



Comparing Countermeasures for Mitigating Wrong-way Entries onto Limited Access

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Current Situation

In its [Statewide Wrong Way Crash Study](#) (2015), the Florida Department of Transportation (FDOT) reported 280 wrong-way driving (WWD) crashes on Florida interstates during 2009-13. Several initiatives at FDOT have focused on the decision-making process of drivers who make wrong-way entries and investigated mitigating countermeasures. FDOT also developed a new standard for minimum signing and pavement markings at interstate ramp termini as a countermeasure to WWD.

Research Objectives

University of South Florida researchers compared countermeasures available for use in Florida to recommend the appropriate measures for future deployment by FDOT.

Project Activities

Six wrong-way driving (WWD) countermeasures were evaluated: red rectangular rapid-flashing beacons (RRFB); flashing red in-pavement markers; detection-triggered LED lights around “Wrong Way” signs; detection-triggered blank-out signs that flash “Wrong Way”; exit ramp delineators; and alternately flashing warning beacons. The researchers also evaluated the new FDOT signing and marking standard.

Countermeasures were studied and evaluated by four methodologies: analysis of existing data and studies; focus groups; a public opinion survey; and a human factors study using driving simulation. Field evaluation of the countermeasures was an important component of this project. Analysis of existing data and studies was based on a literature review and a cost analysis of each countermeasure. The focus group identified the most effective countermeasures: red rectangular rapid-flashing beacons, detection-triggered blank-out signs, and flashing wigwag beacons.

All countermeasures were then evaluated through a public opinion process. Tampa-area events yielded 250 surveys responding to a presentation which included driver’s point-of-view videos of each type of countermeasure operating in the field. Participants then completed a survey that addressed three primary issues: how much each countermeasure improved driver awareness, compared to previous standard signage; ranking the effectiveness of the countermeasures; and estimating the effectiveness of each participant’s top two countermeasures, if used together.

In the human factors study, participants drove scenarios in a driving simulator, encountering RRFBs, alternately flashing beacons, LEDs, blank-outs, and standard “Wrong Way” signs. The participants, with a median age of 20, performed the scenarios both unimpaired and with a simulated impairment (goggles that distorted their vision). Participants reported that dynamic signage was more effective than static “Wrong Way” signs, but their measured performance showed that all countermeasures performed similarly. Based on the cumulative project results, the researchers identified countermeasures that were more effective than others and opportunities for deploying them to help mitigate WWD incidence at highway exits.

Project Benefits

Marking highway exits using countermeasures that have proven effectiveness can reduce wrong-way entries and protect the public from this category of crashes. This project’s results have immense applicability and can be of national significance, since they provide a perspective on the effectiveness of countermeasures from a driver perspective.

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



A group participates in general public evaluation of wrong-way driving countermeasures.