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TXDOT ADMINISTRATION RESEARCH: TASKS COMPLETED FY2009

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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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PROJECT STRUCTURE

Texas Department of Transportation (TxDOT) Project 0-6581-TI, TxDOT Administration Research, encompasses multiple tasks that explore and support administrative aspects of transportation research.

The project term began in October 2008 and has been extended to continue through August 2010. This report documents work conducted under the project during fiscal year 2009 (FY2009).

TASK 1: TECHNICAL SUPPORT FOR MILEAGE-BASED USER FEE REVENUE SCENARIOS

This task explores questions regarding long-term sustainability of the fuel tax as the primary mechanism for funding transportation development in Texas. It consists of three activities:

- conduct a preliminary analysis,
- review preliminary results, and
- develop final deliverables.

In this task, Texas Transportation Institute (TTI) researchers worked toward development of a model for estimating the revenue-generating potential of a fee based on miles driven ("mileage fee"). This model was developed in response to ongoing dialogues at national and state levels regarding long-term sufficiency of the fuel tax as the primary mechanism for funding transportation system development.

Researchers constructed the fee-based model using several basic assumptions:

- The relationship between population growth and vehicle-miles-traveled (VMT) will continue in the long term.
- All vehicles will be priced for miles driven beginning in 2010.
- Average vehicular fuel efficiency will continue to increase.
- Current legislative apportionment of fuel tax revenues to non-transportation activities will continue.
- The fuel tax will not be increased or indexed.

Results from the revenue model showed that under the State Demographer's Population Growth Scenario 00-07 (selected to ensure conformity with ongoing work by the TEMPO Working Group and the 2030 Committee), a flat fee of 1.6 cents, if applied to all mileage in the state of Texas beginning in 2010, would generate the equivalent amount of revenue that state fuel taxes are expected to generate for that year. If differential pricing is to be applied by vehicular class, then a 3.3 cents per mile fee applied to all commercial vehicle mileage and a 0.93 cents per mile applied to all personal vehicle mileage will generate the same amount of revenue in 2010 as the state gasoline and diesel taxes are expected to.

The mileage fee applied in this model was structured to act as a complete replacement for the fuel tax in terms of generating sufficient revenue at the state level, although many of the assumptions incorporated into the model are simplistic and perhaps unattainable. For example:

- The initial year for mileage fee collection is 2010, but it is inconceivable that any sort of mileage-based fee system will be ready for implementation by the year 2010, much less full implementation.
- It is likely that only a small percentage of vehicles would be subject to the fee initially (most likely heavy trucks and hybrid/electric vehicles) and this percentage would grow at a steady rate.
- It is possible that some time in the near term the state's fuel tax may be increased or indexed, meaning that this revenue estimating model will underestimate future fuel tax revenues relative to expected mileage fee revenues.
- It is also possible that a fee based on mileage will drive down VMT, something that is not currently accounted for in this model.

Because of these variants, TTI researchers are working to update the model so as to account for a more attainable phase-in period, potential declines in VMT as a result of pricing, and the possibility of increasing or indexing state fuel taxes. TTI researchers are also working to ensure that the model utilizes data consistent with the Transportation Revenue Estimation and Needs Determination System (TRENDS) model currently under development.

TTI researchers completed a micro-analysis to examine how a mileage fee would affect the average Texas driver in terms of expenditures. Researchers compared the change in vehicular ownership costs for the owner of a 2008 Ford Taurus (a mid-range vehicle in terms of fuel efficiency) relative to the change in cost of ownership for a 2008 Toyota Prius (a popular and very fuel-efficient vehicle). The analysis shows that a mileage-based fee would work to equalize the cost of using the road system across both vehicle types without significantly raising the cost of ownership for the more fuel-efficient vehicle. A recurring criticism of mileage-based fees is that applying a flat fee to all vehicles, regardless of fuel economy, provides a disincentive to utilize more fuel-efficient vehicles. However, this analysis showed that while a mileage-based fee system would raise the cost of ownership for drivers of highly fuel-efficient vehicles, their year-to-year cost of ownership remains low. Fuel costs for such vehicles could be less than half the cost of fuel for drivers of less-efficient vehicles.

The work conducted as part of Task 1 during FY2009 is described in the Task 1 chapter of this report.

TASK 2: TRADE FLOWS THROUGH THE RIO GRANDE VALLEY

The objective of this task is to identify trade flows between Mexico and the United States through the Rio Grande Valley land ports of entry. It consists of four activities:

- analyze existing international transportation infrastructure,
- analyze international trade flows,
- identify plans that could impact trade flows, and
- supplement resulting information with interviews if needed.

The objective of this task was to identify trade flows between Mexico and the United States at the lower Rio Grande Valley (RGV) land ports of entry. The task analysis used publicly available information from various sources. Publicly available information has some limitations, particularly concerning the "true" geographic location of the origin and destination of freight flows. This is due to the way the information is collected, which is through the data contained in the customs manifest. However, analysis of this publicly available information could still provide sufficient knowledge about the magnitude of trade and commodity detail and, as directed by TxDOT, the report produced during this task covers the analysis of the publicly available information.

The analysis conducted during this task consisted of three components:

- a description of existing freight-related infrastructure in the RGV,
- an overview of planned transportation infrastructure in the RGV, and
- an analysis of freight flows in the RGV.

The most important insights gained from conducting the analysis of freight flows in the RGV include:

- Most of the freight crossing the international border between Texas and Mexico in the RGV crosses via truck, with the ports of Pharr and Brownsville accounting for a large majority of those crossings.
- Electronics and electronic equipment account for most of the freight movements in the RGV, due to the maquiladora industry in the region. According to the regional maquiladora association, over 200 maquiladoras employing more than 1 million people operate in the RGV.
- The most common commodities moved via rail in the RGV are automobiles, automobile parts, and grain.
- Origin-destination (O-D) data show that most of the trade in the region is between the Mexican State of Tamaulipas and Texas; however, there are some limitations with this type of data.
- Depending on the final use of the information resulting from task activities, and if more detail is required, further analyses could be performed by augmenting O-D data with information obtained directly from shippers and carriers.
- Infrastructure improvements, particularly on the Mexican side of the border, could provide shippers in Mexico's interior (e.g., Monterrey and Saltillo) a viable alternative route for freight destined to or coming from the U.S. east coast.

These findings, along with the results of the analysis conducted as part of this task, are documented in the full task report.

The work conducted as part of Task 2 during FY2009 is described in the Task 2 chapter of this report.

TASK 3: DEVELOPING A CONGESTION PERFORMANCE MEASURE

This task represents a collaborative effort of TxDOT, the American Association of State Highway and Transportation Officials (AASHTO), and TTI. The collaboration brought together existing and new information from all three organizations to produce a draft concept ("strawman") paper that outlined proposed basic principles and detailed key choices for a congestion performance measure. The task consists of two main activities:

- develop "strawman" presentation and paper, and
- make revisions and assist with preparation of final paper and presentation.

The key elements of the congestion performance measure developed under this task are outlined below. These elements are related to the desired outcomes and to other performance measure topics. Key elements for discussion include:

- Approach – The community should develop the measures and targets that best reflect its vision. National measures, if used, should apply to the national system, be focused on issues of national importance (e.g., freight), and recognize that improvements must also work in, and be consistent with, the desires of the local community.
- Targets – A set of performance targets will be necessary, although the regional average congestion target level will undoubtedly be the primary metric used in public functions.
- National target – The need for a national target congestion value may be limited to routes that serve an important national interest. Important freight travel routes, border crossings, key freight connections, and urban corridors during off-peak hours are examples, but evacuation routes, national defense mobilization corridors, and other network elements may also qualify.
- Measures – A set of a few performance measures appears appropriate at the summary level with at least one average congestion measure and one travel time reliability measure. A single measure may be used to discuss the problems, but focused action requires several measures:
  - Travel delay per commuter is a good regional average measure; it is easily understood and directly affected by all solutions.
  - Travel time index is useful at several levels of geography and could be used to compare both regional and sub-regional targets.
  - Buffer index is an easily understood and useful measure of the variation in travel time; it is affected by a range of operations improvements.
- Peak and off-peak measures – Commuter conditions are important, but the midday period is when freight moves and it is perhaps more important to maintain a reliable, smooth flowing transportation network during this time.
- Average and reliability measures – Regular congestion problems are typically included in performance reporting, but the variation in travel time is caused by different issues and has a different set of solutions than the typical "too many cars on too little road" type of problem.
- Accountability and transparency – Accountability and transparency will be provided and assessed in several ways. The targets will be developed by the communities (not imposed from the outside). Each area should be responsible for identifying its progress toward targets it developed and identifying the reason why they are not making progress if no progress is made. The development of an open process and visible and measurable targets will provide a connection between annual project lists and ultimate goals of the chosen set of projects.
- Project priorities – Project priorities should be chosen (at least in part) according to their role in alleviating the problems identified in the performance measures. The measures

should illustrate the effects of all types of strategies being used to address congestion problems—added capacity, operational improvements, demand management, and land use development patterns.

The work conducted as part of Task 3 during FY2009 is described in the Task 3 chapter of this report.

TASK 4: TECHNICAL SUPPORT FOR MILEAGE-BASED USER FEES

This task continues technical support of activities conducted on behalf of TxDOT in Task 1 of this project. It consists of three activities:

- revise federal grant proposal for Texas pilot project,
- update vehicle miles traveled forecast model, and
- provide technical assistance and support regarding a mileage-based user fee structure in Texas.

The purpose of this task was to outline the information needs required to make revisions to the initial federal project grant proposal for a mileage-based user fee pilot prior to re-submittal. An enhanced proposal will benefit from the second phase of University Transportation Center for Mobility (UTCM) research that has been underway since October 2008. A number of policy questions emerged during the current research effort and are outlined in Task 4 of this report. These questions should be addressed before substantive revisions can be made to the federal grant proposal or further pilot development can proceed. A strategy for moving forward with pilot project development is outlined in the Recommendations section of Task 4 chapter.

The Northeast Texas Regional Mobility Authority provided direction for the initial grant application, namely that it was seeking a method to develop a local revenue stream for projects of regional significance. The grant application was oriented for a rural/small urban environment in accordance with this objective. Although various efforts were made to include provisions for a pilot project in recent legislation, the 81st Texas Legislature adjourned without offering policy direction. There has been interest expressed in broadening the pilot project to address other policy objectives that may support metropolitan area or statewide interests, and that policy direction will have to be articulated so that the pilot is designed to achieve the desired goals.

How should the outstanding policy questions be addressed? In other states, policy committees have been formed for the purpose of recommending overarching principles and criteria for the implementation of a new pricing approach. The Oregon Road User Study Task Force and the I-394 Express Lane Community Task Force are two examples. The broad policy questions critical to advancing mileage-based fees in Texas are:

- program goals,
- phase-in strategy,
- who pays,
- control of revenue,
- privacy versus transparency, and
- old or new technology.

It is suggested that TxDOT and its partners continue to explore mileage-based fees building on the momentum gained from the baseline research, the national symposium, and the discussions held in consideration of the proposed pilot study legislation (House Bill 3932). Texas is considered one of a handful of states leading the research and discussion in this area.

Federal grant funding can be pursued when the Federal Highway Administration issues a solicitation for proposals, but progress can be made in the interim given that timeframe is unknown. The case for federal funding can be made stronger by demonstrated action at the state level under a systematic approach for developing policy direction, defining system architecture, and engaging in public dialogue.

The work conducted as part of Task 4 during FY2009 is described in the Task 4 chapter of this report.

TASK 5: TECHNOLOGY TRANSFER AND TECHNICAL SUPPORT RELATED TO TXDOT'S WEBSITE USER INTERFACE (PROJECT TRACKER)

In this task, TTI researchers assist TxDOT in disseminating information related to its project tracker website, as well as gathering and relaying related information. The task consists of four activities:

- prepare for regional and district meetings,
- facilitate discussions at regional and district meetings,
- document findings from regional and district meetings, and
- attend and observe TxDOT town hall meetings.

The purpose of this task is to provide support to TxDOT administration in using new tools and techniques to demonstrate a new focus on performance-based goals. An initial effort included the development of an updated PowerPoint® presentation that describes TxDOT's focus on using performance measures and metrics to achieve agency goals. The initial presentation was made by Mary Meyland of TxDOT to the Texas Transportation Commission. The update to the presentation includes research findings that were conducted under previous efforts.
The presentation was used at the TxDOT district meetings in June and also will be presented at the 2009 Short Course in College Station in October. It is anticipated that portions of the presentation will be presented at quarterly meetings of the Regional Centers. The focus of this effort is to inform and engage TxDOT personnel at the district and division level in the "re-scoping" of TxDOT's goals and mission.

As a supplement to the presentation, two handouts were developed. One of the handouts, *Why Performance Measurement is a Good Idea and Why TxDOT Is Using It,* describes performance measurement, data sources, major process elements, and motivations for using performance measurement. It discusses the possible roles for performance measurement in TxDOT. The other document, *What Other States Have Done with Performance Measurement and Why They Began*, discusses the impetus for beginning to use performance measures at other state departments of transportation, how measures were chosen, and how thresholds were set. It documents who at the agency is involved in reviewing measures and how often reviews are conducted. The purpose of both documents is to provide background information on what other states have done regarding performance measurement and how TxDOT might best move in that direction. Both of those documents are presented in this report in the Task 5 chapter.

It was recognized that public input and direction on this process would be necessary and appropriate. As part of that effort, TTI will coordinate and conduct eight focus groups throughout the state of Texas during the months of July and August 2009. This work is currently underway.

The work conducted as part of Task 5 during FY2009 is described in the Task 5 chapter of this report.

TASK 6: TEXAS CONGESTION ESTIMATION TOOLS

This task uses the tools developed for the Texas Metropolitan Mobility Plan and the 2030 Transportation Needs Study as a basis for developing tools to evaluate the lag between funding and necessary estimated transportation needs. The task updates analyses regarding the state's 8 metro areas and 17 urban areas.

Exhibits 1 and 2 summarize the findings of the preliminary estimate of the 2009 ahead/behind status using the congestion estimation tool. These estimates are derived from estimates about the amount of construction activity in 2009 and should be revisited when final values for the amount of road construction are included in the TxDOT roadway inventory database. Exhibits 1 and 2 show the expected trend – more investment yields lower congestion levels – and therefore the state is farther behind if it wishes to reach targets associated with greater mobility (and lower congestion). The state's urban areas are farther behind on the freeway additions in this early analysis than on the arterial additions. The metro regions are the opposite, with freeways leading arterials, perhaps due to the toll road mileage.

The calculation process of the Texas congestion tool developed in task activities does not depend on traffic volume trends or fluctuations because it is tied to achieving goals. If expectations for population, job, or traffic growth change, the adjustments to the long-range plan should be incorporated in the calculation.

Any conclusion of "ahead" or "behind" in regard to target congestion goals should consider the recent past and future capacity additions schedule. An area might, for example, show as ahead of schedule due to a recently completed large project, but have no more substantial projects scheduled for many years. Likewise, an area considered behind might have a major project soon-to-be-completed that will advance its status.

Exhibit 1. Summary Results for the 17 Urban Areas in Texas

How far ahead or behind are we? (17 Urban Areas)	Reduce Congestion	Prevent Worse Congestion	Economically Competitive	Current Spending Trend
Total Lane-Miles Behind	-184	-101	-4	23
Freeway	-40	-35	-10	-11
Arterial	-140	-63	8	36
Cost if "Behind" ($Mill)	$ 369	$ 204	$ 98	$ 47

Exhibit 2. Summary Results for the 8 Metro Areas in Texas

How far ahead or behind are we? (8 Metro Areas)	Reduce Congestion	Prevent Worse Congestion	Economically Competitive	Current Spending Trend
Total Lane-Miles Behind	-1177	-931	-524	4
Freeway	-244	-166	-51	115
Arterial	-877	-709	-419	-78
HOV	-57	-56	-55	-33
Cost if "Behind" ($Mill)	$ 4,707	$ 3,344	$ 2,007	$ 550

Due to a large number of projects let during the mid-2000s and estimated to be completed in 2009, the urban and metro regions are slightly ahead of the "Current Trend" pace at the regional lane-mile level (23 lane-miles ahead for the urban areas and 4 lane-miles ahead for the metro regions). Even within this comparatively good news, there are needs within the urban arterials and the metro arterials and high-occupancy vehicle network. Larger numbers of positive or "ahead of pace" construction in other functional classes make the overall number positive for this scenario. The results vary by urban region as well, with 12 regions showing "ahead of pace" values for their systems and the remaining 13 showing needs or "right on pace."

All the remaining news is negative. There is a total of 1,032 lane-miles needed to get back on pace to achieve the 2030 Transportation Needs Committee recommendation of Prevent Worse Congestion with only two urban regions showing an "ahead of pace" value for that scenario. The total cost to catch up to the Prevent Worse Congestion trend is $3.5 billion in 2008 dollars. The value might be lower if 2009 costs are used (the recession has reduced highway construction price pressures), but there remains a substantial gap.

The work conducted as part of Task 6 during FY2009 is described in the Task 6 chapter of this report.

TASK 7: MOST CONGESTED TEXAS ROADS

In response to Rider 56 of TxDOT's appropriates bill, this task identifies the 100 most congested roadway segments in the state. The task consists of five activities:

- document procedures used to analyze congestion levels,
- examine data for roadway sections designed by TxDOT,
- review comments from Lt. Governor's office and adjust database and procedures,
- rank the congestion levels to produce list of top 100 most congested roadways, and
- participate in meetings and briefings as needed to communicate findings.

Work is underway for the execution of Task 7 and will continue into FY2010.

TASK 1: MILEAGE-BASED USER FEE SCENARIOS

REVENUE FORECASTS FOR A VMT-BASED USER FEE SYSTEM

A Technical Memorandum

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February 2009

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INTRODUCTION

This memorandum outlines an effort by Texas Transportation Institute researchers to develop a model for forecasting revenues from a Vehicle Miles Travelled (VMT)-based fee. The base of the fuel tax, fuel consumption, is being eroded as vehicle fuel efficiencies nationwide continue to increase and alternative fuel vehicles gain increased market penetration. Fees based on actual miles driven are considered one of the more promising alternatives. The revenue forecasting model utilized in this research effort is based on the Transportation Revenue Estimation and Needs Determination System (TRENDS) model currently utilized by the Texas Department of Transportation for projecting future fuel tax revenues. This model, as well as TRENDS, is based on a statistical relationship between population and fuel consumption. Although the assumptions incorporated into the model are rather basic, the model does show that a VMT-based fee has the potential to generate significant revenues in the future relative to the fuel tax, which is expected to see declining revenues sometime during 2019 through 2021.

This memorandum also highlights an effort by TTI researchers to analyze the potential impact of a VMT-based user fee on the individual user of the state highway system. Researchers compared the change in cost for the owner of a 2008 Ford Taurus (a mid-range vehicle in terms of fuel efficiency) relative to the change in cost of ownership for a 2008 Toyota Prius (a popular and very fuel efficient vehicle). The analysis shows that a VMT-based fee would work to equalize the cost of using the road system across both vehicles without significantly raising the cost of ownership for the more fuel efficient vehicle.

BACKGROUND

Revenues from fuel taxes account for the largest percentage of funds allocated to transportation related projects at the state level. State motor fuel tax revenues accounted for 32.1 percent and federal funds (mostly in the form of fuel tax reimbursements) accounted for 48.6 percent of State Highway Fund Revenues in the 2008 – 2009 Biennium (1).

However, the base of the fuel tax is in jeopardy. There is general trend in national government policies to reduce fuel consumption and emissions, which has positive societal impacts. However, the impact to transportation funding from reduced fuel consumption is significant. For example, air quality regulations provide a strong incentive for auto makers to produce more fuel efficient vehicles and high fuel prices provide incentives for consumers to purchase them. This increases the overall fuel efficiency of the US auto fleet, a trend which is expected to continue (Figure 1), and works to drive down fuel consumption.

A more fuel efficient auto fleet means that drivers can utilize roadways to a greater extent while paying less in fuel taxes for that use. A significant gap between the use of the nation's roadway system and the consumption of fuel has thus developed (Figure 2). If future use of the roadway system continues to outpace the consumption of fuel, the revenues derived from that consumption may be insufficient to address roadway needs.

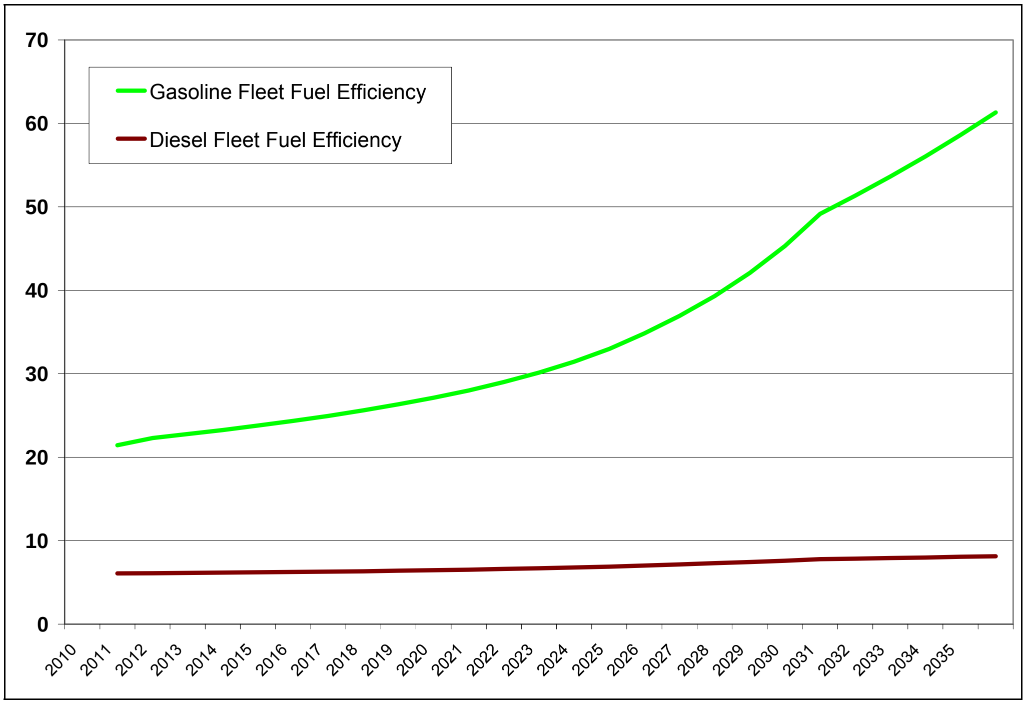

Figure 1: Projected Fleetwide Fuel Economy (in Miles per Gallon)
Source: Cambridge Systematics, Texas Transportation Institute

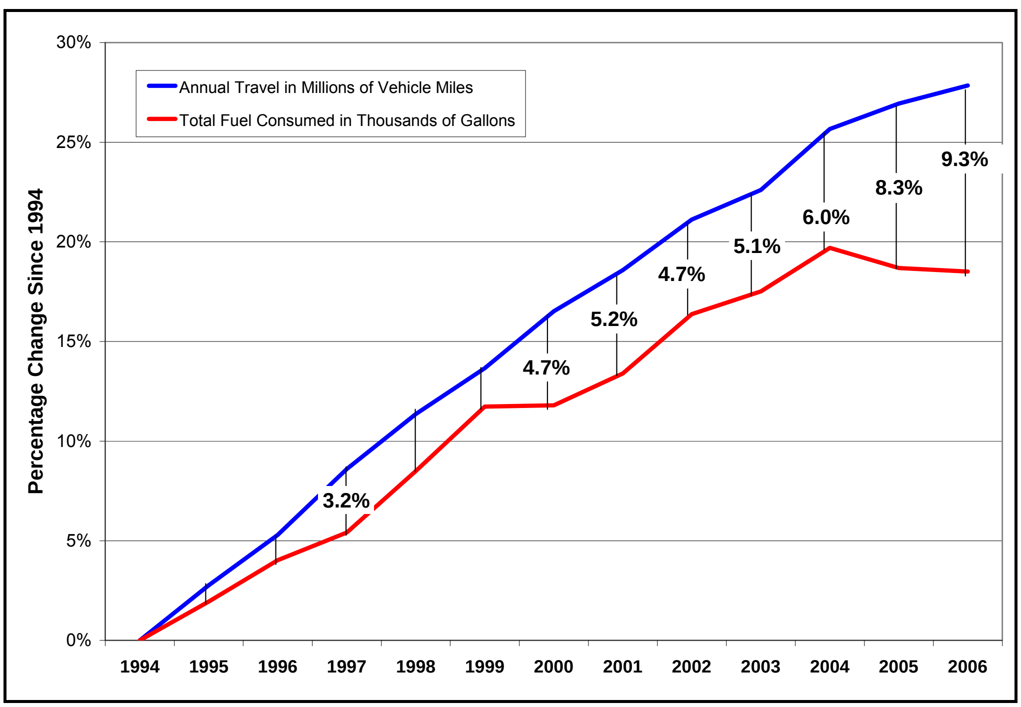

Figure 2: Annual Percentage Increase in Vehicles Miles Traveled and Fuel Consumption, Indexed to 1994

Sources: FHWA Traffic Volume Trends – December 2007; and the U.S. Energy Information Administration

The structure of the fuel tax also presents a problem, as it is levied on the gallon purchased and not the purchase price. As a result the tax loses purchasing power to inflation. Further complicating this problem is the fact that in recent years the cost of constructing and maintaining highways (as measured by the Federal Highway Administration's Annual Cost Construction Index) has outpaced general inflation (Figure 3). It is unknown, however, to what extent this particular trend will continue in the long run.

