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A Data-Driven Approach to Implementing Wrong-Way Driving Countermeasures

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Current Situation

Crashes resulting from drivers entering highways via the off-ramp and driving the wrong way are relatively rare, but they are much more likely to result in fatal and serious injuries. Florida is one of the many states that has focused on preventing these crashes. A series of Florida Department of Transportation (FDOT) research projects has identified locations and causes of wrong-way driving as well as possible countermeasures. As this work moves toward implementation, more information is needed about the placement and selection of suitable countermeasures.

Research Objectives

Florida International University researchers examined wrong-way crashes to determine the possible conditions that might lead to these crashes, with the goal of developing a demographics-based methodology for determining which countermeasures should be used at which off-ramps.

Project Activities

The researchers analyzed wrong-way driving (WWD) crashes and demographic and land-use factors to identify the predominant factor that could potentially contribute to WWD incidents at each of the 1,633 off-ramps in Florida. Three factors were the focus of the analysis: impaired drivers; drivers aged 65 years and older; and tourists.

Based on 6,888 WWD crashes in Florida (2011-2015), demographic data, and land-use data, the researchers first identified ten hotspots for WWD crashes in each of the seven FDOT districts and on the Florida Turnpike. Then, they reviewed police reports of the WWD crashes on freeways to identify factors associated with the off-ramps upstream of the crash locations. One or more of the factors were associated with all off-ramps in the hotspot and crash analyses.

Off-ramps not identified in the hotspot analysis or in the crash analysis were examined for factors that increased the likelihood of WWD incidents. Demographic and land-use factors for areas near these off-ramps were examined. The association between WWD crashes involving impaired drivers and the density of alcohol outlets was high; WWD crashes involving drivers aged 65 and older and facilities of interest to this population were weakly associated; no association was found between tourist-involved WWD crashes and tourist facilities.

Once the predominant factor at each off-ramp was determined, that factor was used as the basis for recommending specific countermeasures: for impaired drivers, a combination of red rectangular rapid flashing beacons (red-RRFBs) and internally illuminated raised pavement markers (iiRPMs); for drivers aged 65 and over, a combination of LED-lighted Wrong Way signs and iiRPMs; and for tourists, either red-RRFBs or LED-lighted Wrong Way signs. New signing and pavement markings (S&PM) were recommended at all off-ramp locations.

Project Benefits

Research-based approaches to understanding wrong-way crashes can help prevent these crashes and mitigate their associated severe consequences. Findings from this study provide guidance to proactively deploy WWD countermeasures at all the off-ramps in Florida.

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



A Wrong Way sign with edge illumination warns drivers not to enter off-ramps.