



ACCELERATED BRIDGE CONSTRUCTION
UNIVERSITY TRANSPORTATION CENTER

UTC Project Information	
Project Title	Eliminating Column Formwork Using Prefabricated UHPC Shells
University	FIU
Principal Investigator	Azizinamini, Atorod
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Funding Source(s) and Amounts Provided (by each agency or organization)	ABC-UTC Funds: \$50000 Match Funds: \$25,000
Total Project Cost	Total Funds: \$75,000
Agency ID or Contract Number	Accelerated Bridge Construction University Transportation Center (ABC-UTC)69A3551747121
Start and End Dates	01/08/2018 – 01/03/2020
Brief Description of Research Project	<p>Traditional formwork acts as molds for wet concrete and supports concrete wet weight and live load of equipment and workers temporarily. Scaffolding acts as a supporting platform and provides temporary access to structures under construction. Erecting components of formworks and scaffolding together takes time, can cause traffic congestion, and increases the construction cost. It is also possible that the design cannot be incorporated due to unexpected site condition, and formwork failures can occur because of deviations from the original design. Formwork failure can also occur due to possible human errors or crushing of wooden surface where the heavy loads are placed if the bearing surface of joints is not appropriately designed. Based on “Use and Re-use of Formwork: Safety Risks and Reliability Assessment” report, the re-used formwork is not factored into its design, and since it is subjected to wide range of loads and exposures, it can experience possible degradation in its structural capacity. Furthermore, failure of formwork can also occur during concrete pours and can cause concrete leaking, failure of formwork components, complete structure collapse, and serious injuries or deaths. Possible failures of formwork can be caused by mistakes during erection, wrong calculations of weight acting on formwork, extra loads or due to natural disasters. To prevent possible hazards of formwork and scaffolding failure, a new concept is proposed using ultra-high performance concrete (UHPC) to prefabricate a shell which acts as permanent stay-in-place form for bridge elements. The prefabricated shell is intended to eliminate</p>

	<p>the conventional formwork and scaffolding while reducing the on-site construction time and acting as a durable protective layer for normal strength concrete inside it. The main objectives of this project are:</p> <ol style="list-style-type: none"> 1- The development of prefabricated UHPC shell for bridge column. 3- The development of column-to-footing and column-to-cap beam connections for the proposed column with UHPC shell. 4- Conducting an experimental study on the proposed bridge column utilizing UHPC shell under constant axial and lateral cycle loads 5- Conducting numerical modeling using finite element models on the tested specimen.
<p>Describe Implementation of Research Outcomes (or why not implemented)</p> <p>Place Any Photos Here</p>	<p>Ghosh Associates invited research team to give 2-hour workshop presentation on UHPC-based solutions; details to be determined</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/fiu-research-projects/eliminating-column-formwork-using-prefabricated-uhpc-shells-envisioning-connection-detail-for-connecting-concrete-filled-tube-cft-columns-to-cap-beam-for-high-speed-rail-application/</p>