

CIAMTIS

U.S. DOT Region 3 University Transportation Center

UTC Project Information	
Project Title	Integration of traffic and structural health monitoring on the Varina-Enon Bridge via sensor fusion
University	Virginia Tech,
Principal Investigator	PI: Rodrigo Sarlo Co-PI: Carin Roberts-Wollman
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Funding Source(s) and Amounts Provided (by each agency or organization)	VTI Fed- \$97,066 VTI Match- \$95,050
Total Project Cost	\$192,116
Agency ID or Contract Number	69A3551847103
Start and End Dates	Start 1/20/2020 End 6/20/2021
Brief Description of Research Project	<p>The significance of this study is two-fold. Firstly, it will demonstrate an application-centric example of ITS and SHM integration. According to a review on ITS and SHM integration by Khan et al. [4], few examples exist in the literature which relate to the estimation of structural features. These types of applied studies are important to establish credibility in these techniques as solutions to practical problems. Secondly, through data fusion techniques, the study will explore alternative sensing methods to complement camera-based measurements, which can suffer from poor performance at night or during inclement weather. A subset of ITS systems, called Bridge-Weigh-InMotion (BWIM) systems, have been developed over several decades to estimate number of axles and vehicle weight using only contact sensors (no cameras). However, positional tracking and vehicle classification has not traditionally been part of the BWIM approach. Furthermore, weight estimation of vehicles on long bridges like the Varina-Enon has not been commonly studied for BWIM [3]. The use of complementary ITS methodologies is a key feature of this study, intended to improve the long-term reliability of these systems. ITS and SHM systems have the potential to save highway infrastructure managers millions in traffic control and maintenance operations, respectively. However, implementation of these systems individually by industry has been slow [4]. The integration of the two systems is more attractive to practitioners because it brings improved performance at a lower cost. That is, on one hand, ITS can make SHM estimates more accurate by providing load information. On the other hand, SHM can complement ITS data to help estimate vehicle weights and overcome</p>

	<p>deficiencies in camera measurements. By fusing system information, less sensors are required overall. One of the key goals of this project will be to produce a problem-specific financial assessment on the benefits of the combined approach on long-term infrastructure management costs. This will solidify the impact on industry partners. Details on this assessment are included in the task list</p>
<p>Describe Implementation of Research Outcomes (or why not implemented) 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 	