

ABC Innovative Projects

Lewis and Clark Bridge					
Location	on State Route 433 across the Columbia River between Longview, Washington and Rainier, Oregon				
State	Washington				
Owner	State				
Year ABC Built	2004				
State ID #	433/1				
NBI #	0003760A0000000				
Coordinates	Latitude: 46.098333		Longitude: -122.968333		
Contact Person	Jugesh Kapur, P.E. State Bridge and Structures Engineer Washington State Department of Transportation Phone: 360-705-7207 Email: kapurju@wsdot.wa.gov				
Mobility Impact Time	ABC:	124 night closures plus 3 weekend closures, with no impact to rush-hour traffic		Conventional:	lane-by-lane deck replacement over 4 years, full closure for several months, or full closure every weekend for 6 months
Impact Category	Tier 1		Tier 2	Tier 3	Tier 4
			X		
Primary Driver(s)	<ul style="list-style-type: none">reduced traffic impacts – limit the impact to emergency services and avoid extended use of long detours; bridge remained open for normal weekday operationsimproved site constructabilityimproved work-zone safety – construction workers’ exposure to traffic during construction was reducedimproved material quality and product durability – prefabrication allowed inspection of the new deck before installation without use of specialized equipment				
Description	<ul style="list-style-type: none">5,478-ft long and 34.17-ft wide 34-span bridge that includes 3 deck-truss spans (168 ft - 337 ft - 337 ft), 3 through-truss spans (760 ft - 1200 ft - 760 ft), and approach spansUrban locationAverage Daily Traffic count: 20,000Traffic management alternative, if constructed conventionally: extended use of a 40-mile detour west to the town of Cathlamet that included a ferry ride, or an 80-mile detour south to Portland <p>Existing Bridge: The bridge is jointly owned by the Washington State Department of Transportation (WSDOT) and the Oregon Department of Transportation. Built in 1929, the steel through-truss bridge was designed by the famed engineer Joseph B. Strauss and is listed in the National Register of Historic Places. It has two 12-ft-wide traffic lanes and two 5-ft-wide shoulders. Built in 1929, the bridge deck was deteriorated and required replacement.</p> <p>Construction Methods: In the contract plans, WSDOT had designed prefabricated full-width full-depth deck</p>				

panels and a placement procedure to accommodate the required rapid construction schedule. A contractor partnered with an SPMT supplier in the development of his bid, assuming a revised placement procedure that used SPMTs in combination with a specially-designed steel truss frame for lifting and transporting. Their bid was considerably lower than the other bidders. The contractor was awarded the contract, and WSDOT accepted their proposed system.

The bridge was closed on Sunday through Thursday nights from 9:30 pm to 5:30 am. The SPMTs with truss frame moved a new panel to the top of the bridge, lifted the old panel out, and then lowered the new panel into place before taking the old panel off the bridge. Each panel movement took an average 6.5 hours. A helicopter with landing pad was provided on the south side of the river for emergency crossings during the closures.

Of the total bridge length, 3,900 ft of the deck was replaced with 103 prefabricated deck panels that were 36 ft wide and 20 ft to 45 ft long (20 at 45 ft, 45 at 40 ft, 20 at 35 ft, 14 at 30 ft, and 4 at 20 ft). The lightweight concrete panels were 6 inches thick plus 1.25-inch-thick microsilica modified overlay and traffic railing. Each panel was supported on two longitudinal steel stringers with intermediate transverse stringers and had a maximum panel weight of 96 tons. The full-width panels were not post-tensioned; the transverse joints had a backer rod and silicone sealant. The new deck eliminated the existing 3-ft-wide raised sidewalks, providing 5-ft shoulders at road level for bicyclists and pedestrians as well as additional room for traffic to maneuver around disabled vehicles. The bridge also used prefabricated widening sections supported by a single longitudinal steel girder. In addition, the project included precast approach slabs.


