



UTC Project Information	
Project Title	Prefabricated Bridge Columns with Self-Centering Capability Using Shape Memory Alloy (SMA) And Ultra-High Performance Concrete (UHPC) In Plastic Regions
University	Florida International University
Principal Investigator	Bijan Khaleghi, Ph.D., P.E.
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Funding Source(s) and Amounts Provided (by each agency or organization)	ABC-UTC funds: \$70,000 Match funds : \$35,000
Total Project Cost	\$ 105,000
Agency ID or Contract Number	69A3552348322
Start and End Dates	January 1, 2024 - June 30, 2025
Brief Description of Research Project	<p>This research proposal introduces a new column-bent cap connection, with innovative materials such as Ultra-High Performance Concrete (UHPC), Shape Memory Alloy (SMA) and Engineered Cementitious Composite (ECC) to promote the self-centering behavior and post-earthquake functionality of bridges subjected to earthquake ground motions. Circular columns will be considered in this study.</p> <p>The significance of this research is to propose a simple yet practical and effective use of innovative materials such as UHPC, SMA and ECC as substructure connection for bridges in medium and high seismic regions. Several factors are simplified in the construction of the column due to novel properties of UHPC and SMA to minimize the splice length between column longitudinal reinforcement. This phase of study will focus on comprehending on fundamental behavior of the proposed system and identify, possible future steps that are needed for implementation of the idea in the field. Research builds on previous work conducted at FIU (Azizinamini, et al) in the form of moving the plastic hinge outside of capacity protected areas in seismic design process, through use of UHPC. The research will involve experimental studies, in the form of 2/3 scaled column specimens subjected to constant axial load and cyclic lateral loads, small scale component tests to comprehend the behavior of SMA and durability aspects of the proposed system. The research is expected to develop a roadmap to implement the proposed idea in the field as well as tentative seismic design methodology that</p>

	can be applied to bridge column-cap beam connections, column-footing connections, and plastic hinge zones.
Describe Implementation of Research Outcomes (or why not implemented) Place Any Photos Here	The outcomes will be tracked and reported once they are identified.
Impacts/Benefits of Implementation (actual, not anticipated)	The impacts will be tracked and reported once they are identified.
Web Links <ul style="list-style-type: none"> • Reports • Project website 	https://abc-utc.fiu.edu/research-projects/prefabricated-bridge-columns-with-self-centering-capability-using-shape-memory-alloy-sma-and-ultra-high-performance-concrete/