2020 – De Roche Creek Strs. & Apprs.

Description

Meta Fields
Construction Schedule 0 Construction Schedule File : 4816
Specifications 0 Spec File : 4814
Abc Construction Equipment : strand jacking frames, hydraulic control station
Prefabricated Bridge Systems : FDcBs {Full-Width concrete-Decked steel Beam Unit}
Contracting : A+B+C bidding
Project Delivery : design-bid-build
Decision Making Tools : State process, benefit/cost method
Longitude : -93.030556
Latitude : 34.213889
Nbi # : 0000000000A7427, 0000000000B7427
State Id # : A7427, B7427
Construction Equipment : Lateral Slide
Total Bridge Length Ft : 170.5
Max Span Length Ft : 170.5
Beam Material : Steel
Spans : One-span
Location : Rural
Owner : State
State : AR
Year Abc Built : 2020
Rapid Embankment : other rapid embankment: low-fines free-draining backfill similar to railroad ballast
Foundations & Walls : CIP substructure under traffic
Construction Schedule : 1
Contract Plans : 1
Additional Information : November 2021 ABC-UTC Monthly Webinar, “Arkansas’ ABC & First Lateral Bridge Slides”
Funding Source : Federal and State
Costs : The winning project bid was $12.7M in June 2019. There were two bidders on the project. The bridge cost was $400/S.F. bid versus approx. $200/S.F. for non-ABC. The biggest discrepancy was in the temporary falsework, jacking, and lateral slide costs, likely due to uncertainties with the first-time

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

use in Arkansas.
Contacts : Owner: Rick Ellis, P.E. State Bridge Engineer Arkansas Department of Transportation Email: Rick.Ellis@ardot.gov Phone: 501-569-2361 **Designer:** Fred Harper, P.E. Department Manager-Bridge Michael Baker Int'l. Email: Fred.Harper@MBakerIntl.com **Contractor:** Manhattan Road & Bridge **Steel Fabricator:** W & W/AFCO Steel **Bridge Lift and Move Subcontractor:** VSL **Submitter:** Adeyemi Sowemimo, Ph.D. candidate UGA research assistant University of Georgia IBT/ABC-UTC Graduate Student Submissions Initiative
High Performance Material : High-early-strength concrete in approach slabs
Stakeholder Feedback :

- The overall construction process went smoothly, with no major issues or delays.
- Proper geometric planning is essential to ensure the success of the lateral slide and overall construction process.
- Conducting a test slide prior to the closure of the interstate was a key step in preventing potential issues during the actual slide; the test slide was required in the special provisions.
- Having a well-prepared contingency plan is crucial in case any challenges arise during the lateral slide.
- Continuous and improved communication between all key players—engineers, contractors, and subcontractors—is essential for the successful execution of the project. Several meetings were held before the slide, and stakeholders were on continuous notice.

Construction Method : The contractor drove permanent steel casings for drilled shafts, seated in the sandstone and shale bedrock, to support permanent semi-integral straddle bent abutments underneath the end spans of the existing bridges. Typical drilled shaft construction followed. The reinforced concrete straddle bent caps were then built on the shafts. Due to the bridge being shortened to a 170-ft simple span, longer wingwalls were required. Wingwall piling was driven to provide support and align the wingwalls as close to the bridge as possible, and the 25-ft-long wingwalls and front-end wall facings were constructed. A center wall was also constructed in the median between the existing bridges to line up with the semi-integral abutment backwalls. A special end bent backfill similar to railroad ballast was used to compact more quickly and to be free-draining. The temporary falsework to support construction and sliding of the replacement spans was then built. Double rows of steel H-piles were driven to support the temporary end bent caps that were cast parallel to the straddle bent caps under tight geometric controls. The bridge superstructures were then constructed on the temporary falsework using conventional means. The superstructure construction included the reinforced concrete semi-integral end bent diaphragms, deck, and railing. Lengthened approach slabs, made of high-early-strength cast-in-place concrete, were constructed to speed roadway approach work. To accommodate the lateral slide mechanism, 8-inch diameter corrugated ducts were integrated into the end bent diaphragms. These ducts housed prestressed strands used in the hydraulic jacking system. The slide system itself was composed of a low-friction surface created by placing PTFE (Teflon) sheets on top of the caps, with stainless steel plates embedded into the bottom of the semi-integral end bents. This combination provided a smooth interface that reduced friction during the slide. The westbound bridge was closed and both directions of traffic were carried on the existing eastbound bridge for 8 days. The westbound bridge was demolished, and the new westbound bridge was slid into position in a carefully controlled operation that lasted approximately 10 hours. Following the successful placement of the westbound bridge, a few weeks later a similar process was repeated for the eastbound bridge. (See the November 2021 Monthly Webinar Archive for additional details on the lateral slide process used in this project.)
Replacement Or New Bridge : Each of the twin 170-ft-long single-span replacement bridges has

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

three 12-ft-wide traffic lanes and two 10-ft-wide shoulders. The 59-ft-wide cross-section consists of seven 69-inch-deep Grade 50 weathering steel plate girders spaced at 8.92 ft, with a composite reinforced concrete deck. The superstructure is supported on semi-integral reinforced concrete abutments founded on 6-ft-diameter reinforced concrete drilled shafts. The single span simplified the lateral slide process and reduced the environmental impact on De Roche Creek. The existing 0.5-degree horizontal curve on the bridges was maintained in the finished deck to provide a smooth roadway geometry. The steel plate girders were chorded to keep the structural framing and slab process as simple as possible. This resulted in varying cantilever dimensions.
Existing Bridge Description : Each of the existing 210-ft-long twin bridges consisted of three 70-ft spans. They were each 42.25-ft wide with two 12-ft-wide traffic lanes, 10-ft-wide shoulder, and 6-ft-wide shoulder. The superstructure cross-section consisted of steel beams with reinforced concrete deck and was supported on multi-column concrete bents on spread footings. The aging of the bridge prompted the need for a full replacement.
Traffic Management : 2 years with reduced number of traffic lanes
Average Daily Traffic At Time Of Construction : 29000
Dimensions : Twin 59-ft wide, 170.5-ft-long single spans with 0.5° horizontal curve
Primary Drivers :

- Reduced traffic impacts
- Reduced onsite construction time
- Improved work-zone safety
- Improved site constructability
- Minimized environmental impacts
- Maintain existing alignment
- Additional primary drivers:
    - Maintenance of traffic
    - Minimize deck area

Impact Category : Tier 3 (within 2 weeks)
Mobility Impact Time :

- ABC: for each bridge, 8 days with traffic reduced to a single lane in each direction during the 11-month onsite construction time
- Conventional: 2 years of traffic disruption

Project Location : Interstate 30 over De Roche Creek, southwest of the Arkansas capital of Little Rock, just north of the town of Arkadelphia
Project Summary : This project is Arkansas' first lateral slide highway bridge replacement. It is on a heavily trafficked Interstate 30 route that connects Little Rock, AR and Dallas, TX.

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