



ACCELERATED BRIDGE CONSTRUCTION
UNIVERSITY TRANSPORTATION CENTER

UTC Project Information	
Project Title	Robust Methods for UHPC Early-Strength Determination and Quality Control for ABC
University	UNR
Principal Investigator	Mohamed Moustafa
PI Contact Information	mmoustafa@unr.edu
Funding Source(s) and Amounts Provided (by each agency or organization)	ABC-UTC Funds: \$65,000 UNR matching Funds: \$32,500 In-kind donations: \$2,500
Total Project Cost	Total Funds: \$100,000
Agency ID or Contract Number	Accelerated Bridge Construction (ABC-UTC) 69A3551747121
Start and End Dates	01/01/2021 - Active
Brief Description of Research Project	<p>UHPC is one of the most commonly used or desired solution for ABC connections nowadays. With large initiatives for developing non-proprietary UHPC mixes (e.g. ABC-UTC ongoing imitative), the applications and use of UHPC for ABC are further expanding in the US and international markets. Given the ABC nature, many projects considering UHPC for connections and early bridge opening for traffic or following construction phases are hinging on reaching a desired early age strength. For example, bridge owners have recently specified Ductal JS1212 for projects requiring that 12 ksi strength is achieved at 12 hours. While robust mixes can accomplish this requirement, a reliable quality control method to verify such requirement on-site is still lacking. In remote sites, it becomes harder to verify the UHPC early age strength using the current state-of-practice, i.e. preparing cylinders by cutting and grinding the ends then testing them within 10-12 hours. In consultation with Caltrans among UHPC vendors and experts in relevant ACI committees, there is big interest in using two of the well-established methods for conventional concrete strength characterization for UHPC. These are using cubes as opposed to cylinders, and relying on strength maturity for quality control. No documented efforts have yet showed the feasibility of such methods for early strength determination of UHPC, which is the motivation of this project. The objectives of this project are to: (1) conduct comparative compression tests for various UHPC mixes and types using cubes and cylinders at early ages (as early as 10 hours); (2) develop strength maturity curves for various UHPC mixes and assess</p>

	<p>the reliability of using such curves for estimating UHPC early strength; (3) collect data from UHPC vendors (e.g. Steelike Inc.) on UHPC maturity to assemble a larger database; and (4) develop guidelines for UHPC quality control and assurance as pertains to early compression strength characterization.</p>
<p>Describe Implementation of Research Outcomes (or why not implemented) Place Any Photos Here</p>	<p>The outcomes will be tracked and reported once they are identified.</p>
<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/unr-research-projects/robust-methods-for-uhpc-early-strength-determination-and-quality-control-for-abc/</p>