

## ABC Innovative Projects

<b>Buffalo Creek Bridge</b>					
<b>Location</b>	Border Line Road over Buffalo Creek approximately 24 miles west of the town of White Butte in Perkins County				
<b>State</b>	South Dakota				
<b>Owner</b>	Perkins County				
<b>Year ABC Built</b>	2011				
<b>State ID #</b>	53-048-010				
<b>NBI #</b>	000000053048010				
<b>Coordinates</b>	<b>Latitude:</b> 45.93587		<b>Longitude:</b> -102.86300		
<b>Contact Person</b>	Kevin Goeden, P.E. Chief Bridge Engineer South Dakota Department of Transportation Phone: 605-773-3285 Email: kevin.goeden@state.sd.us				
<b>Mobility Impact Time</b>	<b>ABC:</b> NA		<b>Conventional:</b> This type construction is typical for local SD roads		
<b>Impact Category</b>	<i>Tier 1</i>	<i>Tier 2</i>	<i>Tier 3</i>	<i>Tier 4</i>	<b>Tier 5</b>
					X
<b>Primary Driver(s)</b>	<ul style="list-style-type: none"> <li>• reduced traffic impacts</li> <li>• reduced onsite construction time</li> <li>• improved site constructability</li> <li>• minimized environmental impacts</li> </ul>				
<b>Description</b>	<ul style="list-style-type: none"> <li>• 60-ft-long and 30.67-ft-wide single-span prestressed double tee beam bridge</li> <li>• Rural location</li> <li>• Average Daily Traffic count: 60 (2009)</li> <li>• Traffic management alternative: Onsite short detour</li> </ul> <p><b>Existing Bridge:</b> The existing single-span bridge was deteriorated and required replacement.</p> <p><b>Replacement Bridge:</b> The replacement bridge has a 28-ft-wide roadway width. The cross-section consists of eight 3.83-ft-wide 30-inch-deep pretensioned double tee beams. The vertical abutments are founded on tied-back H-piles with 10-gauge galvanized steel sheet piling backwalls, and precast concrete planks at the ends of the beams.</p> <p><b>Construction Methods:</b> The pretensioned double tee beams were fabricated at a precast plant and shipped to the bridge site. The two exterior beams were cast with Type T101 rail post connection steel. The eight beams weigh approximately 16 tons each.</p> <p>The bridge was closed and traffic detoured. Excavation was completed and H-piles were driven at each abutment location. The sheet pile backwalls and wingwalls were erected and tie-back cables were anchored to steel piling driven in undisturbed soil behind the abutments. Steel pile caps were erected onto the H-piles and the bearing dowel bars were welded to the bottom flange.</p>				

	<p>The double tee beams were erected onto elastomeric bearing pads. A dowel pin was placed through the beam end and steel cap top flange and welded. The beams were also welded together at 5-ft spacing longitudinally. The 3-inch x 27-inch precast concrete planks were bolted to the ends of the beams.</p> <p>The shear keys between beams and the dowel bars were filled with non-shrink grout. The 7-inch x 4-inch x 5-inch blockouts at the ends of the beams were filled with grout. Railing was installed. No overlay was applied. The bridge was opened to traffic.</p> <p>No incentives/disincentives or other contracting strategies to achieve rapid construction were used on this project. The schedule was driven by the contractor's availability and work load.</p> <p><b>Stakeholder Feedback:</b> This bridge is an example of the prefabricated bridges commonly used on the South Dakota local road system. It is an example of the use of PBES that could have been done in an accelerated manner. However, there were no requirements at this location for accelerated construction. The use of PBES was driven more due to the remote location and lack of ready-mix concrete availability.</p>									
<b>High Performance Materials</b>	<ul style="list-style-type: none"> <li>•</li> </ul>									
<b>Photos</b>  <a href="#">Additional photos</a>										
<b>Project Planning</b>	<i>Decision-Making Tools</i> <ul style="list-style-type: none"> <li>•</li> </ul>	<i>Site Procurement</i> <ul style="list-style-type: none"> <li>•</li> </ul>	<i>Project Delivery</i> <ul style="list-style-type: none"> <li>• Design-bid-build</li> </ul>	<i>Contracting</i> <ul style="list-style-type: none"> <li>• Full lane closure</li> </ul>						
<b>Geotechnical Solutions</b>	<i>Foundations &amp; Walls</i> <ul style="list-style-type: none"> <li>•</li> </ul>		<i>Rapid Embankment</i> <ul style="list-style-type: none"> <li>•</li> </ul>							
<b>Structural Solutions</b>	<b>Prefabricated Bridge Elements &amp; Systems</b> <table border="1"> <thead> <tr> <th><i>Elements</i></th> <th><i>Systems</i></th> <th><i>Miscellaneous</i></th> </tr> </thead> <tbody> <tr> <td> <ul style="list-style-type: none"> <li>• Adjacent double tee beams</li> <li>• Steel sheet piling</li> <li>• Other abutment element: precast planks</li> </ul> </td> <td> <ul style="list-style-type: none"> <li>•</li> </ul> </td> <td> <ul style="list-style-type: none"> <li>• Grouted keys</li> </ul> </td> </tr> </tbody> </table>			<i>Elements</i>	<i>Systems</i>	<i>Miscellaneous</i>	<ul style="list-style-type: none"> <li>• Adjacent double tee beams</li> <li>• Steel sheet piling</li> <li>• Other abutment element: precast planks</li> </ul>	<ul style="list-style-type: none"> <li>•</li> </ul>	<ul style="list-style-type: none"> <li>• Grouted keys</li> </ul>	<i>Construction</i> <ul style="list-style-type: none"> <li>•</li> </ul>
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<b>Costs</b>	<p>The engineer's estimate for the project was \$ 413,000. The low bid was \$459,000. There were four bidders. The cost per square foot of bridge was \$136 compared to \$141 for conventional construction in this region in 2011.</p>									
<b>Funding</b>	<i>Federal only</i>	<i>State only</i>	<i>Federal and State</i>	<i>Other</i> Federal & Local						
<b>Incentive</b>	<i>Highways for LIFE</i>	<i>IBRD</i>	<i>SHRP2</i>	<i>Other</i>						

<b>Program (\$)</b>				
<b>Contract Plans</b>	<b>Complete Set:</b>	<a href="#">Contract Plans</a> (link to pdf)	<b>ABC *:</b>	
<b>Specifications</b>	<b>Complete Set:</b>	Not available.	<b>ABC *:</b>	
<b>Bid Tabs</b>	<a href="#">Bid Tab</a> (link to pdf)			
<b>Schedule</b>	<b>Engineer's:</b>	Not available.	<b>Actual:</b>	7/2010 to 11/2011
<b>Other Related Information</b>				
<b>Photo Credits</b>	South Dakota Department of Transportation			

\* Specific to the ABC used in the project.