Texas A&M Transportation Institute

PROJECT SUMMARY

Texas Department of Transportation

0-6997: Develop Capacity and Cost Benefits of Super 2 Corridors

Background

Super 2 corridors provide operational and safety benefits to two-lane highways by creating additional passing opportunities, leading to their increased use across Texas; however, specific benefits in improving capacity are not well known. This project compared operational and economic benefits of Super 2 corridors to traditional two-lane and four-lane cross-sections, on the premise that a Super 2 provides capacity benefits similar to a four-lane alignment but at reduced costs. This information will allow practitioners to make better decisions on which cross-section is appropriate for a given location.

What the Researchers Did

Field data from five Super 2 corridors contributed to a microsimulation model that analyzed operational performance of a simulated 40-mile rural highway corridor with varying average daily traffic (ADT) (3000 to 19,000 vehicles per day); heavy vehicle volumes (20, 30, and 40 percent of the total volume); and length, number, and spacing of passing lanes. Results from the operational analysis, combined with other inputs, formed the basis of a benefit-cost model to quantify the relative economic benefits of Super 2 cross-sections. A spreadsheet tool calculates the benefit-cost analysis and is provided for practitioners to evaluate alternatives on current and future construction projects. Researchers also produced a Value of Research assessment, which is provided in the research report.

What They Found

Researchers compared operational performance for eight cross-sections (Table 1). The 2U cross-section had the lowest or second-lowest speeds (and highest delays) for every scenario. The 2S-36, as expected, had the best Super 2 performance, and the 2S-26 outperformed the 2S-33 in every scenario, supporting previous findings that more passing lanes provide more operational benefit than longer passing lanes. The 4U and 4D cross-sections had high performance for volumes up to 13,000 ADT, but they declined sharply at higher volumes, underperforming the 2U in some cases. Performance of the 2U+LT was similar to the 2U for ADTs up to 15,000 but stabilized at higher volumes, producing higher speeds than most other options at 19,000 ADT and lower delays at higher volumes as the truck percentage increased.

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Table 1. Cross-Sections Included in the Simulation.

Abbreviation	Cross-Section	Passing Lane Length	Number of Passing Lanes in Each Direction
2U	2-lane undivided	None	None
2U+LT	2-lane undivided with left-turn lanes at highway intersections	None	None
4U	4-lane undivided	None	None
4D	4-lane divided	None	None
2S-23	Super 2	2 miles	3 passing lanes
2S-33	Super 2	3 miles	3 passing lanes
2S-26	Super 2	2 miles	6 passing lanes
2S-36	Super 2	3 miles	6 passing lanes

Note: Super 2 and 4-lane cross-sections did not include left-turn lanes.

Super 2 scenarios had the highest benefit-cost ratios (BCRs) in all ADT and truck percentage configurations (Table 2), and the 2S-36 produced the highest BCR, compared to the baseline 2U scenario. The 4U and 4D options performed poorly at lower ADT levels because project costs are higher and safety benefits are less than those for a Super 2.

Table 2. Benefit-Cost Ratios (Discounted at 3 Percent).

Project Type	3,000 ADT		19,000 ADT	
	20% Trucks	40% Trucks	20% Trucks	40% Trucks
2S-23	2.1	2.2	26.2	70.6
2S-33	2.2	2.3	28.6	73.8
2S-26	2.3	2.5	33.9	80.6
2S-36	2.4	2.5	40.1	87.7
4U	0.2	0.2	6.2	13.4
4D	1.0	1.0	5.9	26.2

What This Means

Passing lanes provide operational and economic benefits for through vehicles on rural two-lane highways at a variety of volumes and truck percentages. Results for other cross-sections suggest that as volume and truck percentage increase, accommodating turning vehicles, even for low turning volumes, can produce more operational benefit at an access point than an additional through lane or a passing lane. Incremental changes in speed and delay for all cross-sections increased greatly above 15,000 ADT compared to lower volumes, changing the relative performance of some cross-sections. These results indicate that when considering treatment options for high-volume conditions, the design process should reflect the presence of turning vehicles, rather than emphasize through vehicles traveling the length of the corridor.

For More Information

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