PABC Innovative Projects

US 131 / Parkview Avenue Bridge					
Location	Over US 131 southwest of Kalamazoo in Kalamazoo County				
State	Michigan				
Owner	State				
Year ABC Built	2008				
State ID #	S01 39014				
Federal ID #	BRN 0739(039)				
Coordinates	***Latitude:*** 42.25989		***Longitude:*** -85.651217		
Contact Person	Steven P. Beck, P.E. Supervising Engineer, Structures Michigan Department of Transportation Phone: 517-373-0097 Email: becks2@michigan.gov				
Mobility Impact Time	***ABC:*** less than three months for original schedule; two-month delay for re-casting panels		***Conventional:*** minimum six months		
Impact Category	*Tier 1*	*Tier 2*	*Tier 3*	***Tier 4***	*Tier 5*
				X	
Benefits	reduced traffic impacts, improved site constructability				
Description	• 249-ft-long and 55-ft wide, three-lane, four-span bridge (37.5 ft – 83.25 ft – 83.25 ft – 44.75 ft); 67º skew • Urban location • Average Daily Traffic count: 44,000 on US 131 (2004); 11,200 on Parkview Avenue (2004) • Traffic management alternative, if constructed conventionally: extended detour on city streets ***Existing Bridge:*** Built in 1962, the two-lane, four-span steel W-beam bridge needed an additional lane and increased vertical under-clearance over US 131. ***Replacement Bridge:*** During the study phase of the project, precasters and contractors in the state partnered with MDOT. Skewed deck panels were determined to be more economical than rectangular panels, to eliminate the closure pours at abutments or lengthening the bridge to square the abutments. To simplify panel fabrication, grouted transverse deck joints and a longitudinal cast-in-place closure pour to eliminate a crown in the panels were selected. The replacement bridge consists of precast integral abutments on single rows of H-piles, precast caps on precast multi-column piers, seven AASHTO Type III pretensioned beams spaced at 9 ft in each span, and skewed full-depth precast longitudinally post-tensioned deck panels. The precast beams and substructure components were fabricated in Kalamazoo, Michigan while the 48 full-depth deck panels were fabricated at a plant 170 miles from the site in Midland, Michigan. ***Construction Methods:***				

	The 64-ton abutment was precast in two segments to facilitate handling, with a cast-in-place closure pour connecting the segments. The abutments were cast with oversized pockets for the steel H-pile connections. The four 10-ton round precast columns at each interior support were supported on cast-in-place spread footings. The 65-ton pier caps required two cranes for erection. The 19-ton skewed full-depth precast longitudinally post-tensioned deck panels had grouted transverse joints and a closure pour at the crown point. The female-to-female transverse deck joints were grouted with a backer rod sealing the bottom joint; a heat-shrink wrap connected the ducts in blockouts at post-tensioning duct locations. Inserts were cast into the beams at shear pocket locations, with coil bolts threaded into the inserts after panel placement. An aesthetic Michigan bridge railing was cast in place following panel erection. The deck panels were instrumented with a structural health monitoring system that recorded strain and temperature data for one year following completion of the bridge. The project was let through the standard design-bid-build process. The contractor had an expedited schedule with the open to traffic date one month prior to completion. ***Stakeholder Feedback:*** This project was the first ABC project in the state, and much was learned (see *Lessons Learned*). MDOT expects that ABC costs will be reduced as fabricators and contractors become more familiar with its use, and as the prefabricated elements are standardized.
High Performance Materials	•
Photos Additional photos	  

Project Planning	*Decision-Making Tools*	*Site Procurement*	***Project Delivery***	*Contracting*
	•	•	• Design-bid-build	•

Geotechnical Solutions	*Foundations & Walls*	*Rapid Embankment*
	•	•

Structural Solutions	***Prefabricated Bridge Elements & Systems***			*Construction*
	Elements	*Systems*	***Miscellaneous***	•
	• Full-depth precast deck panels with post-tensioning • Precast caps and columns • Abutment – precast backwalls	•	• CIP reinforced concrete closure pours • Grouted keys • Grouted PT ducts • Grouted pockets with shear connectors • Overlay – asphalt with membrane	

Costs	The bridge cost was $1.88 million or $143 per sq ft, compared to $1.32 million or $100 per sq ft for conventional construction. Of this total cost, the deck cost was $495,000 or $38 per sq ft compared to $326,000 or $25 per sq ft for conventional deck construction. The bid cost was within four percent of the engineer's estimate, and the as-constructed

	cost was within two percent of the bid cost.			
Funding	*Federal only*	*State only*	***Federal and State***	*Other*
			X	
Incentive Program ($)	*Highways for LIFE*	***IBRD***	*SHRP2*	*Other*
		$80,000		
Contract Plans	**Complete Set:** Plans [link to pdf]		**ABC *:**	
Specifications	**Complete Set:** Proposal [link to pdf]		**ABC *:**	
Bid Tabs	Bid Tabs [link to pdf]			
Schedule	**Engineer's:** Not available.		**Actual:** Not available.	
Other Related Information	Lessons Learned [link to pdf] 2012 TRB Presentation [link to pdf] "A Precast Bridge System for Rapid Construction Applications," 2010 FHWA Bridge Engineering Conference: HfL & ABC [link to Conference CD] MDOT Research Spotlight [link to pdf]			
Photo Credits	Michigan Department of Transportation			

* Specific to the ABC used in the project.