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16. Abstract State and federal research has examined toll roads and attempted to identify methods to make toll roads a more attractive option for drivers. Researchers examined various views of toll road transactions and concluded: <ul style="list-style-type: none"> • Truckers and trucking companies view toll roads significantly differently than the average passenger car driver. Travel time savings and avoiding congestion are generally less important than the actual cost of the tolls and their inability to pass those costs to their customers. • Drivers require more information on toll roads: where they are located, how/where to access them, how to pay for the toll transaction, how much time will they save by taking a toll road versus a free alternative, who operates a given toll road, etc. • Raising toll rates actually increases revenue while lowering toll rates will increase traffic volumes at the expense of toll revenues. 					
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EXECUTIVE REPORT: TOLL ROADS, TOLL RATES, AND DRIVER BEHAVIOR

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DISCLAIMER

This research was performed in cooperation with the Texas Department of Transportation (TxDOT) and the Federal Highway Administration (FHWA). The contents of this report reflect the views of the authors, who are responsible for the facts and the accuracy of the data presented herein. The contents do not necessarily reflect the official view or policies of the FHWA or TxDOT. This report does not constitute a standard, specification, or regulation.

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INTRODUCTION

The Texas A&M Transportation Institute (TTI)—as directed by the Texas Legislature through Rider 44 of the Fiscal Year 2012–2013 appropriations bill for the Texas Department of Transportation (TxDOT)—is conducting an analysis that identifies strategies to maximize toll revenues collected on the state’s TxDOT-operated toll roads. While this research study is ongoing, and final results and recommendations are not available at this time, it is possible to use information from early findings and previous research efforts to address a few toll road topics that are often brought up for discussion. Specifically, this report examined the following three commonly mentioned views regarding attempts to increase toll road transaction revenues:

1. Truckers prefer a congestion-free, guaranteed travel time for their long-haul routes. The cost of tolls along a toll road is worth the price for such reliable trips.
2. The average driver is well informed of where toll roads are located, how they work, and understands their benefits. There must be other reasons why people choose not to use toll roads.
3. Lowering toll rates makes toll roads a more attractive option for the average driver, thus increasing toll road traffic volumes. The higher traffic volumes will then generate more toll revenues.

TRUCKS AND TOLL ROADS

State and federal research has examined the trucking industry's view of toll roads and attempted to identify methods to make toll roads a more attractive option for truck drivers and trucking companies. At the national level, a research study commissioned by a joint committee of the National Cooperative Freight Research Program and National Cooperative Highway Research Program—both of the Transportation Research Board of the National Academies—published a report in 2011 that examined what value stakeholders in the trucking industry seek from toll roads (*1*). In other words, researchers attempted to identify what kinds and level of benefits must be obtained from a toll road in order for truckers and trucking companies to select toll roads over free alternatives. According to hundreds of surveys and interviews of people in the trucking industry, the overwhelming attitude toward toll roads is negative. Broadly, this negativity is attributed to two items: (1) the inability to monetize the benefits of toll roads, and (2) the difficulty in passing toll costs to end users.

Based on findings from Texas-specific research studies regarding trucks and toll roads, the findings support the same conclusions drawn in the national research (*2,3,4*). Interviews and focus groups conducted as part of these research efforts revealed the following about the trucking industry and the use or non-use of SH 130 in the greater Austin area by truckers and trucking companies:

- Due to performance and fuel efficiencies, the optimal travel speed for a truck is in the 62–64 miles per hour range. Driving faster than these speeds is more costly, so higher speed limits provide practically no benefit to truckers. Due to insurance requirements

and safety concerns, some companies do not allow drivers to operate their trucks above these speeds.

- The longer distance associated with driving SH 130 around Austin versus IH 35 through Austin increases fuel costs on top of the toll charges.
- Toll rates for trucks are typically three to six times higher than a passenger car. What would be a \$9 total toll to travel the road in a passenger car can cost a truck driver as much as \$54 to travel the same road.
- For independent truck drivers, tolls are an out-of-pocket expense that cannot be passed on to their customers. The financial burden of tolls for this segment of the trucking industry prevents them from choosing toll roads.
- Shipping schedules (routes and times) are already derived assuming some delays along IH 35 in the Austin area. Congestion on IH 35 would need to exceed two hours of delay before trucking companies actively route trucks to SH 130 over IH 35. Moreover, to make SH 130 the viable alternative, trucks must be made aware of this delay before the IH 35 versus SH 130 diversion decision point.
- If a truck is not completely bypassing the Austin area, taking SH 130 for part of the trip, then heading west back into the area takes too much time. This delay is due to using surface streets with multiple traffic signals, stop signs, narrow lanes/roads, and other characteristics that inherently slow trucks.

