



Caltrans Division of Research,
Innovation and System Information

Research

Notes

Transportation
Safety and
Mobility

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Project Title:
Methods for Identifying High
Collision Concentration Locations
for Potential Safety Improvements

Task Number: 3057

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Completion Date: January 31, 2023

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Phase 2: Implementation of Safety Performance Functions for California

Develop tools to provide Caltrans to implement SPF techniques to efficiently target highway improvements and countermeasures at locations that demonstrate the greatest

WHAT IS THE NEED?

Identifying high collision concentration locations is a major objective of many state and local transportation agencies. In recent years, significant progress has been made with respect to crash prediction models for identifying such locations. In addition to providing valuable information related to factors that can potentially contribute to increase in the likelihood of traffic collisions, the Highway Safety Manual explains how Safety Performance Functions (SPFs) (i.e., a mathematical relationship describing the collision frequency and explanatory variables) are used to estimate the expected number of collisions per year for a given location, which serve as a baseline for network screening techniques which play a major role in the transportation safety management process.

California Department of Transportation (Caltrans) is currently in the process of piloting SPF-based methodologies into the process to identify high collision concentration locations for roadway segments, intersections, and ramps on the entire state highway system. While the existing effort have value, the full benefits cannot be realized until the necessary enhancements are developed, and the process is fully deployed.



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WHAT ARE WE DOING?

The techniques and tools developed in this study will help Caltrans to target locations more efficiently that will likely benefit from safety improvements and would result in the greatest reduction in fatal and injury collisions. To accomplish this, we will further develop the range and depth of the existing SPF along with enhancements to the Microsoft (MS) Excel tool.

WHAT IS OUR GOAL?

The proposed project has several goals:

- i. Identifying performance measures and threshold values for the potential safety improvements of sites
- ii. Enhancing the capability of the existing MS Excel tool in terms of functionality, users, and interface
- iii. Maintaining forward-compatibility with Transportation System Network Replacement;
- iv. Developing advanced SPFs and evaluation types of SPFs in network screening along with integration from new SPF such as nighttime
- v. Developing MS Excel tool guidelines, along with training materials and user manual.

WHAT IS THE BENEFIT?

As a result of implementing these activities, Caltrans shall be able to use the current SPF for identifying high collision concentration locations. Using the most current SPFs will allow Caltrans to use state-of-the-art models to conduct the most efficient and accurate network screening techniques for the California state highway system.

WHAT IS THE PROGRESS TO DATE?

The following tasks have been accomplished:

Task 3:

- Developed mockup of the Table B reporting format – summary report and detailed report within the SPF Tool V1.6.6, based on the insights from the Caltrans' experts on the significance of Table B reports.

Task 5:

- Developed analysis plans for the proposed five alternatives for bi-directional network screening includes short- and long-term plans – (a) using existing SPF -based on crash frequency; side of highway and state-wide threshold, (b) using existing SPF – bi-directional network screening and finally (c) develop bi-directional SPF which is a long-term plan.
- Based on discussions with Caltrans' safety experts, decided to move forward with using existing segment FSV (Fatal Severe Visible Injuries) SPFs to conduct bi-directional network screening to identify HCCLs.
- Advancing research to develop bi-direction network screening methodology with the CA-specific FSV segment SPFs developed in the first phase – which includes developing segmentation, crash merging and network screening approaches.

Task 7:

- Updated SPF Tool business requirements with proposed additional fields in the PSI list reporting format – population group – rural or urban, and includes travel direction – EB; WB; NB or SB to the location information.
- Updating SPF Tool V1.X to incorporate bi-direction network screening methodology - research team is working to update segmentation, crash merging and analysis stages within the SPF Tool.