Florida Department of Transportation Research

Linking Crash Patterns to ITS-Related Archived Data: Phase II
Vol. 1 – Real-Time Crash Risk Assessment Models and
Vol. 2 – Evaluations of ITS Strategies
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The Florida Department of Transportation (FDOT) uses embedded loop detectors on several high-traffic freeways to collect real-time traffic speed, volume, and lane-occupancy data. FDOT contracted the University of Central Florida to conduct a study of loop detector data to determine whether it could be used to provide real-time warnings of potentially hazardous traffic conditions. A warning system would enable quick-response traffic-control strategies to reduce the potential for crashes.

Loop detectors like these provide real-time traffic data useful for congestion management.

In the first part of the study (Vol. 1), the researchers compared the loop detector data with concurrent crash data collected over a period of five years along a 36.25 mile segment of Interstate 4. They also reviewed the highway design for the same area to determine if it influenced the risk for crashes. The study showed that the occurrence of rear-end crashes, which are the most common type, corresponded with 77% accuracy to the level of traffic congestion reported by the detectors. The second most frequent crash type, lane-change crashes, corresponded to traffic speed and congestion 60% of the time.

In the second part of the study (Vol. 2), the researchers utilized the models developed in the previous phase of study to evaluate the effectiveness of three ITS strategies used on the same section of I-4: i.e., route diversion, ramp metering, and variable speed limits. The strategies were evaluated independently and in combination. Route diversion and ramp metering (the use of traffic signals to control traffic flow onto freeways) reduced crash risk during moderate congestion but tended to increase travel time. Variable speed limits (slowing traffic approaching congested areas to allow the congestion to dissipate) reduced crash risk without significantly increasing travel time. None of the strategies successfully reduced the crash risk during dense traffic congestion.

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