



# Project Summary

Texas Department of Transportation

## 0-5377: Operational Factors that Impact Truck Use of Toll Roads

### Background

Texas has approximately 300 miles of toll roads, predominantly in the three largest and most congested urban areas of Austin, Dallas, and Houston. The Turnpike Authority Division of TxDOT also operates the rural, two-lane Loop 49 toll road near Tyler, Texas. Additional toll road and managed lane projects are in development by TxDOT through comprehensive development agreements in the Dallas/Fort Worth and Austin/San Antonio areas.

At the same time, the trucking industry is growing in Texas. While this is good for the Texas economy, it is also a safety concern. According to 2007 data from the Federal Motor Carrier Safety Administration, Texas leads the nation in the number of fatal crashes involving large trucks, with 421 crashes that year. As more toll road infrastructure is built in Texas, it will be important to understand how the trucking industry can make safe and effective use of these facilities (see Figure 1).

### What the Researchers Did

The purpose of this project was to identify the potential factors that could impact truck use of toll roads and managed lanes. The research summarized trucking industry needs through a synthesis of existing literature. The research methodology primarily focused on extracting findings from past research, existing guidelines, and published industry surveys. The approach was “pricing-neutral” and did not look at how price affected truck use. Geometric design and roadway operational factors that are important to truck drivers were identified and organized around facility geometric design characteristics, operating characteristics, and corridor operational strategies.

### What They Found

The research resulted in published guidelines to help transportation planners, highway designers, and transportation operations professionals determine the geometric design and operational factors important to truck drivers. The following recommendations are made for consideration:

- Select realistic design speeds for trucks on mainlane roadways, ramps, and interchanges.
- Use low maximum grades on vertical alignment.

### Research Performed by:

Texas Transportation Institute (TTI),  
The Texas A&M University System

### Research Supervisor:

Christopher Poe, TTI

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Figure 1. Researchers Looked at ways Trucks and Passenger Vehicles can Effectively Share Toll Roads.

- Include climbing lanes to minimize truck loss of speed and potential speed differentials.
- Avoid use of long downgrades.
- Increase the lengths of vertical curves to increase sight distance for truck drivers.
- Lengthen acceleration lanes from entrance ramps to provide trucks adequate space to reach mainlane design speeds.
- Lengthen deceleration lanes to exit ramps to allow trucks to fully exit before decreasing speeds from mainlanes.
- Use larger radii on curves in multi-curve ramp systems to better account for truck vehicle dynamics negotiating ramp alignments.
- Consistently provide full 12-ft travel lanes.
- Use adequate lane widening in horizontal curves.
- Consistently provide full 12-ft shoulders for truck use.
- Provide adequate parking at rest areas and connecting facilities.
- Provide adequate curve radii, curb return radii, and storage for left-turn and right-turn lanes at intersections at the end of ramps from toll roads or managed lanes.
- Give proper consideration of the truck demand and truck classes expected to use a toll road or managed lane.
- Use static dual-speed curve warning signs to alert truck drivers to the appropriate speed in negotiating ramps and direction connections.
- Provide informational signing and variable message signing in proper placement for better visibility for large trucks.
- Use continuous, longitudinal rumble strips to assist in alerting truck drivers to the edge lines of traveled ways.
- Use barrier curve delineation systems on curves needing special attention from truck drivers negotiating ramps and direct connections.
- Explore automatic vehicle identification technology for trucks in Texas to be interoperable with other systems in North America.
- Install active curve warning systems for truck drivers to warn of approach speeds exceeding the design speed of ramps and direct connections.
- Provide a comprehensive, coordinated incident management program to respond to truck incidents and minimize the impact of incidents on traffic flow.
- Consider active traffic management techniques to proactively manage traffic flow on corridors for more stable and reliable operation.
- Use intelligent transportation system technologies to manage traffic flow and communicate unexpected delays to all users of a facility.

## What This Means

Use of these guidelines in designing toll roads and managed lanes will increase the safety and efficiency of trucks on these facilities. If a facility is perceived or found to be safe and efficient, truck drivers may be more likely to use these facilities than alternate routes.

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