ABC Innovative Projects

Biltmore Avenue Bridge					
Location	On Biltmore Avenue (NC 81, an urban minor arterial) over the Swannanoa River in Biltmore Village in Buncombe County				
State	North Carolina				
Owner	State				
Year ABC Built	2010				
State ID #	B-2515				
Federal ID #	BRSTP-0081(1)				
Coordinates	***Latitude:*** 35.56872222		***Longitude:*** -82.54419444		
Contact Person	Brian C. Hanks, P.E. Structures Management Project Engineer North Carolina Department of Transportation Phone: 919-707-6419 Email: bhanks@ncdot.gov				
Mobility Impact Time	***ABC:*** 4-month road closure with an off-site detour		***Conventional:*** 24 months with adjacent temporary detour bridge		
Impact Category	*Tier 1*	*Tier 2*	*Tier 3*	*Tier 4*	***Tier 5***
					X
Benefits	• Minimized environmental impacts • Reduced traffic impacts, reduced pedestrian impacts, minimized economic impact to local businesses • Reduced onsite construction time • Improved site constructability				
Description	• 135-ft-long and 72.5-ft wide single-span modular-beam-and-deck bridge • Urban location • Average Daily Traffic count: 34,890 (2009); 52,640 (projected by 2029) • Traffic management alternative, if constructed conventionally: required construction of temporary detour bridge ***Existing Bridge:*** The existing four-lane reinforced concrete girder bridge with cast-in-place concrete deck consisted of three 41-ft spans. It was 123-ft long with a clear roadway width of 40 ft. Built in 1935, it was structurally deficient, functionally obsolete, and required replacement. ***Replacement Bridge:*** The longer and wider four-lane replacement bridge has two traffic lanes in each direction and two 7-ft-wide sidewalks. The superstructure consists of six modular units. Each 11.25-ft-wide unit has two 4-ft-deep Grade 50W plate girders spaced at 6.13 ft, and a composite concrete deck that is 10.5 inches thick over the girders and 8.0 inches thick between girders. The units are connected with 12-inch-wide longitudinal cast-in-place concrete closure joints. ***Construction Methods:*** The contractor constructed the superstructure units at an adjacent staging area. The girders were supported at bearing locations with required superelevation, and allowed				

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<tr><td></td><td>to deflect under self-weight prior to installing the intermediate diaphragms to ensure fit. The girders were then shored to prevent deflection during deck casting. Each deck unit was cast with blockouts in the corners to facilitate placement of the end diaphragms between units. Shoring was removed after the deck concrete attained compressive strength.

Foundations were constructed of micropiles, with demonstration micropiles required prior to construction to ensure capacity would be achieved. The abutments were constructed using cast-in-place concrete and the bridge seat elevations verified before placement of the bearing assemblies. The superstructure units were erected, and the intermediate diaphragms were tightened. The classic concrete bridge railing and sidewalks were constructed. The closure joints were then cast, followed by grinding of the deck and approach slab for rideability.

Attendance at a pre-bid conference was mandatory to bid on the project. The contractor was required to construct, maintain, and afterwards remove a temporary pedestrian bridge for use during construction.

From January 2 until April 30, the road was closed for construction. Traffic was maintained with an off-site detour approximately one mile in length through city streets. Prior to January 2, nightly road closures were allowed if needed.

Liquidated damages were $2000 per calendar day for interim and final completion. If all traffic lanes were not open Monday through Sunday from 6 am to 9 pm during the first construction phase, liquidated damages ranged from $1000 per hour to $500 per 15 minutes.

All work was completed on schedule and no liquidated damages were incurred by the contractor. No incentives were offered for early completion.</td></tr>
<tr><td>High Performance Materials</td><td>• Partial replacement of cement with fly ash or ground granulated blast furnace slag in deck concrete</td></tr>
<tr><td>Photos

Additional photos</td><td>    </td></tr>
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• Disincentive clauses</td></tr>
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<tr><td>Elements</td><td>Systems</td><td>Miscellaneous</td><td rowspan="2">•</td></tr>
<tr><td>• Modular beams with decks</td><td>•</td><td>• CIP reinforced concrete closure joints</td></tr>
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Costs	The engineer's estimate for the project was $ 3.03 million. The low bid was $ 2.10 million ($ 931,000 = 31% lower than engineer's estimate). There were four bidders. The cost per square foot of bridge was $136 compared to $135 for conventional construction in this region in 2010.			
Funding	*Federal only*	*State only*	***Federal and State***	*Other*
			X	
Incentive Program ($)	*Highways for LIFE*	***IBRD***	*SHRP2*	*Other*
		$110,000		
Contract Plans	**Complete Set:**	Contract Plans (link to pdf)	**ABC *:**	
Specifications	**Complete Set:**	Proposal (link to pdf) Special Provisions (link to pdf)	**ABC *:**	
Bid Tabs	Bid Tabs (link to png)			
Schedule	**Engineer's:**	Not available.	**Actual:**	
Other Related Information	UTUBE video [http://www.youtube.com/watch?v=TlCSxcbaoOI]			
Photo Credits	North Carolina Department of Transportation			

* Specific to the ABC used in the project.