Kansas Department of Transportation

TECHNICAL SUMMARY

Evaluation of Wrong-Way Driving Countermeasures at Kansas Urban and Rural Interstate Ramps

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Introduction

Although WWD crashes occur less frequently than other crashes, they are more likely to result in fatalities (Baratian-Ghorghi et al., 2015; Cooner et al., 2004b). Furthermore, WWD crashes frequently result in head-on crashes, which are often fatal (Baratian-Ghorghi et al., 2015). Although WWD crashes in Kansas account for only approximately 0.05% of all vehicle crashes, they result in approximately 2% of all fatalities in Kansas (KDOT, 2016). WWD crashes also have been shown to have a much higher rate (2.0 to 1.4) of fatalities and serious injuries per fatal/serious injury crash than all other types of fatal/serious injury crashes (KDOT, 2016). High vehicle speed was a factor in more than half of all WWD crashes that resulted in at least one fatality or serious injury. Additionally, research has found that approximately 35% of WWD crashes in Kansas involve alcohol or drugs (KDOT, 2016). In addition to the loss of life, each fatal crash in the state results in an economic loss of approximately $4 million. Therefore, reducing the number of WWD incidents would significantly benefit the state of Kansas.

Project Description

This study evaluated low-cost countermeasures at partial cloverleaf interchanges in Kansas. Six ramps were selected in the metropolitan area of Topeka, including four study sites and two control sites. Three sets of WWD incident data were gathered over a 10-day to a 14-day period, including one before study and two after studies, using two sets of pneumatic road tubes on the ramps at each site. Three cases were established to grade the severity of wrong-way incidents based on wrong entry, self-correction, and error; the results converted to a rate of incidents per 100,000 entering vehicles (ev). In the before study, incident rates ranged from 3.7 to 92 incidents per 100,000 ev. The evaluated countermeasures were red retroreflective delineators, oversized and lowered wrong-way signs, and a flashing LED wrong-way sign. The first set of after data, which were collected immediately after the countermeasures were installed, showed improvements at all but one of the study sites, with incident rates ranging from 3 to 103 incidents per 100,000 ev. The second set of after data were collected months after installation, and they showed improvement at all the study sites, with incident rates ranging from 0 to 40 incidents per 100,000 ev. Although the results for the flashing LED sign were inconclusive, the study found that red retroreflective delineators and oversized and lowered signs effectively reduced the number and type of WWD incidents.

Project Results

Results from the first after study showed that case 1 incidents decreased to zero, and three of the ramps showed marked improvement compared to the before study. One ramp, Auburn Rd, had a similar incident rate as the before study. One countermeasure used at Auburn Rd was the flashing LED Wrong Way sign. Although sign installation was successful and the sign was activated per vendor instructions to blink from 9:00 p.m. to 4:00 a.m. each night, the sign did not blink as intended. Tech support discovered an issue with the sign operating through midnight into the next day, so a work around was developed where the sign successfully operated from 9:00 p.m. to 11:55 p.m. and then from 12:01 a.m. to 4:00 a.m. However, the issue caused a seven-day span in which the sign did not work properly, and a seven-day span with data in which the sign did work properly. An incident rate was determined for each time period with their countermeasures, as shown in Table 6.3. The observed difference was an incident rate of 93.98 before the sign was operational compared to an incident rate of 112.78 after the sign was operational.

Project Information

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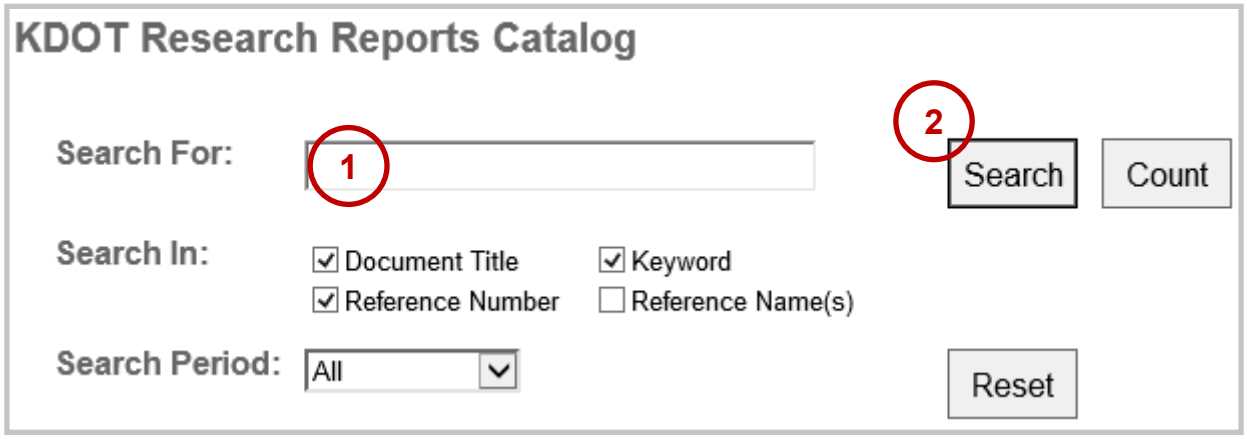

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