



## The University of Texas at Arlington

Project Summary Report 4009-S

Project 0-4009: Pricing Strategies for Managed Lanes

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### Assessing Pricing Strategies and Users' Attitudes Towards Managed Lanes: Executive Summary

#### PROJECT SUMMARY REPORT

"Managed lanes" is a new concept that has emerged in recent years. The concept combines many advantages of traditional management and market-based strategies, as well as Intelligent Transportation Systems (ITS) approaches. A managed lane facility is designed and operated to achieve specific goals by managing access for defined user groups, applying pricing and various sensing, computer, and communication technologies, and so forth. It typically provides improved travel conditions for eligible users.

Currently, the managed lane concept is being considered for major freeway projects in many metropolitan areas in the State of Texas. A key component of the managed lane concept is pricing strategy and the fees charged to various types of vehicles and user groups. In order to select

an appropriate pricing strategy that would result in a target flow on managed lanes and general-purpose lanes, transportation planners and managed lane operators must understand the price sensitivity of various user groups. In spite of the useful insights provided by the existing literature on managed lane studies, little is known about the impact of price on change in demand for managed lanes and variations among different user groups. Also overlooked are methods that can apply price elasticity information to the evaluation and selection of optimal pricing strategies.

The main objectives of this project are to investigate travelers' attitudes toward the managed lane concept and to develop a tool for transportation planners and engineers and toll agencies to evaluate the impacts of various pricing policies and select

appropriate options for managed lanes in the State of Texas.

#### *What We Did ...*

Working closely with the project director and TxDOT staff, the research team completed a number of tasks. A literature search on pricing, travel behavior, and simulation methods identified the factors that influence travel decisions and lessons with regard to the development of pricing policies and the implementation of pricing projects.

To learn about travelers' attitudes toward managed lanes and their willingness to pay for the perceived time-savings, the research team developed survey instruments based on findings of literature review and conducted surveys on travelers who use the corridors of the Lyndon B. Johnson Freeway (LBJ) and the Dallas North Tollway (DNT) in the Dallas/Fort Worth (DFW) metropolitan area.



In addition, the research team analyzed the survey data and developed a tool for the evaluation of pricing strategies (see Figure below) and a guidebook for the use of the tool.

### What We Found ...

The literature search reveals that congestion pricing is gaining momentum under ISTEA and TEA-21. Current congestion pricing projects have been implemented in new road capacity, on existing toll roads, and on existing High-Occupancy-Vehicle (HOV) lanes. Studies are underway to explore the Fast and Intertwined Regular (FAIR)

lane concept for implementing congestion pricing in locations where new capacity cannot be built and converting existing general-purpose lanes is necessary.

Congestion pricing schemes include variable charges, fixed charges related to time of day, cordon, and distance, and a combination of the above. Most current pricing projects apply fixed charges related to time of day. Only one, the I-15 project in San Diego, California, is operated with dynamic pricing in which price changes according to real-time traffic flow.

Research on existing pricing projects provides limited information on price elasticity of demand for managed lanes, ranging from  $-0.02$  to  $-1.00$ , meaning a 10 percent increase in price will result in 0.2 to 10 percent decrease in demand. Evaluation of successful projects suggests that congestion pricing has had positive impacts, to a certain extent, on traffic throughput and on travel behavior, including time of travel, mode change, and travel route selection. Effect on overall traffic conditions is mixed, due to induced travel demand.

## The Toll Evaluation Model



Previous studies suggest lessons in goal setting, pricing policy evaluation, equity consideration, and marketing approaches for overcoming political and institutional barriers for the implementation of managed lanes.

Analysis of the survey data resulted in a number of key findings and implications. First, more than 50 percent of the survey participants indicated that they would be very or somewhat likely to use managed lanes if implemented. This implies that there is considerable public acceptance of managed lanes.

Second, the survey data indicate that few Single-Occupancy-Vehicle (SOV) users would change to HOV in order to use managed lanes for free or at a reduced fare, and *vice versa*. This suggests that managed lanes may have only limited impact on carpooling if incentives (e.g., price and travel time saving) for carpooling are not high enough.

