

Safety Programs

May 2026

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

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Estimating Wet-Pavement Exposure with Precipitation Data

Updating county-level wet-pavement exposure estimates to account for different patterns in precipitation due to climate change.

WHAT IS THE NEED?

The California Department of Transportation (Caltrans) is committed to safety as the top priority. To this end, Caltrans develops a list of high crash concentration locations (Table C) every quarter using the Traffic Accident Surveillance and Analysis System database. Table C identifies the ramps, intersections and highway segments with crash rates that are significantly higher than the statewide average. The identified locations in Table C are then investigated individually to evaluate collision risk based on observed frequency. Caltrans also develops a Wet Table C annually that analyzes updated lists of wet accidents alone using a similar methodology as Table C. The existing table of percent wet time (i.e., wet pavement factors) was developed in 2008 based on data from 1995-2005. Due to climate change and other environmental considerations the frequency and intensity of precipitation has likely changed. This may mean that the wet-pavement exposure factors are now outdated. Outdated wet percent time factors may misidentify locations as being significant and requiring site investigation. More importantly, incorrect wet percent time factors used in the development of Wet Table C could result in locations needing safety investigations not being identified. In addition to this, to improve the High Collision Concentration Locations program, Caltrans is transitioning to Safety Performance Function (SPF)-based network screening to replace Table C. These SPFs also rely on the same wet-pavement exposure data and may reduce performance of the programs. Not having accurate wet-pavement exposure factors will may also delay the implementation of the wet SPFs. Considering this, there is an urgent need to develop an updated wet-pavement exposure factors.



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WHAT ARE WE DOING?

Wet percent time refers to the proportion of time during the year that pavement is damp. Wet time is usually measured on an hourly or a daily basis and expressed as a percentage. First, hourly precipitation data will be downloaded from the various available network sources. These sources include the California Data Exchange Center, the California Irrigation Management Information System, MESOWEST, the National Climatic Data Center, and the National Weather Service. The next step, reprocessing, involves checks to identify errors in the meta-data, to standardize the data format, and to create a common, standardized database. For the analysis, the zonal statistics provided in Geographic Information System software will be used to produce an updated County-Average Wet Percent Table. The research will also document a method to update the wet-pavement factors every 3-5 years.

WHAT IS OUR GOAL?

The project team will develop up-to-date wet-pavement exposure factors, for use in Wet Table C and Wet SPF network screening on the State Highway System.

This research will have three main implementation stages. First, the Wet-pavement exposure factors will make sure Caltrans is using the more current data about wet-pavement conditions due to precipitation. Second, this will be used as part of the Wet Table C program and the Wet-SPF network screening. Third, the use of updated Wet Table C and wet SPF will be used by the relevant Caltrans personnel for crash location identification and prioritization process.

WHAT IS THE BENEFIT?

Having up-to-date wet pavement exposure factors will facilitate more accurate crash location identification and will enable Caltrans personnel to provide countermeasures to reduce the potential for a crash under wet conditions. Moreover, being

involved in a crash along the State Highway System may also create negative perceptions of safety, thus affecting future interactions with the system. In addition, better identification would result in better utilization of the time and resources of Caltrans' traffic safety investigators, thus helping to improve safety and save time and money for Caltrans.

WHAT IS THE PROGRESS TO DATE?

- Task 3:
 - Completed level III reviews of flagged records to identify any areas of improvement and adjust the QC process.
 - Retrieved and processed PRISM monthly rainfall data to compare to stations and identify potential outliers based on aggregate hourly station readings.
 - Completed the evaluation of missing data in-filling and adjusted if needed.
 - Continued drafting the chapter on the quality control and missing data in-fill process, incorporating any final adjustments.
- Task 4:
 - Drafted code to generate wet percent time factors for each station, interpolate a raster grid and calculate county level wet percent time.