Trucks and SH 130 Toll Rates

Last year, TxDOT conducted a truck toll discount period between December 21, 2011, and January 25, 2012, along SH 130 to encourage trucks to use SH 130 as an alternative to IH 35. During the discount period, the tolls for trucks were dropped to the same toll rate as passenger cars. This represented a 67 percent drop in the toll rate for trucks. Mathematically, a $\frac{2}{3}$ lowering of the toll rate means that the volume of trucks would need to triple in order to maintain the same level of toll revenue from trucks during the discount period. Analysis of the transaction data from SH 130 during the discount period showed that truck traffic increased between 40–45 percent. When the toll rate discount period ended, truck traffic on SH 130 declined but did stay slightly higher than the truck volumes measured before the discount period went into effect. Based on these results, lowering truck toll rates does increase the use of the toll road by truckers, but the increased traffic volumes comes at the loss of total toll revenues. Due to lack of data, it is unknown if the movement of some trucks to SH 130 during the toll rate discount period resulted in any real or perceived benefits along IH 35. It is also not known whether additional outreach strategies, including increased advertising, would result in more trucks using SH 130.

GENERAL PUBLIC AND TOLL ROADS

Again, the study of the general driving public and their attitudes toward toll roads is an on-going research topic across the nation. Knowing when and why the average driver would choose a tolled route over a free alternative is critical knowledge for transportation decision makers both for planning purposes and for ongoing operations of a tolled facility. Drivers' reasons for deciding to use or not use a toll road can be placed in one of two broad categories: (1) philosophical/principle views, or (2) lack of knowledge of the physical and/or operational aspects of toll roads.

Philosophical and Principle Beliefs

Road tolling in the United States dates before the Declaration of Independence when towns, counties, and even individual landowners excised tolls on people to use bridges and ferries as they traveled. The dedicated toll road has decades of history in the U.S. and in Texas.

Because of this history, it would be fairly reasonable to believe that the general driving public understands why toll roads are considered viable options in the surface transportation system and how they are funded. In reality, surveys, interviews, and focus groups have revealed little understanding as to how the highway system is funded and the costs of planning, designing, building, and maintaining transportation facilities (5). When people do comprehend that fuel taxes are the primary funding source for highways, there is a tendency to believe that they, as individuals, are paying for transportation when they fuel their vehicles, and tolls are a second (or double) tax to use a roadway. Because of this point of view, some drivers fundamentally do not drive on toll roads unless the toll road is the only route option. Converting these non-users to toll road users will not be an easy task. Education is the starting point, but the education process must be comprehensive, on-going, and transparent.

Operations of Toll Roads

As part of the focus groups and online survey conducted through the Rider 44 project, people were asked why they choose not to use a toll road in the Austin area. Obviously, some participants responded that toll roads currently do not exist in the parts of the greater Austin area where they travel. In other words, they do not have the option to use a toll road.

For those that do have the option of using a toll road, some people select not to use them for the philosophical and political reasons previously stated. But for those drivers who could use a toll road, and are open to the idea of taking toll roads but currently do not, they indicate that they do not have enough knowledge of the option to make their decisions. For example, participants of focus groups and interviews revealed the following (4).

- Participants (individually or as a group) could not identify all the toll roads in the greater Austin area, nor could they identify the entities responsible for operating the area toll facilities.
- Many participants were unsure how to use the toll roads in terms of payment options.
- Participants who were non-users of toll roads indicated they did not know where to access the toll roads or did not know where the toll roads could take them (i.e., non-users were unaware that a toll road would be a viable alternative for a given trip).
- Participants believed the time savings provided by area toll facilities tends to be negated because they generally end in congestion at the connection with a non-tolled road.
- Lack of information at appropriate locations regarding travel times and/or travel speeds for the tolled option versus the non-tolled options (e.g., SH 130 vs. IH 35) prevents drivers from making informed decisions as to which route to take.
- Participants who needed to travel to the downtown Austin area indicated that there were no toll facilities that offered convenient access to downtown.

For the Austin area focus group participants, it does not appear that the focus group participants view the area's toll facilities as a solution to the Austin area traffic woes. SH 130, in particular,

is viewed as being too far to the east of Austin and too far from downtown to provide any significant congestion relief for commuters. Rather, toll facilities are viewed primarily as a premium road service, to be used occasionally when the driver is in a rush or simply does not feel like sitting in congestion.

From the focus groups conducted as part of the Rider 44 research study, there was general agreement among participants that it is appropriate for the operating agency of a toll road to provide more information to the public regarding the tolled facilities. This information would include location, access points, payment options, travel time savings comparisons, and other such operational details.

