Project Information Form

Project Title	Next-Generation Wireless Bridge Weigh-in-Motion (WIM) System Integrated with Nondestructive Evaluation (NDE) Capability for Transportation Infrastructure Safety
University	Georgia Institute of Technology, University of Alabama at Birmingham
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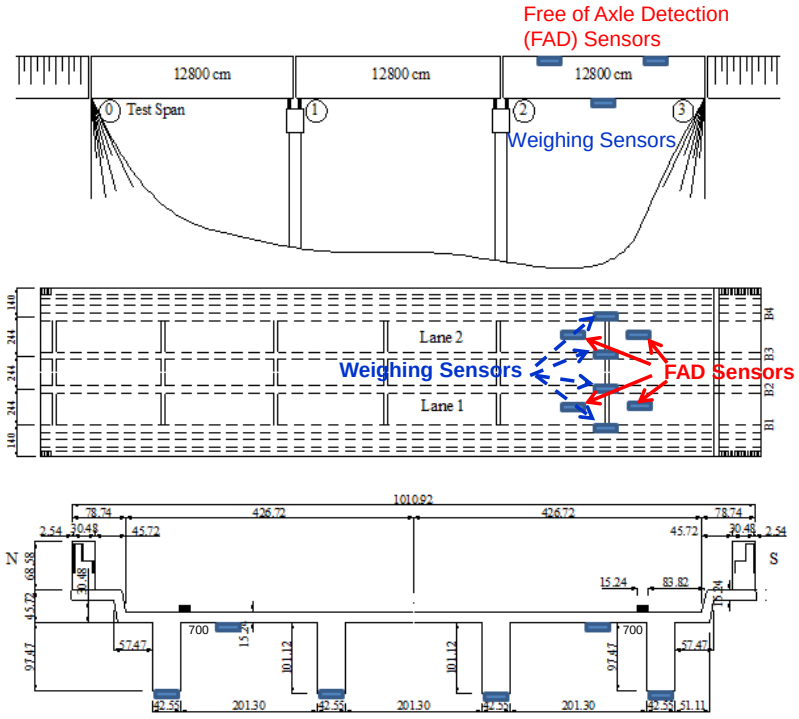
Funding Source(s) and Amounts Provided (by each agency or organization)	$ 244,562 (UTC) + $177,949 (GDOT) + $109,075 (ALDOT)
Total Project Cost	$313,436
Agency ID or Contract Number	DTRT12GUTC12
Start and End Dates	05/01/12 ~ 08/15/14
Brief Description of Research Project	This proposal seeks to develop a wireless WIM+NDE system as a solution to the premature transportation infrastructure safety problem, for the first time ever, in a two-fold approach: control of overloaded trucks and safety assessment/monitoring of transportation infrastructure. The system contains individual wireless sensing nodes that integrate state-of-the-art shear strain sensors suitable for concrete bridge components, and ultrasonic nondestructive evaluation (NDE) devices suitable for steel components.
Describe Implementation of Research Outcomes (or why not implemented) (Attach Any Photos)	• The main goal of current research work is on simulation of heavy vehicle to bridge interaction using advanced finite element modeling technique in order for effective use with the moving force identification (MFI) algorithm for the B-WIM system for enforcement and safety assessments. For this reason, the 3D heavy vehicle model was created with a complex suspension and damping system along with pneumatic tires. In addition to this, the 3D bridge model was developed with different types of elements such as beam, shell and

	solid. Transient dynamic vehicle to bridge interaction analysis was carried out based on numerical finite element computational mechanics using LSDYNA advanced computer program. We are in the process of mapping the 3D LSDYNA output of bridge-vehicle interaction analyses onto recently developed MFI algorithm from this current project. Our recently developed MFI algorithm is not, however, capable of integrating high fidelity simulation output from 3D LS DYNA. So significant efforts are currently underway on upgrading MFI algorithm and implementing the approach on a US-78 bridge.  **Weighing and FAD sensor locations at US-78 Bridge**
Impacts/Benefits of Implementation (actual, not anticipated)	• The efforts are underway for the real time application of advanced FE simulation into MFI algorithm on a US-78 bridge to improve the axle detection of the current B-WIM system therefore making it more reliable for enforcement and safety assessment.
Web Links • Reports • Project website	http://nctspm.gatech.edu/pi/next-generation-wireless-bridge-weigh-motion-wim-system-integrated-nondestructive-evaluation-nde