



ACCELERATED BRIDGE CONSTRUCTION
UNIVERSITY TRANSPORTATION CENTER

UTC Project Information	
Project Title	Use of All Lightweight Concrete in Conjunction with UHPC Connection for Prefabricated Barrier System
University	Florida International University
Principal Investigator	Atorod Azizinamini
PI Contact Information	aazizina@fiu.edu
Funding Source(s) and Amounts Provided (by each agency or organization)	\$35,000 from ABC-UTC \$15,000 from lightweight concrete industry
Total Project Cost	\$50,000
Agency ID or Contract Number	69A3551747121
Start and End Dates	03/01/2021 to Active
Brief Description of Research Project	<p>Barriers are one of the essential components in bridges to ensure safety for vehicles and redirect the errant vehicles passing over bridges. Several attempts were taken place to develop prefabricated barriers with connection to the bridge deck using post-tensioned thread rods and stainless-steel bars. However, those connections are associated with higher cost and durability issues. A new prefabricated barrier system utilizing UHPC connection to deck overhangs was developed under an on-going project [ABC-UTC-2016-C3-FIU05]. To further enhance the developed prefabricated barrier system, the barriers, in this proposed project, will be fabricated from all lightweight concrete with a unit weight of 100 pounds per cubic yard. The use of all lightweight concrete in barriers and in some cases bridge overhangs provides a reduction in the total weight of the barriers by almost 33% allowing the transportation of more barrier units on one truck and easy handling. Furthermore, in seismic regions, lighter barrier contributes to a lesser total mass of bridge superstructures which is beneficial in many cases. In this project, two barriers, made of all lightweight concrete, will be tested under static load test setup and the results will be compared to the specimens which are being tested under project number [ABC-UTC-2016-C3-FIU05]. The objectives include:</p> <ol style="list-style-type: none"> 1- Verification of the suitability of the developed UHPC connection for all-lightweight concrete barrier systems, 2- Conducting detailed finite element modeling on the proposed all-lightweight concrete barrier system and connections, 3- Conducting experimental work on the proposed prefabricated/all lightweight concrete barriers with UHPC connections, 4- Assessment of the performance of prefabricated/all-lightweight

	<p>concrete barriers with UHPC connections if compared to barriers made of normal concrete (prefabricated and cast-in-place barrier), and</p> <p>5- Developing detailed finite element models for the proposed all-lightweight concrete barriers with UHPC connections for better understanding of system performance, therefore, extending the study to analyze other specimens which will not be possibly tested.</p>
<p>Describe Implementation of Research Outcomes (or why not implemented)</p> <p>Place Any Photos Here</p>	<ul style="list-style-type: none"> • Lightweight concrete industry will be actively participating in this project and has provided \$15,000 funds plus in-kind materials • Research team has been assembled to pursue upcoming NCHRP 22-56 project on development of additional barrier systems for ABC
<p>Impacts/Benefits of Implementation (actual, not anticipated)</p>	<p>Lightweight concrete industry is looking to the ABC-UTC to partner with industry to expand the use of lightweight concrete in ABC applications (due to effectiveness of ABC-UTC's technology transfer strategies)</p>
<p>Web Links</p> <ul style="list-style-type: none"> • Reports • Project website 	<p>https://abc-utc.fiu.edu/research-projects/use-of-all-lightweight-concrete-in-conjunction-with-uhpc-connection-for-prefabricated-barrier-system/</p>