TEXAS TRANSPORTATION INSTITUTE
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Project Summary Report 7-4915-S

Project 7-4915: Investigating the General Feasibility and Guidelines for High-Occupancy/Toll Lanes in Texas

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PROJECT SUMMARY REPORT

Considerations in Assessing the Feasibility of High-Occupancy Toll Lanes

The research on this project was completed in 2000 and formed the basis for other research on high-occupancy vehicle/toll lanes. In 2001, research started on Project 0-4160, "Operating Freeways with Managed Lanes." This project is ongoing, and the products currently developed can be found at the Texas Transportation Institute's website on Managed Lanes at: http://managed-lanes.tamu.edu.

High-occupancy/toll (HOT) lanes are high-occupancy vehicle (HOV) facilities open to lower-occupancy (including single-occupancy) vehicles upon payment of a fee or toll. HOT lanes differ from regular toll roads, which may offer discounts to high-occupancy vehicles, in that they give drivers of lower-occupancy vehicles a choice: stay in the free but congested lanes or pay a fee and enjoy a faster, more reliable, and less stressful trip in the HOT lane. In addition to providing another travel option in highly congested corridors, HOT lanes improve the efficient utilization of existing HOV lanes.

HOT lanes are a very recent experiment nationally, evolving out of a federal program initiated under the Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991. While the concept of HOT lanes offers significant potential, especially for underutilized HOV lanes, there are very few operating examples from which to draw experience. The Texas Department of Transportation (TxDOT) initiated this research project to gather and synthesize as much information as possible to enhance the quality of planning for HOT lanes on Texas freeways.

What We Did ...

We examined all the national literature and ongoing experience. Through our research contacts we explored in depth the major HOT lane projects in San Diego and Orange County, California. In addition, the research team was very familiar with the other HOT lane project, the Katy HOV lane in Houston, because of our extensive involvement in the original feasibility study.

We analyzed all of these projects from both engineering and public policy standpoints to determine what would contribute to making a HOT

lane feasible. The key areas examined were:

- policy and institutional issues,
- planning and demand estimation,
- design,
- operations,
- economics and finances, and
- public acceptance and evaluation.

For each of the three operating examples, we dissected the published and unpublished information to form a complete picture of the history, operation, and results of the HOT lane.

Because we wanted to be sure that we were including a broad perspective in our analysis, we invited participants from around Texas to a workshop and sought their input on issues they believed to be the critical issues that the research should explore. We used the results of that workshop in two ways. First, we used it to augment the issues list prepared by the research team and TxDOT. Second, we used it to generate ideas for subsequent presentations and short-course sessions with TxDOT and other Texas entities to further expand the issues list and the ideas for solutions.

What We Found ...

HOT lanes are feasible both technically and as an instrument of public planning. Although their application is fairly narrow, they may be an appropriate element of highway operation in Texas urban areas. They are a valuable complement to HOV lanes and, in some cases, may aid in improving both the efficiency and perception of underused HOV lanes. They are also an effective way to reduce demand on congested HOV lanes without eliminating an entire class of users.

Many aspects of HOT lanes, such as design, are closely related to HOV lanes and require very similar treatment by TxDOT. However, many other aspects – particularly policy, planning and operations – are very different from anything TxDOT currently does and require much more external coordination.

The Researchers Recommend ...

Based on experience throughout the United States, it is evident that clearly understood and mutually agreed upon goals and objectives are essential for a successful HOT lane. Table 1 shows the common goals and corresponding objectives of the HOT lanes that have been successful thus far.

Among the more common applications currently envisioned for HOT lanes is the conversion of existing HOV lanes to HOT lanes. This conversion typically requires the installation of some technology to allow collection of the HOT lane toll electronically. Table 2 describes recommended criteria to be considered in the decision between HOV lane or HOT lane.

Table 1. Potential Goals and Objectives of HOT Lane Projects.	
Typical Goals	Corresponding Objectives
Test/evaluate peak-period pricing strategies	Monitor and report on operations, congestion, air quality impacts, and public reaction to demonstration projects
Enhance efficiency of existing and planned HOV system	Enhance people-moving capacity of HOV lanes
Respond to negative public opinion about underutilized HOV lanes	Smooth transition from two-person to three-person HOV lane requirement
Phase in congestion pricing	Implement pricing in a way that minimizes negative public opinion Increase public familiarity with and acceptance of pricing policies/technologies
Provide a new travel alternative — pay to bypass congestion	Reserve a portion of the capacity for congestion-free travel
Provide a no-pay or discount option for accessing priced facilities	Minimize negative impacts of pricing policy to lower-income persons
Raise revenue	As a return on initial investment For new or improved transportation facilities or services To accelerate programmed capacity expansion
Maintain or increase mobility on adjacent free lanes	Increased operating speed Reduced speed fluctuations
Improve multi-occupant vehicle use	Maintain or increase carpool formation and longevity rates, average vehicle occupancy, and transit use
Enhance regional air quality	Postpone the need for investment in new construction

Table 2. Criteria for Converting HOV Lanes to HOT Lanes.
Selecting new HOV lanes to be redesigned as HOT lanes
• Corridor has capacity deficiencies • Corridor is used by travelers making relatively long trips • The new lane would develop sufficient demand to attract private investment • The new lane makes sense in terms of the overall phasing for the regional HOV program • Transportation alternatives are, will be, or could be available at the time fees are implemented • Construction as a HOT lane could accelerate scheduled implementation or enhance its public benefit • Project would be cost effective
Converting existing HOV lanes into HOT lanes
• Corridor has capacity deficiencies • Corridor is used by travelers making relatively long trips • There is excess capacity on an existing HOV lane or there could be excess capacity by moving from HOV 2 to HOV 3+, and implementation would not cause adverse effects • Income revenue exceeds implementation costs • Transportation alternatives are, will be, or could be available at the time fees are implemented

For More Details . . .

The research is documented in Report 4915-1: *Investigating the General Feasibility of High-Occupancy/Toll Lanes in Texas*.

Related Research
Several Texas research projects have been completed or are underway, including:

- Report 2701-1F, *Feasibility of Priority Lane Pricing on the Katy HOV Lane: Feasibility Assessment*, Stockton, et al., Texas Transportation Institute, 1997.
- Report E 305001, *QuickRide Evaluation*, Stockton, et al., Texas Transportation Institute, 2000.
- Report 1832-1, *Defining Special-Use Lanes: Case Studies and Guidelines*, Mahmassani, et al., Center for Transportation Research, 2000.
- Project 0-4160, *Operating Freeways with Managed Lanes*, Kuhn and Daniels, Texas Transportation Institute, 2001 (ongoing).
- Project 0-4009, *Role of Pricing in Managed Lanes*, Jianling Li, University of Texas at Arlington, 2001 (ongoing).

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TxDOT Implementation Status
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The research was completed several years ago, but the information generated from this research is still being utilized. For example, currently TTI researchers are assisting the Tyler District in developing a tolling strategy for a new loop highway segment. The tolling strategy will be based in part on the electronic tolling technologies addressed in Report 4915-1: *Investigating the General Feasibility of High Occupancy/Toll Lanes in Texas*. This report is available by contacting TxDOT's Research and Technology Implementation office. It can also be obtained electronically at: http://tti.tamu.edu/product/catalog/reports/4915-1.pdf.

For more information, contact: Andrew Griffith, P.E., RTI Research Engineer, at (512) 465-7908 or e-mail: agriffi@dot.state.tx.us.

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