

## Research Project Descriptions

UTC Project Information	
Project Title	<b>Risk-based life-cycle management of deteriorating bridges</b>
University	Oklahoma State University
Principal Investigator	PI: Mohamed Soliman, Oklahoma State University (OSU) Co-PI: Julie Ann Hartell, Oklahoma State University (OSU)
PI Contact Information	Mohamed Soliman; <a href="mailto:mohamed.soliman@okstate.edu">mohamed.soliman@okstate.edu</a> ; 405-744-9777
Funding Source(s) and Amounts Provided (by each agency or organization)	SPTC: \$72,500.00 Oklahoma State University: \$72,644
Total Project Cost	\$145,144
Agency ID or Contract Number	DTRT13-G-UTC36 SPTC 15.1-12
Start and End Dates	4/01/2016 – 3/31/2017
Brief Description of Research Project	<p><b>PROBLEM:</b> Bridges are among the most vulnerable, yet important, components of transportation networks. They are under continuous deterioration due to various environmental and mechanical stressors and are subjected to several types of extreme events which can lead to partial or total failure. Such failures are often accompanied by severe consequences including loss of life and significant social, economic, and environmental impacts. Accordingly, proper life-cycle management techniques must be implemented in order to mitigate the risk of such failures while taking into account strict budgetary constraints, as well as the uncertainties associated with the performance prediction of these deteriorating structures. Moreover, future climate change is expected to increase the deterioration rate and intensify the risk of failure of these structures. Unfortunately, most of our design, assessment, and management methodologies use past climate conditions when constructing new bridges or assessing the reliability of existing ones. Effects related to climate change, such as the increase in long-term annual average temperatures and the increase in frequency and magnitude of storms and flood events, and their impact on the Nation's bridges, are still not well understood. Therefore, developing new infrastructure design, assessment, management, and adaptation methodologies capable of mitigating the risk related to climate change is of paramount importance.</p> <p><b>PROPOSED SOLUTION:</b> This research will develop a risk-based life-cycle management technique for bridges susceptible to failure due to scour and floods considering the long-term impact of climate change. A decision</p>

	making tool will be formulated to assist in planning future adaptation and mitigation strategies. The developed tool will identify available adaptation strategies, as well as their effect on the risk profile, and perform stochastic optimization to obtain the optimum time and adaptation type required to reduce the risk of failure and extend the service life.
Describe Implementation of Research Outcomes (or why not implemented)  Place Any Photos Here	
Impacts/Benefits of Implementation (actual, not anticipated)	
Web Links <ul style="list-style-type: none"><li>• Reports</li><li>• Project website</li></ul>	