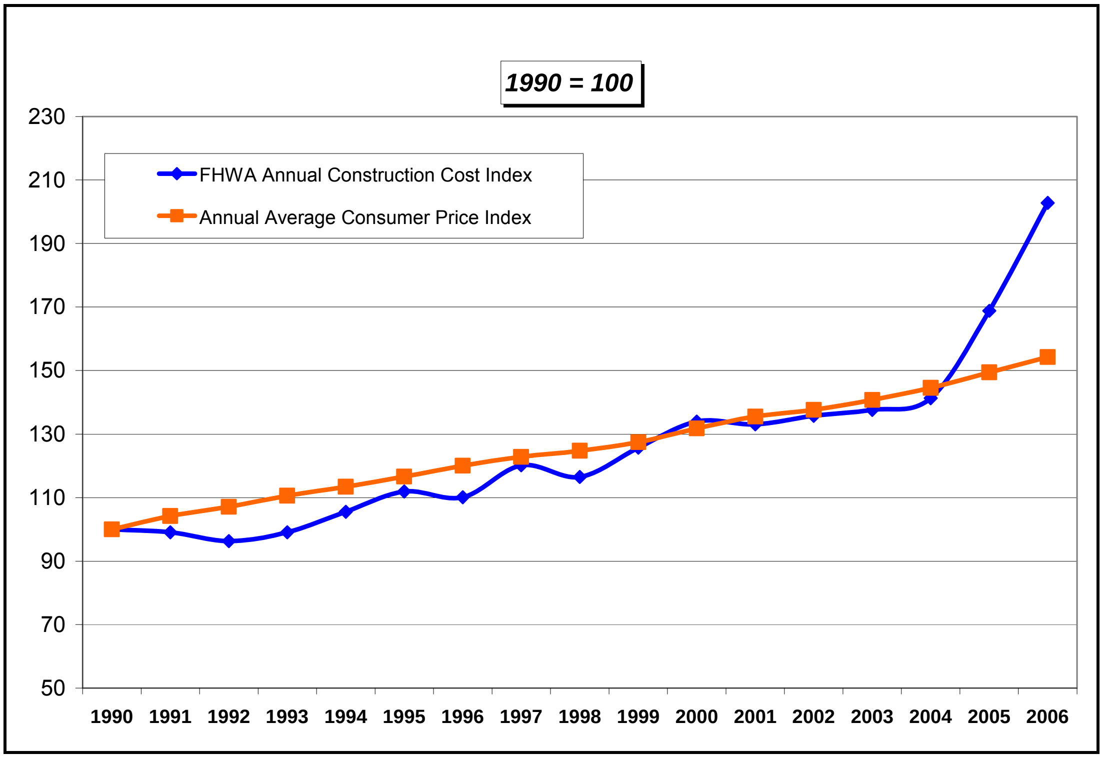

Figure 3: FHWA Highway Cost Index and Consumer Price Index from 1990 to 2006
Source: U.S. Department of Labor, Bureau of Labor Statistics; Washington State Department of Transportation

In response to these concerns over the long-term viability of the fuel tax, several studies and commissions have been established. The National Surface Transportation Policy and Revenue Study Commission released its final report in 2007, which makes several conclusions and recommendations regarding the future of transportation funding and financing. Among these recommendations is a call to study alternatives to the fuel tax, and specifically VMT-based user fees (2). VMT-based user fees have been examined by the Transportation Research Board's (TRB) Committee for the Study of the Long Term Viability of Fuel Taxes for Transportation Finance, which concluded that such fees are a promising replacement for the fuel tax (3). TxDOT has also endorsed the study of various alternatives (4). The National Surface Transportation Infrastructure Financing

Commission will be releasing its final report soon, and it is expected to make many of these same recommendations.

The benefits of a mileage-based revenue system can be summarized as follows (5):

- Alternative fuels do not erode revenues over time.
- Fuel use is separated from highway use and removes conflict with energy and environmental policies.
- All users can pay their fair share.
- Revenue keeps pace with population and economic growth.
- Such a system provides the ability to allocate resources based on usage.

THE BASICS OF VMT-BASED USER FEES

A VMT-based user fee would involve charging drivers a fixed fee for the number of miles driven for each household vehicle within a certain area. The fee would also be applied to commercial vehicles which would, ideally, pay increased fees for their use of the highway system due the added strain such vehicles place on the system.

Under most implementation concepts, the fee would be assessed on a per-mile basis within the implementing jurisdiction, be it the state, county or locality, and would exclude any miles driven outside that jurisdiction. In order to provide a means of adequately counting only jurisdictional miles, the mileage fee system would require a potential combination of electronic toll collection (ETC), Global Positioning System (GPS), and/or various in-vehicle technologies. Fees could be assessed and collected at filling stations, intermittently via ETC or cellular-based systems, or at annual inspections.

Depending on the technological configuration utilized in the system, fees could vary by any number of factors. If the implementing agency wishes to maintain incentives for drivers to purchase more fuel efficient cars, then lower fees could be assigned to high efficiency vehicles. It may also be possible to implement a fee that varies by time of day, essentially congestion pricing, or varies by facility type or individual road segment.

To date there have been two completed pilot projects to test VMT-based user fees, and there is one major, multi-state pilot project currently underway.

Completed in 2007, the Oregon Department of Transportation’s Mileage Fee Concept and Road User Program tested a GPS equipped on-board unit (OBU) that tallied then relayed mileage data through the use of wireless technology at fuel pumps. The system was meant to mimic as closely as possible the system by which travelers pay fuel taxes. The test was considered a success, as the system was deemed viable in terms of its technological reliability, and the majority (91 percent) of the program’s participants stated that they would agree to continue paying the mileage fee in lieu of the gas tax (6).

In 2008, the Puget Sound Regional Council (PSRC) concluded its Traffic Choices Study, which was also GPS based but relied on cellular technologies for the transmission of mileage information. This study was focused more on measuring changes in driver behavior and less on the acceptability of the system. The PSRC study concluded that the mileage-based fee system induced motorists to make small-scale adjustments in their travel behavior that, if aggregated across the whole Puget Sound region, would have a major effect on transportation system performance (7).

The University of Iowa is currently conducting a multi-state test of a VMT-based user fee system. The system being tested is similar to the PSRC system in that it utilizes GPS technologies to determine vehicle location and cellular technology for the transmission of fee information. Sites of the study include: Austin, Texas; Baltimore, Maryland; Idaho, Eastern Iowa, the "Research Triangle" area of North Carolina; and San Diego, California (8).

A number of states are considering VMT-based fees as a supplement or replacement to state fuel taxes, and many are considering pilot projects similar to the three just discussed. These states include Minnesota (9), Massachusetts (10), North Carolina (11), Connecticut (12), Rhode Island (13), Missouri (14), Kansas (15), Idaho (16), and until recently Colorado[a].

There are numerous challenges associated with the implementation of a mileage-based user fee system that have yet to be addressed.

Public Acceptance Issues

One of the biggest hurdles facing VMT-based fee mechanisms is that of public acceptance. Their potential reliance on GPS systems for vehicle location may be seen as an invasion of privacy, or "big brother" (17). If a VMT-based system is to be implemented with public support, it will have to be shown that all possible measures have been taken to ensure user privacy.

Furthermore, new user fees may be seen as imposing an unnecessary administrative burden. The fuel tax is relatively simple and efficient in its collection protocols. It is generally collected at the wholesale level from a few distributors, whereas VMT-based systems would need to be collected from every road user. This would require the development of new information systems (or modification of existing systems) and the establishment of new agencies and procedures for collections and other administrative functions. These new administrative procedures are likely to be viewed as unnecessary given the perceived ease of fuel tax collections (17).

System Configuration Issues

While there have been, to date, successful tests of VMT-based fee systems, a consensus has yet to be reached on how a mileage fee system should be structured from a

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[a] The Colorado State Assembly was considering a bill that would set aside funds for the implementation of a VMT Fee Pilot Program. However, the language referring to the pilot program was removed from the bill, and the future of the VMT fee proposal is currently unknown.

technological and administrative perspective. For example, Oregon's pilot system utilized a pay-at-the-pump strategy, which relied on wireless technologies that allowed drivers to pay their fees in a fashion similar to fuel taxes. However, in the long term such a system would not capture fees from electric cars or vehicles that are not required to be fueled at a service station but nevertheless use the roadway system. A system similar to the one tested by the PSRC addresses this problem by transmitting fee information via cellular signal to a billing center. However, this would require drivers to pay bills on a regular basis, as opposed to having the cost rolled into their fuel purchases. Furthermore, such a configuration would require a system for rebating users of the system for fuel taxes at fuel purchases, either through a direct refund at the time of VMT-fee payment or a credit for fuel taxes at the fuel pump.

Both the Oregon and PSRC systems utilized OBUs that tallied mileage and then transmitted the information. These are both "smart car" configurations, in that the vehicle itself (or more precisely the vehicle's OBU) handles most of the information gathering. However, it may be possible to implement a VMT-system utilizing roadside data collection devices. In a "smart road" application the roadway itself is responsible for collecting data from passing vehicles and tallying mileage driven, not the vehicle. A rudimentary smart road system is already in place here in Texas with the TxTag program. It is likely that a national VMT-system would need to utilize both "smart car" and "smart road" components, but it is unclear how and to what extent.

If VMT-based fees are to eventually replace fuel taxes then there will likely need to be substantial coordination among federal, state, and local transportation agencies. As previously noted, the system will likely require the development of new information management systems, and to the extent that the system is a replacement for fuel taxes it will need to be applied across the whole nation. There are numerous unresolved questions as to what extent this new system could be built upon existing information sharing platforms and how dynamic the system should be in terms of allowing for local and state options.

Pricing Policy Issues

Pricing policies (who gets charged and how much) will depend very much on the goals of the agency implementing the VMT fee. Large cities might wish to incorporate congestion pricing as a means of reducing traffic and improving air quality. However, congestion pricing may not be appropriate in smaller urban areas that have congestion but do not offer alternatives to automobile travel. Therefore any future VMT-based user fee system should be flexible enough to accommodate numerous, potentially conflicting, pricing policies across various jurisdictional boundaries. This will require that the system be developed with extensive coordination among these jurisdictions. To date, it is unknown as to what coordination strategies should be utilized.

MACRO-ANALYSIS

The first analysis undertaken by TTI involved an assessment of possible future revenues that could be expected with the implementation of a VMT-based user fee. These revenues are compared to potential fuel tax revenues for the same time frame.

THE GENERAL MODEL

All of the models discussed in this memorandum are based on data utilized in the TRENDS forecasting model used by TxDOT, which is in turn based on population projections generated by the Texas State Data Center and the State Demographer's Office. The model developed for this research task utilizes the 1990 – 2000 Migration Scenario ("Scenario 1"), the One-Half 1990 – 2000 Migration Scenario ("Scenario 0.5"), and the 2000 – 2007 Migration Scenario ("Scenario 00-07"). The TEMPO working group and 2030 Committee have both adopted Scenario 00-07 for their projection efforts. Therefore, in cases were more detailed analysis was required the 00-07 scenario was used.

A more detailed discussion of the population scenarios utilized in this effort is provided in Appendix A.

TTI researchers have determined that there is a strong statistical relationship between population and gasoline and diesel fuel consumption. The revenue forecasting model discussed in this memo utilizes this relationship to determine future fuel consumption and, with estimates of future fuel efficiencies, calculates future VMT. Future fuel consumption and this derived VMT value serve as the base numbers for the revenue projections presented herein.

General Assumptions

Two revenue models are presented in this memorandum (they will be discussed in the next section), both of which are built on these basic assumptions.

Revenue Estimates are for Gross Revenue

Unless stated explicitly, fuel tax and mileage fee projections do not reflect any existing or potential deductions. These deductions include but may not be limited to:

- 1 percent deducted from gross revenues for administration and enforcement of fuel tax laws;
- $7.3 million deducted from gross revenues for the County and Road District Highway Fund; and
- 25 percent taken, after previous deductions, for the Available Education Fund.

It is uncertain to what extent constitutional provisions would affect revenues under a mileage-based system. It is likely that revenues would be deposited into the state's general fund, unless a state constitutional amendment were to be passed that would dedicate these revenues to transportation. In the interest of providing the most level comparison between future fuel tax revenues and a possible VMT fee, researchers therefore decided to present an analysis of gross revenues. It is likely that actual fuel tax revenues allocated to TxDOT would be less than 74 percent of the gross revenues discussed in this memorandum.

Tax Rates are Fixed and Constant

This analysis assumes that the current $0.20 per gallon state fuel tax is maintained through 2035 and is not indexed. Applying a potential fuel tax increase to the model would require researchers to make broad assumptions regarding public policy, which was beyond the scope of this research effort. However, there is currently a bill being considered in the Texas State Senate that would index the fuel tax to inflation (18). Although the future of the proposed measure is unknown, TTI researchers believe that future VMT fee revenue estimation efforts should take into account possible indexing of fuel taxes. If a fuel tax indexing measure is passed and implemented, and that change is not reflected in revenue estimation models, then long-term fuel tax revenues will be understated relative to VMT fee revenues. Likewise, the mileage fees utilized in each projection are constant and are not indexed.

Revenue is Based on Flat Mileage Fees

In the German distance-based heavy vehicle fee system, the fee applied to commercial trucks varies depending on the number of axles and age of the truck. Heavier and older (more polluting) vehicles thus pay more per mile driven. Such variable pricing may one day be possible within this state under a VMT-based fee system, but the revenue projections presented in this analysis represent flat fees applied to miles driven by commercial and personal vehicles or all vehicles together. Fee amounts only vary between commercial and personal vehicles, not within these vehicle classes. In other words, all commercial trucks are charged the same fee and all personal vehicles are charged the same fee.

There is also no accounting for potential congestion pricing or cordon style pricing application that would levy a higher fee for miles driven within congested urban centers. Nor is there any accounting for higher emission vehicles or incentives for lower emission vehicles.

Revenue is Generated on All Roadways

One of the more attractive aspects of a mileage-based fee system is that it might be possible to allocate revenues based on facility type and by jurisdiction. Mileage accrued and revenue generated on county roads would be allocated to the county, and fees generated within city limits could be allocated to the city. However, for this exercise researchers derived VMT from statewide estimates of population and national estimates of future fuel efficiency. Data were not available that would allow researchers to allocate these derived VMT values to on-system and off-system roadways. As such, the VMT estimates used in this analysis represent statewide VMT, and no distinction is made between on-system and off-system VMT.

Imposition of a VMT-based User Fee Does Not Reduce Miles Traveled

It should be noted that none of the revenue models discussed within this memo incorporate an assumption regarding the effect a VMT-based fee would have on travel. Studies have been conducted that attempted to estimate the actual decline in VMT as a result of a VMT-based fee, but these studies have generally occurred in an urban environment and have been very limited in sample size. For example, Puget Sound's Traffic Choices study estimated that VMT dropped by 12 percent per week for study participants. However, this study occurred in a congested urban area where participants had access to alternatives to auto travel such as transit. The research team did not feel there was sufficient empirical data to apply a factor for reduced VMT to account for reductions in total statewide VMT.

Mileage Fees are Based on a Breakeven Analysis

For each revenue projection, a "breakeven fee" was determined and utilized as that projection's base mileage fee. The breakeven fee refers to the amount that would need to be charged to each vehicle-mile travelled in order to generate the same amount of revenue that the fuel tax is expected to generate in the year that the mileage fee is implemented. For this analysis, 2010 is the assumed year of implementation. Since each population projection differs in its estimate of population in 2010 (and thus differs in its estimation of fuel consumption and VMT), the breakeven fee for each population will differ slightly, though the difference is marginal under the combined/tiered VMT fee system (discussed in the next section). These fees are shown in Table 1.

Table 1: Per-Mile Breakeven Fee

	Per-Mile Breakeven Fee ($ per mile)		
	Flat Fee	Combined VMT Fee *Personal*	Combined VMT Fee *Commercial*
Scenario 1	$ 0.0117	$ 0.0093	$ 0.0329
Scenario 00-07	$ 0.0016	$ 0.0093	$ 0.0329
Scenario 0.5	$ 0.0015	$ 0.0093	$ 0.0329

Mileage Fee System is Fully Implemented as a Replacement to the Fuel Tax

For purposes of simplicity, it is assumed that once the VMT is implemented it is done so as a complete replacement to the fuel tax. Thus, the fuel tax projections presented in this analysis are for fuel tax revenues in the absence of the VMT fee. In all likelihood, a VMT fee would be phased in slowly, so that it represents an increasing share of overall transportation revenues as more and more vehicles are brought on to the system. Revenues under such a phased system might resemble Figure 4.

Time Periods

Revenue projections are for the years 2010 through 2035. This was done to coincide with TRENDS fuel tax revenue estimates, which are for the same years.

The Two Models

Two sets of VMT fee revenue projections are presented. The first is based on a flat fee that would be charged to all vehicles equally ("flat fee"). This means that heavy commercial vehicles, light duty trucks, hybrids, and luxury sedans would all pay the same per-mile rate. In determining the VMT breakeven fee, researchers projected diesel- and gasoline-based VMT for 2010 and then aggregated these values. This aggregate VMT (for 2010) was then divided into total projected fuel tax revenues for 2010 to determine the requisite per-mile rate. While this is a fairly simple configuration, the results of the analysis help to illustrate long-term trends.

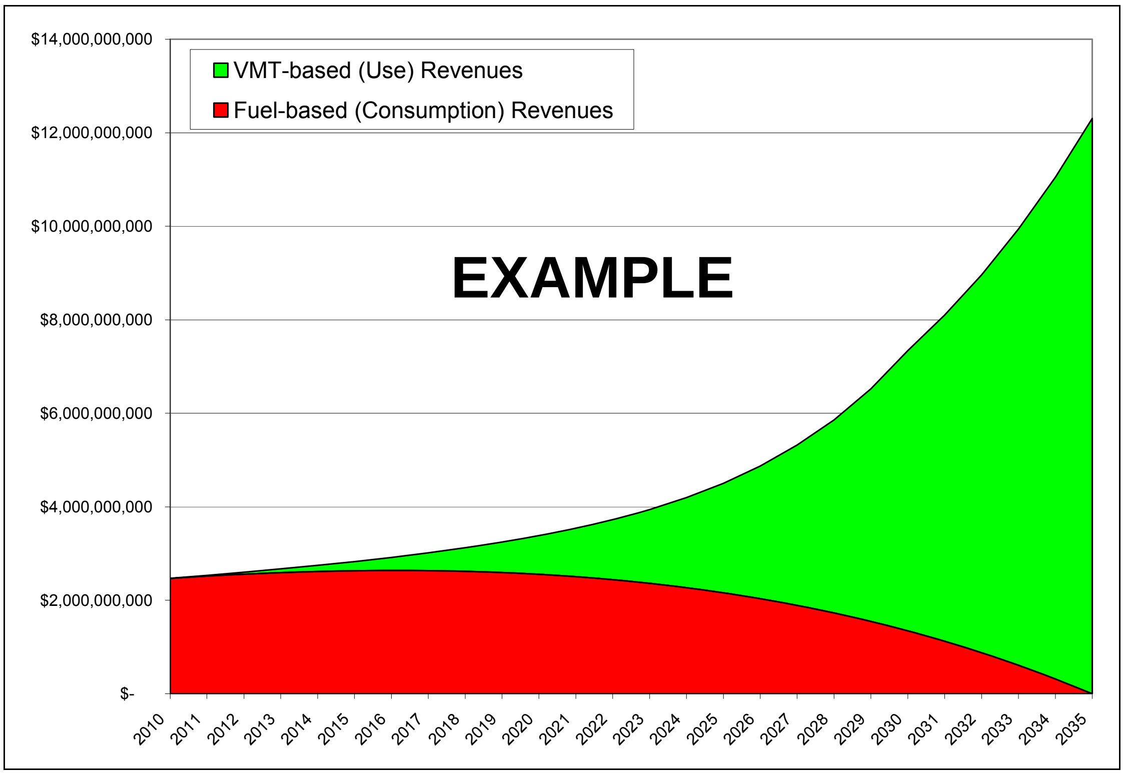

Figure 4: Example of Potential Revenues under a Phased System

The second set of revenue fee projections applies a different fee to commercial vehicles and personal vehicles ("tiered fee"). Commercial vehicle VMT was derived from diesel fuel consumption projections and estimated commercial vehicle fleet fuel efficiency for 2010. Personal vehicle VMT was derived from gasoline consumption projections and estimated gasoline fleet fuel efficiency for 2010. It was assumed that 3 percent of diesel fuel is consumed by non-commercial vehicles. Breakeven fees were determined by dividing commercial and personal VMT into total diesel and gasoline tax revenues for 2010, respectively. Projected revenues under the tiered model were slightly higher than the flat fee model over time (Figure 5) because a much higher fee (see Table 1) was affixed to travel by commercial vehicles.

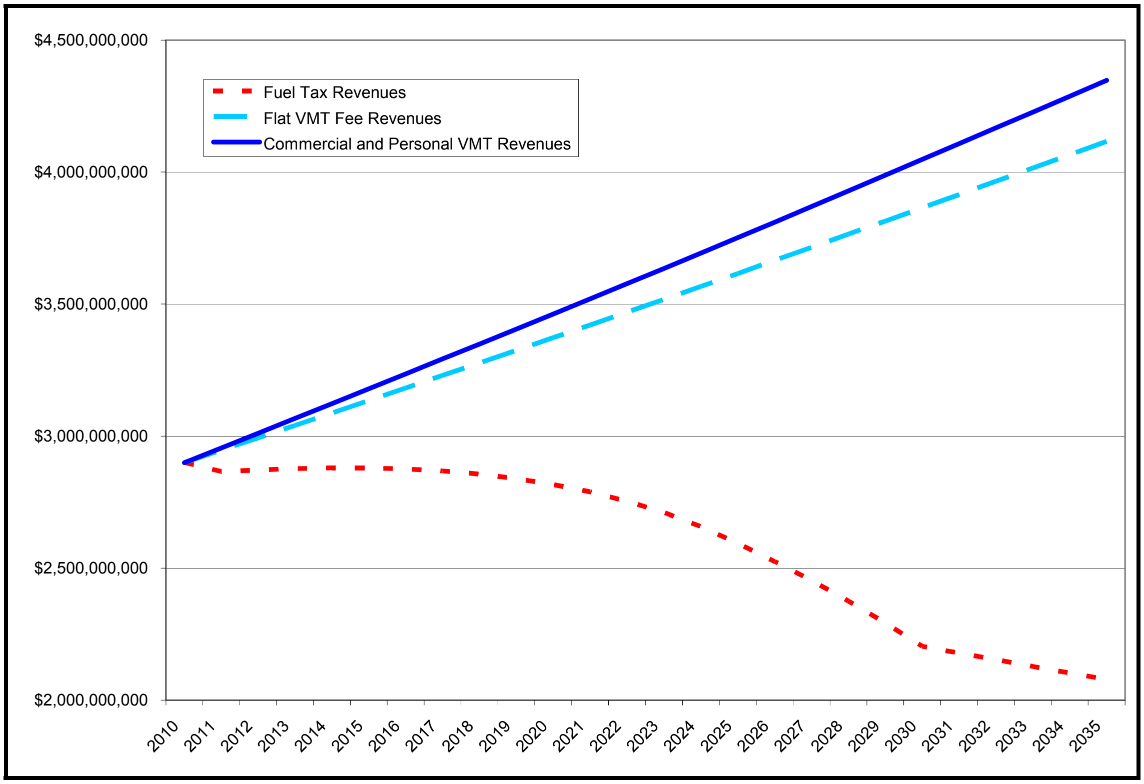

Figure 5: Projected Revenue, 2010 through 2035 (Population Growth Scenario 2000-2007)

FLAT VMT FEE REVENUE PROJECTIONS

The "flat fee" model represents a fee applied to aggregate vehicle miles travelled. This means that all vehicle miles travelled, regardless of whether they are travelled by a heavy commercial or light personal vehicle, are charged at the same rate. Figure 6 shows the projected revenue through 2035 for the fuel tax and a VMT-based fee under each of the three population scenarios. VMT fee revenues are based on a breakeven fee that was calculated for each scenario.

