DRISI

Caltrans Division of Research, Innovation and System Information

Research Results

Strategies for Reducing Pedestrian and Bicyclist Injury at the Corridor Level

A systemic approach to identify and address pedestrian safety problems in California, with the goal of reducing pedestrian fatalities and injuries.

Transportation Safety and Mobility

MAY 2019

Project Title:
Strategies for Reducing Pedestrian and Bicyclist Injury at the Corridor Level

Task Number: 2450

Start Date: April 21, 2014

Completion Date: Janaury 31, 2017

Task Manager:
Jerry Kwong
Transportation Engineer
j.kwong@dot.ca.gov

WHAT IS THE NEED?

As people are being encouraged to walk more to reduce environmental impacts and improve public health, transportation professionals are obligated to make walking as safe as possible. To date, the dominant approach used by state agencies to allocate safety resources is the hotspot approach that focuses on identifying and recommending improvements for high collision concentration locations. Another approach is the systemic approach that seeks blanket improvements that can be implemented at sites across the road network, based on specific roadway features that are associated with a particular crash type. While the hotspot approach is reactive in the sense that it focuses on sites that already had crashes, the systemic approach has both reactive and proactive components to it. It is reactive since it uses historical crash data to identify the type of roadways that suffer from recurring safety concerns, and it is proactive in the sense that it provides a mechanism to make improvements also at sites that, while they share the same design and operational attributes, have not had many (or any) crashes yet. In light of this, there is a need to develop a systemic tool that can be used to identify systemic pedestrian safety concerns that would benefit from blanket improvements across a desired area to support pedestrian safety improvements across the state highway system.

WHAT WAS OUR GOAL?

The overarching goal was to reduce pedestrian fatalities and injuries by developing a systemic approach for pedestrian safety concerns and improvements. This included: (a) developing a practical method to identify systemic pedestrian safety concerns across the state highway system; (b) provide a list of potential improvements for systemic concerns to support practitioner decision-making; and (c) develop a prototype Excel Spreadsheet to conduct systemic pedestrian analysis and decision support.

WHAT DID WE DO?

Caltrans, in partnership with the University of California, Berkeley Safe Transportation Research and Education Center identified a set tasks and activities to accomplish this research. The activities included: (i) studied where can systemic efforts fits alongside other road safety management efforts in terms of reactive vs. proactive approaches (see FIGURE 1); (ii) identified the core components of the systemic approach which led to the development of the systemic matrix as described in FIGURE 2; (iii) developed and populate the systemic pedestrian crash matrix using available crash and roadway data; (iv) customized matrices for intersection and roadway sections; (v) develop lists of relevant countermeasures for each matrix cell as shown in FIGURE 3; and (vi) develop a user-friendly prototype tool in MS Excel that can conduct such an analysis and produce a list of attributes of relevant countermeasures.

WHAT WAS THE OUTCOME?

The outcome is a methodology to support systemic pedestrian efforts across the California state highways system. The methodology is incorporated into a user-friendly MS Excel prototype tool to conduct systemic pedestrian efforts analyses and safety improvements. Screenshot of the tool's functionality ribbon can be seen in FIGURE 4.

WHAT IS THE BENEFIT?

This research provides Caltrans with a simple to assemble, simple to interpret, snapshot of systemic pedestrian concerns across the state highway system. Using this, Caltrans can develop programs to detect systemic priorities for pedestrian safety problems across a district or other scalable area. The methodology and corresponding tool can provide a list of countermeasures that are relevant for the specific safety concern and location type. This can be used as a resource for identifying the appropriate safety improvement. Ultimately, these methods and tools will lead to fewer pedestrian injuries and fatalities on the California State Highway System.

LEARN MORE

Review the complete report.

Project Contacts:
Rachel Carpenter, rachel.carpenter@dot.ca.gov
Jerry Kwong, jerry.kwong@dot.ca.gov
Offer Grembek, grembek@berkeley.edu

IMAGES

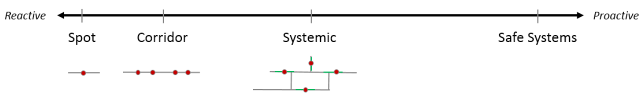

FIGURE 1: The Systemic Approach on the Reactive-Proactive Continuum. The systemic approach is reactive since it uses historical crash data to identify the type of roadways that suffer from recurring safety concerns, and it is proactive in the sense that it provides a mechanism to make improvements also at sites that while they share the same design and operational attributes, have not had many (or any) crashes yet.

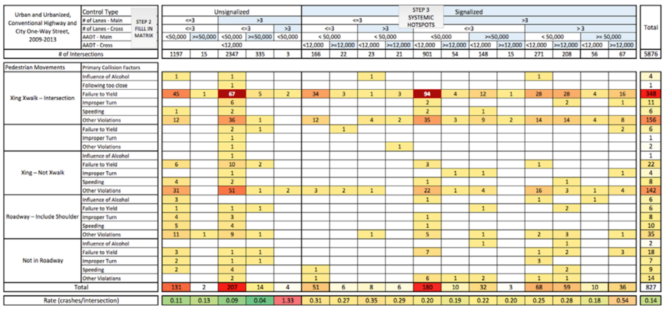

FIGURE 2: The Systemic Crash Matrix. The different rows in the systemic matrix represent different Crash Types, while the columns represent different Facility Types. The cells of the matrix include the number of crashes that occurred for each combination. The Crash Matrix provides Caltrans with a simple to assemble, simple to interpret, snapshot of any systemic pedestrian problems across the State Highway System.

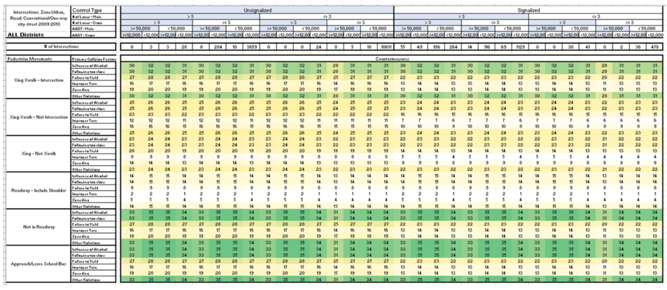

FIGURE 3: The Systemic Countermeasure Matrix. The countermeasure matrix serves as a toolbox of engineering safety improvements to address the specific crash-facility type combination. The value in each cell represents the number of relevant countermeasures.

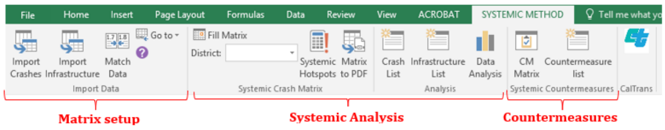

FIGURE 4: Ribbon of Prototype MS Excel Tool. The tool allows users to import data to set up the matrix, conduct analysis to detect systemic safety concerns, and identify a set of potential countermeasures to address specific systemic priorities.