



ACCELERATED BRIDGE CONSTRUCTION
UNIVERSITY TRANSPORTATION CENTER

UTC Project Information	
Project Title	Development of Non-Proprietary UHPC Mix
University	Florida International University
Principal Investigator	David Garber
PI Contact Information	dgarber@fiu.edu
Funding Source(s) and Amounts Provided (by each agency or organization)	ABC-UTC Funds: \$52,249 Match Funds: \$28,401
Total Project Cost	\$80,650
Agency ID or Contract Number	69A3551747121
Start and End Dates	Completed
Brief Description of Research Project	<p>Ultra-high performance concrete (UHPC) is cementitious composite material with high compression strength (greater than 21 ksi), high tensile strength (greater than 1 ksi), and sustained post-cracking tensile strength. Proprietary UHPC mixes offer consistent quality and material properties, but come at a premium compared to the cost of the individual components of the mix. Non-proprietary UHPC mixes have been previously investigated by several state DOTs and FHWA, but are dependent on the type and quality of locally available materials. The proposed study by FIU is part of a larger overall project including all five of the ABC-UTC partner universities. The main objective of this proposed study is to develop a non-proprietary UHPC mix design, labeled "ABC-UTC Non-Proprietary UHPC Mix," made with local materials that can achieve the necessary mechanical properties and durability for use in bridge components, repair, and connections. The starting point for this mix will be non-proprietary UHPC mixes previously developed by the University of Oklahoma (OU). The ABC-UTC has partner universities covering most of the country, so the applicability of the previously developed mix design in different regions will be assessed or a set of regionally applicable non-proprietary UHPC mixes will be developed. One additional variable that will be considered during mix development is fiber content and fiber type.</p> <p>The OU team will coordinate the overall effort of researchers at the five ABC-UTC partner universities to investigate material properties, bond strength, shear strength, and full-scale structural performance of the</p>

	<p>“ABC-UTC Non-Proprietary UHPC Mix” developed by the partner universities working together. Information and materials will be shared between the partner universities to investigate the repeatability of the proposed mix design. The combined efforts of the partner universities will lead to more significant results than could be obtained by any of the institutions working individually.</p> <p>The study proposed by FIU will focus on evaluating the material properties of the “ABC-UTC Non-Proprietary UHPC Mix” and provide necessary information and materials to OU for the development of a “Guide for ABC-UTC Non-Proprietary UHPC.” FIU will also contribute to the planned technology transfer workshop at the 2019 International ABC Conference in Miami.</p> <p>The main objective of this proposed study is to develop a non-proprietary UHPC mix design, labeled “ABC-UTC Non-Proprietary UHPC Mix,” made with local materials that can achieve the necessary mechanical properties and durability for use in bridge components, repair, and connections.</p>
<p>Describe Implementation of Research Outcomes (or why not implemented) Place Any Photos Here</p>	<ul style="list-style-type: none"> • Collaboration between FIU, UNR, and OU invited to present a full-day non-proprietary UHPC mix workshop, held in Miami on 12-11-2019 • As requested by Oklahoma DOT, Atorod Azizinamini gave a presentation ("UHPC-based Bridge Engineering Solutions") during Oklahoma Transportation Research Day (OTRD) on October 20, 2020 • Used results from project in FDOT proposal on UHPC bond, which was awarded to PI in January 2022 for \$250,000
<p>Impacts/Benefits of Implementation (actual, not anticipated)</p>	<p>The impacts will be tracked and reported once they are identified.</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/development-of-non-proprietary-uhpc-mix/</p>