5-7083-01: Implementation of Safety Prediction Methods for Texas Highways

Background

The *Highway Safety Manual* (HSM) contains safety performance functions (SPFs) that are used in project-level decision-making to estimate the average crash frequency by severity level for existing conditions, alternatives to existing conditions, or proposed new roadways. Because most existing HSM SPFs were developed for states other than Texas, SPFs need to be calibrated to apply them to Texas highways. Calibration is conducted to account for differences in crash-reporting procedures, thresholds, driver characteristics, animal population, and weather conditions, among others.

The Texas Department of Transportation (TxDOT) sponsored Research Projects 0-7083 and 0-7067 that derived local calibration factors for the SPFs documented in HSM Chapters 10, 11, 12, and 18. Researchers also developed new safety prediction models for frontage roads and ramp segments, and analysis spreadsheet tools to help implement the new models and facilitate analysis of all rural and urban roadway segments and intersections. In particular, the tools assist in estimating the average crash frequency at a particular site and in evaluating different cross-sectional alternatives.

What the Researchers Did

In this implementation project, researchers first conducted a pilot testing of the safety prediction methodology. Researchers selected a sample of roadways and used the HSM models and spreadsheets to obtain crash estimates. Researchers considered at least 30 sites for each functional class that represent all regions in the state. This exercise assisted in validating the quality of spreadsheets, guidance related to the spreadsheets, and predictive methodology. This exercise gave insights into the challenges in collecting required data, issues with data inputs, problems with the interpretation of results, potential shortcomings of predictive methods, and areas for improvement.

Researchers developed slides, visual aids, and handout materials and presented training workshops for TxDOT practitioners and consultants. Three 4-hour workshops were presented, reaching 66 practitioners from various TxDOT districts and several consultant firms. In the first session, researchers conducted classroom instruction lessons of approximately 2 hours in duration, and hands-on training of

approximately 2 hours in duration containing multiple examples in the second session to demonstrate use of the spreadsheet tools.

Researchers also developed slides and example applications of the safety prediction methodology and conducted one 2-hour webinar. The webinar included presentation materials and time for questions and discussion. The webinar was quick and aimed at wider audiences, and the workshops were in-depth and included hands-on training lessons for smaller audiences.

What They Found

Researchers used the experience received from the pilot testing and workshops to modify the guidance and spreadsheets accordingly. Some of the improvements include but are not limited to optimizing the data collection efforts, making certain assumptions if a particular variable is unavailable, and making the results easy to understand.

The workshop participants provided positive feedback about the presentation materials and spreadsheets. Participants particularly liked the interactive nature of the workshops, user-friendly spreadsheet tool, practical examples, and the activity of solving examples together.

What This Means

Researchers provided training to TxDOT practitioners and consulting firms about the safety prediction methods and usage of spreadsheet tools for estimating the average crash frequency at a particular site and in evaluating different cross-sectional alternatives. This training will also help safety professionals in evaluating complex trade-offs between safety, operations, community impacts, and costs that are often necessary when planning and designing highway projects. This knowledge will form a powerful tool for selecting Highway Safety Improvement Program projects and will support safety decisions made by the Design Division and districts.