



# Project Summary

Texas Department of Transportation

## 0-5286: The Role of Preferential Treatment for Carpools in Managed Lane Facilities

### *Background*

High-occupancy vehicle (HOV) facilities are an important element of the transportation systems in Houston and Dallas, and are being considered in other metropolitan areas in the state. The Texas Department of Transportation (TxDOT) and partnering agencies have learned a great deal about the design, operation, and enforcement of HOV lanes over the past three decades. With the evolution of HOV facilities to managed lanes, and the increasing level of activity in the development of managed lanes, there is a need for research and guidance defining the role of carpools in priced managed lanes and the trade-offs between carpool exemptions and other project objectives. Increasingly, project objectives are reflecting not only mobility concerns but funding deficiencies and the need to generate revenue. As a result, allowing exempt users such as carpools requires an evaluation of revenue impacts as well as mobility interests such as person movement, operations, and emissions.

### *What the Researchers Did*

The research involved a review of the state-of-the-practice in carpool preferences on managed and tolled lanes, a stated-preference survey of HOV lane users with respect to carpool preferences relative to price, development of a predictive demand model, and an assessment of mobility, revenue, and environmental impacts.

The research team began by conducting a state-of-the-practice review of managed and toll lanes. Assessing carpool preference in the state-of-the-practice identified the basis for decisions on pricing incentives made by agencies. This review also described policies and methodologies used to define carpool preferences based on phone interviews with project contacts.

A web-based survey was conducted on separate Dallas and Houston web sites, coupled with an on-the-ground paper survey at targeted locations to increase minority participation. The intent of focusing on Houston and Dallas was to capture traveler responses in regions that have both toll roads and HOV lanes. The survey generated over 4600 responses.

A hypothetical managed lanes facility tested alternative carpool policy scenarios using a model derived from the survey data to predict traveler behavior. The 24 carpool policy scenarios ranged from all carpools paying full toll to all carpools free, and under low, medium, and high toll rates. The purpose of the impact analysis was to provide quantitative estimates of carpool preferential treatment impacts on a variety of performance measures.

A 19-member advisory committee comprising staff from TxDOT's partnering agencies — including metropolitan planning organizations (MPOs), transit authorities, and toll authorities — supported and guided the research team.

### *Research Performed by:*

Texas Transportation Institute (TTI),  
The Texas A&M University System  
The University of Texas at Arlington (UTA)

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## What They Found

Using the information collected and analyzed from the state-of-the-practice review, the user survey, and the impact analysis, the researchers found the following results based on relative trade-offs between alternative carpool preference policies for a variety of typical managed lane performance objectives.

**Person Movement** – the more favorable the carpool preference policy, the higher the person throughput when compared to “all users pay” full toll or 50 percent toll.

**Revenue Generation** – in terms of revenue generation, the more favorable the carpool policy the lower the revenue generated.

**Emissions Reduction** – in general, there is little difference between alternative carpool policies in terms of reduction of emissions, with some changes possible in CO<sub>2</sub> reduction under more favorable carpool policies.

**Operational Performance** – in general, there is little difference between alternative carpool policies for a facility that is managed, though under high toll rates there may be reduced performance in the general use lanes.

**Enforcement and Operational Complexity** – The least complex operating scenario is the express toll lane, where no differential pricing between vehicles occurs and vehicle occupancy does not have to be verified; the most complex operating scenario is one in which there is differential pricing among two or more different user groups, including carpool verification.

**Public Perception and Support** – this research concluded that there is high support for managed lanes, with no differentiation between types of operations; however, previous research suggests that managed lanes with carpool preference have a higher level of public support than those without carpool preference.

## What This Means

Determining the right carpool policy depends upon the managed lane project objectives and relative weights of each. The objectives are based upon the expected outcome of the project in terms of regional goals and with facility objectives. There are myriad policy combinations from which to choose, but ultimately the mix depends on the weighting of objectives, on the intended performance outcome, and on any financial constraints.

The following conclusions result from the research findings:

- Carpool preferences are common for managed lanes in operation and under development. There are no express toll lane projects in operation.
- There are operational, enforcement, and equity considerations on the part of agencies that influence decisions about carpool preference.
- Carpool preferences in managed lanes can influence carpooling behavior. The most common reason for carpooling is having access to the HOV lanes, particularly for work trips.
- There may be more to gain in person-moving capacity with policies that emphasize carpool preference.
- Carpool preference policies in managed lanes have minimal impact on emissions, although there may be an influence associated with CO<sub>2</sub> emissions under higher toll rates and more favorable carpool preferences.

The impacts of different carpool pricing policies on the overall mix of traffic on an entire freeway are small. However, the small changes to the number of HOV3+ travelers can represent a significant portion of travelers using these modes.

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