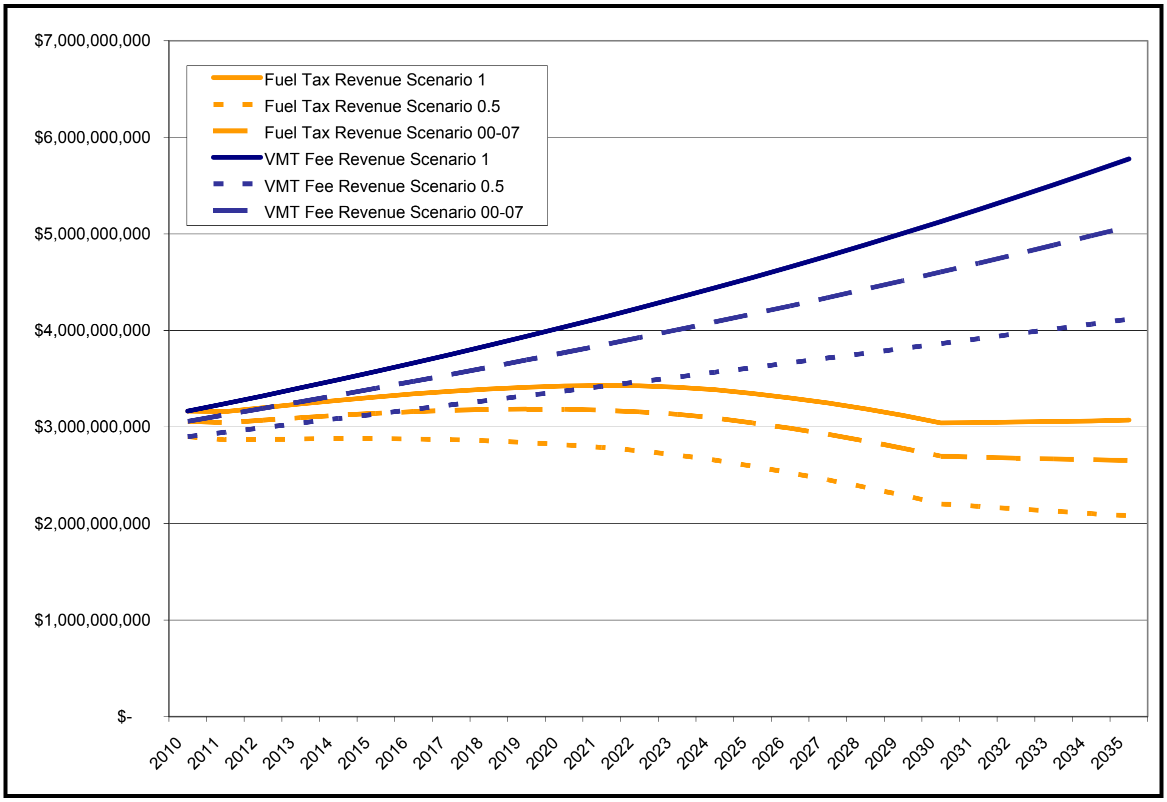

Figure 6: Flat VMT Fee Projected Revenue, 2010 through 2035

As can be seen in the figure, VMT related revenues could be expected to increase throughout the 2010 through 2035 time period, while fuel tax revenues are expected to decline beginning around 2019 to 2021, depending on the population projection.

Total revenue for the years 2010 through 2035 is shown in Figure 7. Due in large part to the continued increase in vehicle fuel efficiencies through 2035, it is expected that a VMT-based revenue mechanism will generate an average 33 percent more in revenue over the fuel tax through 2035.

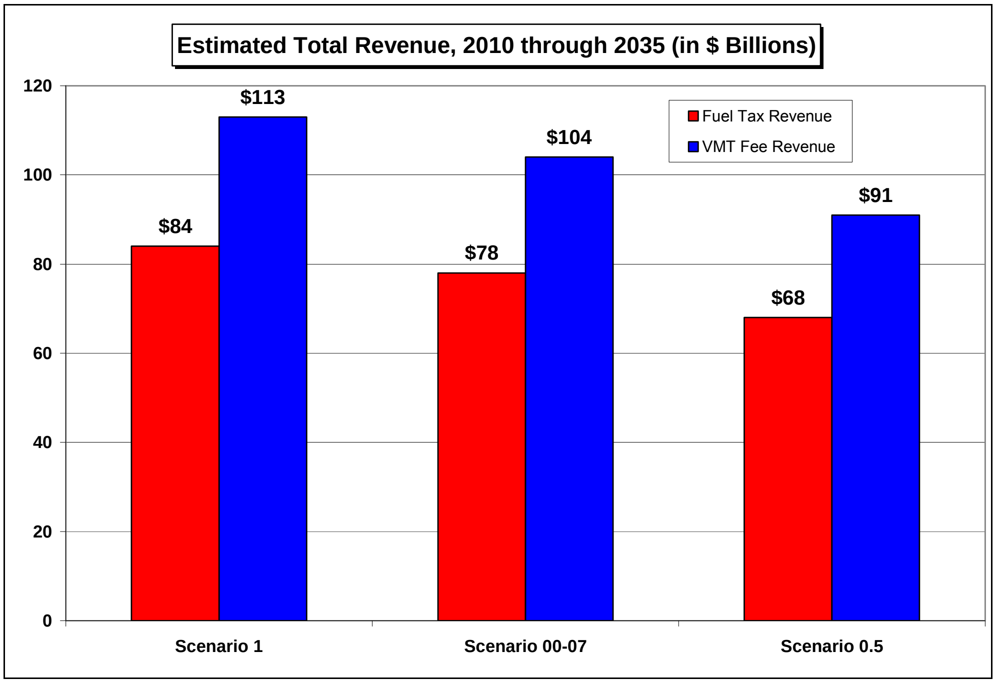

Figure 7: Total Projected Revenue for a Flat VMT Fee and the Fuel Tax

As was previously noted, these figures represent gross revenue and do not reflect the funds that TxDOT is likely to receive. Figure 8 shows the revenue that could be expected for transportation projects (after deductions) and revenue available for education under Scenario 00-07 for the fuel tax versus a VMT-based fee for the years 2010 through 2035.

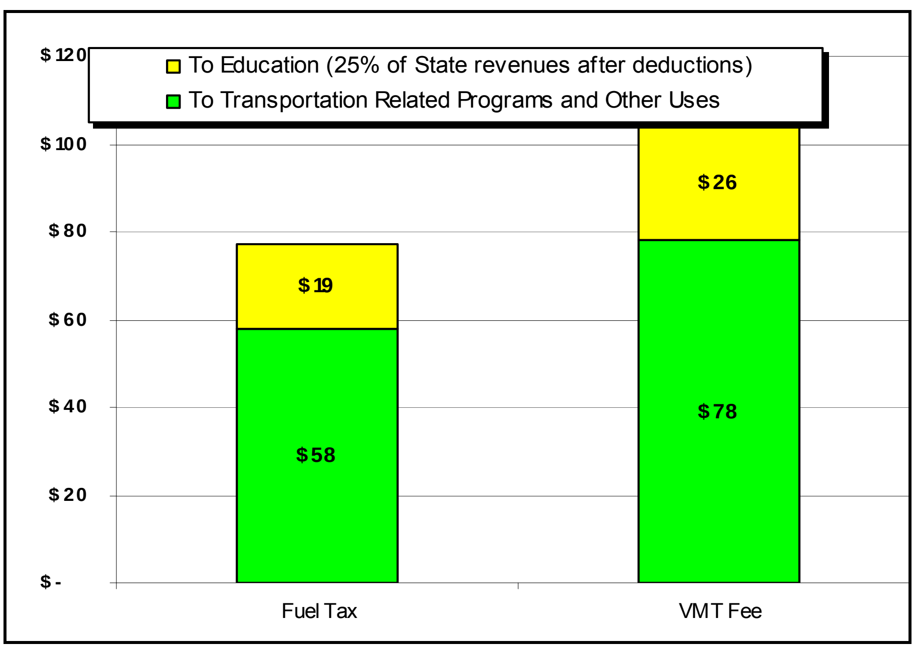

Figure 8: Flat VMT Fee Revenue Allocation (Scenario 00-07)

TIERED VMT FEE REVENUE PROJECTIONS

Unlike the current fuel tax system, which applies the same diesel rate to heavy commercial vehicles as personal diesel driven vehicles, a mileage fee system could be implemented that would charge different rates to heavy and personal vehicles. For this next analysis a different breakeven fee was applied to the miles driven by commercial vehicles and personal vehicles. In other words, the fee applied to heavy commercial VMT will generate the same revenues as the state diesel tax, and the fee applied to personal VMT will generate the same revenue as the state gasoline tax.

However, for this analysis it is assumed that 97 percent of the diesel fuel consumed in the state is consumed by heavy, commercial vehicles. It is also assumed that the fuel efficiency of non-commercial (or personal) diesel burning vehicles is comparable to gasoline burning personal vehicles. In this analysis non-commercial diesel vehicles will be taxed at the personal vehicle (gasoline) mileage rate.

Figure 9 shows revenue projections for both the fuel tax and the combined commercial and personal VMT fee under the three population scenarios. As with the flat VMT fee, tiered VMT fee revenues would be expected to increase through 2035 as fuel tax revenues begin to decline around 2019.

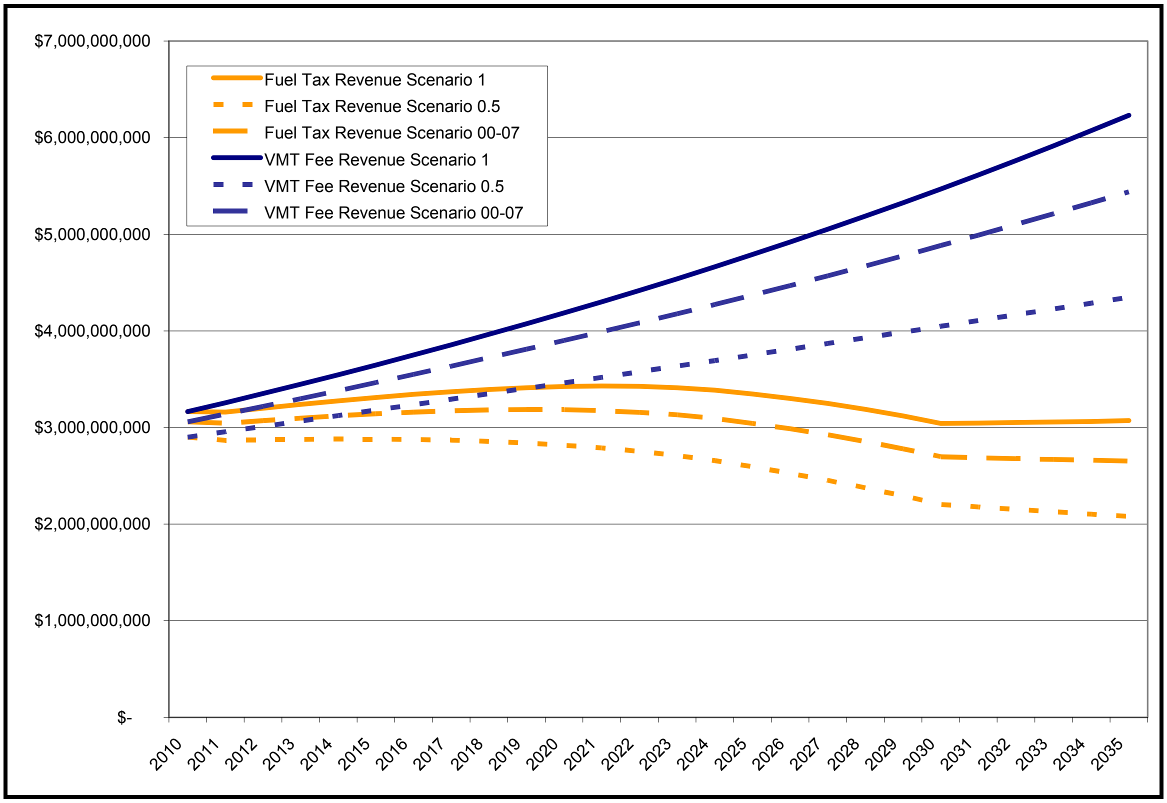

Figure 9: Tiered VMT Fee Projected Revenue, 2010 through 2035

Figure 10 shows the total revenues that could be expected under each of the three population growth scenarios for the fuel tax and the tiered VMT fee. These VMT fee revenues are higher than those under the flat fee configuration due to the increased fee placed on commercial VMT.

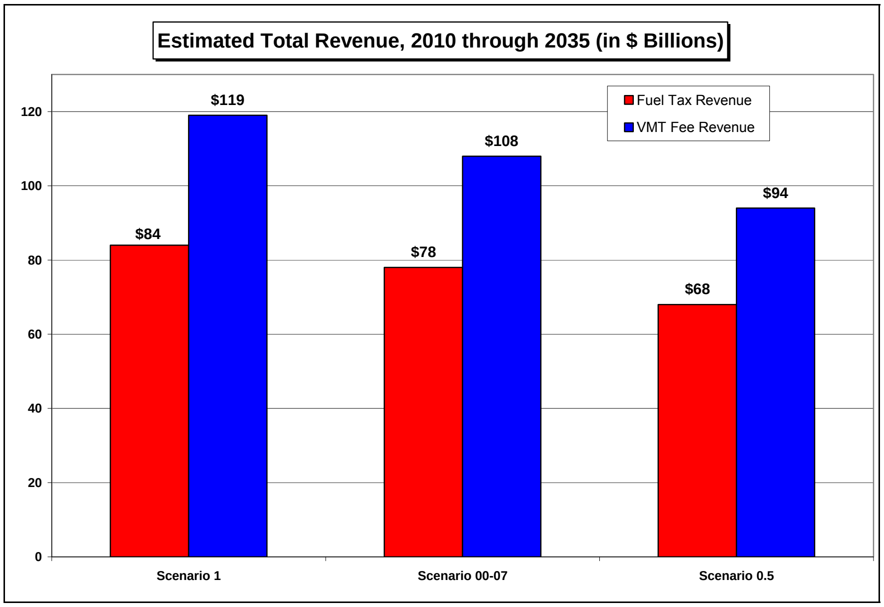

Figure 10: Total Projected Revenue for a Tiered VMT Fee and the Fuel Tax

Actual revenues allocated to transportation (and education) are shown in Figure 11. These revenues reflect existing deductions made to state fuel tax revenues.

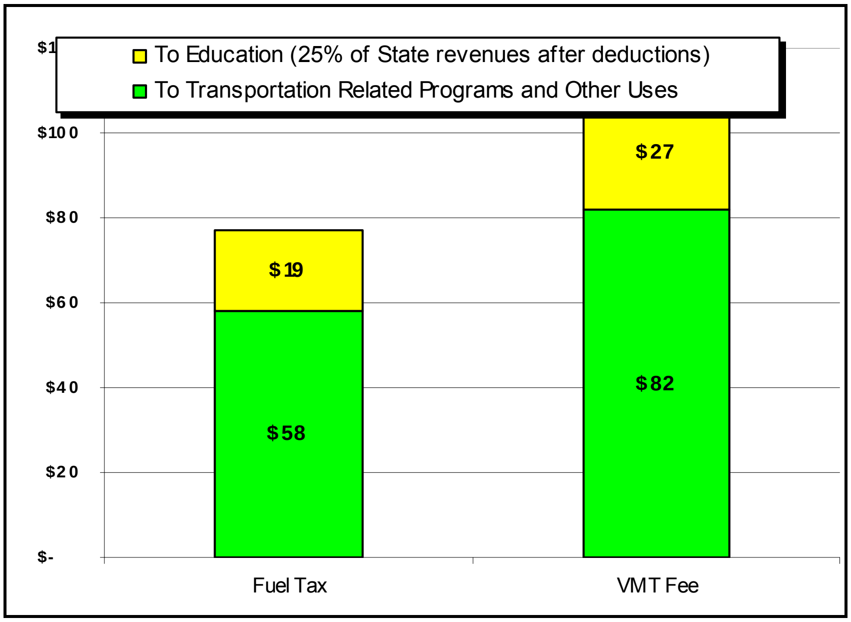

Figure 11: Tiered VMT Fee Revenue Allocation (Scenario 00-07)

MICRO-ANALYSIS

TTI researchers also conducted a simple analysis to evaluate how a VMT fee might affect individual users. In particular, researchers focused on the effect of such fees on the owners of vehicles with high fuel efficiencies versus the owners of vehicles with more standard fuel efficiencies.

Researchers compared the various costs of ownership of a 2008 Toyota Prius, one of the most popular hybrid vehicles on the road today, to the same costs for a 2008 Ford Taurus, a popular American sedan.

All data regarding vehicle ownership costs was obtained from Edmunds.com.

ASSUMPTIONS

For this analysis it was assumed that each vehicle would travel 15,000 per year. Total mileage was split 55 percent city driving and 45 percent highway driving. Fuel efficiencies for each vehicle were obtained from the Environmental Protection Agency and were as follows:

- 2008 Ford Taurus – 18 mpg city, 28 mpg highway
- 2008 Toyota Prius – 48 mpg city, 45 mpg highway

A per-gallon price of $2.00 was used for this analysis. Unless stated explicitly, the price of fuel does not include federal and state fuel taxes.

A VMT fee of $0.0093 per mile was used in this analysis. This is the breakeven fee for personal vehicles used in the macro-analysis of the tiered VMT fee.

COST COMPARISON

As can be seen in Figure 12, a VMT fee of $0.0093 would reduce the total taxes and fees paid by the Taurus owner by around a dollar, while the Prius owner would pay upwards of almost $80 more a year.[b] It should be noted that while the Prius driver would pay more in taxes on a yearly basis, their overall cost of ownership is still much lower, as their fuel purchases would be less than half that of the Taurus driver.

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[b] Taxes and fees include state and federal fuel taxes, base sales taxes, license and registration fees, and any applicable gas guzzler taxes.

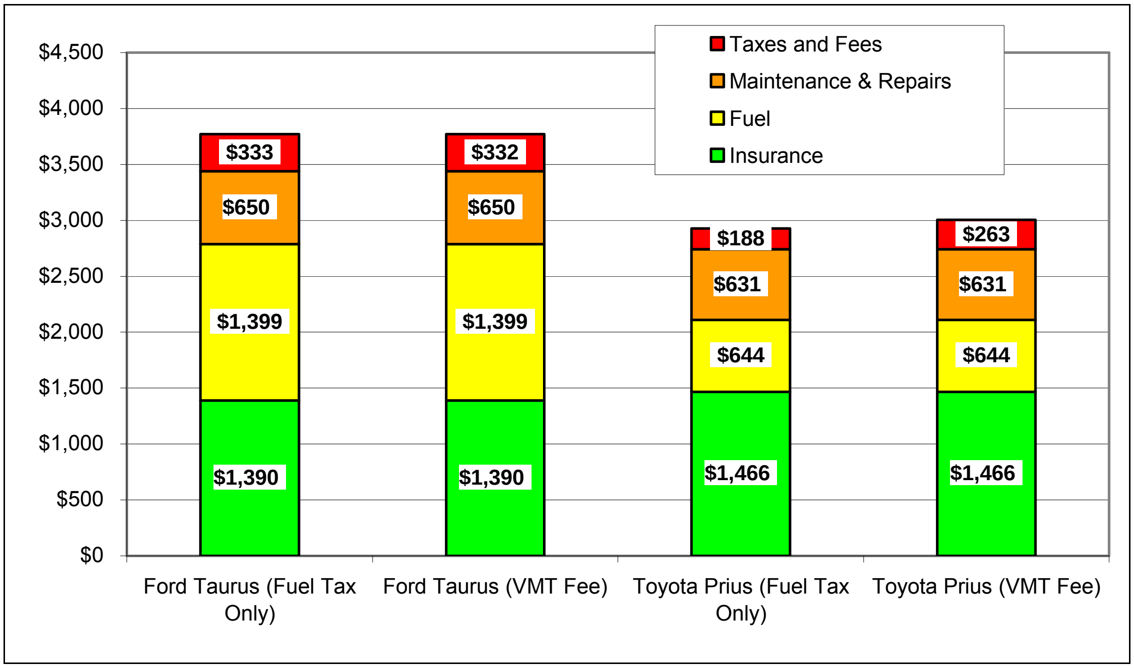

Figure 12: One Year Cost of Ownership Comparison under the Fuel Tax Versus a VMT-Based Fee

CONCLUSIONS & RECOMMENDATIONS

These revenue forecasting models have shown that the base of the two fee systems under examination, the fuel tax and a VMT-based fee, are very much facing different futures. While VMT should continue to grow along with population, fuel consumption will be depressed by increasing fuel efficiency, environmental regulations, and fuel prices, thus reducing future fuel tax revenues.

As was noted throughout this memorandum, many of the assumptions incorporated into the VMT fee revenue models discussed are simplistic and perhaps unattainable. For example, the initial year for VMT fee collection is 2010, but it is inconceivable that any sort of VMT-based fee system will be ready for implementation by the year 2010. It is also highly unlikely that any system will be able to capture all vehicles immediately upon implementation, as these models imply. It is more likely that only a small percentage of vehicles would be subject to the fee (most likely heavy trucks and hybrid/electric vehicles), and this percentage would grow at a steady rate.

It may therefore be beneficial to explore enhancements to this revenue estimation tool. The model can be adapted to incorporate any number of additional variables to analyze alternative policy scenarios without compromising compatibility with data generated through the TRENDS model. It is recommended that the following features be incorporated into future VMT fee revenue estimating efforts:

- phased implementation schedules,
- fuel tax (and VMT fee) indexing,

- electric car market penetration, and
- effect of VMT fee on travel patterns.

It is also recommended that the basic assumptions upon which this model is developed be examined over time. While it is indeed likely that population within the state will continue to increase, it is not as well known if VMT will increase at the historical rate. It is possible that the fundamental relationship between population and fuel consumption (and thus VMT) will change in the coming years. Making adjustments to these models as conditions warrant will ensure that the most accurate data as possible are provided.

A recurring criticism of VMT-based fees is that by applying a flat fee to all vehicles, regardless of fuel economy, they provide a disincentive to utilize more fuel efficient vehicles. However, this analysis has also shown that while a VMT-based fee system would raise the cost of ownership for drivers of highly fuel efficient vehicles, their year-to-year cost of ownership remains low. Fuel costs for such vehicles could be less than half of the cost of fuel for drivers of less efficient vehicles.

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APPENDIX A: DESCRIPTION OF STATE POPULATION PROJECTIONS

http://txsdc.utsa.edu/tpepp/2008projections/2008_txpopprj_method.php

The 1990-2000 Migration Scenario (Scenario 1)

Scenario 1 assumes that the growth trends of the 1990s (in terms of age, sex, and migration rates of various races and ethnicities) will continue into the future. The 1990s was a period of rapid growth, and thus Scenario 1 is considered high growth. It is believed by the Office of the State Demographer that these growth rates are unsustainable in the long term.

The One-Half 1990-2000 Migration Scenario (Scenario 0.5)

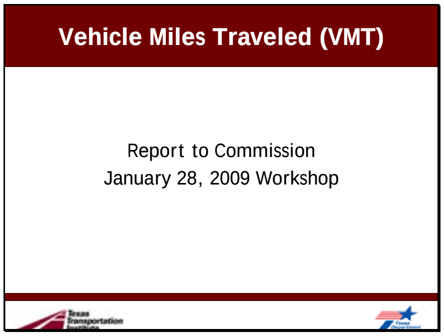
Scenario 0.5 is an approximate average of the State Demographer's Zero Migration Scenario (which assumes that immigration and outmigration rates will be equal) and Scenario 1. It assumes that net migration rates in the future will be one-half of those of the 1990s.

The 2000-2007 Migration Scenario (Scenario 00-07)

Scenario 00-07 takes into account various population trends that have occurred after the 2000 census. The state overall has experienced a reduction in levels of net migration, while a few counties have seen increased net migration rates over those experienced in the 1990s. Scenario 00-07 assumes that these post-2000 migration rates will prevail through 2040.

PRESENTATION: REPORT TO COMMISSION
JANUARY 28, 2009

Slide 1



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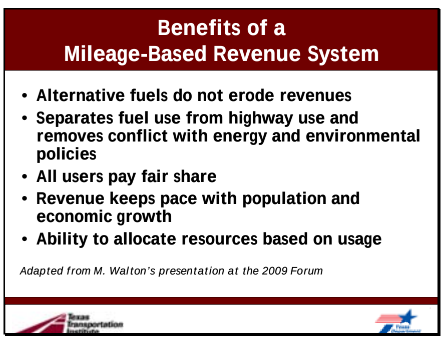
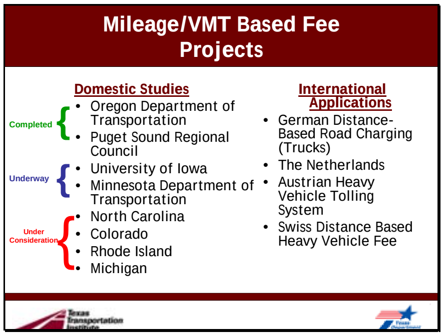


Supported by the TRB Committee for the Study of the Long-Term Viability of Fuel Taxes for Transportation Finance. Their report, issued in 2006, is entitled "The Fuel Tax and Alternatives for Transportation Funding."
2 national commissions looking into transportation policy and funding, AASHTO, several states

Slide 3



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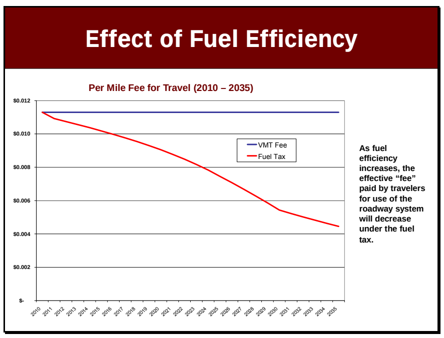
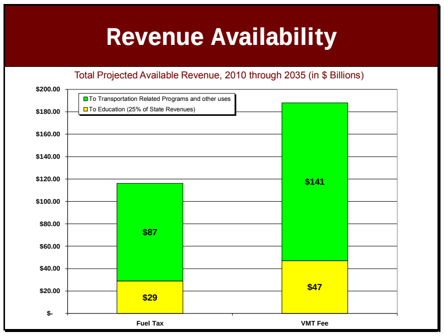


The breakeven fee used here is $0.0113 per mile. This is the fee that would be needed to generate the same GROSS revenues in 2010 as the fuel tax. (In other calculations we have used a smaller breakeven fee, because we are only trying to generate enough revenue to cover what is placed in the State Highway Fund after deductions for administration and education.)

