2011 â?? US 6 Bridge over Keg Creek

Description

Meta Fields

Contact Us | Phone: (305) 348-0110 | Email: abc@fiu.edu | 10555 W. Flagler Street, EC 3680 Miami, FL 33174

Contact Us | Phone: (305) 348-0110 | Email: abc@fiu.edu | 10555 W. Flagler Street, EC 3680 Miami, FL 33174

Contact Us | Phone: (305) 348-0110 | Email: abc@fiu.edu | 10555 W. Flagler Street, EC 3680 Miami, FL 33174

Project Summary : totally prefabricated bridge replaced with a 14-day closure using prefabricated elements; this bridge was the first pilot construction project to use the Strategic Highway Research Program 2 (SHRP2) ABC toolbox that was developed under the SHRP2 R04 research project, â??Innovative Bridge Designs for Rapid Renewal.â?•
Project Location : on US 6 over Keg Creek 6 miles east of the city of Council Bluffs
Mobility Impact Time :

- ABC: 2 weeks of traffic disruption
- Conventional: 4-6 months

Impact Category : Tier 3 (within 2 weeks)
Dimensions : 204.5-ft-long and 47.2-ft wide three-span modular decked steel beam bridge (67.25 ft - 70 ft â?? 67.25 ft)
Average Daily Traffic At Time Of Construction : 5380
Traffic Management : extended use of 22 (13 out-of-distance)-mile detour
Existing Bridge Description : Built in 1953, the existing three-span 180-ft by 34.7-ft two-lane continuous concrete girder bridge was structurally deficient and required replacement.
Replacement Or New Bridge : The replacement bridge has two traffic lanes, one in each direction, and two 8-ft-wide shoulders. It consists of precast semi-integral abutments, precast columns and pier caps connected with high-strength grouted couplers, modular beams with composite slab superstructure, and precast approach slabs. Each superstructure span consists of six modular full-span beam segments. The segments are 7.3-ft wide with two W30x99 steel rolled I-beams and 8.5-inch-thick composite concrete deck that includes a 0.5-inch grinding allowance. Six-inch-wide longitudinal closure joints filled with ultra-high-performance concrete (UHPC) connect the segments.
Construction Method : The bridge was constructed as a three-span continuous bridge by combining field-cast UHPC joints with simple-span modular segments erected with conventional cranes. UHPC joints were used for both the longitudinal joints between adjacent modular beam segments and, for the first time in the US, the moment-resisting transverse superstructure joints at each pier. Prior to construction, structural testing was done to evaluate the moment-resisting transverse connection over the piers. The bond broke between the UHPC joints and deck panels, and cracking was observed in the panels. As a result, the beam ends across the piers were retrofit with longitudinal rods post-tensioned to 70 ksi in the field. The contractor fabricated the precast elements on site, and concrete drilled shafts were constructed outside the bridge footprint at the two interior support locations. The superstructure spans were prefabricated in a field adjacent to the site. The contractor chose to fabricate the modules in their exact relative location and cast the deck with a traditional paver. This required the contractor to provide formed voids in the deck for the UHPC joints, thus allowing the contractor to separate the modules. All formwork for the deck was supported from the longitudinal girders similar to conventional construction. The bridge was then closed and demolished. The 4-ft square precast columns were installed on the drilled shafts, connected with grouted splice couplers in the columns. The 85-ton pier caps were lowered onto the columns, connected with grouted splice couplers in the caps. Abutment steel H-piles were driven, and precast abutment stem and wingwalls were assembled. Self-consolidating high-performance concrete (HPC) was cast in the abutment cap pockets. The 60-ton modular steel beam and composite concrete deck segments were installed, complete with traffic railing on the outside segments and suspended abutment backwalls. The exterior modules with railing were carefully rigged for a balanced lift. Longitudinal and transverse closure joints in the deck were cast with UHPC. The precast approach slabs were assembled. Self-consolidating HPC was cast in the deck lifting loop pockets and in the precast approach pavement joints. The deck and approach slabs were diamond ground to final profile. Fully-contained flooded backfill was used to minimize approach settlement and avoid the bump at the end of the bridge. A structural health monitoring system was installed to assess the overall bridge performance during and after construction. The contract included incentives / disincentives of $22,000 for road closure with detour in effect per day less than / greater than the 14-day maximum closure.
Stakeholder Feedback : Extra attention is needed for field tolerances. The contractor had difficulty

Contact Us | Phone: (305) 348-0110 | Email: abc@fiu.edu | 10555 W. Flagler Street, EC 3680 Miami, FL 33174

Contact Us | Phone: (305) 348-0110 | Email: abc@fiu.edu | 10555 W. Flagler Street, EC 3680 Miami, FL 33174