

0-7156: Using Vehicle Probe Data to Evaluate Speed Limits

Background

Speed limits are among the most visible and routinely enforced traffic control devices motorists encounter in their everyday driving. When speed limits are set via an engineering speed zone study, the operating speed for a site is needed. This research project investigated how to make speed zone studies and speed limit decisions more effective and efficient.

What the Researchers Did

This research project investigated whether probe speed data (rather than speeds measured in the field) could reasonably be used in a speed zone study. The idea for using probe speed data is to develop conversion equations that would convert an average yearly speed measure obtained from probe speed data into a speed measure that would represent free-flow conditions for passenger cars. Equations for 85th percentile speed and average speed were created for freeway and non-freeway facilities, each subdivided into urban and rural contexts, and their performances were evaluated.

What They Found

For freeways, the adjusted R-squared values for the regression equations indicate that the

independent variables used in the models can explain between 77 and 92 percent of the observed speed variability. Further, the values for the root mean square error imply that on average, the predicted speeds are off by 2.6 to 2.9 mph, which are lower than the suggested incremental speed limits (5 mph).

For non-freeway facilities, the adjusted R-squared values for the regression equations indicate that the independent variables used in the models can explain between 71 and 89 percent of the observed speed variability. The values for the root mean square error imply that on average, the predicted speeds are off by 2.8 to 3.5 mph. These values are again lower than the suggested incremental speed limits (5 mph) but high enough to potentially affect the outcome of the speed zone study.

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Project Completed:
8-31-2024

Further, the research team used the speed zone methodology to generate a suggested speed limit using on-site and predicted speed data. For the freeway test case, 97 percent of the rural study sites and 88 percent of the urban study sites had the same suggested speed limit when using either the on-site or predicted speed data. The rural non-freeway test case also had a high suggested speed limit match (86 percent). For the urban non-freeway test case, only 42 percent of the study sites generated the exact same suggested speed limit; however, if the range were expanded to be within 5 mph, 93 percent of the study sites would be included.

What This Means

The calculated predicted speeds used in the speed zone method generally produce suggested speed limits that are the same as the suggested speed limits identified using the on-site speed data or within 5 mph of them. Therefore, the potential of using probe speed data exists. Additional required research includes applying the protocol to a select region and reviewing the findings to determine if the results are defensible, identifying how influential various factors are to the outcomes, and identifying how to implement such a process.

For More Information

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Keyword: Research

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