The breakeven fee was calculated based on ALL VMT, meaning that it would be applied to miles travelled by commercial vehicles as well. So in other words, the breakeven fee used here would not vary by vehicle weight, emissions class, or anything else. It is simply a flat fee applied to <u>any and all</u> vehicle miles travelled in the state.

This chart assumes that:
1. The fuel tax is not raised at all between 2010 and 2035
2. The mileage fee is not adjusted during that time
3. Fuel efficiencies continue to increase

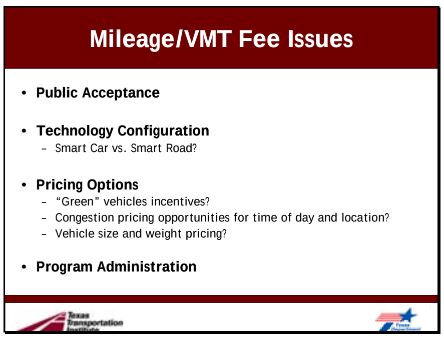
Slide 5



VMT fee revenues are based on a breakeven fee of $0.0113 per miles (used on the previous slide). And as in the previous slide, this breakeven fee is applied to ALL vehicle miles travelled (personal vehicles and commercial vehicles).

The amount available for education was calculated by taking gross revenues, subtracting 1% for administrative costs, subtracting another $7.3 for the County and Road District Maintenance Fund, and then taking 25% of what is left over after these deductions. (We are assuming that the $7.3 million deduction is not changed between 2010 and 2035.)

Slide 6



Public acceptance: more on next slide

Technology – smart car tabulates the mileage from the vehicle and transmits out, smart road uses the infrastructure to determine the mileage by the positioning of readers

Policy objectives – argument against has been that this will lessen the incentive to switch to more fuel efficient vehicles, pricing policy can continue to encourage; German includes an emissions charge on top of mileage charge that corresponds with the engine characteristics
Congestion pricing
Pricing based on size and weight of vehicle

Administration – state and federal roles, transition from tax to user fee, phased implementation

Slide 7

Public Acceptability - Research Results

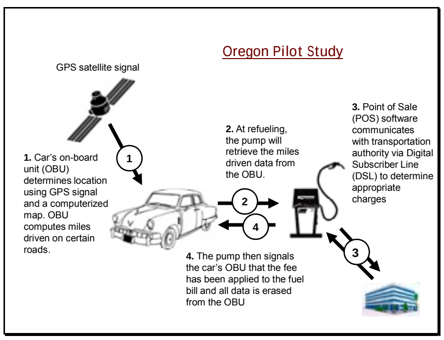
- Addresses privacy and data security concerns
- Low-cost administrative functions
- Simple and customer-friendly
- Reliable, tamper-proof and enforceable
- Charges appropriately by individual road types
- Charges appropriately by vehicle class
- Allows for local retention of revenue
- Transparent
- Demonstrates clear added value over current system

Slide 8

Activities in Texas

- Northeast Texas RMA federal grant application for pilot project
- Current TTI research in support of pilot development
  - Technology alternatives
  - Institutional issues
- National Symposium on Mileage-Based User Fees, Austin, April 14-15

Slide 9



Iowa

Yes, the field test began in October with recruitment and training of 1,200 participants. There are six sites (San Diego, Boise, Austin, Eastern Iowa, Baltimore, and the research triangle in North Carolina). The target number of participants was 200 per site. In the Austin area, we had 6,500 candidates to select the 200 (across the six sites the total was 36,650).
The installation of the on-board computers began in Nov. and concluded on Dec. 31, 2008. We are now in the data collection phase of this first round from both the on-board computers and participant questionnaires. Currently we have one set of questionnaires from the participants and in the process of acquiring the second questionnaire (there are a total of 7 questionnaires over the next 8 months (*Sept.?).* Each questionnaire inquires about the participant's acceptance, understanding, habits, and attitudes regarding driving and road fees.

TASK 2: TRADE FLOWS THROUGH THE RIO GRANDE VALLEY

Analysis of Trade Flows in the Rio Grande Valley

Juan Carlos Villa
Program Manager
Texas Transportation Institute

February 2009

Prepared for
Texas Department of Transportation

By
TEXAS TRANSPORTATION INSTITUTE
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INTRODUCTION

The objective of this project is to identify trade flows between Mexico and the United States at the lower Rio Grande Valley (RGV) land ports of entry. The analysis uses publicly available information from various sources. Publicly available information has some limitations, particularly concerning the "true" geographic location of the origin and destination of freight flows. This is due to the way the information is collected, which is through the data contained in the customs manifest. However, the analysis of this publicly available information could provide sufficient knowledge about the magnitude of trade and commodity detail. Depending on the final use of the information, the publicly available information could be complemented by shipper surveys. As directed by TxDOT, this report covers the analysis of the publicly available information.

The report is organized in four sections. The first section is the introduction, followed by a brief description of the existing transportation infrastructure in the bi-national region, including the regional roadway network and international crossings that serve freight transportation, as well as the local railroad network. The third section of the report presents a description of freight flows in the region by port of entry. The analysis includes volumes and commodity detail. The fourth and final section includes a brief summary of the conclusions that resulted from the analysis of the existing demand information and infrastructure expansion plans. The report contains four appendices with detailed trade flow statistics.

EXISTING TRANSPORTATION INFRASTRUCTURE

Texas international trade relies on the network of transportation systems within the state and its connections with the Mexican transportation network. The study area consists of the border between the state of Texas and the Mexican state of Tamaulipas. The region hosts the largest commercial land ports of entry (POEs) and is served by a highway and rail network, as well as a maritime port.

The Rio Grande Valley is located at the southernmost tip of Texas and the continental United States. This region contains four Texas counties: Starr, Hidalgo, Willacy, and Cameron. It contains three major cities: Brownsville, Harlingen, and McAllen. The region's transportation infrastructure is composed of several land ports of entry, highway and railroad networks, and a maritime port in Brownsville. Each of these components is described in the following sections.

PORTS OF ENTRY

The Rio Grande River separates the states of Tamaulipas in Mexico and Texas in the United States; therefore, all international land ports of entry in the region are bridges. Six operating bridges handle freight in the RGV. Table 1 lists these bridges, along with the border cities in the United States and Mexico, the number of lanes, and the hours of operation at each bridge. FAST lane indicates whether a special travel lane exists at the bridge for trucks enrolled in the U.S. Customs and Border Protection (CBP) Free and Secure Trade (FAST) program. The FAST program allows pre-certified shipments to use the lane and receive expedited inspection at the CBP booth.

Table 1 – Rio Grande Valley's Commercial Border Crossings

International Bridge		City		Number of Lanes			Hours of Operation		
		United States	Mexico	NB	SB	FAST	M-F	Sat.	Sun.
1	Veteran's International Bridge—Los Tomates	Brownsville	Matamoros	2	2	Yes	8-23	8-16	8-16
2	Free Trade International Bridge—Los Indios	Los Indios	Lucio Blanco	2	2	Yes	8-22	10-18	10-18
3	Weslaco-Progreso International Bridge	Progreso	Nuevo Progreso	1	1	-			
4	Pharr-Reynosa International Bridge on the Rise	Pharr	Reynosa	2	2	Yes	6-22	8-16	8-16
5	Rio Grande City-Camargo International Bridge	Rio Grande City	Camargo	1	1	-	7-24	7-17	7-17
6	Roma-Ciudad Miguel Alemán International Bridge	Roma	Ciudad Miguel Alemán	1	1	-	10-18	10-18	10-18

Source: *Cross-Border Transportation and Infrastructure Report.* TxDOT. December 2008.

HIGHWAYS

On the U.S. side of the border, the RGV is served by three major highways: US 281, US 77, and US 83.

The southern end of US 281 is located in Brownsville, extending west to McAllen, where it turns north and ends at the border with Canada. US 81 links the RGV with San Antonio and other major metropolitan areas. US 281 was converted to a freeway in Edinburg beginning in 1980, with the completion of the Edinburg bypass. This bypassed the section of former US 281 that is now known as BU 281-W. There is a short spur of US 281 in Hidalgo to serve the international border crossing.

US 77 also has its southernmost end in Brownsville at the Veteran's International Bridge. It travels north to Corpus Christi and connects the RGV with other major cities in Texas, including Waco and Dallas.

US 83 parallels the Rio Grande serving Mission, McAllen, and Harlingen, where it meets US 77 to Brownsville and the Mexican border. In 1997, US 83 was extended to the Los Tomates International Bridge Crossing and converted to a freeway in 2004.

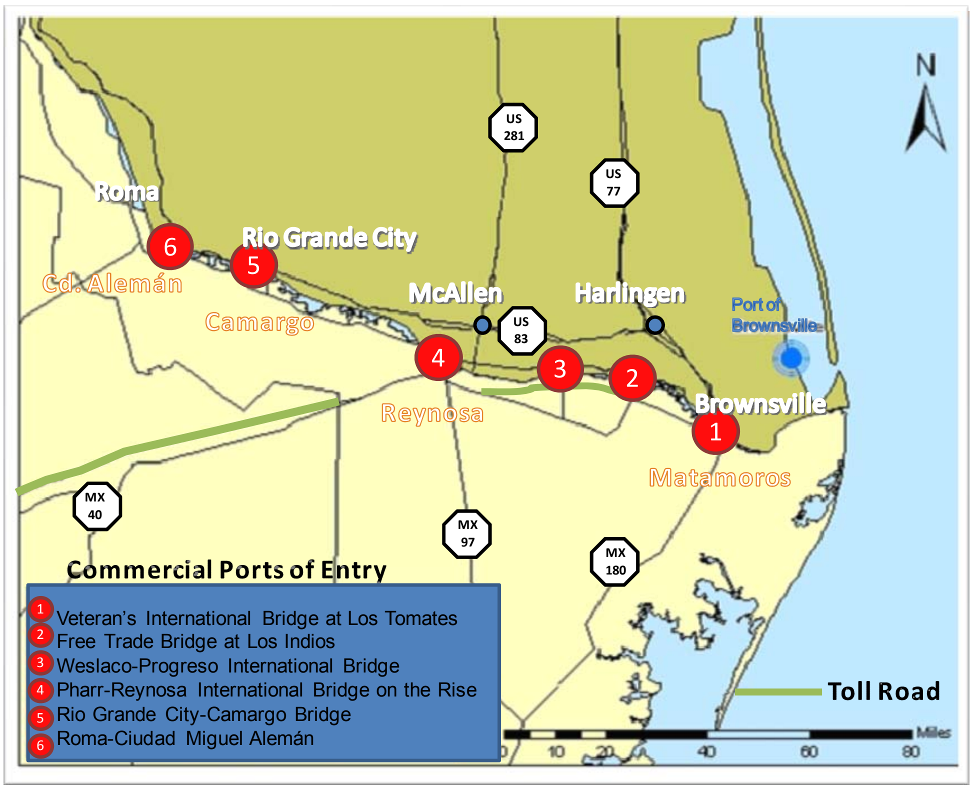
On the Mexican side of the border, there are three main highways that connect the region with the rest of the country. US 77 connects Brownsville/Matamoros with Mexican Federal

Highway 180. This road travels south parallel to the Gulf of Mexico, linking the RGV with Tampico and Altamira, a major Mexican industrial port, continuing all the way to the Yucatan Peninsula.

Mexican Federal Highway 40 links the Gulf of Mexico with the Pacific Ocean. In the region, it links the RGV with Monterrey and Saltillo, major industrial areas of Mexico. Most of the 138 miles between Reynosa and Monterrey are served by a toll road.

Mexican Federal Highway 97 travels from Reynosa to the south where it intersects with Mexican Federal Highway 180.

Figure 1 shows a map of the Rio Grande Valley area with main highways and ports of entry.



Source: Developed by the Texas Transportation Institute.

Figure 1 – Rio Grande Valley Highway Network and Ports of Entry

RAIL TRANSPORTATION SERVICE

The Rio Grande Valley area is served by one major Mexican railroad, two Class I U.S. railroads, and a short line railroad. On the U.S. side of the border, the Union Pacific Railroad (UP) has access to Brownsville, McAllen, and Harlingen. UP connects to other major metropolitan areas in Texas such as Houston, San Antonio, and Dallas, and with the Mexican railroad Kansas City Southern de México (KCSM) to the south. Burlington Northern Santa Fe (BNSF) has a haulage agreement with UP in which UP hauls BNSF's traffic from Houston to Brownsville. Traffic is interchanged with KCSM via an intermediate switch with UP at the Brownsville and Matamoros

International Bridge. The KCSM line travels from Matamoros to Monterrey, where KCSM's operations headquarters are located.

The Brownsville and Rio Grande International Railroad (BRGRR) is a short line railroad that offers rail transportation to all facilities located within the Brownsville Navigation District. The BRGRR operates on behalf of the Brownsville Navigation District and has interchange connections with the UP and BNSF railroads.

MARITIME PORTS

The Rio Grande Valley has one major maritime port. The Port of Brownsville is the southernmost port in Texas at the western end of the Gulf Intracoastal Waterway System. The port is connected to the Gulf of Mexico by a 17-mile long ship channel, and is located 3 miles north of the Mexican border, 5 miles east of the city of Brownsville, and 7 miles from the rail and highway border crossing.

The Brownsville Navigation District owns the waterfront facilities on the Brownsville Ship Channel, the main harbor, and the fishing harbor. All deepwater facilities in the main harbor are public facilities. The Port of Brownsville has 10 deep-sea dry docks, four deep-sea liquid cargo docks, two liquid cargo barge docks, and one dry cargo barge dock. The port contains 444,000 square feet of transit shed space and 450,000 square feet of dockside aprons. The Port of Brownsville has connections to five different transportation modes that include ocean vessels, truck and rail service, barge service, and air service.

PLANNED TRANSPORTATION INFRASTRUCTURE IN THE REGION

INTERNATIONAL CROSSINGS

There are several transportation infrastructure expansion projects in the region. The Anzalduas International Bridge will be located 3 miles up the Rio Grande River from the Hidalgo-Reynosa Bridge and will connect Mission with the western outskirts of Reynosa. This international bridge is not intended for commercial vehicles, and it will consist of two southbound and northbound lanes as well as a pedestrian crossing. Construction on this bridge started in December 2006, and the bridge is set to open in 2009. The Donna-Rio Bravo International Bridge started construction in late 2008 and is expected to start operation in March 2010. This bridge is also not planned for commercial vehicles.

Additionally, the Mexican government has expressed interest in building a new rail crossing in Brownsville. As part of the Mexican Northeast Infrastructure Package that is being privatized by the Ministry of Transportation and Communication (SCT), a new international rail crossing in Brownsville will substitute for the existing bridge. No specific plans for this project have been released.

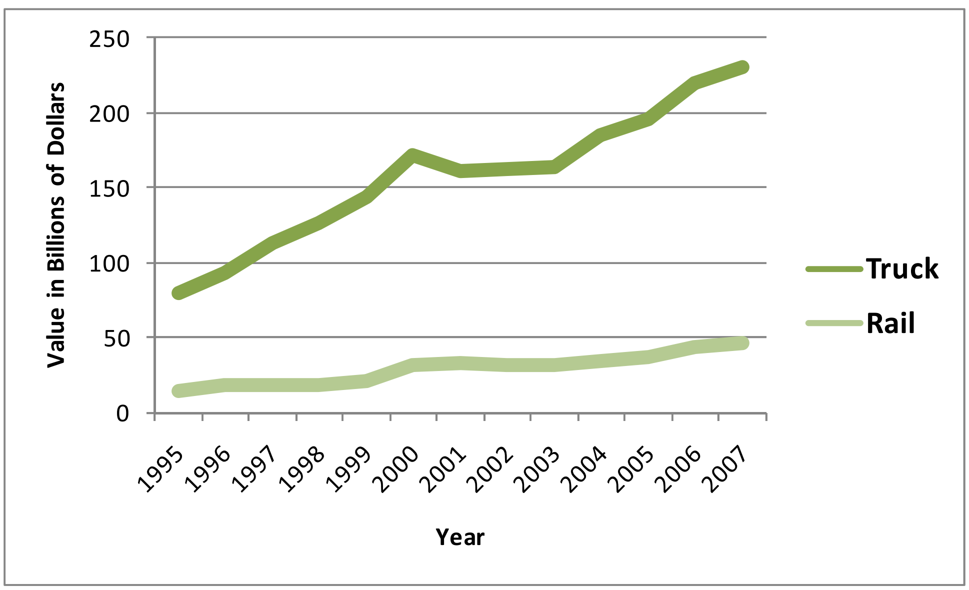
HIGHWAYS

The Mexican side of the border in the region is also part of the Mexican North East Infrastructure Package. The proposed concession includes the operation of existing roadways as well as the development of new ones. The existing infrastructure in the region includes the Reynosa-Matamoros toll road and three international bridges: Pharr-Reynosa, Los Tomates, and the Brownsville Matamoros Bridge (B&M). Infrastructure that the winner concessionaire would need to build in the region includes a 23-mile highway bypass in Reynosa, a 6-mile rail bypass in Matamoros, and improvements to the Los Tomates Bridge and Donna-Rio Bravo access roads.

On the U.S. side of the border, even though the Trans-Texas Corridor has changed from the original concept, the I-69 corridor environmental studies will continue in this region. These efforts will establish study areas for future multimodal projects that may be needed in this area.[1]

REGIONAL TRADE FLOWS

U.S.-Mexico trade by truck grew almost three times between 1995 and 2007, from $80 billion in 1995 to $230 billion in 2007. Trade between the two countries by rail grew at a higher rate than truck, from $13.8 billion in 1995 to $46 billion in 2007, equivalent to 10.6 percent per year on average (Figure 2).

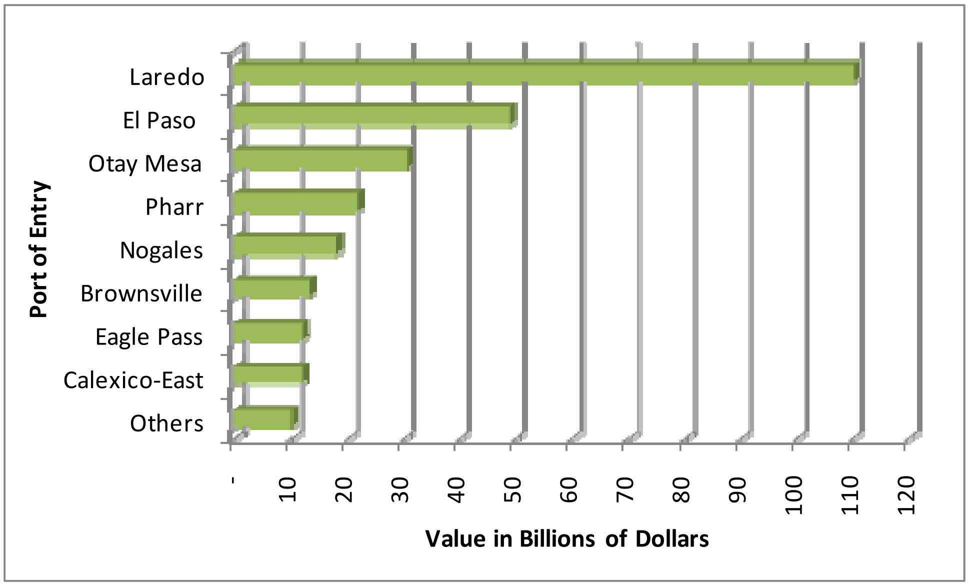


Source: Transborder Freight Data. U.S. Department of Transportation, Research and Innovative Technology Administration, Bureau of Transportation Statistics.

Figure 2 – Evolution of the U.S.–Mexico Border Trade by Value

[1] Keep Texas Moving, Texas Corridors. http://www.keeptexasmoving.com/index.php/texas_corridors.

Land trade between Mexico and the United States is concentrated heavily at a limited number of ports of entry. Laredo, El Paso, Otay Mesa, and Pharr/McAllen handle close to three quarters of the total trade by truck and rail between the two countries. Laredo is by far the largest port of entry with 38 percent of the total trade (Figure 3).

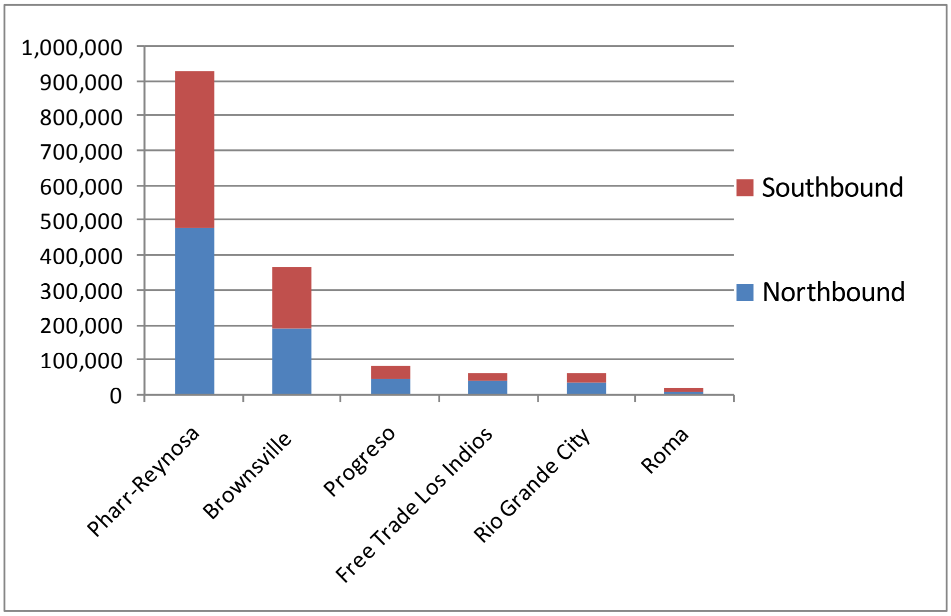


Source: Transborder Freight Data. U.S. Department of Transportation, Research and Innovative Technology Administration, Bureau of Transportation Statistics.

Figure 3 – 2007 Value of U.S.–Mexico Trade by Port of Entry

TRUCK CROSSINGS

The six commercial ports of entry in the region managed more than 1.5 million trucks in 2008 in both directions. The Pharr-Reynosa International Bridge handled more than 900,000 trucks in both directions, or 62 percent of the total in the region, followed by the Veteran's Bridge in Brownsville that handled 360,00 trucks in both directions. These two crossings accounted for more than 85 percent of the total truck crossings in the region (Figure 4).



Source: Texas A&M International University, Texas Center for Border Economic and Enterprise Development.

Figure 4 – Truck Crossings in the Region

COMMODITY FLOWS

There are two publicly available sources of information that provide international commodity flow information: the Bureau of Transportation Statistics (BTS) in the U.S. Department of Transportation's Research and Innovative Technology Administration, and the Texas Center for Border Economic and Enterprise Development (TCBEED) at Texas A&M International University.

The BTS database provides U.S.-Mexico trade information with a commodity breakdown, disaggregated by port of entry and transportation mode. However, there are some limitations to the BTS database. Some that are worth mentioning include:

- The origin and destination information could not match the true location of the trip beginning or end because the source of the data is the customs manifest. Depending on the terms of sale and logistics operations of each shipper, the point of origin in the database could be the point where the merchandize was registered to cross the border or the address of the customs broker and not the true origin.
- Port of entry aggregation does not provide details on the actual international bridge. The information collected from BTS is grouped by customs district, so for the RGV there are only two ports of entry registered in the database—Hidalgo and Brownsville.
- The state of origin in Mexico for imports into the United States is not available. The raw data that are utilized to create the BTS Transborder database do not provide information about the origin state in Mexico in combination with the port of entry.
- The BTS database does not provide commodity detail in combination with port of entry.

The TCBEED database provides information of U.S.-Mexico trade value with commodity breakdown by port of entry. The information includes the 25 highest-value traded products crossing into/out of the U.S. southern border states and does not include a breakdown by mode of transport. Some of the commodities shown in this database are clearly not crossing the border by truck or rail.

Based on the attributes of these two sources of information, the BTS Transborder database was used to analyze origin and destination by ports of entry in the region, and the TCBEED information was used to analyze commodity breakdown by port of entry. The BTS information corresponds to 2007 figures, while the TCBEED information has 2008 information.

Origin/Destination

U.S. Exports

According to the BTS information, in 2007 the United States exported $15.8 billion to Mexico through the land ports of entry at the RGV by truck. The top five state origin/destination pairs represent 80 percent of the total exports through the RGV (Table 2).

The states of Texas and Tamaulipas seem to be the largest trading partners in the region. However, as mentioned earlier, these values could not reflect the ultimate origin and destination of the merchandize. The state of Mexico and the Federal District (DF) that make up the Mexico City metropolitan area are the top destinations for U.S. exports through the RGV by truck after Tamaulipas. The state of Nuevo Leon is also in the top five, with Monterrey's industrial sector as the main attractor of U.S. goods. The state of Chihuahua appears to have trade coming from Texas. However, as mentioned earlier, this does not seem to be logical and could be explained as a coding issue.

After Texas, the state of Florida is the second largest point of origin for goods exported to Mexico through the RGV ports of entry. Exports from Florida go mainly to Tamaulipas. The rest of the U.S. states have a very small proportion of trade through the RGV. Detailed U.S. export origin-destination information by port of entry is located in Appendix A.

