Project Information Form

Project Title	Full-Scale Wall of Wind Testing of Variable Message Signs (VMS) Structures to Develop Drag Coefficients for AASHTO Supports Specifications
University	Florida International University
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Funding Source(s) and Amounts Provided (by each agency or organization)	Georgia Institute of Technology FIU: $90,000 UTC + $90,000 Matching UAB: $70,000 UTC + $70,000 Matching
Total Project Cost	$160,000.00 + $160,000 Matching
Agency ID or Contract Number	DTRT12GUTC12 (AWD000000002293)
Start and End Dates	1/8/12 to 1/31/14 (No cost extension approved for December 31, 2014)
Brief Description of Research Project	The overall scientific objective of this project is to develop accurate drag coefficients for incorporation in the AASHTO Support Specification to foster safer and more economic design of VMS structures. This project will facilitate the development of new drag coefficients for fatigue design under service load conditions and ultimate strength design under extreme wind conditions.
Describe Implementation of Research Outcomes (or why not implemented) (Attach Any Photos)	• Wall of Wind (WOW) tests on VMS and data analyses were completed. Conference calls are conducted between FIU and UAB team members to finalize results. PhD student Debbie Meyer is completing her dissertation based on WOW results and plans to graduate in Fall 2014. • UAB has performed the FEM analysis. Based on the FIU Wall of Wind test results and Finite Element Modeling at UAB, new drag coefficients are being developed. Those coefficients will be recommended for incorporation into AASHTO specs. Instead of a

	single drag coefficient, inappropriately applied to all VMS structures under the current design provision, a new table will be proposed containing a set of wind drag coefficients as functions of the various geometrical configurations of the VMS structures. This will help realize economic benefits by downsizing structural elements without jeopardizing the safety of these cornerstones of Intelligent Transportation Systems (ITS) infrastructure. • Significant reduction in drag by simple corner modifications (as much as 30% reduction in loading) has been achieved. Such information will be disseminated to VMS manufactures through DOT and Florida Turnpike personnel. These design optimizations can be very easily and economically incorporated in to future aerodynamically favorable VMS structures to reduce their cost.
Impacts/Benefits of Implementation (actual, not anticipated)	• The expected significance and benefits of the research results is attributed to: (i) safety and economic benefits that can be realized when using large-scale test-based realistic drag coefficients for fatigue and extreme wind and rain, (ii) development of realistic design loads on critical ITS infrastructure, and (iii) advancement of fundamental knowledge of 3D sign structure aerodynamics. The research will be of significant important to a wide spectrum of professionals including traffic engineers at state DOT, Florida Turnpike engineers, VMS manufactures, design professionals involved in wind design of traffic infrastructure, and general public whose safety depends on the reliability of VMS structures operating in the US highways and interstates. The 'wind-friendly' design modification information, along with the associated cost-benefit attributes, will be disseminated to VMS manufactures so that they can fabricate safer VMS systems under constrained resources of funding. Designers will benefit from the new VMS-related AASHTO specifications that will be proposed for future incorporation.
Web Links • Reports • Project website	http://nctspm.gatech.edu/pi/full-scale-wall-wind-testing-variable-message-signs-vms-structures-develop-drag-coefficients