Third, the data show that the values of travel time savings for LBJ and DNT users are fairly low, about \$3/hour and \$6/hour respectively. However, it is interesting to note that, on average, LBJ users perceive more time savings from using managed lanes than DNT users, but their average willingness to pay for the time savings is lower than that of DNT users. Such a difference implies that experience with

toll may be an important factor in explaining willingness to pay for time savings, though income may play a role as well.

The demonstrations of the toll evaluation model prove that the tool can be used to select a toll price that optimizes one or more different objectives. But the demonstrations also indicate that some objectives of pricing strategy are in conflict with each other. The finding suggests that toll agencies and transportation authorities must set the priorities of goals and objectives when developing pricing policies.

Finally, our experience with survey data collection suggests that the preparation of survey sample pool should take into account unexpected factors, such as weather conditions, traffic conditions, and data availability. More vehicle licenses may be needed in the initial data collection stage in order to provide sufficient samples for survey.

It should be pointed out that while the stated preference method is a good way for investigating travelers' potential reaction to managed lanes before implementation, the method can provide only perceived information on time savings and willingness to pay. There will be a gap between real time-savings and perceived time-savings. In addition, there is a difference between willingness to pay and market price that one has to pay. The true price elasticity

of demand for managed lanes, as widely suggested, has to be studied with empirical data through field observation after the implementation of managed lanes.

### ***The Researchers Recommend ...***

This research leads to a number of recommendations for model implementation and future research:

1. Investigate the political and institutional issues of implementing managed lanes. The focus of this research was to develop a technical tool for toll evaluation. However, political and institutional factors play a vital role in the success of a managed lane project. In addition, public involvement, funding, marketing, and legislative and operational issues are crucial for managed lane planning and implementation. More research is required to investigate these issues.

2. Continue the current research to improve the toll evaluation model developed in this study. As shown in the full report, the tool has the ability to search for an optimal pricing policy option that satisfies one or more project objectives. However, due to time and data constraints, the research has not fully investigated the price impacts on mode change and impact of HOV on travel demand for managed lanes. In addition, the tool does not provide an option of evaluating impacts of toll prices applied to HOVs.



Furthermore, there is a need to fine-tune the shape of the price and demand curve. Therefore, future research should continue to improve the model with feedback from field tests of the model. New research also needs to find new emission information.

3. Provide training for using the evaluation tool developed in this research. While researchers of this project have made an exceptional effort to explain the model and potential applications in this report and the guidebook, it will be necessary to provide training

for using the model in order to ensure the proper use of the model. The model requires inputs from the user and could provide misleading outputs if the user does not supply correct information.

### *For More Details ...*

The research is documented in Report 4009-1, *Pricing Strategies for Managed Lanes*.

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### *TxDOT Implementation Status*

Two products were developed in this research.

P1-Guidebook that includes instructions for performing assessment of pricing strategies, including data required for analysis, data collection methods, data analysis procedures, and presentation opinions. Status: Developed price-elasticity and optimization models using LBJ Freeway and Dallas North Tollway as case studies. Available for use. Possible further refinement to include Houston and Austin case studies.

P2-Spreadsheet that includes models for assessing pricing strategies. Status: Available for trial use. After refinements, need to distribute to districts and MPOs.

For more information please contact Dr. Khali Persad, P.E., RTI Research Engineer at (512) 465-7908 or email at [kpersad@dot.state.tx.us](mailto:kpersad@dot.state.tx.us).

### *DISCLAIMER*

This research was performed in cooperation with the Texas Department of Transportation. The contents of this report reflect the views of the authors, who are responsible for the facts and accuracy of the data presented herein. The contents do not necessarily reflect the official view or policies of the TxDOT. This report does not constitute a standard, specification, or regulation, nor is it intended for construction, bidding, or permit purposes. Trade names are used solely for information and not for product endorsement. The researcher in charge of this project was Dr. Jianling Li.

