



ACCELERATED BRIDGE CONSTRUCTION
UNIVERSITY TRANSPORTATION CENTER

UTC Project Information	
Project Title	UHPC connection for SDCL steel bridge system
University	FIU
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Funding Source(s) and Amounts Provided (by each agency or organization)	ABC-UTC Funds: \$10,000 Matching Funds: \$5,000
Total Project Cost	Total Funds: \$15,000
Agency ID or Contract Number	Accelerated Bridge Construction University Transportation Center (ABC-UTC) 69A3551747121
Start and End Dates	04/01/2020 - Active
Brief Description of Research Project	<p>Simple for dead load and continuous for live load (SDCL) steel bridge system has been investigated thoroughly for non-seismic and seismic areas. SDCL bridge system provides a solution for advanced bridge construction (ABC) application of steel bridges. The current detail uses a cast-in-place concrete diaphragm over the middle pier to connect the steel girder and make them continuous. Application of an SDCL steel bridge system has many advantages including eliminating field splices, eliminating expansion joints, reduced negative moment over the pier, and minimized traffic interruption. Further, encasing the ends of the girder in concrete protects the girder ends and results in enhanced service life and lower inspection and maintenance costs if compared to conventional continuous steel bridge systems. The current system has shortcomings that can be addressed by taking advantage of new advanced materials such as ultra-high performance concrete (UHPC). By using the current SDCL detail, although the resulting closure time for the facility carried by structure is reduced if compared to the conventional methods of steel construction, but it might exceed the weekend closure time limits that is usually available for high traffic roadways. The reason is that normal strength concrete usually reaches its minimum required strength in more than a couple of days. Another issue with the current SDCL detail is the tight tolerances for steel fabrication. As the steel girders are placed on adjacent spans in this system the end detail of the girders (steel blocks) should be touching to prevent concrete diaphragm from crushing. UHPC has been recently widely considered for</p>

	<p>ABC applications due to its superior mechanical properties, durability and also high early strength as compared to normal concrete. However, this material is more expensive than conventional concrete so it should be utilized strategically. In this research, the use of UHPC as diaphragm material is proposed that results in decreasing construction time for the facility carried, increasing the tolerances and simplifying the cast-in-place detail of the concrete diaphragm. The objectives include:</p> <ol style="list-style-type: none"> 1- Developing finite element models capable of modeling the new proposed system; 2- Studying the effect of connection parameters and details when the diaphragm is made of UHPC, therefore there are opportunities to simplify the end girder details; 3- Developing tentative design guidelines for UHPC connection; and 4- Developing a research plan and road map to experimentally evaluate the proposed connection.
<p>Describe Implementation of Research Outcomes (or why not implemented) Place Any Photos Here</p>	<p>Research project sponsored by TxDOT was awarded to Texas A&M University based on previous and on-going ABC-UTC project on simple for dead continuous for live steel bridge system (PI: Matthew Yarnold and funding amount: \$689,995) https://rip.trb.org/View/1879829</p>
<p>Impacts/Benefits of Implementation (actual, not anticipated)</p>	<p>This is an active research project. Upon completion, impacts/benefits will be reported.</p>
<p>Web Links</p> <ul style="list-style-type: none"> • Reports • Project website 	<p>https://abc-utc.fiu.edu/research-projects/fiu-research-projects/uhpc-connection-for-sdcl-steel-bridge-system/</p>