Florida Department of Transportation Research

A Roadway Context Classification Approach for Developing Safety Performance Functions and Determining Traffic Operational Effects for Florida Intersections

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Current Situation

Safety performance functions (SPFs) are used by designers and planners to predict the average number of crashes per year that can be expected on a section of roadway. These functions are based on several factors, including the geometry of the road or intersection, traffic levels, speed limit, and others. Planners can use SPFs to make choices that will improve safety. SPFs are applied according to context, based on the geometry of the intersection and the volume and type of traffic it serves. The first design step therefore is to determine this context. The Florida Department of Transportation (FDOT) has recently drafted a classification system comprising eight contexts, including, for example, suburban residential, rural town, and urban core. More contexts allow more specific and more accurate SPFs, but new SPFs must be developed to match the contexts.

SPFs that can help improve safety can be developed for specific intersection types, like this busy urban intersection.

Research Objectives

University of Central Florida researchers developed context-specific SPFs corresponding to the FDOT's context classification scheme. They also surveyed state DOTs across the U.S. to learn about the use of contexts and SPFs in road design.

Project Activities

FDOT provided the researchers with data for over 3,400 Florida intersections, covering many intersection types and including context information such as geometry, traffic volumes, and signalization. The FDOT data conformed to the Model Inventory of Roadway Elements (MIRE) 2.0; therefore, the data were in standard formats regardless of their original source.

A variety of mathematical procedures can be used to develop SPFs from intersection data. These procedures differ in the type of mathematics they rely on and the specific data they require. For example, several procedures required AADT (average annual daily traffic), a common measure of traffic flow, while others relied more on other data to describe an intersection and its traffic. The researchers tested several procedures with each intersection type to find the one most useful in developing SPFs for that type. In this way, the researchers identified the most important factors that influence crashes for each intersection type. They also identified intersections with high potential for crash reduction and recommended effective countermeasures. The researchers compared their SPFs and SPFs from other sources to historical crash data and showed the improved insight gained from context-specific SPFs.

Departments of transportation across the U.S. were surveyed about their current SPF development practices and context classification. Many states (64% of the 42 respondents) use Highway Safety Manual SPFs or SPFs calibrated to their jurisdiction. Although 62% of states had not heard of context classification, 67% of states expressed interest in the system, emphasizing the importance of this research to improve intersection safety across the nation.

Project Benefits

FDOT's new context-specific classification of intersections and the supporting SPFs developed in this project can help improve intersection safety across Florida.

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