Development of Crash Reduction Factor (CRFs) for Bicycle-Related Safety Countermeasure

WHAT IS THE NEED?

Communities across California are looking to alternatives to the motor vehicle as the primary means of transportation to, from, and between activities. Investments in bicycling infrastructure, education, and enforcement have improved; and continue to have the potential to improve the quality of life in large and small communities.

Furthermore, there is an increasing interest in improving safety for vulnerable road users, and advancing the goals of Vision Zero (a traffic safety philosophy that rejects the notion that traffic crashes are simply “accidents”, but instead preventable incidents that can and must be systematically addressed) to eliminate traffic fatalities and serious injuries. A transportation network with safe bicycle facilities means less traffic, more physical activity, and reduced carbon emissions; making bicycling a solution to many pressing concerns.

Caltrans is responding to this shift by adopting new policies intended to encourage bicycling and emphasize safety, livability, and sustainability for all. It also aligns with Caltrans’s mission to “Provide a safe, sustainable, integrated and efficient transportation system to enhance California’s economy and livability,” and its vision toward “A performance-driven, transparent and accountable organization that values its people, resources and partners, and meets new challenges through leadership, innovation and teamwork”, as well as its goals to “Provide a safe transportation system for workers and users, and promote health through active transportation and reduced pollution in communities.”

As communities and transportation agencies confront an increasing demand for bicycle infrastructure and programs, there is a need for information about the effectiveness of such facilities. Crash Reduction Factors (CRFs), refers to the percentage of crash reduction that might be expected after implementing a given countermeasure at a specific site, plays a crucial role in providing the quantitative data that is needed by practitioners engaged in bicycle safety improvements as they ascertain expected effectiveness of various countermeasures.
WHAT ARE WE DOING?

The research team will perform the following tasks:

1) Document existing bicycle-related safety countermeasures appropriate for various environments: urban/rural, intersections, midblock crossings, and road segments. This will include searches of existing compilations of countermeasures including the BIKESAFE Countermeasure Selection Tool, the Federal Highway Association (FHWA) Separated Bike Lane Planning and Design Guide 2015, and the extensive literature review on the forthcoming National Cooperative Highway Research Program (NCHRP) 15-63 Guidance to Improve Pedestrian and Bicycle Safety at Intersections.

2) Document the available CRFs or Crash Modification Factors (CMFs) for the countermeasures listed in Task 1. CMFs refers to multiplicative factor used to compute the expected number of crashes after implementing a given countermeasure at a specific site. The research team will search the FHWA CMF Clearinghouse (an online repository of CMFs), the Highway Safety Manual (HSM), and FHWA Desktop Reference for Crash Reduction Factors; as well as conduct an extensive literature review on NCHRP 15-63 Guidance to Improve Pedestrian and Bicycle Safety at Intersections.

Additionally, the researchers will review the ongoing projects to obtain previews of any soon-to-be published materials from NCHRP 17-84 Pedestrian and Bicycle Safety Performance Functions for the Highway Safety Manual, FHWA Development of Crash Modification Factors Program Task B5, and NCHRP 07-25 Guide for Pedestrian and Bicycle Safety at Alternative Intersections and Interchanges.

3) Assess and rate the applicability of the CMFs or CRFs found in Task 2 to bicycle-specific safety concerns, conditions, and use in California.

4) Review and rate the quality of the CRFs listed in Task 2. The research team will rate the quality of the CRFs in accordance with the star rating system used by the FHWA CMF Clearinghouse, in which five stars represents the highest quality level and one star represents the lowest. CMFs and CRFs with fewer than three stars will be excluded from consideration for further use.

5) Develop a framework to recommend (a) data requirements for approved countermeasure installations for site-specific evaluation and CMF calibration/estimation, and (b) analytical approaches that can be utilized to quantify the before-after change subject to different types of data availability.

WHAT IS OUR GOAL?

The goal is to provide the best expertise to meet the needs and apply state-of-the-art methodologies to California data, and apply the statistical analyses required to develop California-specific CMFs to support relevant bicycle safety programs across California. To achieve this, the researchers will identify the existence, quality, and applicability of any available CRFs. This information will help to establish research gaps and prioritize which countermeasures to focus on for the data collection. The research team will eventually develop a countermeasure evaluation framework.

WHAT IS THE BENEFIT?

Caltrans is adopting new policies intended to encourage bicycling and emphasize safety, livability, and sustainability for all. This research aligns with Caltrans’s current mission to “Provide a safe, sustainable, integrated and efficient transportation system to enhance California’s economy and livability”. The results of this research will help shape policy by proving which specific countermeasure shows the biggest crash reductions.

WHAT IS THE PROGRESS TO DATE?

This project will be executed in June 2018.