



ACCELERATED BRIDGE CONSTRUCTION
UNIVERSITY TRANSPORTATION CENTER

UTC Project Information	
Project Title	Prefabricated Barrier System Utilizing UHPC Connections
University	FIU
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Funding Source(s) and Amounts Provided (by each agency or organization)	ABC-UTC Fund: \$50,000 Match Fund: \$25,000
Total Project Cost	Total Fund: \$75,000
Agency ID or Contract Number	Accelerated Bridge Construction University Transportation Center (ABC-UTC) 69A3551747121
Start and End Dates	2020/01/01- Active
Brief Description of Research Project	<p>Barriers are one of the most important safety features in bridge construction and their main function is to keep vehicles within roadways and redirect errant vehicles passing the bridge. The philosophy of barrier design is to have a sufficiently resistant deck to force the yield line failure pattern to remain in the barrier. Therefore, the deck overhang is designed to provide a flexural resistance, acting coincidence with the tensile force, more than flexural resistance of barrier about the longitudinal axis of the bridge. One durability issue regarding cast-in-place (CIP) barriers is the early-age cracking due to temperature gradients and curing conditions which can subject them to excessive risk of corrosion, leading to costly repair projects. This undesired phenomenon can be avoided by using high-quality prefabricated barriers which can significantly reduce on-site construction time and enhances work zone safety. However, connecting prefabricated barriers to the structure may be challenging. 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 is proposed under this project. A single-slope prefabricated barrier with grooves will be connected to deck overhang with dowels extended vertically from its end. The grooves in addition to 1 in. leveling pad will be filled using UHPC to connect the prefabricated barrier to bridge deck overhang. The use of UHPC allows for shorter development</p>

	<p>length of overhang extended dowels resulting in easy erection and simplification in reinforcement details of the barrier itself. Under this project, component and large scale testing will be conducted along with extensive finite element models to ensure that the proposed prefabricated barrier system with UHPC connections meets TL-4 requirements. The objectives of this research are: (1) Development of new connections utilizing ultra high performance concrete (UHPC) to connect prefabricated barriers to bridge deck considering geometry and fit-up issues; (2) Conducting detailed finite element modeling on the proposed barrier system and connections; (3) Conducting proof of concept experimental work on component test for the proposed prefabricated barriers with UHPC connections; (4) Conducting proof of concept experimental work on large test for the proposed prefabricated barriers with UHPC connections; (5) Assessment of the performance of the prefabricated barriers with UHPC connections compared to the most common barrier systems; and (6) Developing detailed finite element models for the proposed prefabricated 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) Place Any Photos Here</p>	<p>Research team has been assembled to pursue upcoming NCHRP 22-56 project on development of additional barrier systems for ABC.</p>
<p>Impacts/Benefits of Implementation (actual, not anticipated)</p>	<p>Research output is viewed by bridge professionals as an excellent alternative to be pursued.</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/prefabricated-barrier-system-utilizing-uhpc-connections/</p>