Table 2 – Value of U.S. Exports to Mexico by Truck through the Rio Grande Valley with State Detail

State of Origin	State of Destination					Total (Millions)
	Tamaulipas	Estado Mexico	Chihuahua	DF	Nuevo Leon	
Texas	6,862	1,010	1,463	1,002	702	11,039
Florida	983	27	0	3	4	1,017
Michigan	194	19	0	24	24	261
Maryland	201	1	0	1	2	205
Georgia	6	130	0	2	4	142
Total	8,247	1,188	1,463	1,031	736	12,664

Values are in $ millions.

Source: Transborder Freight Data. U.S. Department of Transportation, Research and Innovative Technology Administration, Bureau of Transportation Statistics.

U.S. exports to Mexico by rail through Brownsville were approximately $1 billion in 2007. Five origin/destination pairs make up 70 percent of this total trade. Texas is the main origin of goods, while the state of Mexico is the main destination. The Federal District is the second state of destination in Mexico. Other states in the United States have very low participation in the rail trade (Table 3).

Table 3 – Value of U.S. Exports to Mexico by Rail through Brownsville with State Detail

State of Origin	State of Destination					Total (Millions)
	Estado de Mexico	Nuevo Leon	DF	Tamaulipas	San Luis Potosi	
Texas	155	64	105	50	3	378
Nebraska	0	113	1	-	-	115
Michigan	35	-	73	0	0	109
Washington	50	-	9	-	-	59
Pennsylvania	1	0	-	2	46	50
Total	241	178	188	53	50	710

Values are in $ millions.

Source: Transborder Freight Data. U.S. Department of Transportation, Research and Innovative Technology Administration, Bureau of Transportation Statistics.

U.S. Imports

The BTS information does not provide information on the state of origin in Mexico by port of entry. However, it provides value and weight for commodities imported into the United States. In 2007, approximately $18 billion and 5.4 million tons of goods were imported by truck through ports of entry at the RGV. Five states in the United States accounted for close to 70 percent of the total value and more than 80 percent of the tonnage of imports by truck in the region. The state of Texas imported more than 50 percent of the total value and 70 percent of the total tonnage (Table 4). Other states with much lower participation included Ohio, Maryland, California, and Georgia. Appendix B presents detailed value and tonnage imports by port of entry.

Table 4 – Value and Weight of U.S. Imports from Mexico by Truck through the Rio Grande Valley with State Detail

State of Destination	Value ($ Millions)	State of Destination	Weight (Metric Tons)
Texas	$9,676.36	Texas	3,888,064
Ohio	$750.83	California	201,725
Maryland	$701.03	Ohio	143,485
California	$636.18	Tennessee	120,412
Georgia	$564.16	Missouri	117,615

Source: Transborder Freight Data. U.S. Department of Transportation, Research and Innovative Technology Administration, Bureau of Transportation Statistics.

U.S. imports through Brownsville by rail in 2007 accounted for $255 million and 300,000 tons. According to the BTS statistics, 40 percent of the total rail movement by value and 50 percent by weight terminated in Texas. Other states where Mexican rail shipments crossing via Brownsville terminated include Pennsylvania, New Jersey, and Illinois (Table 5).

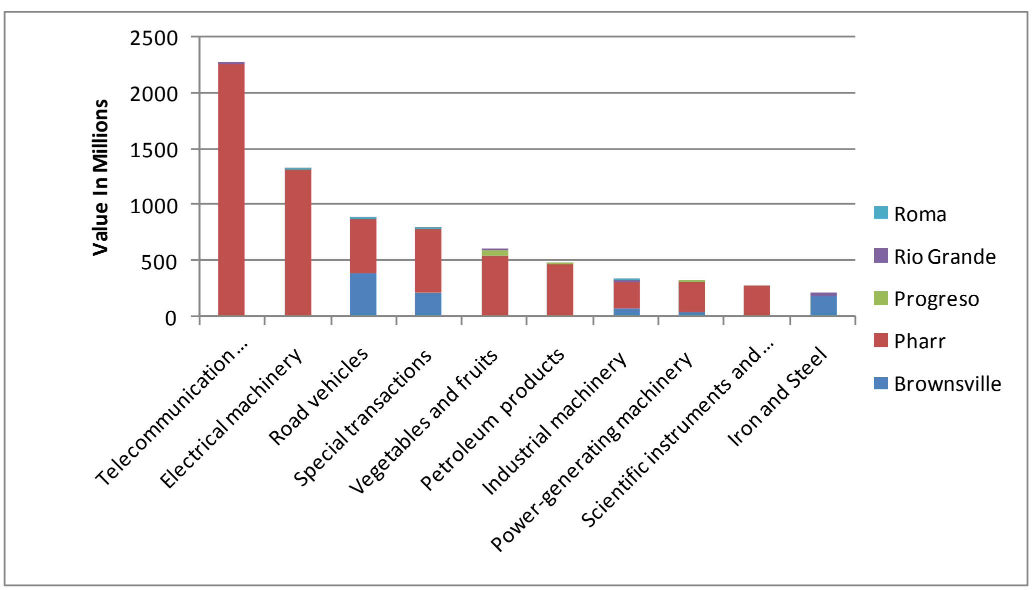
Table 5 – Value and Weight of U.S. Imports from Mexico by Rail through Brownsville with State Detail

State of Destination	Value ($ Millions)	State of Destination	Weight (Metric Tons)
Texas	$106.48	Texas	177,048
Pennsylvania	$45.18	Pennsylvania	48,510
Illinois	$18.95	Illinois	36,841
New Jersey	$17.83	New York	21,610
Alabama	$13.61	Louisiana	18,715

Source: Transborder Freight Data. U.S. Department of Transportation, Research and Innovative Technology Administration, Bureau of Transportation Statistics.

Commodity Detail

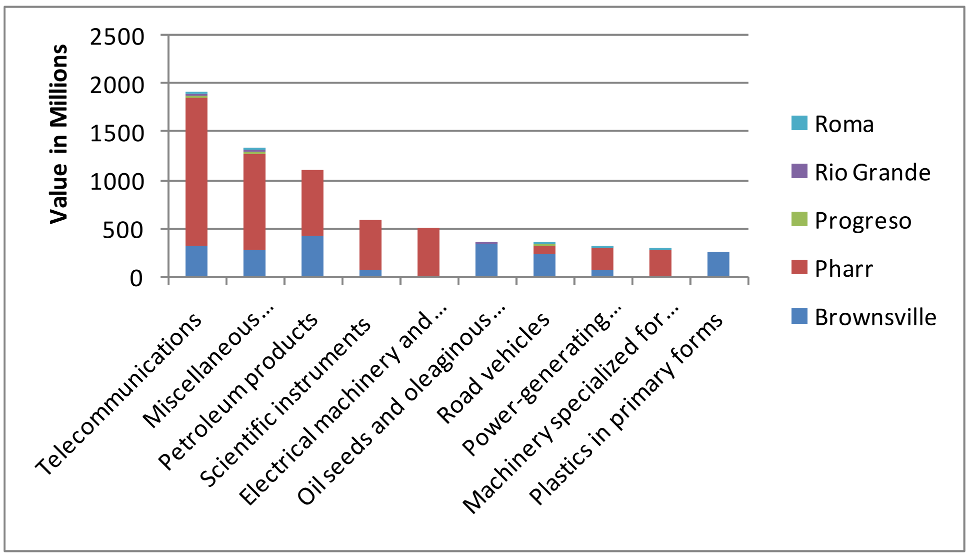
The top 10 U.S. imports from Mexico by commodity through the RGV ports of entry by truck and rail are presented in Figure 5. Telecommunications equipment and electrical machinery and appliances represent 40 percent of the total imports. The large majority of these two commodities cross into the United States through the Pharr-Reynosa International Bridge. The third largest volume of imports in the region is finished vehicles that cross into the United States through Brownsville and Pharr. Vegetables and fruits also crossed via Pharr and Progreso. Appendix C presents the top 25 commodities imports in the region, and Appendix D presents the top 25 commodities imported through each of the five ports of entry in the region.



Source: Texas Center for Border Economic and Enterprise Development.

Figure 5 – Value of U.S. Imports from Mexico by Commodity (RGV Region)

The composition of exports to Mexico through the RGV ports of entry is slightly different than the imports (Figure 6). The top commodity of export is telecommunications equipment, similar to imports. This is due to intercompany trade in the region for maquiladora industry, which specializes in this area of manufacturing. After miscellaneous products that are not classified, the third largest commodity of export through the region is petroleum products, which cross into Mexico through Brownsville and Pharr in a combination of truck and rail movements. Electrical machinery crosses mainly through the Pharr-Reynosa Bridge, followed by oil seeds that cross through Brownsville. It is expected that these commodities cross by rail. Appendix C presents the complete export dataset with the top 25 commodities by port of entry, and Appendix D presents the top 25 commodities exported through each of the five ports of entry in the region.



Source: Texas Center for Border Economic and Enterprise Development.

Figure 6 – Value of U.S. Exports to Mexico by Commodity (RGV Region)

CONCLUSIONS

International trade in the region is dominated by electronic equipment and electrical machinery and parts. The large concentration of maquiladora industry in the region has attracted this industry sector that includes production of telephone sets, video games, appliances, etc. According to the regional maquiladora association, there are more than 200 maquiladora plants in the region employing more than 1 million people. Most of the parts and finished goods travel by truck; some that are required for a just-in-time manufacturing environment are transported by air when needed. This type of product is usually intercompany shipments that require extensive logistical coordination and warehouses for final distribution close to or at the border.

The information shows that most of the international trade in the region is between Texas and Tamaulipas. As mentioned earlier, this could be misleading due to the way the information is recorded. However, even with these information limitations, other geographic information included in the BTS database provides good information on flows to and from the United States through the region. Florida and Michigan represent important trade partners. Michigan is a large automobile parts producer and receiver.

Rail movements in the region are mainly grain and finished vehicles. Grain is exported to Mexico via Brownsville, and automobiles move in both directions. Automobile parts are also moved by rail in containers or special racks.

Even though two crossings—Pharr and Brownsville—concentrate 60 percent of the total truck movements in the region, shippers and carriers have several alternative crossings to choose from. This is unique to this border region. The development of planned border crossing infrastructure will provide additional capacity, reducing congestion.

This additional border crossing capacity, in conjunction with plans from the Mexican government to improve the roadway capacity in northeast Mexico, will provide an alternative to shippers and receivers in the industrial area of Monterrey and Saltillo to ship through the RGV ports of entry, particularly for shipments to and from the U.S. East Coast.

APPENDIX A

Value of U.S. Exports with Origin-Destination Detail by Port of Entry

BROWNSVILLE—TRUCK						
	State of Destination					
State of Origin	Tamaulipas	Chihuahua	Estado de Mexico	Distrito Federal	Nuevo Leon	Value (Millions)
Texas	1,926	1,349	481	475	270	4,501
Michigan	164	0	18	23	5	210
Ohio	30	-	59	20	7	116
Pennsylvania	45	0	30	6	16	97
New York	17	0	9	39	9	73
Total	2,182	1,349	597	563	307	4,998

HIDALGO—TRUCK						
	State of Destination					
State of Origin	Tamaulipas	Estado de Mexico	Distrito Federal	Nuevo Leon	Tabasco	Value (Millions)
Texas	4,776	525	475	233	111	6,121
Florida	978	0	1	2	1	982
Maryland	193	-	-	0	-	193
Wisconsin	135	1	0	9	0	145
Georgia	4	122	0	0	0	127
Total	6,085	649	476	244	113	7,567

PROGRESO—TRUCK						
	State of Destination					
State of Origin	Nuevo Leon	Tamaulipas	Distrito Federal	Jalisco	Queretaro	Value (Millions)
Texas	75	70	26	18	19	209
California	0	1	2	1	-	4
Alabama	-	0	-	-	-	0
Michigan	-	-	-	0	-	0
U.S. State Unknown	0	0	1	0	-	1
Total	76	71	29	19	19	214

RIO GRANDE CITY—TRUCK						
	State of Destination					
State of Origin	Tamaulipas	Nuevo Leon	Distrito Federal	Jalisco	Tabasco	Value (Millions)
Texas	77	41	21	13	4	155
California	0	0	7	2	-	9
Illinois	0	3	0	0	0	3
Louisiana	0	-	-	-	2	2
Wisconsin	-	0	-	0	-	0
Total	77	44	28	15	6	170

ROMA—TRUCK						
State of Destination						
State of Origin	Nuevo Leon	Tamaulipas	Jalisco	Distrito Federal	Estado de Mexico	Value (Millions)
Texas	82	14	7	5	2	109
California	3	2	1	1	0	7
New York	5	0	-	-	0	5
Nebraska	2	1	0	0	1	4
Illinois	3	0	0	0	0	3
Total	95	17	7	6	3	129

BROWNSVILLE—RAIL						
State of Destination						
State of Origin	Estado de Mexico	Nuevo Leon	Distrito Federal	Tamaulipas	San Luis Potosi	Value (Millions)
Texas	155	64	105	50	3	378
Nebraska	0	113	1	-	-	115
Michigan	35	-	73	0	0	109
Washington	50	-	9	-	-	59
Pennsylvania	1	0	-	2	46	50
Total	241	178	188	53	50	710

Source: Transborder Freight Data. U.S. Department of Transportation, Research and Innovative Technology Administration, Bureau of Transportation Statistics.

APPENDIX B

Import Value and Tonnage by Port of Entry

BROWNSVILLE			
State of Destination	Value ($ Millions)	State of Destination	Weight (Metric Tons)
Texas	$3,099.80	Texas	681,295
South Carolina	$446.13	Tennessee	76,127
Tennessee	$258.57	Illinois	50,961
Michigan	$181.76	Michigan	36,090
Illinois	$173.87	Ohio	31,800
Total	$4,160.12	Total	876,273
HIDALGO			
State of Destination	Value ($ Millions)	State of Destination	Weight (Metric Tons)
Texas	$6,390.92	Texas	2,876,358
Maryland	$643.59	California	180,896
Ohio	$620.15	Missouri	116,330
California	$569.32	Ohio	105,481
Indiana	$472.28	Wisconsin	91,848
Total	$8,696.26	Total	3,370,913
PROGRESO			
State of Destination	Value ($ Millions)	State of Destination	Weight (Metric Tons)
Texas	$31.03	Texas	100,360
Kentucky	$16.64	Kentucky	9,886
Washington	$5.79	Florida	5,168
Florida	$1.30	California	3,268
California	$0.79	New York	798
Total	$55.54	Total	119,480
RIO GRANDE CITY			
State of Destination	Value ($ Millions)	State of Destination	Weight (Metric Tons)
Texas	$144.14	Texas	227,014
Georgia	$6.14	Georgia	31,229
Oklahoma	$5.22	Oklahoma	25,793
Ohio	$1.37	Ohio	6,204
Oregon	$1.13	Oregon	4,951
Total	$157.99	Total	295,191
ROMA			
State of Destination	Value ($ Millions)	State of Destination	Weight (Metric Tons)
Texas	$10.48	Texas	3,037
Indiana	$0.99	Indiana	70
Idaho	$0.03	Idaho	52
North Carolina	$0.02	North Carolina	2
New Mexico	$0.00	New Mexico	0
Total	$11.52	Total	3,161

Source: Transborder Freight Data. U.S. Department of Transportation, Research and Innovative Technology Administration, Bureau of Transportation Statistics.

APPENDIX C

Value of Top 25 Commodity Exports by Port of Entry in the Rio Grande Valley

Commodity	Pharr	Brownsville	Progreso	Rio Grande	Roma	Grand Total
Telecommunications equipment	1,567,325,843	303,019,907	6,384,700	17,538,738	14,060,344	1,908,329,532
Miscellaneous manufactured articles	1,004,927,571	272,393,339	9,778,139	36,388,521	15,282,615	1,338,770,185
Petroleum products and related materials	692,884,368	418,849,957				1,111,734,325
Professional instruments	506,273,007	71,409,910				577,682,917
Electrical machinery and appliances	493,286,183					493,286,183
Oil-Seeds and Oleaginous Fruits		332,008,502	26,059,124	3,828,089		361,895,715
Finished Vehicles	100,630,967	230,711,658	1,346,542		17,643,575	350,332,742
Power-generating machinery and equipment	246,610,332	68,480,411			3,066,177	318,156,920
Machinery specialized for particular industries	281,528,086				12,493,895	294,021,981
Plastics in Primary Forms		250,986,466				250,986,466
General Industrial Machinery and Equipment	167,602,502	76,205,188				243,807,690
Office machines and automatic data-processing machines	192,123,346					192,123,346
Manufactures of Metals	93,334,977	94,148,263				187,483,240
Textile Fibres	77,584,594	76,345,432	17,631,155	15,633,792		187,194,973
Electrical Machinery, apparatus and appliances		183,098,237				183,098,237
Cereals and cereal preparations			156,587,744			156,587,744
Chemical Materials and Products		143,640,058		2,951,818		146,591,876
Iron and Steel		136,045,034				136,045,034
Paper, paperboard and articles of paper pulp, of paper or of paperboard	97,993,990		17,033,850	8,059,969		123,087,809
Crude animal and vegetable materials	89,663,037					89,663,037
Furniture, and parts thereof		80,319,875				80,319,875
Essential oils and resinoids and perfume materials; toilet, polishing and cleansing preparations			12,945,700	17,721,673	17,512,095	48,179,468
Footwear			8,452,927	23,181,399	10,031,891	41,666,217
Gold, non-monetary				40,321,630		40,321,630
Pulp and waste paper				19,525,134	2,541,285	22,066,419
Special transactions and commodities not classified according to kind			2,428,372	8,130,603		10,558,975
Articles of apparel and clothing accessories			2,026,179		3,768,097	5,794,276
Feeding stuff for animals			5,650,715			5,650,715
Plastics in non-primary forms				4,968,017		4,968,017
Textile yarn, fabrics, made-up articles, n.e.s., and related products			2,384,278	2,509,965		4,894,243
Tobacco and tobacco manufactures					3,410,413	3,410,413
EXPORT SHIPMENTS VALUED NOT OVER $10,000					3,018,955	3,018,955
Non-metallic mineral manufactures				2,684,301		2,684,301
Photographic apparatus, equipment and supplies and optical goods, n.e.s.; watches and clocks					1,946,932	1,946,932
Prefabricated buildings; sanitary, plumbing, heating and lighting fixtures and fittings, n.e.s.					1,768,353	1,768,353
Fish (not marine mammals), crustaceans, molluscs and aquatic invertebrates			1,727,162			1,727,162

Source: Texas Center for Border Economic and Enterprise Development.

Value of Top 25 Commodity Imports by Port of Entry in the Rio Grande Valley (Continued)

Commodity	Brownsville	Pharr	Progreso	Rio Grande	Roma	Grand Total
Telecommunications equipment		2,279,172,955		1,285,508		2,280,458,463
Electrical machinery and appliances		1,331,798,897	196,652		1,219,044	1,333,214,593
Finished Vehicles	395,311,030	504,637,537			2,726,553	902,675,120
Special transactions and commodities not classified according to kind	212,695,946	594,905,417		753,083	844,394	809,198,840
Vegetables and Fruits		543,303,322	46,921,416	21,659,926		611,884,664
Petroleum products		479,971,092	115,500			480,086,592
General industrial machinery and equipment	73,894,898	263,146,948		859,818	245,278	338,146,942
Power-generating machinery and equipment	48,818,476	278,910,038	99,141			327,827,655
Professional instruments		285,629,755				285,629,755
Iron and Steel	189,272,146			38,272,578		227,544,724
Gas, natural and manufactured		220,861,819				220,861,819
Machinery specialized for particular industries	202,209,385		117,344			202,326,729
Furniture	196,941,596				23,215	196,964,811
Crude Rubber	163,249,817					163,249,817
Office machines and automatic data-processing machines		131,551,933				131,551,933
Manufactures of Metals	111,519,273			738,925	234,891	112,493,089
Non-metallic mineral manufactures	62,854,603		498,935	28,587,155	154,199	92,094,892
Inorganic Chemicals	80,310,722					80,310,722
Paper, paperboard and articles of paper pulp, of paper or of paperboard	50,967,729		14,217,409			65,185,138
Coffee, tea, cocoa, spices, and manufactures thereof	48,770,821					48,770,821
Gold, non-monetary (excluding gold ores and concentrates)				32,382,086		32,382,086
89 - Miscellaneous manufactured articles				23,154,891	456,753	23,611,644
29 - Crude animal and vegetable materials			4,792,074		1,656,515	6,448,589
28 - Metalliferous ores and metal scrap			675,359	1,824,804		2,500,163
27 - Crude fertilizers			97,001	472,597		569,598
53 - Dyeing, tanning and colouring materials				539,917		539,917
62 - Rubber Manufactures					195,439	195,439
65 - Textile yarn, fabrics, made-up articles, n.e.s., and related products					100,810	100,810
9 - Miscellaneous edible products and preparations					41,000	41,000

Source: Texas Center for Border Economic and Enterprise Development.

APPENDIX D

Top 25 Commodities Imported and Exported by Port of Entry in the Rio Grande Valley Region

U.S. EXPORTS TO MEXICO

Port of Entry	RANK	SITC	SITC PRODUCT DESCRIPTION	TRADE VALUE
BROWNSVILLE	1	34320	Natural gas, in the gaseous state	402,050,039
	2	33460	Petroleum oils and oils obtained from bituminous minerals	348,698,768
	3	22220	Soya beans	332,008,502
	4	78439	Other road vehicle parts	230,711,658
	5	76431	Transmission apparatus	164,590,383
	6	67321	Flat-rolled products of iron or non-alloy steel	136,045,034
	7	77642	Processors-controllers, whether or not combined with memories, converters, logic circuits, amplifiers, clocks, etc.	117,615,396
	8	89961	Hearing aids (excluding parts and accessories)	117,043,423
	9	57112	Polyethylene having a specific gravity of 0.94 or more	96,470,470
	10	69969	Articles of iron or steel, n.e.s.	94,148,263
	11	57419	Other polyethers	86,018,584
	12	82119	Parts of the seats of subgroup 821.1	80,319,875
	13	89399	Other articles	78,668,845
	14	89844	Optical media	76,681,071
	15	26310	Cotton (other than linters), not carded or combed	76,345,432
	16	74918	Injection or compression types of molds for rubber or plastics	76,205,188
	17	76493	Parts and accessories suitable for use solely or principally with the apparatus of division 76	73,355,612
	18	59899	Other chemical products and preparations	72,631,080
	19	87490	Parts and accessories for machines, appliances, instruments, and apparatus, n.e.s.	71,409,910
	20	59840	Mixed alkylbenzenes and mixed alkylnaphthalenes, other than those of subgroups 335.2 and 511.2	71,008,978
	21	33512	Paraffin wax, microcrystalline petroleum wax, slack wax, etc., and similar products obtained by synthesis	70,151,189
	22	57511	Polypropylene	68,497,412
	23	71690	Parts, n.e.s., suitable for use solely or principally with the machines falling within group 716	68,480,411
	24	77258	Plugs and sockets	65,482,841
	25	76339	Other apparatus	65,073,912

SITC = Standard International Trade Classification
Source: Top 25 Exports and Imports through Texas Ports. Texas Center for Border Economic and Enterprise Development.

