multicolumn bents with inverted-t caps and monolithic piers, support the bridge superstructure of this multilevel ramp configuration. Typical column dimensions for the rectangular piers are 6 × 5 ft, 8 × 5 ft and 8 × 7 ft. The tallest pier is more than 87 ft high.

Accommodating roadway curvature for balanced-cantilever construction required the use of counterweights to balance the transverse loads induced by the curved superstructure.

To speed construction, the JV proposed a bottom-up concrete placement method for the columns and piers. This method used a concrete pump truck and a specially formulated concrete mix to pump concrete into the form. The placement began at an injection point near the base of the column. Similar injection points were placed incrementally along the height of the pier. Once the concrete level had passed the next injection point, the pump hose was jumped to the next location, and the injection continued. Occasional pulses of form vibration kept air bubbles rising with the concrete. This innovative method produced an excellent concrete finish.

Piecing together

The major superstructure element on the project is precast concrete segmental box girders. A casting yard was established nearby at the port of Tampa, where a total of 2,765 precast segments are cast from six typical segment beds and two pier-segment beds. Casting began on July 14, 2010, and all segments are anticipated to be cast by the end of 2012. Twelve individual segmental bridge structures are made up of 149 spans. Typical precast segments are 9.5 ft deep and vary in length from 9 ft 2 in. to 10 ft. Segment widths vary from 30 ft 1 in. to 47 ft 3.5 in.

Limited right-of-way and crossing of both CSX railways, I-4 and the Selmon Expressway necessitated the use of both balanced-cantilever and span-by-span segmental construction methods.

Balanced-cantilever construction is used for 104 spans—more than two-thirds of the project—easily spanning CSX railway lines, the Selmon Expressway, State Road 60, numerous local streets and I-4, while keeping traffic moving. Erecting cantilevers over active railways and roadways influenced the JV's decision to utilize segment lifters to erect many of the cantilevers crossing the Selmon Expressway, Bulk Intermodal Distribution Services Terminal and the CSX Hookers Point Mainline railway. The longest cantilevers have 28 segments with spans in excess of 250 ft.

Accommodating roadway curvature for balanced-cantilever construction required the use of counterweights to balance the transverse loads induced by the curved superstructure. In some cases, this required as much as 450,000 lb of precast solid concrete blocks arranged near the outside of the curve over the pier.

Forty-five spans will be erected by the span-by-span method using an overhead gantry. This method was chosen for one bridge because it is located between the Selmon Expressway and the CSX Hookers Point Mainline railway with no room to place cranes and erect by the balanced-cantilever method. Similarly, span-by-span construction was chosen for a long run of spans tucked between the Selmon Expressway and an inlet to McKay Bay. The typical length for spans built using span-by-span construction is 143 ft.

Completion of the Connector is scheduled for 2013 and will bring increased traffic mobility to the Tampa area, benefitting commuters, commercial traffic, local communities and interstate users. R&B

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For more information about this topic, check out the Bridge Channel at www.roadsbridges.com.