

UTC Project Information	
Project Title	MPC-394 – Quantifying Uncertainty in Nondestructive Bridge Inspection Methods for use in Performance Based Inspection
University	Colorado State University
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Agency ID or Contract Number	DTRT12-G-UTC08
Project Cost	\$100,000
Start and End Dates	January 1, 2012 – December 31, 2013
Project Duration	2 Years
Brief Description of Research Project	<p>The large stock of aging bridges in the US transportation system combined with tight repair and maintenance budgets make efficient bridge asset management imperative for improving upon (or even maintaining) current levels of safety and service. There are three key components to the management of bridges and other types of infrastructure 1) inspection of assets, 2) decision making about maintenance and repair programs, and 3) the conduct of maintenance and repair activities. This research project specifically considers the inspection phase of the process.</p> <p>Currently visual inspection is the most common inspection method (Phares et. al., 2004), and most visual inspections are conducted on a deterministic two year cycle as required by the National Bridge Inspection Standards, NBIS, (Hearn, 2007). In the aftermath of the I-35W bridge collapse in Minneapolis, US bridge inspection practice received close scrutiny. A recent White Paper on Bridge Inspection and Rating produced by an Ad-Hoc Group of the American Society of Civil Engineers Structural Engineering Institute (ASCE-SEI) and AASHTO (2009) developed a listing of several deficiencies in existing inspection</p>

	<p>practice. One of this group’s recommendations was: “A more rational, risk-based approach to determining the appropriate inspection intervals for bridges is needed, as opposed to a set twenty-four month cycle for all bridges.” This paper went on to note “A more detailed inspection conducted less frequently may have a positive impact on the overall safety and maintenance of bridges in the U.S., allowing for broader application of Nondestructive Evaluation (NDE) technologies and a better understanding of the condition of individual bridges” (2009).</p> <p>In response to these calls for improvement, the principal investigators have developed a model for Performance-Based Inspection planning, wherein inspection scheduling considers the level of uncertainty present in knowledge about the current condition of a structure and the risk posed by the structure to the network. In order to assess the uncertainty present in knowledge about the current condition of a structure, information about the accuracy of various bridge inspection methods is critical. Kim and Frangopol (2011) recently showed that optimal inspection and monitoring plans could be developed to minimize the cost of inspection and the time to defect detection (the length of time the damage exists on the structure before it is identified by some type of inspection). However, their work was based on idealized representations of inspection uncertainty. The real uncertainty present in different inspection techniques needs to be quantified in order to make these optimized plans relevant to real structures. Information about nondestructive techniques is especially needed in order to promote the more frequent use of these methods.</p>
<p>Describe Implementation of Research Outcomes (or why not implemented)</p> <p>Place Any Photos Here</p>	
<p>Impacts/Benefits of Implementation (actual, not anticipated)</p>	
<p>Web Links</p> <ul style="list-style-type: none"> • Reports • Project Website 	<p>https://www.ugpti.org/resources/reports/details.php?id=819</p>