

ABC Innovative Projects

I-15 / Pioneer Crossing Bridge					
Location	Pioneer Crossing over I-15 in American Fork, south of Salt Lake City				
State	Utah				
Owner	State				
Year Built	2010				
State ID #	S-R399(42) and S-R399(59)				
NBI #	Eastbound: 2F 785		Westbound: 4F 785		
Coordinates	Latitude: 40.376667		Longitude: -111.819722		
Contact Person	Carmen Swanwick, P.E. Chief Structural Engineer Utah Department of Transportation Phone: 801-965-4981 Email: cswanwick@utah.gov				
Mobility Impact Time	ABC: One or two of three I-15 lanes closed over 10-hr period during the night on two weekends, with one 30-minute full closure of I-15 per span; total 20 months		Conventional: Multiple long-term closures over 24 months		
Impact Category	Tier 1 I-15	Tier 2	Tier 3	Tier 4	Tier 5 Pioneer Crossing
Primary Driver(s)	Reduced onsite construction time; reduced traffic impacts; improved work-zone safety; improved site constructability; improved material quality and product durability				
Description	<ul style="list-style-type: none"> • 191-ft long and 69-ft wide single-span bridge roll-in; 2,300-ton self-weight (longest and heaviest multi-girder spans moved with SPMTs in the US to date) • Urban location • Average Daily Traffic count: 128475 for I-15 and 23810 for Pioneer Crossing • Traffic management alternative, if constructed conventionally: extended detour <p>Existing Bridge: The existing four-span 2-lane bridge was 353-ft-long and 42-ft-wide and constructed in 1963. The existing bridge was being removed due to existing deterioration and due to the need to increase the capacity of the interchange.</p> <p>Replacement Bridge: The replacement bridge is on the new six-mile urban arterial connecting Saratoga Springs to Lehi that is part of Utah's Corridor Expansion (CORE) initiative to restore and renovate I-15 in Utah County. The Pioneer Crossing interchange with I-15 is a diverging diamond interchange (DDI), only the third such interchange in the US, which replaces the existing diamond interchange. The DDI was proposed in an Alternative Technical Concept process included in the specifications to allow a design-build team to propose innovative concepts.</p> <p>The Pioneer Crossing DDI includes twin two-span prestressed concrete beam bridges. Each of the four spans has a 53-degree skew and nine 94.5-inch-deep prestressed concrete Washington State bulb tee beams spaced at 7.75 ft with an 8.5-inch-thick cast-in-place concrete deck. The deck was designed with additional reinforcement to account for the temporary tensile stresses during the move. To help minimize temporary</p>				

stresses and to accommodate live load continuity, the last 10 ft at each end of the deck and the concrete end diaphragms were cast after the spans were moved. UDOT's SPMT manual was followed for stress limits, twist tolerance, and other criteria.

Construction Methods:

The four spans were constructed on temporary falsework supported on large concrete spread footings in adjacent staging areas less than a quarter mile from the bridge site. The westbound spans were constructed in a staging area southwest of the bridge site, and the eastbound spans were constructed in a staging area northwest of the site.

The four spans were moved with SPMTs in four nights. Two lines of SPMTs supported the span at each end. Special tower stand jacks raised the span off the temporary supports and lowered it onto the new abutments. After the two spans were in their final positions, they were connected with a closure pour over the interior support.

The westbound bridge span over the I-15 northbound lanes was moved into place with SPMTs on a Friday night in October 2009. The westbound bridge span over the I-15 southbound lanes was moved into place two days later on Sunday night. The adjacent existing four-span bridge was then dismantled without reducing the three-lane capacity in each direction on I-15. [Note: The weekend timeline for the moves is described below for the eastbound bridge moves.]

Eight months later on a weekend in June 2010 SPMTs moved the eastbound bridge spans into place. The eight month period between span placements was utilized to accomplish multiple activities. The existing structure was removed and the proposed substructure was placed. The geotechnical site conditions required settlement time for the approach embankments leading up to the bridge. Concurrent with the final bridge location activities, the bridge staging area was moved and construction of the superstructure was completed.

Friday evening

At 8 pm one lane of I-15 in each direction was closed. At 9 pm a second lane was closed in each direction. At 10 pm a rolling roadblock was begun by the Utah State Police to allow the SPMTs to move the span along I-15. Approximately 15 minutes later traffic in the one open lane on I-15 southbound was stopped and the SPMTs loaded with the span to go over southbound I-15 moved along southbound I-15 to the bridge site. After stopping traffic for half an hour, one lane in each direction of I-15 was reopened and detoured onto ramps around the bridge site. The bridge was lowered onto the abutments by 1 am.

Saturday

I-15 traffic was flowing freely in both directions by 6 am. The SPMTs were then loaded with the eastbound span to go over northbound I-15, and positioned next to I-15 for the move Sunday night.

Sunday evening

Timeline was similar to Friday evening's move. The eastbound bridge span over northbound I-15 was lowered onto its supports by 3 am Monday morning.

Monday morning

All lanes of I-15 were reopened to traffic by 5 am Monday morning.

The contract included a completion incentive of \$25,000 per calendar day up to a maximum of 120 days.

	Pioneer Crossing construction began in January 2009 and was opened to traffic in August 2010 (20 months of onsite construction compared to 2 years of conventional construction).			
High Performance Materials	<ul style="list-style-type: none"> • None 			
Photos				
Project Planning	Decision-Making Tools <ul style="list-style-type: none"> • State process 	<i>Site Procurement</i> <ul style="list-style-type: none"> • 	Project Delivery <ul style="list-style-type: none"> • Design-build 	Contracting <ul style="list-style-type: none"> • Full lane closure • Incentive / disincentive clauses
Geotechnical Solutions	<i>Foundations & Walls</i> <ul style="list-style-type: none"> • 		Rapid Embankment <ul style="list-style-type: none"> • Other - embankment surcharge 	
Structural Solutions	Prefabricated Bridge Elements & Systems			Construction <ul style="list-style-type: none"> • SPMTs
	Elements <ul style="list-style-type: none"> • MSE walls 	Systems <ul style="list-style-type: none"> • Full-width beam span with deck 	Miscellaneous <ul style="list-style-type: none"> • CIP reinforced concrete closure pours 	
Costs	\$172 million design-build project			
Funding	<i>Federal only</i>	State only	<i>Federal and State</i>	<i>Other</i>
		X		
Incentive Program (\$)	<i>Highways for LIFE</i>	<i>IBRD</i>	<i>SHRP2</i>	<i>Other</i>
Contract Plans	Complete Set:	Contract Plans (link to pdf)	ABC *:	
Specifications	Complete Set:		ABC *:	Special Provisions for SPMT use (link to pdf)
Bid Tabs	Not available.			
Schedule	Engineer's:	Not available.		Actual: Not available.
Other Related Information	Winter 2011 ASPIRE (link to pdf) March 2010 Roads & Bridges (link to pdf) "Placement of Precast Prestressed Concrete Girder Bridge Spans with SPMTs – Pioneer Crossing ...," 2010 FHWA Bridge Engineering Conference: HfL & ABC (link to pdf) UDOT ABC website [http://www.udot.utah.gov (Inside UDOT / Project Development / Structures Design and Bridge Operations / ABC)]			
Photo Credits	Kiewit/Clyde, a joint venture, and Parsons			

* Specific to the ABC used in the project.