Florida Department of Transportation Research

MASH Validation Testing of Low-Profile Barrier

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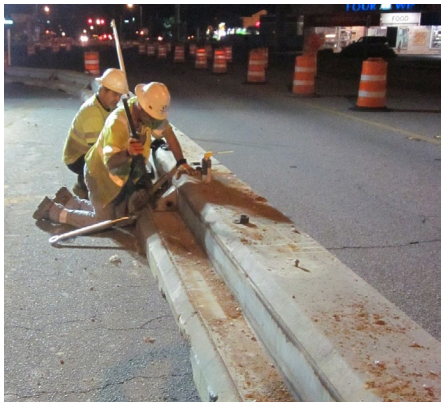
Current Situation

Among the sophisticated, high-tech, and massive equipment that are part of building transportation structures, one of the most ubiquitous is also apparently one of the simplest: the traffic barrier. These indispensable concrete barriers perform a critical safety function, both for drivers and workers. Yet, they are not a simple as they seem – they are the product of engineering studies as well as testing and validation of their intended function. Used at low to moderate roadways speeds, the Florida low profile barrier has a minimal impact on driver visibility while offering protection for workers and drivers from work zone hazards. This barrier was originally developed and validated in accordance with NCHRP Report 350, *Recommended Procedures for the Safety Performance Evaluation of Highway Features* (National Academy Press, 1993). Since the publication of that report, roadway design, vehicle types and sizes, and roadway conditions have changed, and NCHRP Report 350 has been updated and superseded by the AASHTO *Manual for Assessing Safety Hardware* (MASH; 2016).



Workers install segments of the Florida low profile barrier to create a safe work zone.

Research Objectives

University of Florida researchers reassessed the Florida low profile barrier under impact conditions as specified in the MASH standard.

Project Activities

The assessment was conducted in two tasks: numerical finite element simulations of vehicle barrier impacts were conducted to estimate system performance and full-scale vehicle barrier crash tests were performed to validate compliance with MASH TL-2 requirements.

In preparation for full-scale crash tests, numerical simulations were conducted to estimate the performance of the Florida low profile barrier. Two vehicles were simulated: an 1,100-kg small car and a 2,270-kg pickup truck. Mesh models of these vehicles at both high and coarse resolutions were obtained from the Center for Collision Safety and Analysis. Each vehicle was studied in collisions with a connected set of ten low profile barrier segments. For these studies, the coarse resolution models were sufficient. MASH defines crash scenarios for barriers by angle of collision and speed. Simulations indicated that the Florida low profile barrier would qualify under the MASH standard, but full-scale testing was recommended for full validation.

For full-scale tests, sixteen Florida low profile barriers were obtained. Two vehicles in the weight classes previously described were used for the tests. Examples of qualifying criteria include the ability of the barrier to contain and redirect the vehicle or bring it to a controlled stop, debris from the barrier should not be able to penetrate the vehicle, and the vehicle should remain upright during and after collision. The full-scale tests indicated that the Florida low profile barrier is designed to meet all MASH criteria. Based on both numerical and physical tests, the researchers made recommendations for barrier design and installation parameters.

Project Benefits

The results of this project help assure that the Florida low profile barrier will perform its important safety function under current vehicle and traffic conditions.

For more information, please see www.fdot.gov/research/.