

UTC Project Information	
Project Title	MPC-408 – Exploring Unique Plastic-Reinforced Concrete Bridge Components: Phase I
University	Colorado State University
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Funding Agencies	USDOT, Research and Innovative Technology Administration
Agency ID or Contract Number	DTRT12-G-UTC08
Project Cost	\$44,000
Start and End Dates	October 1, 2012 – October 1, 2014
Project Duration	2 Years
Brief Description of Research Project	<p>Concrete bridge reinforcement has historically been steel reinforcing bars. Unfortunately steel reinforcement is susceptible to corrosion, particularly in areas of the country such as the Mountain Plains region where deicing agents are frequently applied during winter months. Fiber reinforced polymer (FRP) bars are one alternative that is not used frequently due to cost. While FRP in a traditional round bar has worked successfully for many years, it is hypothesized here that tubular (and other) shapes may provide superior performance. The ability to extrude plastics and fiber reinforced plastics (FRP) into virtually any shape makes small-scale experimental exploration of this concept possible. If the improved performance that is anticipated can be demonstrated it is envisioned that this would have applications in bridge components, including: decks, girders, columns, and virtually any reinforced concrete component used in structural design.</p> <p>Research Objectives: The research objective of this project is to (1) demonstrate experimentally that shapes other than typical round reinforcing bar can enable better bridge deck performance, and (2) develop a solid model of the most promising shapes that can be used for further investigation in later phases of the work.</p>

<p>Describe Implementation of Research Outcomes (or why not implemented)</p> <p>Place Any Photos Here</p>	<p>The conclusions are limited by the small sample size and weaker-than-desired concrete in the beams. The wave style of reinforcement was found to be ineffective due to the tight dimensions of the wave. However, the helical reinforcement geometries showed comparable, and perhaps enhanced, flexural and shear performance when compared to the beams with straight FRP bars. The helical geometries also did not show the pull-out failure of the reinforcement, and since they were assembled as a unit, they were simpler to place in the beams and could lead to savings in construction time.</p>
<p>Impacts/Benefits of Implementation (actual, not anticipated)</p>	<p>This project contributes to a body of research seeking the best ways to take advantage of FRP to enhance the longevity of transportation infrastructure. By exploring alternatives that are distinct from the classic straight bar used for steel reinforcement, we may find ways that take better advantage of the unique properties of FRP and reduce or eliminate the drawbacks of FRP reinforcement such as its lower bond strength and brittle nature.</p>
<p>Web Links</p> <ul style="list-style-type: none"> • Reports • Project Website 	<p>http://www.ugpti.org/resources/reports/details.php?id=841</p>