


ABC Innovative Projects

41st Street Bridge					
Location	41 st Street over the Big Sioux River in the City of Sioux Falls in Minnehaha County				
State	South Dakota				
Owner	City of Sioux Falls				
Year ABC Built	2010				
State ID #	50-183-230				
NBI ID #	000000050183230				
Coordinates	Latitude: 43.51479722		Longitude: -96.76568056		
Contact Person	Josh Peterson, P.E. Principal Engineer City of Sioux Falls Phone: 605-367-8616 Email: jpeterson@siouxfalls.org				
Mobility Impact Time	ABC: 113 days with two-stage construction		Conventional: one year with two-stage construction		
Impact Category	<i>Tier 1</i>	<i>Tier 2</i>	<i>Tier 3</i>	<i>Tier 4</i>	Tier 5 X
Benefits	<ul style="list-style-type: none"> reduced traffic impacts – critical arterial improved site constructability – no deck forming required 				
Description	<ul style="list-style-type: none"> 305-ft-long and 112.33-ft wide three-span bridge (90 ft - 125 ft - 87 ft) Urban location Average Daily Traffic count: 47,000 Traffic management alternative, if constructed conventionally: extended use of detours onto city streets <p>Existing Bridge: The existing six-lane, three-span bridge was 282-ft-long and 106.83-ft-wide with 15 steel I-beams at 6.5 ft and 7.0 ft spacing per span. Built in 1965, and widened at a later date, the bridge is located in the city's business district on the busiest street in the state of South Dakota, the bridge was initially to be replaced by the US Army Corps of Engineers as part of a flood control project to improve the safety of the levee along the Big Sioux River. Because of its deteriorated condition and potential impact on traffic, the City of Sioux Falls decided to replace it with accelerated methods, ahead of the levee project.</p> <p>Replacement Bridge: The seven-lane replacement bridge has 19 adjacent precast pretensioned concrete box beams per span, with a composite 5.5-inch-thick cast-in-place concrete deck. The Colorado DOT standard box beams were 4.5 ft deep and 5 ft and 6 ft wide. The cross-section also included 4-ft outside shoulders as well as sidewalks separated from traffic lanes by concrete barriers.</p> <p>Construction Methods: The bridge was constructed in two stages with two 11-ft-wide lanes of traffic in each direction maintained during each stage. The steel H-pile concrete-encased wall piers were constructed prior to removal of the existing piers to speed construction. The integral abutment was founded on a single row of H-piles. The adjacent beams were</p>				

	<p>erected and transversely post-tensioned with tie-rods. The deck was cast end-to-end with no transverse joints; the deck was cast at the minimum rate of 40 cu yds per hr using a set retarder. A full-depth concrete closure joint was cast between the stages of construction.</p> <p>The contract required completion of the bridge within 160 days for the bid to be responsive. The incentive was set at five to six percent of the estimated cost, for a maximum incentive of \$500,000. The contract included a \$250,000 lump-sum incentive payment if the project was completed within the number of days bid in the awarded contract. An additional \$10,000 incentive was included for each day the project was completed earlier than the number of days bid.</p> <p>The awarded contractor bid 140 days. The actual construction duration of 113 days resulted in a 70% time savings compared to conventional construction. The contractor received the maximum incentive of \$500,000.</p> <p>Stakeholder Feedback: The adjacent box beams were a new beam for the state of South Dakota. The local fabricator commented that since they constructed the precast box girder for this project, the learning curve for these types of precast members is reduced and would they would readily bid these types of structures on future projects. Also, the contractor stated that adding a precast overhang would have accelerated construction, although costs would not likely have been reduced.</p>			
High Performance Materials	<ul style="list-style-type: none"> • 			
Photos Additional photos				
Project Planning	<i>Decision-Making Tools</i> <ul style="list-style-type: none"> • 	<i>Site Procurement</i> <ul style="list-style-type: none"> • 	<i>Project Delivery</i> <ul style="list-style-type: none"> • Design-bid-build 	<i>Contracting</i> <ul style="list-style-type: none"> • A+B bidding • Incentive / disincentive clauses • Lump sum
Geotechnical Solutions	<i>Foundations & Walls</i> <ul style="list-style-type: none"> • 		<i>Rapid Embankment</i> <ul style="list-style-type: none"> • 	
Structural Solutions	<i>Prefabricated Bridge Elements & Systems</i>			<i>Construction</i>
	<i>Elements</i> <ul style="list-style-type: none"> • Adjacent box beams 	<i>Systems</i> <ul style="list-style-type: none"> • 	<i>Miscellaneous</i> <ul style="list-style-type: none"> • Grouted keys • PT ducts, grouted 	<ul style="list-style-type: none"> •
Costs	<p>The engineer's estimate for the project was \$5.7 million (bridge replacement). The low bid was \$4.4 million (\$1.3 = 30% lower than the engineer's estimate). There were five bidders. The cost per square foot of bridge was \$127 compared to \$85-\$100 for conventional construction in this region in 2010.</p>			
Funding	<i>Federal only</i>	<i>State only</i>	<i>Federal and State</i>	<i>Other</i> City of Sioux Falls

Incentive Program (\$)	<i>Highways for LIFE</i>		<i>IBRD</i>		<i>SHRP2</i>		<i>Other</i>	
Contract Plans	Complete Set:	Bridge Plans (link to pdf)			ABC *:			
Specifications	Complete Set:	Specifications_09-1105 (link to pdf)			ABC *:			
Bid Tabs	Bridge Bids (link to pdf)							
Schedule	Engineer's:	Schedule-PrelimStudy (link to pdf)			Actual:			
Other Related Information	"In the Eye of the Storm: Utilizing Precast Solutions to Accelerate Bridge Construction," 2011 PCI National Bridge Conference Proceedings Disc [link to pdf]							
Photo Credits	City of Sioux Falls							

* Specific to the ABC used in the project.