U.S. EXPORTS TO MEXICO

Port of Entry	RANK	SITC	SITC PRODUCT DESCRIPTION	TRADE VALUE
PHARR	1	89431	Video games of a kind used with a television receiver	874,175,178
	2	76411	Telephone sets, including telephones for cellular networks or for other wireless networks	801,699,598
	3	33460	Petroleum oils and oils obtained from bituminous minerals (other than crude) and preparations, n.e.s.	692,884,368
	4	76493	Parts and accessories suitable for use solely or principally with the apparatus of division 76	571,475,245
	5	87490	Parts and accessories for machines, appliances, instruments, and apparatus, n.e.s.	313,204,914
	6	71690	Parts, n.e.s., suitable for use solely or principally with the machines falling within group 716	246,610,332
	7	76418	Telephone sets, including cellular or wireless networks; other apparatus for the transmission or reception of voice	194,151,000
	8	74790	Parts for the appliances of group 747	167,602,502
	9	77282	Parts suitable for use solely or principally with the apparatus falling within subgroups 772.4, 772.5, and 772.6—other parts	166,487,705
	10	72393	Parts for boring or sinking machinery of heading 723.37 or 723.44	147,455,540
	11	72849	Machines and mechanical appliances having individual functions, n.e.s.	134,072,546
	12	89399	Other articles	130,752,393
	13	75997	Parts/accessories (other than covers, carrying cases, and the like) suitable for use solely or principally with the machines of subgroups 751.1, 751.2, and 751.9 and group 752 for the machines of group 752	103,238,983
	14	78432	Other parts and accessories of bodies (including cabs)	100,630,967
	15	87221	Syringes, needles, catheters, cannulae, and the like	99,366,030
	16	64211	Cartons, boxes, and cases of corrugated paper or paperboard	97,993,990
	17	87465	Other regulating or controlling instruments and apparatus	93,702,063
	18	69969	Articles of iron or steel, n.e.s.	93,334,977
	19	29193	Guts, bladders, and stomachs of animals (other than fish), whole and pieces thereof	89,663,037
	20	75270	Storage units	88,884,363
	21	77259	Other electrical apparatus for switching/protecting electrical circuits, or for making connections to or in electrical circuits	86,188,623
	22	77316	Other electric conductors, for a voltage not exceeding 1,000 V	82,787,282
	23	77644	Memories	81,027,534
	24	26310	Cotton (other than linters), not carded or combed	77,584,594
	25	77649	Electronic integrated circuits—other	76,795,039

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U.S. EXPORTS TO MEXICO

Port of Entry	RANK	SITC	SITC PRODUCT DESCRIPTION	TRADE VALUE
PROGRESO	1	4530	Grain sorghum, unmilled	108,029,585
	2	4814	Other worked cereal grains (e.g., hulled, pearled, clipped, sliced, or kibbled), except rice of subgroup 042.3	25,012,270
	3	4490	Maize (not including sweet corn), unmilled other	23,545,889
	4	22230	Cotton seeds	16,717,174
	5	26901	Clothing/accessories, textile materials; footwear and headgear of any material (other than of asbestos)	16,284,349
	6	55149	Mixtures of odoriferous substances and mixtures (including alcoholic solutions)	10,990,515
	7	64169	Paper, creped, crinkled, embossed, or perforated, n.e.s.	10,250,875
	8	22390	Flours/meals of oil seeds, oleaginous fruits (excluding mustard flour), non-defatted, partially defatted, or defatted and wholly or partially refatted with their original oils	9,341,950
	9	85132	Footwear, n.e.s., with outer soles and uppers of rubber or plastics—other	8,452,927
	10	89842	Magnetic media	6,840,562
	11	64110	Newsprint, in rolls or sheets	5,126,402
	12	76211	Radio-broadcast receivers not capable of operating without an external source of power	5,025,827
	13	89420	Tricycles and similar wheeled toys; doll carriages; reduced-size models and similar recreational models	2,937,577
	14	93100	Special transactions and commodities not classified according to kind	2,428,372
	15	65731	Textile fabrics coated with gum or amylaceous substances, of a kind used for the outer covers of books or the like	2,384,278
	16	8129	Bran, sharps, and other residues, whether or not in the form of pellets, derived from sifting or milling	2,293,383
	17	84270	Blouses, shirts, and shirt blouses	2,026,179
	18	55310	Perfumes and toilet waters	1,955,185
	19	8124	Bran, sharps, and other residues, whether or not in the form of pellets, derived from sifting or milling	1,887,581
	20	3611	Shrimps and prawns, frozen	1,727,162
	21	64299	Other paper, paperboard, and cellulose wadding/webs of cellulose fibers cut to size/shape; other articles of paper pulp	1,656,573
	22	8133	Oil cake/other solid residues (except dregs), whether or not ground or in the form of pellets	1,469,751
	23	76339	Other apparatus	1,358,873
	24	26662	Synthetic filament tow of polyesters	1,346,806
	25	78439	Other parts and accessories	1,346,542

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U.S. EXPORTS TO MEXICO

Port of Entry	RANK	SITC	SITC PRODUCT DESCRIPTION	TRADE VALUE
RIO GRANDE	1	97101	Gold (including gold plated with platinum), non-monetary, unwrought/semi-manufactured forms, or in powder form	40,321,630
	2	25111	Unbleached craft paper or paperboard, or corrugated paper or paperboard	19,525,134
	3	85132	Footwear, n.e.s., with outer soles and uppers of rubber or plastics—other	14,640,883
	4	89842	Magnetic media	13,345,565
	5	26901	Clothing/accessories, textile materials; footwear and headgear of any material (other than of asbestos)	12,156,070
	6	76339	Other apparatus	11,248,394
	7	55149	Mixtures of odoriferous substances and mixtures (including alcoholic solutions)	9,586,665
	8	89731	Articles of jewelry and parts of precious metal or of metal clad with precious metal (except watches and watch cases)	8,400,499
	9	89844	Optical media	8,378,780
	10	55310	Perfumes and toilet waters	8,135,008
	11	93100	Special transactions and commodities not classified according to kind	8,130,603
	12	64159	Other paper and paperboard, uncoated	5,363,753
	13	85125	Tennis shoes, basketball shoes, gym shoes, training shoes, and the like with outer soles of rubber or plastics	5,169,664
	14	58120	Tubes, pipes, and hoses, rigid	4,968,017
	15	76211	Radio broadcast receivers not capable of operating without an external source of power	3,844,115
	16	22390	Flours/meals of oil seeds, oleaginous fruits (excluding mustard flour), non-defatted, partially defatted, or defatted and wholly or partially refatted with their original oils	3,828,089
	17	26902	Used/new rags, scrap twine/cordage, rope/cables, and worn-out articles twine/cordage and rope/cables textile materials	3,477,722
	18	85148	Footwear, n.e.s., with outer soles of leather	3,370,852
	19	89431	Video games of a kind used with a television receiver	3,369,998
	20	59899	Other chemical products and preparations	2,951,818
	21	89420	Tricycles and similar wheeled toys; doll carriages; reduced-size models and similar recreational models	2,893,679
	22	64141	Craft liner	2,696,216
	23	66749	Synthetic or reconstructed precious or semiprecious stones, n.e.s.	2,684,301
	24	65731	Textile fabrics coated with gum or amylaceous substances, of a kind used for the outer covers of books or the like	2,509,965
	25	76160	Reception apparatus for television, incorporating radio-broadcast receivers/sound/video recording	2,446,229

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U.S. EXPORTS TO MEXICO

Port of Entry	RANK	SITC	SITC PRODUCT DESCRIPTION	TRADE VALUE
ROMA	1	55310	Perfumes and toilet waters	17,512,095
	2	85148	Footwear, n.e.s., with outer soles of leather	10,031,891
	3	78439	Other parts and accessories	8,236,255
	4	76339	Other apparatus	7,828,706
	5	78432	Other parts and accessories of bodies (including cabs)	6,922,332
	6	89729	Imitation jewelry of other non-precious materials	4,624,462
	7	76411	Telephone sets, including telephones for cellular networks or for other wireless networks	4,148,210
	8	72321	Front-end shovel loaders	3,943,230
	9	84699	Made-up clothing accessories, n.e.s.; parts of garments or of clothing accessories	3,768,097
	10	12220	Cigarettes containing tobacco	3,410,413
	11	89844	Optical media	3,326,364
	12	71392	Parts, n.e.s, for the internal combustion piston engines of subgroups 713.2, 713.3, and 713.8	3,066,177
	13	99200	Export shipments valued not over $10,000	3,018,955
	14	89431	Video games of a kind used with a television receiver	2,984,366
	15	72329	Other self-propelled mechanical shovels, excavators, and shovel loaders	2,726,201
	16	89842	Magnetic media	2,724,480
	17	25111	Unbleached craft paper or paperboard, or corrugated paper or paperboard	2,541,285
	18	78120	Motor vehicles for the transport of persons, n.e.s.	2,484,988
	19	72312	Graders and levelers	2,207,000
	20	76493	Parts and accessories suitable for use solely or principally with the apparatus of division 76	2,083,428
	21	88542	Other wrist watches, whether or not incorporating a stopwatch facility	1,946,932
	22	72399	Other parts for the machinery of group 723 (excluding heading 723.48) and of subgroup 744.3	1,866,321
	23	81100	Prefabricated buildings	1,768,353
	24	72855	Parts, n.e.s., for the machines of headings 723.48, 727.21, 728.44, 728.46, and 728.49	1,751,143
	25	89399	Other articles	1,622,943

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U.S. IMPORTS FROM MEXICO

Port of Entry	RANK	SITC	SITC PRODUCT DESCRIPTION	TRADE VALUE
BROWNSVILLE	1	93100	Special transactions and commodities not classified according to kind	212,695,946
	2	82119	Parts of the seats of subgroup 821.1	196,941,596
	3	78439	Other parts and accessories	194,175,266
	4	77865	Ceramic dielectric fixed capacitors, multilayer	171,344,628
	5	23211	Styrene-butadiene rubber (SBR); carboxylated styrene-butadiene rubber (XSBR)	163,249,817
	6	77123	Ballasts for discharge lamps or tubes	149,173,589
	7	72393	Parts for boring or sinking machinery of heading 723.37 or 723.44	147,028,573
	8	77862	Tantalum fixed capacitors	141,583,807
	9	77121	Static converters (e.g., rectifiers)	128,831,098
	10	78432	Other parts and accessories of bodies (including cabs)	124,230,074
	11	67554	Flat-rolled products of stainless steel, not further worked cold-rolled (cold-reduced) of a width of 600 mm or more	110,222,498
	12	77835	Parts of the equipment of heading 778.34	91,541,088
	13	52236	Other inorganic acids	80,310,722
	14	67553	Flat-rolled products of stainless steel, not further worked cold-rolled (cold-reduced) of a width of 600 mm or more	79,049,648
	15	78433	Brakes and servo-brakes and parts thereof	76,905,690
	16	74561	Fire extinguishers, whether or not charged	73,894,898
	17	66492	Multiple-walled insulating units of glass	62,854,603
	18	69563	Rock-drilling or earth-boring tools	61,887,085
	19	72399	Other parts for the machinery of group 723 (excluding heading 723.48) and of subgroup 744.3	55,180,812
	20	77635	Thyristors, diacs, and triacs (excluding photosensitive devices)	54,002,155
	21	77255	Other switches	52,037,382
	22	64233	Binders (other than book covers), folders, and file covers	50,967,729
	23	69969	Articles of iron or steel, n.e.s.	49,632,188
	24	71620	Motors (other than motors of an output not exceeding 37.5 W) and generators, direct current	48,818,476
	25	7320	Other food preparations containing cocoa, in blocks, slabs or bars weighing more than 2 kg or in liquid, paste, powder, granular, or other bulk form in containers or immediate packings of a content exceeding 2 kg.	48,770,821

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U.S. IMPORTS FROM MEXICO

Port of Entry	RANK	SITC	SITC PRODUCT DESCRIPTION	TRADE VALUE
PHARR	1	76160	Reception apparatus for television, incorporating radio-broadcast receivers/sound/video recording	776,462,508
	2	76411	Telephone sets, including telephones for cellular networks or for other wireless networks	713,324,292
	3	93100	Special transactions and commodities not classified according to kind	594,905,417
	4	33460	Petroleum oils and oils obtained from bituminous minerals	479,971,092
	5	76211	Radio-broadcast receivers not capable of operating without an external source of power	410,046,859
	6	5797	Avocados, guavas, mangoes, and mangosteens, fresh or dried	295,943,941
	7	78439	Other parts and accessories	286,026,203
	8	71631	AC motors (including universal [AC/DC] motors, but excluding motors of an output not exceeding 37.5 W)	278,910,038
	9	77261	Boards, panels (including numerical control panels), consoles, desks, cabinets, and other bases	273,427,205
	10	74380	Parts for the pumps, compressors, fans, and hoods of subgroups 743.1 and 743.4	263,146,948
	11	77313	Ignition wiring sets and other wiring sets of a kind used in vehicles, aircraft, or ships	224,387,465
	12	76412	Other apparatus for transmission/reception of voice, images/other data, including apparatus for communication in a wired or wireless network (such as a local or wide area network)	223,833,130
	13	34310	Natural gas, liquefied	220,861,819
	14	78432	Other parts and accessories of bodies (including cabs)	218,611,334
	15	77551	Vacuum cleaners with self-contained electric motor	193,131,508
	16	77255	Other switches	178,366,592
	17	77841	Drills of all kinds	167,902,216
	18	77845	Other tools	165,090,814
	19	76418	Telephone sets, including cellular or wireless networks; other apparatus for the transmission or reception of voice	155,506,166
	20	87221	Syringes, needles, catheters, cannulae, and the like	151,299,226
	21	87229	Other instruments and appliances	134,330,529
	22	75220	Portable automatic data-processing machines, weighing not more than 10 kg, consisting of at least a central processing unit, a keyboard, and a display	131,551,933
	23	77318	Optical fiber cables	129,493,097
	24	5721	Lemons and limes fresh or dried	125,116,086
	25	5910	Orange juice	122,243,295

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U.S. IMPORTS FROM MEXICO

Port of Entry	RANK	SITC	SITC PRODUCT DESCRIPTION	TRADE VALUE
PROGRESO	1	5721	Lemons and limes, fresh or dried	14,857,879
	2	5797	Avocados, guavas, mangoes, and mangosteens, fresh or dried	10,054,101
	3	64214	Other sacks and bags, including cones	9,185,871
	4	5456	Cucumbers and gherkins, fresh or chilled	6,771,111
	5	5791	Melons (including water melons) and papaws (papayas), fresh	6,010,640
	6	64213	Sacks and bags, having a base of a width of 40 cm or more	5,031,538
	7	29294	Vegetable saps and extracts	4,505,104
	8	5453	Cabbage and similar edible brassicas, fresh or chilled	2,496,200
	9	5459	Other vegetables, fresh or chilled	2,286,914
	10	5440	Tomatoes, fresh or chilled	1,568,726
	11	5455	Carrots, turnips, salad beetroot, salsify, celeriac, radishes, and similar edible roots, fresh or chilled	1,188,952
	12	5451	Onions and shallots, fresh or chilled	954,890
	13	28821	Copper waste and scrap	675,359
	14	66139	Other monumental/building stone (other than goods of heading 661.31), molded, turned, polished, decorated, carved, or otherwise worked	498,935
	15	29249	Other	286,970
	16	77835	Parts of the equipment of heading 778.34	196,652
	17	5795	Pineapples, fresh or dried	192,341
	18	5798	Other fresh fruit	172,460
	19	5730	Bananas (including plantains), fresh or dried	151,942
	20	5771	Coconuts	130,513
	21	72111	Ploughs	117,344
	22	33300	Petroleum oils and oils obtained from bituminous minerals, crude	115,500
	23	71632	Generators, alternating current	99,141
	24	27892	Natural barium sulphate (barytes); natural barium carbonate (witherite), whether or not calcined (other than barium oxide of heading 522.65)	97,001
	25	5896	Fruits or edible parts of plants, n.e.s.	84,747

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Source: Top 25 Exports and Imports through Texas Ports. Texas Center for Border Economic and Enterprise Development.

U.S. IMPORTS FROM MEXICO

Port of Entry	RANK	SITC	SITC PRODUCT DESCRIPTION	TRADE VALUE
RIO GRANDE	1	97101	Gold (including gold plated with platinum), non-monetary, unwrought/semi-manufactured forms, or in powder form	32,382,086
	2	89731	Articles of jewelry and parts of precious metal or of metal clad with precious metal (except watches/watch cases)	23,154,891
	3	67944	Other, welded, of non-circular cross section	21,810,074
	4	66331	Articles of plaster or of compositions based on plaster	14,947,152
	5	67684	Angles, shapes, and sections, not further worked than cold-formed or cold-finished, of iron or non-alloy steel	13,065,901
	6	5459	Other vegetables, fresh or chilled	10,122,566
	7	66332	Building blocks and bricks, tiles, flagstones, and similar articles	5,296,390
	8	5791	Melons (including water melons) and papaws (papayas), fresh	4,192,326
	9	5798	Other fresh fruit	3,592,230
	10	66245	Glazed ceramic flags and paving, hearth, or wall tiles; glazed ceramic mosaic cubes and the like, whether or not on a backing	3,392,946
	11	67943	Other, welded, of circular cross section	2,803,411
	12	5469	Other vegetables and mixtures of vegetables	2,726,337
	13	66241	Ceramic building bricks, flooring blocks, support, or filler tiles and the like	1,930,397
	14	28929	Waste and scrap of precious metal, n.e.s., or of metal clad with such precious metal	1,824,804
	15	76493	Parts and accessories suitable for use solely or principally with the apparatus of division 76	1,285,508
	16	66139	Other monumental/building stone (other than goods of heading 661.31), molded, turned, polished, decorated, carved, or otherwise worked	1,267,574
	17	5440	Tomatoes, fresh or chilled	1,026,467
	18	66136	Marble, travertine, alabaster, and articles thereof, molded, turned, polished, decorated, carved, or otherwise worked	934,338
	19	74850	Flywheels and pulleys (including pulley blocks)	859,818
	20	66333	Prefabricated structural components for building or civil engineering	818,358
	21	93100	Special transactions and commodities not classified according to kind	753,083
	22	69350	Cloth (including endless bands), grill, netting, and fencing, of iron or steel wire; expanded metal of iron or steel	738,925
	23	67611	Bars/rods, hot-rolled, irregularly wound coils, iron, or steel of iron or non-alloy steel, containing indentations, ribs, or grooves	593,192
	24	53354	Glaziers' putty; grafting putty, resin cements, caulking compounds, and other mastics; painters' fillings	539,917
	25	27324	Plasters, whether or not colored, with/without small quantities of accelerators or retarders	472,597

SITC = Standard International Trade Classification
Source: Top 25 Exports and Imports through Texas Ports. Texas Center for Border Economic and Enterprise Development.

U.S. IMPORTS FROM MEXICO

Port of Entry	RANK	SITC	SITC PRODUCT DESCRIPTION	TRADE VALUE
ROMA	1	78621	Self-loading or self-unloading trailers and semi-trailers for agricultural purposes	2,499,000
	2	29299	Vegetable materials and vegetable products, n.e.s.	1,656,515
	3	77119	Other electrical transformers	1,219,044
	4	93100	Special transactions and commodities not classified according to kind	844,394
	5	62999	Articles of unhardened non-cellular vulcanized rubber, n.e.s.	195,439
	6	69350	Cloth (including endless bands), grill, netting, and fencing, of iron or steel wire; expanded metal of iron or steel	150,759
	7	89972	Brooms, brushes, hand-operated mechanical floor sweepers, and mops/feather dusters; prepared knots/tufts for brooms	147,705
	8	89319	Articles for the conveyance or packing of goods, n.e.s.; stoppers, lids, caps, and other closures	135,611
	9	74291	Parts of the pumps and liquid elevators of group 742, of pumps	118,064
	10	78683	Trailers and semi-trailers, n.e.s.	117,553
	11	78219	Motor vehicles for the transport of goods, n.e.s.	110,000
	12	89332	Tableware, kitchenware, other household articles, and toilet articles	107,758
	13	74380	Parts for the pumps, compressors, fans, and hoods of subgroups 743.1 and 743.4	85,904
	14	66112	Slaked lime	73,064
	15	65759	Articles of yarn, strip, or the like of heading 651.77 or 651.88, twine, cordage, rope, or cables, n.e.s.	70,753
	16	69669	Other articles, not in sets	60,978
	17	66244	Unglazed ceramic flags/paving and hearth/wall tiles; unglazed ceramic mosaic cubes and the like	43,777
	18	74831	Roller chain	41,310
	19	9849	Other sauces and preparations therefore; mixed condiments and mixed seasonings	41,000
	20	89471	Fishing rods, fish hooks, and line tackle; fish-landing nets and nets; decoy "birds" and similar hunting or shooting requisites	39,748
	21	66245	Glazed ceramic flags/paving and hearth/wall tiles; glazed ceramic mosaic cubes, whether or not on a backing	37,358
	22	65893	Life jackets and lifebelts and other made-up articles, including dress patterns	30,057
	23	89439	Articles for funfair, table, and parlor games, n.e.s.	25,931
	24	82139	Furniture, n.e.s., of metal—other	23,215
	25	69241	Tanks, casks, drums, cans, and boxes, for any material (other than compressed or liquefied gas), of iron or steel	23,154

SITC = Standard International Trade Classification
Source: Top 25 Exports and Imports through Texas Ports. Texas Center for Border Economic and Enterprise Development.

TASK 3: CONGESTION PERFORMANCE MEASURE

Developing a Congestion Performance Measure

Building on several research reports, position papers and conference proceedings, the following principles and possible approaches are offered for discussion related to a Congestion Performance Measure by the AASHTO Standing Committee on Performance Measurement.

Summary

The key elements of the Congestion Performance Measure are outlined below. These are related to the desired outcomes and to other performance measure topics. Key elements for AASHTO discussion include:

- Approach – The community should develop the measures and targets that best reflect their vision. National measures, if used, should apply to the national system, be focused on issues of national importance (e.g., freight) and recognize that improvements must also work in, and be consistent with, the desires of the local community.
- Targets – A set of performance targets will be necessary, but the regional average congestion level target will undoubtedly be the primary metric used in public functions.
- National target – The role for a national target congestion value may be limited to routes that serve an important national interest. Important freight travel routes, border crossings, key freight connections, and urban corridors during off-peak hours are examples, but evacuation routes, national defense mobilization corridors, and other network elements may also qualify.
- Measures – A set of a few performance measures appears appropriate at the summary level with at least one "average congestion" measure and one "travel time reliability" measure. A single measure may be used to discuss the problems, but focused action requires several measures.
    - Travel delay per commuter is a good regional average measure; it is easily understood and directly affected by all solutions.
    - Travel Time Index is useful at several levels of geography and could be used to compare both regional and sub-regional targets.
    - Buffer Index is an easily understood and useful measure of the variation in travel time; it is affected by a range of operations improvements.
- Peak and off-peak measures are needed – Commuter conditions are important, but the midday period is when freight moves and it is perhaps more important to maintain a reliable, smooth flowing transportation network during this time.
- Average and reliability measures – Regular congestion problems are typically included in performance reporting, but the variation in travel time is caused by different issues and have a different set of solutions than the typical "too many cars on too little road" type of problem.
- Accountability and Transparency – Accountability and transparency will be provided in several ways. The targets will be developed by the communities (not imposed from the outside). Each area should be responsible for identifying their progress toward targets they developed and, if no progress, the reason why they are not making progress. The

development of an open process and visible and measurable targets will provide a connection between annual project lists and ultimate goals of the chosen set of projects.

- Project priorities – Projects should be chosen (at least in part) according to their role in alleviating the problems identified in the performance measures. The measures should illustrate the effect of all types of strategies being used to address congestion problems—added capacity, operational improvements, demand management, and land use development patterns.

THE CONCEPT & FRAMEWORK

What are we trying to measure?
The problem of congestion and the effect of all possible solutions. These solutions include both transportation and land use approaches. The effect of the entire range of possible solutions should be shown including, for example, adding lanes, bus routes and rail lines, improved traffic signal operations, rapid removal of crashed or stalled vehicles, access management treatments, flexible work hours, commute travel options, telecommuting, bicycle travel, pedestrian treatments and land use development patterns that reduce vehicle travel.
If it's being offered as a solution, it should show up in the measure.

What are we trying to compare?
As described in the AASHTO position paper, the measure will be used to identify a region's trend and compare current and projected levels against targets for that region. The measure should also be appropriate for use at corridor and subregional levels.
Trends and targets.

Why are we trying to compare?
The value of the congestion measure is to ensure that investment decisions aggressively target congestion problems. Changes in the amount of investment and the project and program decisions may be needed to better address critical congestion problems.
If you don't measure it, it won't get done.

Who should set the congestion goal?
Each region is in the best position to decide its congestion goal given the community desires, the long-range growth plans, economic status, and other competing funding priorities.

- DISCUSSION POINT – National congestion level: The federal government has a legitimate and compelling interest in maintaining the service quality on the National Highway System. Congestion that hinders national and international travel and trade is not in the national interest. A national congestion goal that focuses on the time periods of the day when commuting travel is not a substantial portion of trips (for example, outside of 6 to 9 a.m. and 4 to 7 p.m.) is appropriate. Such a goal should recognize the importance of the midday period to the freight movement and manufacturing industries.

We see a use for locally developed goals and national goals to ensure economic competitiveness and national security.

Are we trying to develop a "top 10 list" of most congested regions?
No. The value of a national top 10 list pales in comparison to a congestion target that is supported by the community. Since each region prioritizes congestion relief differently, and will choose to attack each congestion problem differently, the value is in developing a congestion target and a measurement approach, rather than crafting a national standard congestion target. A "one size of congestion fits all" regional target will invariably be an easy accomplishment for small regions or those that are not seeing population and employment growth, and an impossible target for the regions that are creating jobs at rapid rates. Top 10 lists are good for publicity about transportation solutions and benefits, but they are not good decision-making tools.
We seek consistent "measuring spoons" not "cookie-cutter" policy decisions.

Who is the Audience?
There are many audiences, but in general there are two groups. There are many public, decision-makers, policy experts, and stakeholders that form an external and diverse audience of information consumers. There are also many internal consumers of congestion information within an agency including leaders, planners, designers, and operators.
If you aren't sure who you are talking to, how can you know you're using the right language?

- DISCUSSION POINT – What if there is no progress toward the region's self-defined congestion goal? There are a number of reasons a region may not be making progress. These reasons include combinations of poor priority setting, much more growth than anticipated or underfunding of transportation. In these situations, agencies should undertake an analysis of:
  1) agency spending in a few broad categories to determine if one topic area is receiving "more than its share" of the funding,
  2) the mobility-related funding to determine if the set of projects that are being selected are not moving the region toward their goals, and
  3) the type of projects to ensure that proper investigation of all project and program options (large and small) have been considered.

Use carrots, not sticks. Encourage agencies to invest in projects that are consistent with the goals they set.

How should the differences in urban and rural congestion be handled?
Different targets are appropriate for urban and rural areas. There are different expectations for congestion in every region. Comparisons to irrelevant conditions (i.e., comparing rural and big city traffic problems) are not helpful and do not provide citizens with a sense their funds are being spent wisely. Most states and many large MPOs have some sort of "fair share" arrangement for returning funding to areas in relation to the taxes that were paid from that area. In most cases, therefore, rural added capacity projects do not compete for funding with metro region projects.
Each region should decide how much congestion they wish to tolerate.

