Texas A&M Transportation Institute

PROJECT SUMMARY

Texas Department of Transportation

0-7044: Considerations for Super 3 Cross-Section in High-Volume Rural Corridors with Turning Traffic

Background

Super 2 highways are used across Texas to provide passing opportunities and increase capacity on rural two-lane roads; however, the passing lane treatment is for through vehicles and does not address the needs of turning vehicles at intersections. In this project, the researchers used existing conditions on Super 2 corridors with and without turning treatments for computer simulation models to evaluate the effectiveness of such treatments on operations and safety. Researchers used the evaluation results to update guidelines that the Texas Department of Transportation (TxDOT) can use to implement turning treatments at intersections on sections in or near passing lanes.

What the Researchers Did

In addition to a review of the relevant literature, the researchers conducted field studies to observe and record traffic activities at intersections on rural two-lane highways with passing lanes or turn lanes. The field studies produced speed data and video recordings of turning maneuvers to analyze for key findings. Those findings were then used to develop microsimulation models and scenarios to investigate the operational effects of the presence (or absence) of passing lane or left-turn lane in proximity to intersections. Figure 1 shows the intersection layout for one of the testbeds included in the traffic simulation.

Researchers used the results of the simulation to produce a benefit-cost analysis for adding a left-turn lane or passing lane at or near an intersection for a range of through and left-turn volumes and truck percentages. A statistical evaluation was conducted on intersection and intersection-related crashes at 283 intersections located within Super 2 corridors. These rural intersections all had stop control on the minor legs and included both three-leg and four-leg intersections.

What They Found

Through the safety and operational evaluation and literature review, researchers found that the presence of either a left-turn lane or a passing lane at a rural intersection is associated with fewer crashes. For the intersections included in the field studies, researchers found 40 percent of through drivers will move onto the shoulder to

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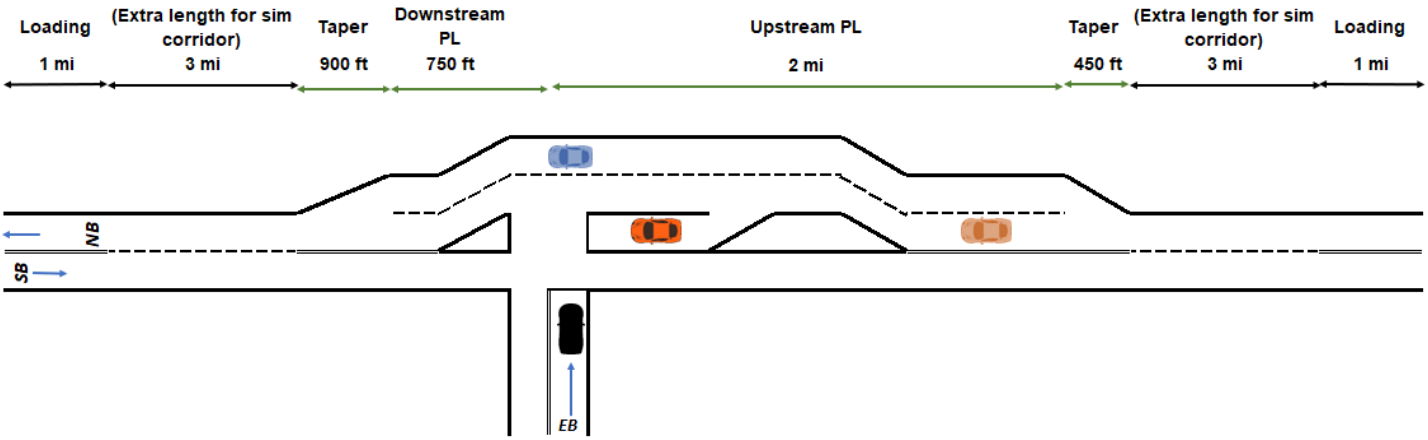

Figure 1. Example of Intersection Layout Used in Microsimulation (Testbed 4.4, Intersections with a Left-Turn Lane within a Passing Lane).

pass a left-turning vehicle that is slowing or stopped in front of them, and they will generally do so at a distance of 210 ft or less. When a passing lane ends within 1500 ft of an intersection (or within 2640 ft for higher-volume conditions), intersection delay is higher than if the passing lane is not present, so merging the passing lane with the through lane should be avoided within those distances. Benefit-cost analysis showed that a left-turn lane or passing lane resulted in a positive benefit-cost ratio much greater than 1.0 for all uncongested conditions.

What This Means

The results of the project confirm that passing lanes can indeed be used near intersections on rural two-lane highways, but better operations occur when there is sufficient separation between the intersection and the dropping of the passing lane. Turn lanes can also be used in conjunction with or instead of passing lanes at intersections, where there is sufficient roadway width available to accommodate the added lanes and sufficient length provided to add and remove those lanes.

The research report provides a set of guidelines for practitioners to consider items related to geometric design, access management, and traffic control devices in implementing passing lanes and turn lanes at intersections on rural two-lane highways. These guidelines supplement the guidance already found in existing TxDOT and national policies and manuals.

For More Information

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