TOLL RATES AND TRAFFIC VOLUMES

Regardless of whether or not a driver uses a toll road, it is common to hear the complaint that toll rates are too high. The setting of toll rates is a combination of art and science. Significant research has been conducted to determine the optimal toll rate for a given tolled facility. A key variable in determining toll rates is the willingness of potential users to pay a toll under various conditions, i.e., what value or price do they place on their time so that the time savings typically gained by using a toll road offsets the cost of the tolls paid to gain that time savings (6). There is an additional complication in toll rate determination: drivers may not actually behave the same way they indicated before the toll road opened (through stated preference surveys) compared to their true actions once the toll road becomes operational (through revealed preference surveys). This presumed versus real behavior and the corresponding value of time calculations play a critical role in the toll road traffic and revenue forecasts.

Determining the optimal toll rate for a roadway depends on the overall goal of the tolling agency: revenue maximization or maximum operational benefit (i.e., attract higher traffic volumes). For toll roads, it is necessary to decide which of these two objectives is more important because they have an inverse relationship. For example, a free road will attract the most traffic, while a toll road with unnecessarily high rates will go virtually unused. If revenue maximization is the goal, then the toll rate must be set so that the enough traffic is attracted to generate the greatest amount of revenue. Granted, slightly lowering the toll rate may bring a higher traffic volume to the tolled facility, but the mathematics (toll rate \times traffic transactions = toll revenue) would cause the revenue to decline. But if having higher traffic volumes on the toll road is a greater benefit than maximum revenue, lowering toll rates is a viable option.

The choice between revenue maximization and greater traffic volumes may be influenced by the financing mechanism used to fund the construction of the tolled facility. If traditional financing is used, the owner typically has more flexibility in setting toll rates and balancing the priorities of revenue generation versus increasing traffic volumes. When financing is done through bonds or other forms of loans, the covenants and terms of those agreements frequently have expectations as to the toll revenue generation as well as toll rate increase requirements. Meeting the contract obligations as to toll rates and revenue generation could then impact the traffic volumes attracted to a toll road.

True or False: Lower Toll Rates = Higher Traffic Volumes = Higher Toll Revenue

There is very little data available showing the impact of lowering toll rates because it rarely ever happens. On SH 130, there have been two occasions when the toll rates for a segment of the vehicles (trucks) were lowered in an attempt to attract more trucks to the toll road (refer back to “Trucks and SH 130 Toll Rates” for the description of the most recent toll discount event). In both cases, the volume of trucks on SH 130 did increase, but not at sufficient levels to maintain revenue levels prior to the toll discount: toll revenues declined due to the lowering of toll rates.

As for the effects of raising toll rates, there are numerous examples and studies showing that increasing toll rates actually increases toll revenues. For toll roads in Texas and across the nation, analyses show that toll rates have elasticities of approximately -0.35 . Imagine there are 1,000 users who pay \$1 each for their toll on a toll road. The resulting revenue would be \$1,000 ($1,000 \times \1.) The toll rate is then raised to \$2 (a 100 percent increase in the toll), and the elasticity calculation predicts the volume of users would decrease by 35 percent. Revenue, however, would actually increase to \$1,300 ($650 \times \2). This same type of result can also be seen in mass transit systems when bus, train, and subway fares are increased.

So what happens to those toll road users that stop using the facility due to the higher toll rates? Although not as extensively studied, there is evidence that traffic volumes on the tolled facility do recover to a large extent after a period of time. Some of the traffic recovery is due to the year-over-year traffic growth that occurs naturally for roadways. Another significant reason for the traffic rebound is due to the fact that once people leave the tolled facility, they discover that the next best alternatives—either to a free route or by changing transportation modes to, for example, bus transit—are not as desirable to them. They value the benefits of the toll road more than the cost of the increased toll rate and eventually return to the tolled facility. Depending on the choice of alternate routes and travel modes, a driver’s decision to go back to the toll road may occur sooner rather than later. The frequency of toll rate increases and the amount of each increase does impact the decision making process.

CONCLUSIONS

Based on information gathered in the on-going Rider 44 study and from other published research on the topic of toll roads, toll rates, and driver behavior, it is possible to draw some conclusions regarding frequent discussion items on these topics.

- Truckers and trucking companies view toll roads significantly differently than the average passenger car driver. Travel time savings and avoiding congestion are generally less important than the actual cost of the tolls and their inability to pass those costs to their customers.
- Drivers require more information on toll roads: where they are located, how/where to access them, how to pay for the toll transaction, how much time will they save by taking a toll road versus a free alternative, who operates a given toll road, etc.
- Raising toll rates actually increases revenue while lowering toll rates will increase traffic volumes at the expense of toll revenues.

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