MEASUREMENT SPECS

Some of the congestion measures should work at several different levels of geography. Providing a congestion measure that can be used at the project and corridor level will improve the chances that the measure will be adopted as a part of regular decision-making practice. It is not necessary that all of the measures satisfy the criteria. The relevant geographies include project, corridor, subregion, and region.
Providing measures that are "useful" for a variety of purposes will accelerate their implementation.

The measures should provide mode-neutral comparisons.
Travel time and person volume related quantities allow for cross-modal and multi-modal comparisons.
A broad and level "playing field" is needed so all modes can be compared.

The measures should include attributes that are important to freight shippers.
Travel time and travel time reliability are important elements in freight mode and route decisions. A measure of the cost of travel delay that recognizes the higher value of an hour of freight delay than an hour of commuter delay enhances the usefulness of the measures and connects to the concerns of shippers, manufacturers and travelers alike.
The movement of goods is critical to a healthy economy and should be reflected in the measures.

The measures should monitor congestion from the full range of congestion causes (i.e., unusual demand, incidents, work zones, special events, operating system failures, weather and inadequate capacity). Some of these are more difficult to monitor or estimate than others, but the cause of the problem(s) must be diagnosed before a solution can be identified.
If you don't know the real problems, you can't develop solutions.

DESCRIBING THE MEASURES

The effect of the broad principles is that a range of measures will be needed to address the key questions. Regions may choose to highlight different measures, but a robust performance measure system should have all of the following attributes.

<u>The congestion measure should be separate from the congestion target.</u> Bundling the measure and target into one metric (e.g., creating an index comparing the growth in congestion to the growth in jobs) will be difficult to explain. Two simple metrics will be easier to use and explain—a congestion measure that can be easily explained and a target that includes a component of population, job, or economic growth.
Don't confuse people with the measure when you want them to focus on what to do with the measure. Use a simple measure, a simple target and explain both.

- The alternative is bundling the measure and the target in a way that normalizes all the determining factors. As an example, one could produce a measure of congestion that would change according to job growth; the target might be "keep the measure value the same from year to year." In this case, congestion is really growing every year, but it would be growing at the same rate as the job market. (Historically, delay per peak period traveler has grown at about triple the rate of population growth). This approach is hard to describe, unnecessarily complicates the message and risks appearing as though "games are being played."

A set of congestion measures should be used to describe problems and the effect of solutions including Travel Time Index, travel delay, total travel time, the buffer index, and the cost of congestion.

- Travel Time Index – A measure of the extra time that travelers must allow for an average peak period trip. A value of 1.50 says that a 20 minute off-peak trip takes 30 minutes in the peak period. *This measure is applicable to the broadest range of uses, but is not sufficient by itself.*
- Travel delay – A measure of the total amount of extra time suffered by all travelers in the designated geography. This is very useful for economic and "total congestion effect" reporting. Travel delay per commuter is also a good measure of regional traffic congestion.
- Total travel time – A measure that brings in the effect of transportation improvements and denser land use patterns that may combine to create trips that take less time. This measure (in person-hours) would include vehicle, walk, bike, and transit modes in one value.
- Buffer Index – A measure of travel time reliability; the percentage of extra time that should be allowed to make an important trip and arrive on time. The Buffer Index is a ratio of the travel time to accomplish the 19th worst trip out of 20 compared to the average travel time (i.e., the 95th percentile travel time). The Buffer Index is explained as 'one should allow an extra BI percent of time for important trips.'
- Congestion Cost – The value of fuel and travel delay is an important measure for discussions with the public and a component of improvement analyses.
- Economic benefits – The benefits to travelers and the economy represent the reason why solutions are pursued. There are several approaches to creating these estimates; it is important that one approach is chosen and used. If the discussion only includes costs and does not include benefits, it will be difficult to convince the public or decision makers to invest more.

Relating the measures to important aspects for person and freight travel:

- *Extra travel time* is a drain on the economy and leads to increased frustration. Most of the measures have an "extra time" component.
- The *unreliability of travel time* has a particularly onerous effect on freight travel and just-in-time manufacturers. Late deliveries or an inefficient process caused by a poorly functioning transportation system affects competitiveness.
- *Economic measures* are particularly relevant to the general public and the business community. If parents only knew how much college cost, there would be very few students; there is a lot of discussion about the value of education.

The geography used by each region does not have to be the same. Long-range planning models are a good source for the data because they include the effect of transportation and land-use actions. There is, however, no consistency in the area included in the travel demand models used by metropolitan planners across the country. Urbanized area data may also be useful because the area includes only the developed portion of each region, a more consistent and similar comparison than the metropolitan area boundary.

The geography should be the same from year to year to illustrate the effect of the solutions (rather than the effect of boundary changes). If a sliding boundary is used, the capacity additions will appear much larger than they are (because existing roads will be re-designated when the boundary is moved).

The target does not have to be the same in every region, in every region of the same size, or even in all parts of a region. Downtowns may be able to accommodate more road congestion due to the presence of a variety of modal alternatives including transit, bike, and walk, and because destinations (jobs, shops, etc.) are nearby. Suburban areas and rural travelers have different alternative travel options and different congestion expectations. Each community is best positioned to balance the wide variety of interests and expectations.

OTHER MEASUREMENT ISSUES

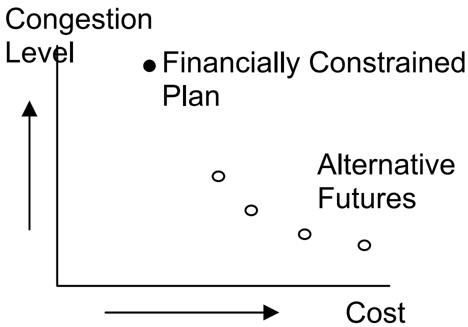
The practical effect of any move toward using performance measures will be that more before-after studies of the effect of projects, programs, and policies should be conducted. All projects are evaluated in some level of detail before implementation, but very few are examined afterward. Many are not even studied in an effort to maximize the return from the investment. In addition, it is difficult to discuss the need for additional funding or more flexibility if there are no evaluations of prior spending programs.

Studies of the effect of additional investments beyond the expected revenue (the financially constrained metropolitan transportation plan) should be developed to identify the funding needs for a range of optional congestion targets and to identify the benefits from such investments. Scenarios might include:

- reduce congestion,
- prevent worsening congestion,
- maintain economic competitiveness of the State, and
- congestion growth matches population growth.

The Exhibit below depicts one outcome of these studies; additional information on the costs and benefits of additional investment in transportation and/or the effect of alternative land use development strategies. These can be created as an extension of current planning activities that focus on producing only a financially constrained plan. Showing the reduction in congestion that comes from additional investment is one component of a program of performance management.

Displaying the Effect of Additional Investment on Congestion Levels
An Example of Performance Measurement Analysis Results



Additional analysis of several cost scenarios informs a discussion of a variety of alternative transportation investment options.

TASK 4: MILEAGE-BASED USER FEE SUPPORT

STRATEGY FOR DEVELOPING A MILEAGE-BASED USER FEE PILOT PROJECT IN TEXAS

Technical Memorandum Submitted Under

Interagency Agreement for Administration

Project 0-6581

Technology Transfer and Technical Support Services

Related to Mileage-Based User Fees

Work Order #4, Task 1

Prepared for the

TEXAS DEPARTMENT OF TRANSPORTATION

by

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June 2009

Background

As interest in mileage-based fees continues to grow and research activities progress in Texas, there is a need to revisit and revise the November 2008 federal grant proposal to conduct a mileage-based user fee pilot project in Texas. The November 2008 federal grant proposal was sponsored by the Northeast Texas Regional Mobility Authority (NET RMA), developed by the Texas Transportation Institute (TTI), and submitted to the Value Pricing Pilot (VPP) Program at the Federal Highway Administration (FHWA).

The VPP program, which is authorized under the federal transportation bill (SAFETEA-LU), encourages implementation and evaluation of value pricing pilot projects to manage congestion on highways through tolling and other pricing mechanisms. It is the only program that provides funding to support studies and implementation aspects of a tolling or pricing project. The program is limited to 15 slots (which FHWA has reserved for "states"). Each state can have multiple projects. Funds available for the VPP program can be used to support pre-implementation study activities and to pay for implementation costs of value pricing projects.

SAFETEA-LU provided a total of $59 million for fiscal years 2005-2009 for the VPP program. $11 million was authorized for FY 2005 and $12 million was authorized for each of FYs 2006 through 2009. Of the amounts made available to carry out the program, $3 million was set-aside in each of the fiscal years 2006 through 2009 for value pricing projects that do not involve highway tolls. Although the NET RMA grant did not have a congestion element, TTI was encouraged to submit the November 2008 proposal as a non-highway tolling project due to national interest in the topic of mileage-based fees.

Status of November 2008 Federal Grant Application

On May 19, 2009, TTI and NET RMA were notified that the pilot project proposal was not awarded by FHWA. A debrief opportunity was not provided, but FHWA indicated another grant solicitation would be forthcoming. This next solicitation will provide for a two-step process that allows a proposal to be subjected to an initial review by FHWA staff with feedback provided on how the final proposal can be improved to enhance competitiveness.

Purpose of this Technical Memorandum

This memorandum outlines the information needs required to make revisions to the initial federal grant proposal prior to re-submittal. An enhanced proposal will benefit from the second phase of University Transportation Center for Mobility (UTCM) research that has been underway since October 2008. It should be noted than there are a number of policy questions that emerged during the current research effort and are outlined in this memorandum. These questions should be addressed before substantive revisions can be made to the federal grant proposal or further pilot development can proceed. A strategy for moving forward with pilot project development is outlined in the "Recommendations" section of this document.

Status of Current Research

Under the second phase of research funding supported by the UTCM, TTI has engaged in several activities to increase the body of knowledge in support of a potential pilot project. Those activities include a technology assessment, an institutional assessment, and hosting a national symposium on mileage-based fees.

Technology Assessment

A report on an assessment of technology options has been drafted and is scheduled for completion July 31, 2009. The preliminary findings of this study are presented in this section.

It is important to situate the discussion of technology options within the larger discussion of design and transition to a mileage-based user fee. Technology choices—the selection of data collection, data transmission, enforcement, and billing and invoicing technologies—are best treated as lower level decisions. As Figure 1 illustrates, in an ideal decision-making hierarchy, technology choices flow from policy objectives by way of system architecture. Above all, discussion of technology choices should not proceed without a clear set of policy objectives that a mileage-based user fee is intended to achieve.

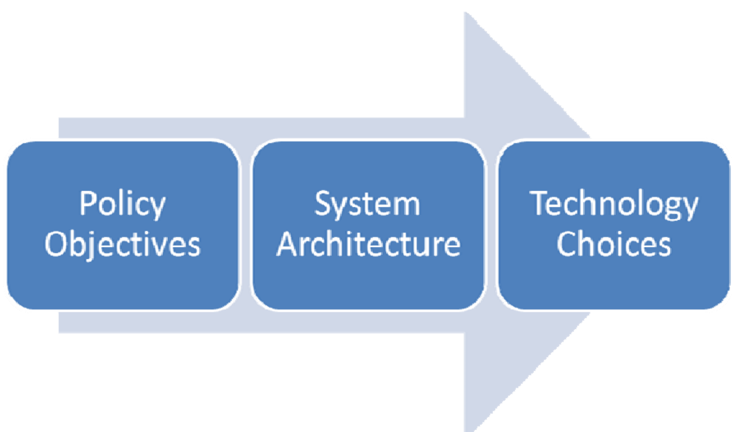

Figure 13: Mileage-based User Fee System Design- Decision-making Hierarchy

Clearly defined policy objectives are crucial to determining the necessary level of technological sophistication. Less ambitious objectives may open the door to relatively low technology solutions. If a mileage-based user fee is sought merely to address erosion of fuel tax revenues, annual odometer readings may suffice. From an economic efficiency standpoint, an annual odometer reading improves upon the gas tax by better capturing a user-pays principle. Annual odometer readings, however, preclude many of the potential objectives achievable by a mileage-based user fee and are blind to differences in cost of driving by roadway and time of day.

On the other hand, if the desire is a fee system that enables advanced tolling capabilities, permits local revenue retention, and facilitates a rich menu of value-added capabilities, a substantially more high technology system is needed. This second set of objectives will require the placement of On-Board Units (OBU) in vehicles that use a positioning technology (such as Global Positioning Satellites [GPS]) and telecommunications technology (such as Digital Short Range

Communications [DSRC] or cellular technology) to communicate with a billing office. While a system of this type represents a significantly greater degree of technological complexity, it would in theory permit the economically efficient use of roadway capacity.

System architecture design is the intermediate stage that links policy objectives to final technology choices. The system architecture can be thought of as the flow and transformation of information from raw data regarding vehicle movement to an end bill that is paid by road users. Major decisions include what raw data are collected, where data are stored, the form data take when uploaded from vehicles to an invoicing office, and how often this upload takes place. The same technologies can be arranged into a number of different architectures, and the same basic architecture can often be designed using different technologies. The system architecture largely sets the system privacy level. Because public acceptability is likely to hinge on system privacy, the system architecture should be defined before discussion of specific technologies proceeds.

There may be significant advantages to a system that offers parallel technology options. In such a system, users would choose between a low tech option (likely odometer readings) and a high tech option (some sort of OBU). In general, the low tech track would offer greater privacy protection while the higher tech track would feature bundled services that compensate users for the lower level of privacy.[1] Such a system could best accommodate users with less inclination towards technology and would begin to demonstrate the principle of a mileage-based user fee. Those users who desire a wide range of services could demonstrate the viability of OBUs. An initial market could speed the development of a more robust offering of OBUs and bundled services. In the long term, as a greater share of users opts for the high tech track, the low tech track could be phased out.

A final point on which great consensus emerged is that technology is not the biggest barrier. A common theme at the symposium and among interviewees was that technological capabilities, if not already present, can be achieved in a relatively short period of time. Establishing consensus on policy objectives and achieving public acceptance were almost unanimously seen as larger challenges.

The technology assessment report will identify a range of potential system architectures that identify the structures within which specific OBU and communications technologies are deployed. The determination of a preferred architecture will be contingent upon articulated policy direction. The relevant policy questions are outlined toward the end of this memorandum.

Institutional Assessment

A report on the institutional issues associated with a mileage-based user fee system is under development and is scheduled for completion July 31, 2009. As part of this review, researchers are reviewing and examining other nationwide program models in terms of their implementation and associated federal/state/local coordination strategies. Furthermore, researchers are examining potential near and long-term implementation strategies. An outline of policy

[1] A system which offers a "lower" level of privacy would almost certainly NOT permit the release of detailed travel history from the vehicle.

questions to be addressed regarding an institutional framework has been completed and incorporated into the next section of this report.

National Symposium on Mileage-Based User Fees

TTI and the University of Minnesota's Hubert H. Humphrey Institute and Center for Transportation Studies hosted the first national Symposium on Mileage-Based User Fees in Austin, Texas, April 14-15, 2009. The vision of the conference was twofold: to advance the discussion on mileage-based fees as a potential replacement for the fuel tax and to engage participants in a facilitated discussion to articulate a possible path forward.

Eighty transportation professionals from 12 states and over 50 organizations gathered for a day-and-a-half to hear presentations from experts on the state-of-the-practice in mileage-based fees, also called VMT fees. Participants represented all levels of government, academic institutions, trade associations, advocacy groups, and the private sector. Panelists from a variety of organizations spoke on a number of issues surrounding this topic, including institutional issues, public acceptance, technology options, and perspectives of stakeholders and local officials. The symposium program can be found at the web site http://utcm.tamu.edu/mbuf.

Although there was a wealth of information shared, the following is a list of salient points of the conference that have relevance to the pursuit of a pilot project in Texas:

- Public acceptance will be the greatest challenge to overcome. There are issues of privacy (what data are collected at the vehicle and what is transmitted to assess a mileage fee), lack of understanding of the need for a new system, and lack of trust in the transportation planning and investment process. Listening to the public was encouraged in early stages to define the "value proposition" and to help articulate benefits.
- The lack of clear national vision and clear system objectives was cited as a significant impediment. While national direction is desired, there is no clear national policy at this point. Therefore, due to urgency with its own funding issues, the states will lead with experimentation and demonstration.
- In spite of lack of formal national policy, there is an interest among federal staff in conducting large-scale pilot projects to test multiple technology platforms with possibilities for bundled or value-added services. Texas could be one of the major pilot states to test a unique technology platform, and this should be a consideration in future federal grant proposals.

Policy Questions Critical to Pilot Project Development

The NET RMA provided direction for the initial grant application, namely that it was seeking a method to develop a local revenue stream for projects of regional significance. As such, the grant application was oriented for a rural/small urban environment in accordance with this objective. Although various efforts were made to include provisions for a pilot project in recent legislation, the 81st Texas Legislature adjourned June 1, 2009, without offering policy direction. There has been interest expressed in broadening the pilot project to address other policy objectives that may support metropolitan area or statewide interests, and that policy direction will have to be articulated so that the pilot is designed to achieve the desired goals.

How should the outstanding policy questions be addressed? In other states, policy committees have been formed for the purpose of recommending overarching principles and criteria for the implementation of a new pricing approach. The Oregon Road User Study Task Force and the I-394 Express Lane Community Task Force are two examples. These two examples of policy task forces are described in Appendices A and B, respectively.

The broad policy questions critical to advancing mileage-based fees in Texas are outlined below.

Program Goals

It will be important for policy makers to articulate what the goals of the potential mileage fee system will be. Revenue generation is likely to be a major policy goal, but will the goal be to maximize and increase revenue? Or should the system remain revenue neutral with the fuel tax? Is the mileage fee being instituted as a replacement to an existing tax or is it a supplement? A supplement implies that drivers will be paying more, whereas a replacement implies that revenues will remain neutral and drivers will pay the same amount under the new mileage-based system as they did under the old, fuel tax-based system. The answers to these questions will dictate the development of fee calculation and other accounting related aspects of the fee system.

If the mileage fee is to act as a replacement fee, then policy makers will need to determine which fee is to be replaced. Most of the discussion regarding mileage-based fees assumes that they will ultimately be replacing the fuel tax. However, the fuel tax may not be the most appropriate fee to replace. Registration fees, for example, are used as a transportation financing mechanism but they are tied even less to actual use than fuel taxes. Transitioning registration fees to mileage-based fees has many advantages over a fuel tax transition in that it would remove the need to reimburse drivers for fuel taxes paid at the pump and would maintain the incentive to purchase more fuel efficient cars by continuing the fuel tax.

Policy makers will also need to determine whether congestion management and mitigation will be a primary goal of the system. Will the system be used to send price signals that create peak period shifts in time of travel, mode of travel, or route choice? Local revenue retention and the provision of value-added services are also potential program goals.

The definition of program goals will drive the development of the system, as various system attributes will be required to satisfy certain policy goals. For example, if revenues are to be distributed among the various jurisdictions within which mileage has accrued, the mileage-fee system will need to utilize equipment that collects data, not just on how much users have driven, but also where they have driven. A system of this sort will be more complex and entail a higher public education burden. A system where revenues are allocated based on facility specific mileage will require additional technology, and so on.

Phase-In

The period during which a new transportation financing mechanism is phased in will be crucial. But how will it occur? Will all vehicles be mandated to participate or will phase in allowed to occur gradually under a voluntary basis? Furthermore, is it desirable to have a date by which all vehicles using the transportation network will be required to participate? Will all new cars manufactured after a certain date be required to come equipped with the appropriate technology?

Additionally, policy makers will need to decide whether a "two-tier" system is desirable and implementable. The idea of a system with a "low tech" and "high tech" track is attractive from many standpoints. Users could opt for an odometer reading or an on-board unit that features different value-added services. Those users participating in the odometer reading would pay for all miles while those users with an on-board unit could be credited for miles driven on non-taxable roads (e.g., out-of-state roads or private farm roads), further incentivizing participation in the high tech track. A low tech track could be quickly established and begin to develop public familiarity with the concept of mileage-based charging. Initial participants in the high tech track could demonstrate the system's ability to protect privacy and fairly and accurately assess charges. The establishment of a market of on-board users could pull the development of new bundled features and applications.

Who Pays?

While this may seem rather straightforward, as most of the discussion regarding VMT fees has occurred within the framework of developing a new "user" fee system, the question of who pays is actually not so straightforward. For example, in a "user" pays situation all vehicles using the roadways would pay for the use of those roadways. This implies that all vehicles are participating in the system, which further implies that a complete phase-in has occurred. However, it is unlikely that this will be possible in the near term.

For purposes of developing an implementable mileage-based fee system in the near term, a more refined (and attainable) definition of "who pays" will need to be articulated. This definition may include (but is not limited to):

- Those who (or eventually would) fall outside of the traditional fuel tax collection framework (i.e., electric vehicles)
- Those who currently underpay for their use of the road system (i.e., drivers of hybrid and otherwise highly fuel efficient vehicles)
- Polluters (drivers of low fuel efficiency vehicles, large trucks)
- Vehicles that contribute more to wear and tear on roadways
- Vehicles travelling during congested periods of the day
- Any combination of these, plus those who wish to voluntarily participate due to do any added value applications a VMT fee system might provide.

Control of Revenue

A VMT-based fee system has the *potential* to significantly alter the existing federal, state, and local transportation revenue distribution system as such a system could be developed so as to allow for local retention of funds. This is fundamentally different from the existing system wherein revenues leave an area and are returned through federal and state apportionment processes. Allowing for revenue to be retained at all levels could possibly eliminate the role of the federal government as a "redistributor" of transportation funds, which could, in turn, reduce revenues available for "donee" states and provide more revenues for "donor" states. A fundamental question is thus "should the federal government retain this role?" A decision by policy makers will be required with regards to how they wish to see revenues from a potential mileage-based fee system distributed.

This is an important element, as local retention of funds has been shown to be a particularly attractive aspect of mileage-based fee systems in public acceptance research. Framing use-based alternatives as a mechanism for increasing control of locally-generated revenues and placing more of the onus for planning efforts on local officials will likely increase the public's receptiveness to these alternatives.

Furthermore, identifying preferred revenue distribution processes will help inform the development of mileage fee administrative mechanisms. If revenues are to be collected by the federal government and distributed to states and local government in a manner similar to the current system, then it is unlikely that new administrative procedures will need to be in place. However, if local entities are to retain a portion of revenues generated within their jurisdiction, then new administrative entities and procedures will need to be developed so as to facilitate the process.

Privacy vs. Transparency

While research into mileage-based user fees has generally concluded that privacy issues are paramount, the same research has revealed that under a mileage-based fee system the public will want transparency. However, transparency will more than likely come at the cost of privacy. Being able to dispute charges will necessarily require the collection and retention of driver data and, if facility specific pricing is to occur, locational data will also be required. Policy makers will need to determine the appropriate balance between protecting driver privacy and ensuring transparency.

For example, achieving the goal of local revenue retention means that the system will almost certainly require vehicles to be equipped with on-board units with GPS that can differentiate between travel within various jurisdictions and on various types of facilities, increasing the amount of data required for the system and potentially decreasing driver privacy. Congestion pricing applications will require on-board units to be able to determine the time of day travel is occurring.

It is also worth noting that limiting what information can leave the vehicle impinges greatly on the ability of many potential added-value services and applications to function adequately. Limiting what information can leave the vehicle would also require an initial degree of trust from users in the computation of their bills. Customers generally trust utility companies to accurately meter their electricity and water usage. Cellular phone bills, though, typically come with a full record of calls attached to them.

The European Union has prohibited any location information whatsoever from leaving the vehicle in European mileage and distance-based fee systems. In other words, on-board units will have to perform all of the charge computation on the vehicle. The vehicle's on-board unit will have to store a rate schedule, compute an amount owed that is sent back to a billing office, and store the travel history so users can verify their bill. However, many TTI research participants, as well as interviewees in the tolling, telecommunications and computer hardware industries, did not see the need for such limits. In the judgment of these participants, drivers' sensitive information could be handled using safeguards similar to those used by the financial and insurance industries.

There may be less extreme options. Texas could legislate that detailed travel information is allowed to leave the vehicle only if a driver waives his right to travel privacy. Alternatively, Texas could legislate that travel information is allowed to leave the vehicle if it is stripped of some level of specificity. For instance, travel information could be aggregated by roadway type or time-of-day, which would permit providers to furnish drivers with a more detailed bill.

The broad base of existing toll tag users in the state has not been factored into the acceptability equation, since the Texas research to date has centered on rural application of VMT fees. These urban toll users are already accustomed to billing systems that have records of location and time of use. Will the new system be interoperable with existing toll back office systems?

"Old" or New Technology?

Will Texas pursue existing technology options or incubate next-generation technological solutions? Odometer readings could be implemented today with an agreement with state inspection outlets and a contract with some entity to invoice drivers. The technology for a system consisting of GPS-equipped on-board units that communicate with a central office is theoretically available today. The major communications technology being discussed today—cellular communications—is, however, cost-prohibitive. With cellular communications, every data transmission is essentially a phone call. At the low end, operating costs of $5 per vehicle per month are being quoted. The gas tax costs about $0.20 per vehicle per month to administer. Costs that are higher than this will likely be seen as burdensome. One option is to pursue cellular-based on-board units and bundle enough services in the unit that users perceive $5 per month worth of value. Bundling other revenue-raising applications such as parking payment, pay-as-you-drive insurance, and tolling applications in the on-board units could help to spread costs thinner.

