



Project Summary

Texas Department of Transportation

0-6035: Establishing Advisory Speeds on Non-Direct Connect (Regular/Slip) Ramps

Background

Current exit ramp advisory speed signing procedures in Texas are based on loose guidelines contained in the Texas Department of Transportation's *Procedures for Establishing Speed Zones*, which suggest an engineering study to determine if it is necessary to advise motorists of a maximum ramp speed. This research investigation was designed to provide guidance on when exit ramp advisory speed signing is recommended and what type of signing is appropriate based on speed, ramp location, the presence of curves on the ramp, and other factors.

What the Researchers Did

The research team performed a state and national questionnaire to gather information on practices and procedures for setting ramp advisory speeds. From the results, researchers discovered that the processes by which advisory speeds are selected are largely based on judgment rather than a documented and consistent rationale. Some of the questionnaire responses implied that the advisory speed for an exit ramp is simply the design speed and that if the differential between the ramp speed and the freeway speed is less than a particular threshold—usually 10 to 20 mph—then an advisory speed is not necessary and a sign is not posted.

The next phase of the research involved field investigations of non-direct connect freeway exit ramps of varying designs and in a range of operating environments. Major factors considered in the selection of study sites were freeway-to-frontage road posted speed differential, distance between the freeway exit gore and the downstream cross-street intersection, and horizontal and vertical curvature along the ramp. The researchers employed statistical methods to develop a combination of these factors to create a reliable speed prediction model that would account for ramps with either one or any combination of these potential speed-influencing factors. The research project studied 17 sites in the Austin, College Station, Houston, San Antonio, and Yoakum areas.

What They Found

After all of the exit ramp speed data were compiled, researchers performed a range of statistical procedures on the data in an effort to create an exit ramp speed prediction model. En route to the final model, researchers discovered that neither ramp vertical curvature (i.e., grades) nor the difference in posted speed between the freeway main lanes and the frontage road had a pronounced impact on driver speed choice on the ramp.

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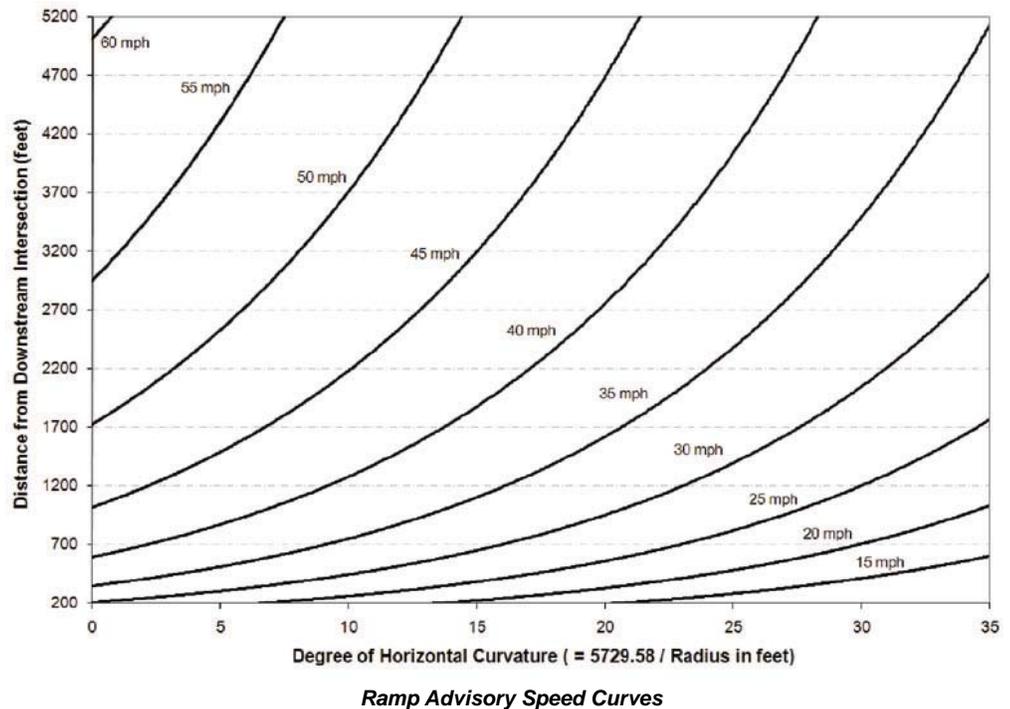
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Project Completed: 8-31-08

As a result, the final speed prediction model uses as its inputs only the degree of horizontal curvature (i.e., the “sharpness” of the curve) and the distance from locations on the ramp to the downstream cross-street intersection, as shown in the figure below. To properly apply the curves found in the figure, ramp speed should be checked at multiple locations along the ramp, and the curve to the right of the minimum speed point should be chosen. The speed associated with the selected curve is the ramp advisory speed.

What This Means

Previous research identified in the literature review of this project targeted mean truck speed as the desired posted speed for setting advisory speeds on horizontal curves. This research effort extended that approach for ramps and uses mean truck speed on the ramp as the ramp advisory speed. Once the ramp advisory speed is known by using the curves in the figure, a speed differential is calculated as the difference between the freeway posted speed limit and the ramp advisory speed. The speed differential is used to establish the signing scheme for the ramp. Recommended signing is based on the magnitude of the calculated speed differential and uses standard signs from the *Texas Manual on Uniform Traffic Control Devices (TMUTCD)*.



The speed posted on the W13-2 or W13-3 sign is the ramp advisory speed from the curves in the figure. Given the speed differential, the recommended signing scheme is as follows:

- 5 or 10 mph - Optional TMUTCD W13-2 or W13-3 for straight ramps, recommended for ramps with curves,
- 15 or 20 mph - TMUTCD W13-2 or W13-3,
- 25 mph - TMUTCD W13-2 or W13-3 and W1-8 (chevron signing) and raised pavement markers for ramps with curves,
- 30 mph or greater - TMUTCD W13-2 or W13-3, W1-8 (chevron signing) and raised pavement markers for ramps with curves, and suggested supplemental freeway signing regarding reduced speed on ramp.



For More Information:

0-6035-1 Establishing Advisory Speeds on Non Direct-Connect Ramps: Technical Report

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