PROJECT SUMMARY REPORT

0-7183: Develop Crash Modification Factors for Super 2 Highways

Background

Super 2 highways have been used across Texas for over 20 years to provide operational and safety benefits to rural two-lane highways at a lower cost than widening such facilities to four lanes. More Super 2 highways are planned as the demand increases on the state highway system. Previous research has provided insights on Super 2 safety, but updated crash modification factors (CMFs) based on a rigorous analysis of recent crash data would provide additional support for installing Super 2 corridors throughout the state and would complement existing guidance.

What the Researchers Did

This project investigated the crash history of existing Super 2 highway corridors in Texas before and after installation, compared to similar two-lane highways without Super 2 passing lanes. In this project, researchers built a database of 67 Super 2 corridors and 165 reference segments (i.e., two-lane highway segments without passing lanes) for crash history comparisons with Super 2 corridors. Researchers used their database of Super 2 highways and site characteristics, combined with additional data from Texas Department of Transportation (TxDOT) databases on construction project history, traffic volumes, crashes, and other relevant factors, to develop the database for analysis, which includes the identification of relationships between crashes and other characteristics. Using the results of this analysis, the research team defined CMFs that TxDOT and other practitioners can use to make decisions on installing future Super 2 corridors.

What They Found

An empirical Bayes before-after analysis of available crash data revealed that Super 2 highways reduced total crashes by 21 percent compared to traditional rural two-lane highways. This result was statistically significant, with a 95 percent confidence interval between 16 and 26 percent for total crashes. Similar results were observed for fatal-injury (KABC) and property-damage-only (PDO) crashes, with crash reductions of 16 and 23 percent, respectively. Table 1 lists all the CMFs developed in this project, along with their corresponding crash reduction factors (CRFs), for general conditions and two factors that the researchers found to be relevant: presence of a non-driveway intersection and driveway densities.

What This Means

The findings from this project provide additional support for installing Super 2 passing lane corridors on rural two-lane highways. Not only do Super 2 corridors improve operational performance by reducing congestion and travel

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time, but they were also found to improve safety performance by reducing crashes, particularly for locations near existing non-driveway intersections or in areas where driveway densities are lower.

As part of this project, researchers also considered recommendations for updates to existing guidance documents to clearly connect the guidance to the supporting research and to provide additional information to practitioners when evaluating and selecting treatment alternatives. The recommended updates provided insights on the identification and selection of CMFs in the decision-making process, as well as additional details on the operational conditions that are most suitable for installation of Super 2 passing lanes.

Table 1. CMFs and CRFs for Super 2 Passing Lane Corridors.

Description	CMF	CRF (%)
Total crashes	0.79	21
KABC crashes	0.84	16
PDO crashes	0.77	23
KABC intersection crashes	0.63	37
KABC non-intersection crashes	0.91	9
KABC crashes for alternating passing lanes	0.84	16
KABC crashes for side-by-side passing lanes	0.94[a]	6[a]
KABC crashes for driveway density = 0 driveways/mi[b]	0.63	37
KABC crashes for 0 < driveway density ≤ 2 driveways/mi	0.73	27
KABC crashes for 2 < driveway density ≤ 5 driveways/mi	0.83	17
KABC crashes for 5 < driveway density ≤ 10 driveways/mi	0.86	14
KABC crashes for 10 < driveway density ≤ 19 driveways/mi	0.88	12
KABC crashes for driveway density > 19 driveways/mi	0.90	10
Total crashes	0.79	21
KABC crashes	0.84	16

[a] Results are not statistically significant.

[b] Driveway density is based on the equivalent number of residential driveways, where one industrial driveway equals three residential driveways, and one commercial driveway equals 12 residential driveways.

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