ABC Innovative Projects

Church Street Bridge					
Location	Church Street South Extension over the New Haven Interlocking and Rail Yard, connecting Union Avenue and Sargent Drive in the city of New Haven to provide a direct link between downtown New Haven and the Long Wharf and waterfront areas				
State	Connecticut				
Owner	City of New Haven				
Year ABC Built	2003				
State ID #	06581				
NBI #	06581				
Coordinates	***Latitude:***	41.293847	***Longitude:***	-72.924747	
Contact Person	Timothy Fields, P.E. Project Manager (Bridge) Connecticut Department of Transportation Phone: 860-594-3217 Email: timothy.fields@ct.gov				
Mobility Impact Time	***ABC:***	10-track outage in active rail yard was limited to 3 hours over weekend; project was completed five months early	***Conventional:***	multiple track outages over months; an additional year of construction would have been required	

Impact Category	***Tier 1***	*Tier 2*	*Tier 3*	*Tier 4*	*Tier 5*
	X				

Primary Driver(s)	• reduced traffic impacts – using prefabrication minimized rail line disruption • improved work-zone safety – extended use of work zone over electrified tracks was eliminated • reduced onsite construction time • improved site constructability – the center span could not have been built in place during the limited working hours allowed by the rail yard
Description	• 320-ft-long steel truss center span (850-ton self-weight) in 1,274-ft-long 56-ft-wide eight-span bridge • Urban location • Average Daily Traffic count: 3,900 (Church Street, projected 2020) • Traffic management alternative, if constructed conventionally: multiple track outages over months ***New Bridge:*** The Church Street South Extension project provided a new steel truss center span over the New Haven Interlocking and Rail Yard. The eight-span bridge also includes a 133-ft-long welded steel plate girder span and an 817-ft-long six-span welded steel plate girder unit (90 ft – 130 ft – 129 ft – 161 ft – 165 ft – 140 ft). The bridge has two 11-ft-wide traffic lanes, an 11-ft-wide median, a 9-ft-wide sidewalk, and 5-ft-wide and 6-ft-wide bike lanes/shoulders. ***Construction Methods:*** The truss span was constructed over several months next to the active rail lines. The span was assembled complete with stay-in-place corrugated galvanized steel deck formwork, inspection platforms, utilities, and drainage.

<table>
<tr><td></td><td>
The erection plan allowed the use of a single high-capacity crane. The crane was delivered to the site in several hundred tractor-trailer loads and required a month to assemble.

On an early Sunday morning in 2003, the power to the electric rail lines was turned off. The crane then lifted the 50-ft-high span 65 ft in the air, moved it 100 ft from its assembly location, then rotated and lowered it into position over the railroad tracks. After erection, MMFX steel deck reinforcement was placed and the 8.25-inch-thick high-performance concrete (HPC) deck was cast.

The combination of MMFX deck reinforcement and HPC constituted the deck protection strategy. No additional deck overlay was proposed.

To minimize disruption in the rail yard and improve work-zone safety for a crew working over active rail lines, the Connecticut DOT required that the center span be erected in a single weekend night. The contract also included liquidated damages of $5,300 per calendar day in excess of the 1,131 calendar days allowed for the project. The project was completed in 940 calendar days.

Stakeholder Feedback:
Metro-North Railroad, operator of the New Haven rail yard, was pleased with progress and outcome of the project. The adjacent prefabrication and single lift-in of the 320-ft-long truss span greatly reduced impact on rail yard operations.
</td></tr>
<tr><td>High Performance Materials</td><td>
• Cast-in-place high-performance concrete (HPC) deck with MMFX deck reinforcement
• High-performance steel (HPS) 70W steel truss members
</td></tr>
<tr><td>Photos</td><td>



</td></tr>
<tr><td>Project Planning</td><td>
<table>
<tr><td>Decision-Making Tools</td><td>Site Procurement</td><td>Procurement</td><td>Contracting</td></tr>
<tr><td>•</td><td>•</td><td>• Design-bid-build</td><td>• Disincentive clause</td></tr>
</table>
</td></tr>
<tr><td>Geotechnical Solutions</td><td>
<table>
<tr><td colspan="2">Foundations & Walls</td><td colspan="2">Rapid Embankment</td></tr>
<tr><td colspan="2">•</td><td colspan="2">•</td></tr>
</table>
</td></tr>
<tr><td>Structural Solutions</td><td>
<table>
<tr><td colspan="3">Prefabricated Bridge Elements & Systems</td><td>Construction</td></tr>
<tr><td>Elements</td><td>Systems</td><td>Miscellaneous</td><td rowspan="2">• High-capacity crane</td></tr>
<tr><td>• Truss span without deck</td><td>•</td><td>•</td></tr>
</table>
</td></tr>
<tr><td>Costs</td><td>
The engineer’s estimate for the project was $ 28.6 million. The low bid was $31.9 million ($ 3.3 million = 12% higher than engineer’s estimate). There were three bidders. The cost per square foot of bridge was $ 257 compared to $ 210 for conventional construction in this region in 2003.

ABC techniques saved an estimated $ 1.1 million in railroad force account costs.
</td></tr>
</table>

Funding	*Federal only*	*State only*	***Federal and State***	*Other*
			X	
Incentive Program ($)	*Highways for LIFE*	***IBRC***	*SHRP2*	*Other*
		$1,200,000		
Contract Plans	**Complete Set:**	Highway Bid Plans (link to pdf) Structure Bid Plans (link to pdf) Plans Addenda 1-5 (link to pdfs)	**ABC *:**	
Specifications	**Complete Set:**	Special Provisions (link to pdf) SP Addenda 1-6 (link to pdfs)	**ABC *:**	
Bid Tabs	Not available.			
Schedule	**Engineer's:**	Not available.	**Actual:**	
Other Related Information	June 2004 AASHTO TIG / FHWA *Prefabricated Bridges 2004: Good Business – Best Practice* (link to pdf)			
Photo Credits	Connecticut Department of Transportation			

* Specific to the ABC used in the project.