

Roadway safety projects prove effective

NEW RESEARCH findings show that past Iowa DOT traffic safety projects have been generally effective in reducing crashes. Perhaps more important, the results will help the Iowa DOT prioritize future roadway safety improvements.

A recent study evaluated crash reduction percentages and benefit/cost (B/C) ratios for the following common roadway safety improvements implemented to reduce crashes at various sites in Iowa:

- replacing pedestal mounted signals with mast arm mounted signals
- adding left-turn phasing to existing signal
- adding left-turn phasing and turn lane(s)
- installing new traffic signal
- adding turn lane(s)
- installing new traffic signal and adding turn lane(s)
- other geometric improvements

Sites had been chosen for safety improvements based on a formula that gives equal weight to number of crashes, crash rate (number of crashes per average daily traffic volume), and severity (loss value) of the crashes. (These data are recorded in a comprehensive database of over 17,000 crash locations.)

The study, conducted by Gary Thomas, former assistant professor of civil and construction engineering at ISU and traffic safety engineer at CTRE, for the Iowa DOT's Office of Traffic and Safety, analyzed approximately 100 traffic safety improvement projects



Replacing pedestal mounted signals (top photo) with mast arm mounted signals (bottom photo) contributed to a 36 percent crash reduction.



constructed in Iowa during the last 10 years. For each improvement type, Thomas calculated the mean crash reduction factor, mean B/C ratio, and 90 percent confidence intervals. (We can be 90 percent confident that the true mean lies within the 90 percent confidence interval. A mean should be taken with caution if the lower limit of the interval dips to a negative number.)

Replacing pedestal mounted signals

The study found that replacing pedestal mounted signals with mast arm mounted signals contributed to a 36 percent crash reduction. Therefore, "it may be concluded that the replacement of pedestal mounted traffic signals with mast arm mounted signals is likely to result in a decrease in total crashes." The benefits outweighed the costs by 11.2 to 1 for this type of improvement, giving it the highest B/C ratio of any improvement type.

Adding left-turn phasing

Two types of improvements that involved adding left-turn phasing were studied: adding left turn phasing to an existing signal and adding both left-turn phasing and turn lane(s). Both of these improvement types resulted in a reduction of crashes. However, because the sample size for these improvements was small, no statistically significant conclusions could be drawn about the B/C ratios. Thomas advises that further research is needed for these improvement types.

Installing new traffic signals and/or turn lanes

According to the research, the addition of a traffic signal, turn lane(s), or both does not necessarily cause an overall reduction of crashes. In fact, while some collision types decreased after these types of improvements, others increased. The B/C ratios for adding traffic signals and adding turn lanes were low, 0.8 and 0.7 (and the lower limits of their 90 percent confidence intervals were negative, -6.6 and -6.0, respectively).

Other geometric improvements

The final category included other improvements such as adding a median or relocating a driveway. For these types of improvements taken together, crashes were reduced by 32 percent. However, because the types of projects included in this category were varied, they "should probably not be lumped into one type of improvement category." It is not advised that the aggregate data be applied to particular cases.

Conclusions

Thomas notes that analyzing crash data is a complex task. "[M]aking improvements of a certain type (for example, adding a traffic signal) will oftentimes change the type of crashes rather than simply reduce the number of crashes."

Nevertheless, the new findings are expected to assist the Iowa DOT in identifying effective crash mitigation strategies at high crash locations.

For more information

For more information on this study and other Iowa DOT-sponsored traffic safety projects, contact Tom Welch, state transportation safety engineer, 515-239-1267, tom.welch@dot.state.ia.us. •