

UTC Project Information	
Project Title	MPC-414 – Quantifying Sustainability Metrics for Trunkline Bridges in the Mountain Plains Region
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Funding Agencies	USDOT, Research and Innovative Technology Administration
Agency ID or Contract Number	DTRT12-G-UTC08, Modification No. 1
Project Cost	\$122,000
Start and End Dates	January 1, 2013- December 31, 2013
Project Duration	1 Year
Brief Description of Research Project	<p>Sustainability is a critical consideration in the decision making process for construction projects. The building construction sector has the LEED certification of the US Green Building Council (USGB). This certification requires an explicit justification of sustainability aspects of a candidate building's design and construction processes. Several levels can be certified, depending on a point system developed by the USGB. Bridge construction in the United States has no equivalent sustainability certification system, although several sustainability initiatives have been developed in the recent past. A sustainability index has been tested by Atkins Global. The Building Research Establishment (BRE) in the UK has specified that future structural design codes must consider sustainability, although no specific measures have been included to date. AASHTO's Center for Environmental Excellence has publications on sustainability; and the most recent USGB guide gives more emphasis to building exterior factors. The ability to quantify the sustainability of bridges and their construction will provide an important metric for decision makers during the bidding and public policy making process.</p> <p>Research Objectives: The research objective of this project is to develop a tool that can be used to provide a quantitative sustainability rating or ratings based on numerous factors. This will help inform decision makers at all levels including bridge owners, engineers, and government.</p>
Describe Implementation of Research Outcomes (or why not implemented) Place Any Photos Here	Using basic rank-ordering for the CO ₂ emissions per square foot of bridge deck allowed a simple statistical division to be made for five different sustainability ratings, namely superior, excellent, acceptable, poor and unacceptable. Each rating corresponds to a percentile within

	the 36 bridges population used in the analysis.
Impacts/Benefits of Implementation (actual, not anticipated)	From analyzing the ranking of bridges, it was found that prestressed bridges have the least amount of CO ₂ /sq foot compared to steel bridges for this simplified approach. Among bridges ranked superior to excellent, 66.7% were prestressed bridges and 33.3% were steel bridges. Similarly, among bridges ranked from acceptable to poor, prestressed bridges comprised 14.3% of the sample size and the remaining 85.7% were steel bridges. The results of this study are preliminary and not intended to be used for applications related to design selection.
Web Links <ul style="list-style-type: none"> • Reports • Project Website 	https://www.ugpti.org/resources/reports/details.php?id=919