


## ABC Innovative Projects

<b>North Kahana Stream Bridge</b>					
<b>Location</b>	Route 83 (Kamehameha Highway) near the Kahana Bay Beach Park in eastern Oahu				
<b>State</b>	Hawaii				
<b>Owner</b>	State				
<b>Year ABC Built</b>	2010				
<b>State ID #</b>	159				
<b>NBI #</b>	003000830302624				
<b>Coordinates</b>	<b>Latitude:</b>	21.555814	<b>Longitude:</b>	-157.874853	
<b>Contact Person</b>	Paul T. Santo, P.E. Bridge Design Engineer Hawaii Department of Transportation Phone: 808-692-7611 Email: paul.santo@hawaii.gov				
<b>Mobility Impact Time</b>	<b>ABC:</b>	18 months	<b>Conventional:</b>	20 months	
<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>• minimized environmental impacts – deck topping did not require shoring or falsework in the streambed</li> <li>• reduced traffic impacts</li> <li>• reduced onsite construction time – precast planks were fabricated during pier construction</li> </ul>				
<b>Description</b>	<ul style="list-style-type: none"> <li>• 128-ft-long and 42.33-ft-wide three-span precast prestressed concrete slab beam bridge (41 ft – 46 ft – 41 ft)</li> <li>• Rural location</li> <li>• Average Daily Traffic count: 9,960 (2009)</li> <li>• Traffic management alternative, if constructed conventionally: extended use of detour across adjacent temporary bridge</li> </ul> <p><b>Existing Bridge:</b> The existing two-lane five-span continuous concrete slab type bridge was 92 ft long and 26 ft wide. The substructure consisted of concrete pier caps on concrete socket piles connected to timber piles. Built in 1927, the bridge was structurally deficient and functionally obsolete and required replacement.</p> <p><b>Replacement Bridge:</b> The replacement bridge was designed for current loads and seismic standards. It has two 12-ft-wide traffic lanes and two 8-ft-wide shoulders. The cross-section consists of ten 4-ft-wide 20-inch-deep 6,000 psi precast prestressed concrete planks, with a minimum 7.5-inch-thick cast-in-place concrete topping that increases in thickness to conform to the roadway cross slope. Each conventionally constructed substructure consists of reinforced concrete caps that are supported by four 5-ft-diameter drilled shafts.</p> <p><b>Construction Methods:</b> The deck planks were fabricated at a precast plant and shipped to the job site.</p>				

	<p>The contractor assembled a temporary 130-ft-long 30-ft wide prefabricated steel truss bridge adjacent to the site. The temporary detour road/bridge was constructed to minimize negative traffic impacts to the traveling public. Traffic was shifted to the temporary bridge and the existing bridge was closed and demolished.</p> <p>Substructures for the replacement bridge were conventionally constructed. Self-consolidating concrete was used in the test drilled shaft but not used for the production shafts for various reasons.</p> <p>Cranes were used to place the deck planks on elastomeric bearing pads. Shear keys between planks were filled with grout. The planks were not transversely post-tensioned; a deck was cast over the planks and into the reinforced closure joints over the piers and abutments. The aesthetic concrete traffic railing was constructed. No overlay or sealant was applied to the deck. Traffic was switched to the replacement bridge, and the temporary bridge was removed.</p> <p>The contract time for completion of all contract items was 385 working days. It included liquidation damages for failure to complete work on time and rental fees for unauthorized lane closure or occupancy. The bridge was opened to traffic in about 18 calendar months and contract items completed in about 22 calendar months after Notice to Proceed. Actual approved extension of time was not available. Any liquidated damage paid was not available.</p>			
<b>High Performance Materials</b>	<ul style="list-style-type: none"> <li>•</li> </ul>			
<b>Photos</b>	 <p><a href="#">Additional photos</a></p>			
<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> <li>• Lane rental</li> <li>• Incentive / disincentive clauses</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>	<i>Prefabricated Bridge Elements &amp; Systems</i>			<i>Construction</i> <ul style="list-style-type: none"> <li>•</li> </ul>
	<i>Elements</i> <ul style="list-style-type: none"> <li>• Adjacent slab beams</li> </ul>	<i>Systems</i> <ul style="list-style-type: none"> <li>•</li> </ul>	<i>Miscellaneous</i> <ul style="list-style-type: none"> <li>• Grouted keys</li> </ul>	
<b>Costs</b>	<p>The engineer's estimate for the project was \$10.06 million. The low bid was \$13.26 million. There were five bidders. The cost per square foot of bridge was \$920 based on FHWA guidelines for calculation of bridge construction unit cost.</p>			
<b>Funding</b>	<i>Federal only</i>	<i>State only</i>	<i>Federal and State</i>	<i>Other</i>
			X	
<b>Incentive</b>	<i>Highways for LIFE</i>	<i>IBRD</i>	<i>SHRP2</i>	<i>Other</i>

<b>Program (\$)</b>		\$400,000		
<b>Contract Plans</b>	<b>Complete Set:</b>	<a href="#">Structural Plans</a> (link to pdf)	<b>ABC *:</b>	
<b>Specifications</b>	<b>Complete Set:</b>	<a href="#">Prosecution and Progress</a> (link to pdf)  <a href="#">Concrete Structures Specifications</a> (link to pdf)  <a href="#">Structural Concrete Specifications</a> (link to pdf)  <a href="#">Standard Specifications</a> [http://hawaii.gov/dot/highways/specifications2005/specifications/specble.htm]	<b>ABC *:</b>	<a href="#">Concrete Structures Special Provisions</a> (link to pdf)  <a href="#">Structural Concrete Special Provisions</a> (link to pdf)
<b>Bid Tabs</b>	<a href="#">Bid Tabs</a> (link to pdf)			
<b>Schedule</b>	<b>Engineer's:</b>	Not available.	<b>Actual:</b>	
<b>Other Related Information</b>				
<b>Photo Credits</b>	Hawaii Department of Transportation			

\* Specific to the ABC used in the project.