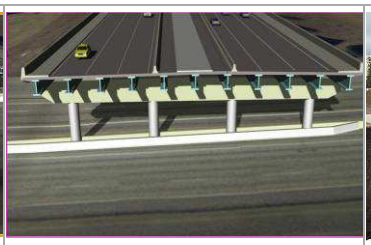
ABC Innovative Projects

I-405 / Northeast 8th Street Bridge									
Location	NE 8th Street over I-405 in the city of Bellevue in King County east of Seattle								
State	Washington								
Owner	State								
Year ABC Built	2003								
State ID #	405/43								
NBI #	0016317A0000000								
Coordinates	***Latitude:***	47.617500		***Longitude:***	-122.188611				
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:***	slide-in over weekend		***Conventional:***	minimum one year				
Impact Category	*Tier 1*		***Tier 2***	*Tier 3*		*Tier 4*		*Tier 5*	
			X						
Primary Driver(s)	• reduced traffic impacts • reduced onsite construction time • improved work-zone safety • improved site constructability • improved material quality and product durability • minimized environmental impacts • reduced life-cycle cost								
Description	• 328-ft long and 121.5-ft wide two-span steel girder bridge (164 ft – 164 ft); lateral roll-in of half the width; 2,200-ton half-bridge self weight • Urban location • Average Daily Traffic count: 298,000 on I-405 (2010) • Traffic management alternative, if constructed conventionally: extended use of detour onto city streets, or reduced capacity during extended stage construction ***Existing Bridge:*** The existing six-span prestressed concrete girder bridge was 293-ft long and 103-ft wide with spans ranging from 44 to 57 ft in length. The substructure consisted of cast-in-place abutments and multi-column piers on spread footings. Built in 1959 and widened in 1973, the bridge was deteriorated and required replacement. ***Replacement Bridge:*** The replacement bridge has nine 11.5-ft-wide traffic lanes and two 8-ft-wide sidewalks. The cross-section consists of eleven 5-ft-deep steel I-girders spaced at 11.25-ft with a 9-inch-thick cast-in-place reinforced concrete deck. The reinforced concrete abutments and four-column interior pier are founded on spread footings. ***Construction Methods:*** When the Northeast 8th Street bridge over busy I-405 in Bellevue needed to be replaced, the Washington Department of Transportation (WSDOT) chose a total								

	prefabrication design that allowed it to stage the bridge beside the highway during construction and then move it into place. The longer and higher bridge accommodated widening of I-405 and accessibility conveniences for a new interchange just south of it. The construction sequence included four stages that allowed all traffic lanes to remain open during replacement of the bridge and also allowed the new two-span superstructure to be laterally rolled into place over a weekend. The contractor constructed the south half of the new bridge on temporary piers south of the old bridge, and then shifted the three eastbound traffic lanes onto the new portion while the north half of the old bridge was removed and rebuilt conventionally. Next, the three westbound traffic lanes were shifted onto the new north half, and the old south portion was demolished and substructures constructed for the south half. On a Friday evening in September, traffic lanes on Northeast 8th Street and I-405 were re-routed, and the bridge was closed. The new south half of the bridge was jacked off its temporary piers and rolled 64 ft north to its permanent location in about 12 hours. I-405 and westbound Northeast 8th Street traffic lanes were re-opened before noon on Saturday. The remainder of Saturday and Sunday were spent installing permanent bridge bearings, constructing approaches, and striping. All lanes were opened for Monday morning commuters. I-405 lanes were reduced during the weekend half-bridge roll-in. Replacement of the bridge required a total of 19 months. The south half of the bridge was conventionally constructed on temporary supports in seven months. The north half of the bridge and the permanent substructure for the south half were constructed in 10.5 months. Casting the deck closure joints and doing other finish work required 1.5 months. An overlay was not applied to the bridge. The contract included an incentive for early completion of the intermediate pier construction to allow early opening of I-405 high-occupancy vehicle (HOV) lanes. The incentive was $5,000 for each HOV lane, Northbound and Southbound, prorated to the nearest hour, with a maximum incentive of $10,000 per day. Liquidated damages were included for late completion. ***Stakeholder Feedback*:** Choosing prefabrication over conventional reconstruction allowed WSDOT to avoid taking the bridge out of commission for up to a year or reducing its capacity by one-half for even longer. The contractor customized techniques to accommodate prefabrication requirements to minimize traffic disruption for downtown Bellevue. The construction caused relatively few disruptions to area drivers, with most closures limited to nights and select weekends and resulted in a wider, safer bridge with more lanes of traffic. The public appreciated the minimized disruption to traffic.
High Performance Materials	•
Photos Additional photos	  

Project	*Decision-Making Tools*	*Site Procurement*	***Project Delivery***	***Contracting***

Planning	•	•	• Design-bid-build	• Incentive / disincentive clauses
Geotechnical Solutions	*Foundations & Walls*		*Rapid Embankment*	
	•		•	
Structural Solutions	***Prefabricated Bridge Elements & Systems***			***Construction***
	Elements	***Systems***	***Miscellaneous***	• Transverse rollers
	•	• Full-width decked beams (FDcBs)	• CIP reinforced concrete closure joints	
Costs	The engineer's estimate for the project was $6.95 million. The low bid was $5.19 million ($1.76 million = 25% lower than the engineer's estimate). There were three bidders. The cost per square foot of bridge was $174 compared to $187 for conventional construction in this region in 2004.			
Funding	*Federal only*	*State only*	***Federal and State***	*Other*
			X	
Incentive Program ($)	*Highways for LIFE*	*IBRD*	*SHRP2*	*Other*
Contract Plans	**Complete Set:**	Contract Plans (link to pdf)	**ABC *:**	
Specifications	**Complete Set:**	Special Provisions-Structures (link to pdf)	**ABC *:**	Special Provisions-Time for Completion (link to pdf)
Bid Tabs	Bid Tabs (link to pdf)			
Schedule	**Engineer's:**	Not available.	**Actual:**	
Other Related Information	"Rolling the NE 8th Street Bridge – Bellevue, Washington," 2005 WSBS Proceedings (link to pdf) September 2008 ABC Workshop Presentation (link to pdf) Construction Animation (link to avi) Construction Time Lapse Video (link to mpeg)			
Photo Credits	Washington State Department of Transportation; HDR			

* Specific to the ABC used in the project.