WSDOT utilized an "A" + "B" + "C" bidding method to determine the lowest responsible bidder, where "A" equals the bid items, "B" equals the total number of bridge closures established by the bidder to complete the work times the Total Bridge Rental Closure Cost of \$8,000, and "C" equals the total number of single lane closures established by the bidder to complete the work times the Bridge Single Lane Rental Cost of \$2,000. The "B" and "C" parts of the bid were only used to determine the lowest responsible bidder, not to determine final payment to the contractor.

The contract included several incentives for early completion. If the contractor finished all work requiring Weekend or Total Bridge Closures by April 30, 2004, he would receive \$100,000. This was specified as a neutral cost to WSDOT because the helicopter contract ended then and renewal would have cost \$100,000.

In addition, for each Weekend Bridge Closure less than 4, the contractor would receive \$55,000. For each Total Bridge Closure less than the number bid in the contract, the contractor would receive \$4,000. For each Single Lane Closure less than the number bid in the contract, the contractor would receive \$1,000.

The contract also included liquidated damages for not meeting the time constraints for accelerated construction. This included a penalty of \$16,000 per Total Bridge Closure more than the number that was bid, and a penalty of \$4,000 per Single Lane Closure more than the number that was bid. In addition, penalties would be assessed for any late opening of closures. A \$1,700 penalty per 15-minute period would be assessed for time beyond that specified for Weekend Closure or Total Bridge Closure, and a \$900 penalty per 15-minute period would be assessed for time beyond that specified for Single Lane Closure.

The deck replacement extended the life of the bridge another 25 years.

	Stakeholder Feedback: The public appreciated minimizing bridge closures and disruption to traffic.			
High Performance Materials	• Lightweight concrete panels			
Photos				
Additional photos				
Project Planning	Decision-Making Tools	Site Procurement	Project Delivery	Contracting
	•	•	• Design-bid-build	• A+B+C bidding • Full lane closure • Lane rental • Incentive / disincentive clauses • Contractor revision
Geotechnical Solutions	Foundations & Walls		Rapid Embankment	
	•		•	
Structural Solutions	Prefabricated Bridge Elements & Systems			Construction • SPMTs
	Elements	Systems	Miscellaneous	
	• Full-depth precast deck panels w/o PT	•	• CIP reinforced concrete closure joints • Grouted keys • Microsilica overlay • Precast approach slabs • Prefab parapets	
Costs	<p>The engineer's estimate for the project was \$28.8 million. The low bid was \$18.0 million (\$10.8 million = 38% lower than the engineer's estimate). There were six bidders.</p> <p>The contractor completed all work requiring Weekend or Total Bridge Closures by the end of April 2004 and, therefore, received the \$100,000 incentive. He also received an incentive of \$55,000 for using 3 instead of 4 Weekend Bridge Closures, and an additional \$30,000 for having 30 fewer Single Lane Closures than the 173 allowed. The contractor received a total incentive of \$185,000. No liquidated damages were assessed.</p>			
Funding	Federal only	State only	Federal and State	Other
			X	
Incentive Program (\$)	Highways for LIFE	IBRD	SHRP2	Other
Contract Plans	Complete Set:	Not available.	ABC *:	Not available.
Specifications	Complete Set:	Not available.	ABC *:	Specifications (link to pdf)
Bid Tabs	Not available.			
Schedule	Engineer's:	Not available.	Actual:	Not available.

Other Related Information	FHWA Connections Manual for PBES Detail 2.4.2.1A “Bridge Deck Replacement Project Using Self-Propelled Modular Transporters (SPMTs)” Case Study [http://www.fhwa.dot.gov/bridge/prefab/spmt.cfm] 2006 FHWA PBES Cost Study [http://www.fhwa.dot.gov/bridge/prefab/successstories/091104/] June 2004 AASHTO TIG / FHWA Prefabricated Bridges 2004: Good Business – Best Practice (link to pdf)
Photo Credits	Washington State Department of Transportation (WSDOT)

* Specific to the ABC used in the project.