

Project Title: Acoustic Emission Safety Monitoring of Intermodal Transportation Infrastructure

Principal Investigator:

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Project Summary:

The theme of NCITEC is to promote the development of an integrated, economically competitive, efficient, safe, secure, and sustainable national intermodal transportation network by integrating all transportation modes for both freight and passenger mobility. Safety is a critical component in the development, implementation, operation and maintenance of the transportation system, and therefore it is imperative to conduct research on utilization of technologies that will allow enhancement of the highway structures safety by monitoring and predicting failures. With these goals in mind, the proposed project will conduct research on the application of acoustic emission and other non-destructive evaluation technologies to address the safety and integrity of highway structures that are exposed to impacts of several modes of transportation interacting with each other. Utilizing the established partnership with Virginia Department of Transportation, acoustic emission monitoring (integrated with remote sensing and analytical data post-processing) is proposed to be used on intermodal assets such as lift bridges and will study the interactions between highway and marine traffic and the corresponding causes and effects as related to the safety of these structures. Other intermodal highway structures will also be considered for the purposes of additional research and training tasks.

The proposed study will affect the passenger and/or freight transportation by providing early warning signs and tendencies of potentially critical highway structures deficiencies therefore lowering the repair and maintenance costs and minimizing traffic flow disruptions that occur when elements of transportation network need to be closed down for major repairs. The broader impacts will include the advancement of U.S. technology and expertise by integrating the acoustic emission technology, data acquisition, and remote sensing for analysis and prediction of factors that lead to deterioration and wear in both accessible and in-accessible structural components under the stresses of intermodal traffic environment as well as student education and training to address the problem of future generation transportation workforce.