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DEVELOPMENT OF MODELS TO QUANTIFY THE IMPACTS OF SIGNALIZATION ON INTERSECTION CRASHES

PROBLEM STATEMENT

Every year, hundreds of thousands of traffic accidents occur in the United States, resulting in loss of wages, time, productivity, and, most tragically, human lives. Intersection-related accidents represent a significant portion of those accidents. The following five categories may be used to group the accidents by the factors that influence their occurrence: *drivers, traffic, intersection or roadway segment, vehicles, and environment (e.g., weather).* Traffic engineers, however, can directly manage, through design or improvement, only those factors related to *intersection or roadway segment*. Among the roadway factors, traffic controls at intersections, including traffic signals, are very important.

OBJECTIVES

This research mainly focused on the following objectives: (1) to estimate the change or impact of signalization on the expected number of crashes based on the expected total number of crashes and the number of crashes for different crash types for the before and after period, (2) to explore the safety-related impacts of traffic signalization on intersection crashes, based on a statewide sampling of intersections in Florida and through a before-and-after comparison analysis of yearly average number of crashes, crash rates, and crash severity, and (3) to incorporate a new approach denominated case-based crash prediction, which is model free, in the evaluation of safety at intersections.

FINDINGS AND CONCLUSIONS

Between 1999 and 2002, researchers at the University of South Florida studied 447 newly signalized intersections in Florida. Utilizing a ten-year history of crash data, available through the Florida Department of Transportation crash database, researchers evaluated the impacts of signalization on the incidence of intersection-related accidents. Their goal was to produce statistical crash prediction models able to perform before and after analysis to estimate the expected numbers of crashes for intersections being considered for signalization. Researchers also examined crash severities, crash rates, and the impact of signalization on crashes.

Researchers developed a series of models designed to predict the before and after potential for the total number of accidents, as well as for accidents based on crash type, including, among others, rear-end crashes, left- and right-turn crashes, which occur when one vehicle making a turn collides into another vehicle, and angle crashes, which occur when a vehicle attempts to cross the path perpendicular to another vehicle. Using these models, and given the characteristics of the subject intersection, engineers can predict how a proposed signalization

would affect the average number of crashes at a particular intersection. Researchers also developed a set of tables as well as the modeling software, either of which may be used by traffic operations and safety engineers to predict the effect of signalization on a given intersection.

BENEFITS

The models developed through this research could be used by traffic operations and safety engineers to estimate changes in the total number of crashes and in the number of crashes by type. This information would prove useful both for determining whether the installation of a traffic signal would best serve the public interest and for informing public officials and citizens of the potential impacts of such installation. The models are currently in use to help determine whether requested non-warranted signals or signals that border on meeting the warrants should be installed.

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