Another path toward a cost-effective system might involve combining cellular-communications with another communications technology that is cheaper to operate. Most other communications technologies require some sort of roadside physical infrastructure. Because it is likely cost-prohibitive to achieve statewide coverage of roadside infrastructure, it would seem that a MBUF system in Texas will need cellular-equipped OBUs.

There are intriguing opportunities to reduce operating costs significantly by coupling cellular communications with a second communications technology. Other communications technologies (Digital Short Range Communications [DSRC], WiFi, Zigbee, etc.) operate in a more localized manner and are essentially free to operate. Data transmissions through these technologies are more similar to a file download than a phone call. There may be chances to use existing toll infrastructure in urban areas and combine it with strategically placed readers near frequently traversed roadways. OBUs would be programmed to wait to upload data until they pass near a reader, but to send data via cellular connection if a reader has not been passed within a specified period. While much discussion of localized communications technologies has focused on smaller readers that are placed all along roadways, one could design high-capacity readers that would be placed near freeway intersections. Strategically placed high capacity readers could capture significant numbers of drivers and reduce maintenance burdens.

In the long run, developing these optimizations could be a better way to bring system operating costs down to a reasonable level. Quite simply, it might be a safer option to develop a cheaper system than to pursue a more expensive system and count on users to perceive it as valuable enough. Texas could be a leader in a dual-technology system, but a concerted effort will be required.

Recommendations: Strategy for Developing and Conducting a Pilot Project

It is suggested that TxDOT and its partners continue to explore mileage-based fees building on the momentum gained from the baseline research, the national symposium, and the discussions held in consideration of the proposed pilot study legislation (House Bill 3932). Texas is considered one of a handful of states leading the research and discussion in this area.

Federal grant funding can be pursued at the point at which FHWA issues a solicitation for proposals, but progress can be made in the interim given that the timeframe is unknown. Furthermore, the case for federal funding can be made stronger by demonstrated action at the state level under a systematic approach for developing policy direction, defining system architecture, and engaging in public dialogue.

Step 1. Define Policy Objectives
Form a policy task force on mileage-based user fees to provide recommendations to the Transportation Commission and Legislature on the guiding principles for developing a new system. Broad participation is recommended, including representation from the Legislature, Transportation Commission, urban and rural interests, stakeholders from transportation user and advocacy groups, and the transportation research community.

The purpose of the task force would be to develop guiding principles that reflect the needs and values of the State of Texas and to create of forum for public discourse. The policy discussion would benefit from and be informed by the data and findings of the existing research, including the public acceptability framework developed in initial TTI research in northeast Texas. Recommendations of the task force would form the basis of the policy objectives for the pilot project. To increase effectiveness of a task force approach, there also should be consideration of the appropriate entity to lead the task force/policy-setting effort, with emphasis on the strength of the sponsoring agency's public credibility.

The Task Force approach provides a secondary benefit in creating educated project champions who can serve as spokespersons for future initiatives. There is a pending question of whether or not legislative authority will be required before proceeding with development of a pilot project.

Step 2. Develop a Concept of Operations/Functional Requirements
Based on the resulting policy objectives, a "Concept of Operations" would be developed for the proposed pilot project.

- This document will identify a concept design for the pilot project that describes system architecture, objectives, scope, and functional requirements. Public education/outreach should also be addressed in the concept design document.
- This document will not specify technology or detailed requirements, but will speak to the operational objectives, information needs, and overall functionality of the road user fee system.

Step 3. Pursue Private Sector Partner for Pilot Implementation

- The concept of operations will be used as a basis for developing a request for proposals (RFP) to seek a private sector partner to implement the pilot project.
- The intent is to (1) harness private sector creativity and innovation, and (2) leverage public funding to seek a partner who has interest in testing their road user fee system approach.
- The private sector participant would financially contribute to the cost of the implementation.
- A selection panel representing TxDOT and partner agencies, with input from researchers and other experts, will select the private partner based on "best value" proposal.

Step 4. Implement Pilot Project

After selection of private partner, the pilot would be implemented.

Step 5. Evaluate Pilot Project

- During and following the implementation of the pilot, researchers will conduct an independent evaluation of the effectiveness of the demonstration in achieving the stated objectives.
- The evaluation will also include (1) an assessment of the feasibility of state-wide implementation of the program, and (2) legislation to implement a road user fee in Texas.

APPENDIX A: Case Study of Oregon Road User Fee Task Force

Before embarking on its Road User Fee Study, the State of Oregon and the Oregon Legislative Assembly established the Road User Fee Task Force (RUFTF) through Oregon House Bill 3946 in July of 2001. The bill noted that:

1. "An efficient transportation system is critical for Oregon's economy and quality of life.
2. The revenues currently available for highways and local roads are inadequate to preserve and maintain existing infrastructure and to provide funds for improvements that would reduce congestion and improve service.
3. The gas tax will become a less effective mechanism for meeting Oregon's long-term revenue needs because:
    a. It will steadily generate less revenue as cars become more fuel-efficient and alternative sources of fuel are identified; and
    b. Bundling fees for roads and highways into the gas tax makes it difficult for users to understand the amount they are paying for roads and highways."

Having established this, the RUFTF was charged with the developing a design for revenue collection that would replace the current system. The task force was to consider all potential revenue sources. Specifically, the task force was to "study alternatives to the current system of taxing highway use through motor vehicle fuel taxes," gather public comment on alternative approaches, and then make recommendations to the Oregon Department of Transportation (ODOT). ODOT would then design a pilot to test the alternatives recommended by the task force.

The RUFTF was composed of 12 members: two members of the state House of Representatives, two members of the State Senate, one representative of the telecommunications industry, one representative of highway user groups, one representative of the Oregon transportation research community, one representative of national research and policy making bodies; one elected city official; one elected county official and two representatives of the Oregon Transportation Commission. Non-governmental task force members included representatives of the Oregon Highway Users Alliance, Pacificorp, the Cascade Policy Institute, the Oregon State University School of Engineering, and Bank of America.

The RUFTF enabling legislation also established how pilot project study participants would be reimbursed for any fee paid in the course of the study and set aside money from the State Highway Fund to conduct the pilot study or studies. In making recommendations, the members of the task force were only required to reach majority support, but it was customary whenever possible to reach full consensus on all decisions.

The task force met nine times over the course of two years. In the course of these deliberations it established several sets of criteria and submitted eight overarching criteria to the State Legislature as essential principles for an acceptable new transportation revenue source.

- **Users pay** – The new revenue system was to be founded upon user pay methods that directly related to the provision and use of road infrastructure and services.
- **Local government control of local revenue sources** – The state was not to appropriate revenue sources that are traditionally and primarily the province of local governments.
- **Revenue sufficiency** – The new revenue system was to have the ability to raise sufficient revenue to allow for the replacement of the gas tax as the primary revenue source for Oregon roads.
- **Transparent to the public** – The new revenue was to be visible to the persons paying it. Individual members of the public should know how much they pay in taxes or fees and understand how any new assessment was to be calculated.

- **Nongovernmental burden** – The new revenue source must not impose substantial burdens either on taxpayers or on private sector entities involved with tax, fee, or data collection.
- **Enforceability** – The new revenue source must be readily enforceable, resulting in minimal tax evasion.
- **Support entire highway and road system** – The new revenue source was to be designed to support the operation, maintenance, and preservation of the highway and road system for the state, cities, and counties in all parts of the state.
- **Public acceptability** – The new revenue source had to be acceptable to the public.

While the task force concluded that congestion pricing and tolling new capacity were both acceptable alternatives in terms of the eight criteria highlighted above, mileage-based fees were deemed to be the superior alternative and were recommended for further study.

Source: http://www.oregon.gov/ODOT/HWY/RUFPP/docs/RUFPP_finalreport.pdf

APPENDIX B. Case Study of I-394 Express Lane Community Task Force

The case study presented herein represents an example of a policy guidance task force that offered direction on a specific pricing-related project. Though the project does not focus on revenue generation, the process and make-up of the task force may offer an example for introducing new concepts.

The I-394 HOT Lane, also known as the I-394 MnPass project, is an 11-mile HOT lane project that has been operating in Minneapolis since May 2005. This was the first project to use tolling in the State of Minnesota. Five objectives were defined for the project:

1. Improve the efficiency of I-394 by increasing the number of people and vehicles using the HOV lanes;
2. Maintain free flow speeds for transit and carpools in the Express Lanes;
3. Use excess revenues, if available, to make transit and highway improvements in the I-394 corridor;
4. Use electronic toll collection (i.e., tags/transponders and readers), which do not require toll booths; and
5. Employ new Intelligent Transportation System (ITS) technologies such as dynamic pricing and in-vehicle electronic enforcement.

The I-394 Community Task Force was a 22-person group of leaders and citizens appointed by the Lieutenant Governor, by the House and Senate leadership, and by the communities themselves. The Chairman of the Task Force was appointed by the Governor. The task force was established to "assist the Commissioner of Transportation in delivering a project that reflects the needs and values of the corridor and broader community to create of forum for public discourse."

Mayor or City Council and citizen members from the cities along the corridor were represented. In addition, House and Senate legislators, private sector organizations (AAA Minnesota/Iowa, MN Trucking Association), public organizations (Downtown Minneapolis TMO and Transit for Livable Communities), public agencies (MPO, transit, county, Mn/DOT), and private citizens are represented.

The Community Task Force met monthly beginning 20 months prior to and through project opening. It provided guidance in the following areas, with majority and minority opinions documented:

- Access Points/Traffic Operations
- Hours of Operation
- Enforcement
- Dynamic Message Signs
- Toll Rates
- Type of Vehicles Allowed
- Transponders
- Expected Revenues
- Public Outreach
- Project Evaluation

Source: http://www.mnpass.org/systemstudy_archive.html

TASK 5: TxDOT PROJECT TRACKER

WHY PERFORMANCE MEASUREMENT IS A GOOD IDEA, AND WHY TxDOT IS USING IT

What is Performance Measurement?
Using a variety of data sources to identify what is happening and why. The key questions to be answered by the measurements are:

- What is happening on the transportation system?
- Why is that happening?
- Are conditions or performance getting better or worse or staying the same?
- What group is in charge of making that happen?
- What can be done to improve, if needed?

The major process elements are:

- Identify key agency functions, responsibilities, and audiences for performance information.
- Define the vision and goals for each function.
- Develop a set of performance measures.
- Ensure that the effect of the potential treatments is identified by the measures.
- Collect or estimate the data items.
- Calculate the measures.
- Use the findings (operations improvements, policy changes, reports/websites).

Performance Measurement…
is about using measurements and performance information to identify situations or functions that are meeting the needs of users and those that are not. It is not usually about collecting more data.

Motivations for Undertaking Performance Measurement
There are four typical motivations for agencies to undertake performance measurement:

1. **Legislative Mandates**. State legislatures have required transportation departments (as well as other state agencies) to engage in a formal performance measurement and reporting process. Performance measures were undertaken—initially—to feed this mandated reporting process. As managers learned that there is intrinsic value in measuring the condition and performance of transportation system elements for their own purposes, however, use expanded.

2. **Agency-wide Performance Measurement Initiatives.** Even in the absence of legislative intervention, DOTs and MPOs have initiated department-wide performance measurement programs for a variety of reasons. Usually these link a combination of "customer focus," improved public relations, better service to citizens and travelers. Like legislative mandates, these efforts result in periodic reports on the internet and in paper. The format and content vary according to the topic and geographic coverage.

3. **Formal Business Plan Linkage.** Several agencies have taken a formal business plan approach to the actions. A business plan can be dictated by DOT upper management or initiated by an internal operations or functional champion.

4. **Quantification of Program Benefits.** DOT personnel are discovering that when it comes to competing for internal resources and visibility, they are at a disadvantage without data to "tell their story." Infrastructure maintenance programs (e.g., bridges, pavements) have a long history of documenting the effects of their program on users and the system condition. "Not having the numbers" makes it hard to argue in favor of programs when others do have the numbers.

Possible Roles for Performance Measurement in TxDOT

Development of performance reports is a significant use for congestion-related performance measures. The frequency of publication varies from weekly to annually, but annual reports are the most common. The linking of performance measures (more specifically, changes in them over time or their level relative to target values) and investment decisions are an established practice in infrastructure maintenance and safety improvement programs. The best examples of actions taken based on congestion performance measures is the tracking of detailed output measures for incident management programs—agencies that act on these can gain greater efficiency and support for activities such as service patrol routing and schedules.

Other states have found excellent benefits by combining three elements of performance measurement:

- using the measures to improve agency performance,
- reporting more information about that performance in ways that improve the appearance of transparency, and
- using the data, measures, and communication techniques to support requests for additional funding.

Most performance measure uses and reports are for individual agencies, but collaboration (for example between MPOs and DOTs) is beginning to occur more frequently.

Performance Measurement Concerns

There are some legitimate concerns that have been expressed by DOT staff. These can be addressed with good communication techniques that focus on explaining the information rather than simply presenting the numbers. Providing information in a format that others can use to evaluate the measures or create different geographic groupings of measures.

- Measures are not seen as relevant by staff – *Remedy – Involve the staff in developing the measures.*
- Measure outcomes cannot be controlled by those that are being measured – *Remedy – Describe the limitations and applications of the measures.*
- Measurement requires additional time and data – *Remedy – Connect the measurement process with operations and investment decision-making.*

What Other States Have Done with Performance Measurement and Why They Began

Performance measure programs have been initiated by a range of causes, but most programs appear to be moving toward common points. They use a few measures for each agency function or transportation service element, they have been designed to meet the needs of both internal and external audiences, and they evolve over time.

How They Got Started

In many cases, the driving force for a performance measurement system was a crisis of some form. Either the problems faced by an agency or region were too great for the funding and available project solutions, or there were questions about the competency or effectiveness of agency leadership. Washington State had a citizen initiative remove about 1/3 of state transportation revenue in 1999, and the debate surrounding that vote made it clear that the public and elected leaders were concerned about the apparent inefficiency, lack of accountability, and growing problems in a number of subject areas *(1)*. Virginia's Dashboard began as an internal effort to gain control over cost and scheduling problems that sapped the DOT's credibility with the General Assembly and the public *(2)*. Maryland's Attainment Report *(3)* and Florida's Key Performance Measures *(4)* were developed as a way to improve the delivery of transportation products and services and to improve linkages between their long-range plan, financial plan and employee work processes.

The Washington State DOT Accountability Office refers to "information asymmetry" as the gap between what the DOT is doing and what the public knows about what the DOT is doing. In very basic terms, performance measurement is designed to address this gap and to aid staff improvement *(1)*.

How Did The Measures And Targets Get Set? What Measures Are Being Used For Congestion, Safety And Road Condition?

The typical evolution for a DOT measurement effort is to begin calculating many measures (more than 100 is common), identify a few that can be used with the general public and decision-makers, scale back the number of measures and then change the performance measures as the uses, audiences, and data sources change. There does not appear to be a single "correct" way to initiate the process, but some involvement by all stakeholders at the beginning can reduce the amount of confusion and staff skepticism. Some states have spent considerable time with a range of stakeholders on this initial stage, but most have been successful with a process that begins with staff, key decision-makers and a few stakeholders deciding which measures satisfy a set of criteria and then embrace comments and suggestions for change as a broad set of users are provided the data and interpretations. Criteria might include elements such as:

- Measures and data should be useful for internal processes and/or external communication about the effect of the investments and policies (do not measure only for the sake of measuring).
- Can be explained and understood by a range of users (although there are also good measures that are used solely for internal technical analyses).

- Include measures of agency activity and the outcome of that activity (example: a measure of on-time delivery of capacity expansion projects should be accompanied by a congestion measure).
- Can be calculated with available data or models – "start small, but report now" (as new data sources are identified they can be incorporated; very few processes have been successful with collecting data for the sole purpose of measurement programs).
- A communications plan should be incorporated from the beginning; text, graphs and easy-to-understand measures should lead the program, with data as a supporting, rather than controlling, element.

Who Is Involved in Reviewing the Measures and How Often?

Previous state DOT experience and research on private sector performance initiatives indicate that it is important to link everyday employee tasks to some element of organizational performance and then measure the performance in a way that holds employees accountable for their contributions to overall agency performance. The Missouri DOT *(5)* has a quarterly meeting run by their Executive Director in an auditorium setting. The "owner" (person responsible for performance in a particular area) describes the data and updates the performance for their measure in a way that recognizes that managers can learn from each other. This atmosphere also uses an element of peer pressure to improve performance and the data and measures, as well. Several agencies use the concept of "ownership" to connect the performance to measures and data. North Carolina DOT *(6)* may be the leading agency in this arena—each employee has an individual "Dashboard" that that represents a move to a results-based performance management (not just measurement) system.

What Measures Are Used?

All of the state DOT performance measurement experts contacted for this study indicated that the measures must relate to employee and agency activity and include measures of both activity and performance. The mix of measures may include some that are purely internal (only used to manage agency activity and investments) and some that are only external (used for communication purposes), but desirably the data and measures should serve both functions. This ensures that there is a "real" purpose behind the measurement effort and that the data and measures will be constantly scrutinized in a way that would not happen if the data were only used "for the monthly report."

Another aspect of performance measurement is the "when?" element. Regular reporting is important, but before-after studies also form a vital link between spending increases and showing the public what they are getting for their money.

A sample of the measures for some of the key elements is presented below. All of these measures can be calculated with data currently available to TxDOT.

Pavement condition – The percentage of highways in "Good" or better condition is a typical metric that is directly collected as part of TxDOT's pavement maintenance program. The measure is used at the system level, as well as at the regional and road section level. Road segment data are used to calculate the regional values, as well as to identify sections with

problems. North Carolina uses an infrastructure health index in an attempt to link several condition aspects, as well as communicate to a non-technical audience *(7).*
Congestion – A variety of travel time and delay measures are used to indicate congestion levels on specific roads. Some of these are estimated from:

- Travel Time Index and Delay per capita are used at the regional level.
- Travel Time Index and Level-of-service measures are used for corridor analyses in several states (LOS is used in rural corridors where congestion is not a frequent concern).
- A frequent agency activity measure is incident clearance time.
- Most of the congestion measures are calculated with RHINO-type data and similar procedures. They can be improved with estimates of incident congestion.

Safety – Deaths and injury or fatality rates (e.g., crashes, injuries or fatalities per million vehicle-miles) are used in almost every state surveyed, with before-after safety studies being a part of a few detailed crash reduction programs.

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2) http://www.vatransperforms.virginia.gov/summary.html
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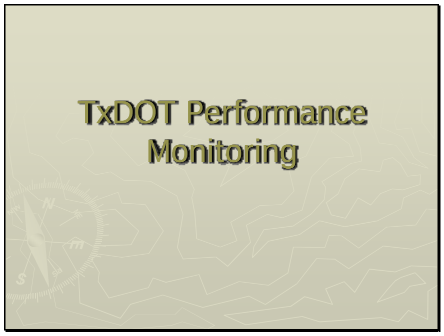
4) http://www.dot.state.fl.us/BusinessModel/MeasurementAnalysis&KM.shtm
5) http://www.modot.gov/about/general_info/documents/Tracker_April09/FullTrackerApril09.pdf
6) http://www.ncdot.org/download/performance/Volume6.pdf
7) http://www.ncdot.gov/programs/dashboard/

PRESENTATION: TxDOT PERFORMANCE MONITORING

Slide 1



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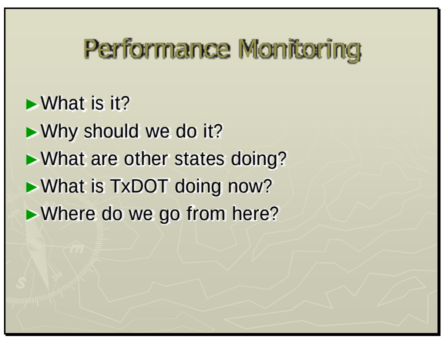


The basic questions we hope to address in this presentation are…

What is performance monitoring?

Why should we do it?

What are other states doing?

What is TxDOT doing now?

Where do we go from here?

Slide 3

You all have heard the negative comments about our agency….”no input needed, dishonest, doing it wrong, tunnel vision, low confidence from public, leadership in denial”

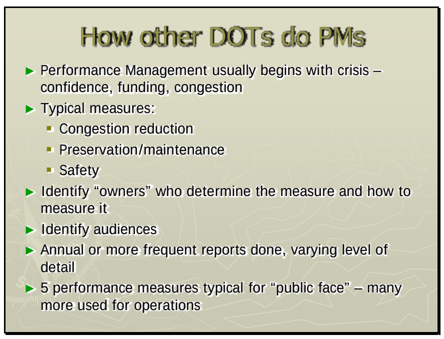
With your help, we are making change. We are improving our reputation. My goal is to work side by side with you to tell our story in a way that rebuilds the trust. Being upfront and honest about our goals, performance monitoring, project successes and problems, how we spend their money, why we do what we do…Let’s invite the public inside so that they better understand our organization. Let’s show them all the many things we do right and explain problems that surface.

Other states have taken bold steps to address similar issues. Texas has a great opportunity right now to turn our negative image around.

Slide 4

Please double click on the picture to watch this 2 minute video presentation taken from three news stories about TxDOT.

Slide 5



Performance Measures are critical for understanding how we are doing as an organization. Like many other states, TxDOT is starting from a crisis where confidence has declined, congestion is up, pavement condition is down, and funding is being reined in by state legislators.

Most states have a basic set of performance measures: items like reduce congestion, preserve and maintain infrastructure, and increase safety. Additional measures are often found, but these three are almost always present.

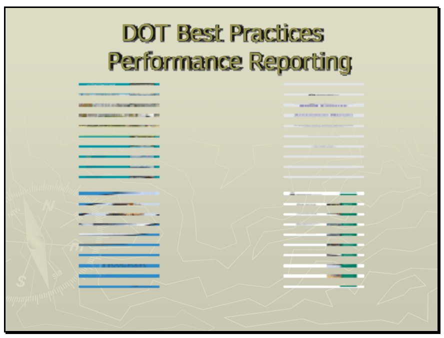
What seems to work well in other states is having measurement "owners" who determine the measure and decide on how to measure it. Having an owner means that the person who is directly involved in delivering that good or service is accountable, empowered since they are the ones who developed the measure in the first place, and will have more interest in using the measure and following through with reporting and explaining accomplishments.

Identifying the audiences…is the measure something that will go on a website or in a report for the public or will it be used as an internal measure? Hopefully, most of our measures will have internal uses – nothing saps the strength of a measurement program like being tabbed "just something we do for the website."

States that can show what they have done in that reporting period (be it annually or quarterly) have received praises as being more transparent and accountable.

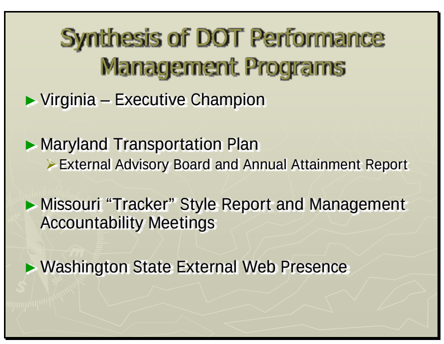
When developing performance measures, keep it simple. A smaller list of five measures is typical for the "public face," but there may be many more.

Slide 6



- In March, a scan tour was completed of four states known for their accomplishments in performance management.
- We brought back products and processes from Virginia, Washington, Maryland and Missouri for incorporation into our program design.

Slide 7

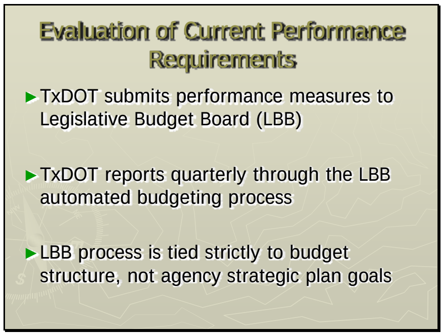


- Virginia, faced with similar confidence issues, developed the first performance dashboard. Monthly performance meetings run by an executive champion, have raised the "accountability" of the agency to all the stakeholders.
- Maryland has consolidated their long range transportation plan and legislatively required strategic plan into one planning document structured around agency goals and performance. Lead by an external advisory board the goals and budget targets are defined for five years. The annual progress towards their 5 year goals is reported in the Attainment Report.

- Missouri utilizes 18 tangible results and 17 agency values instead of traditional goals and strategies to focus performance reporting.

- WashDOT's external website utilizes "performance journalism" to describe their measures. We have chosen their site as a model for our SharePoint web site development. Their reporting was one element of their recovery from losing a 1999 election that cut their revenue by 30%, to gaining a 5 cent and 9 cent fuel tax increase in two successive legislative sessions in 2003 and 2005.

Slide 8

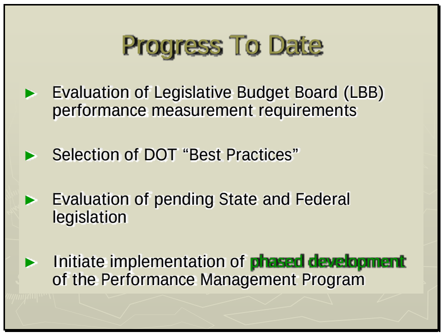


- Currently, TxDOT submits quarterly performance reports to the LBB through the automated budgeting process.

- The LBB performance measurement report is tied to the budget authorization process only.

- Ideally, the new performance management program tied to the agency strategic goals will replace the LBB reporting requirement

Slide 9



To Date we have focused our efforts in four areas:

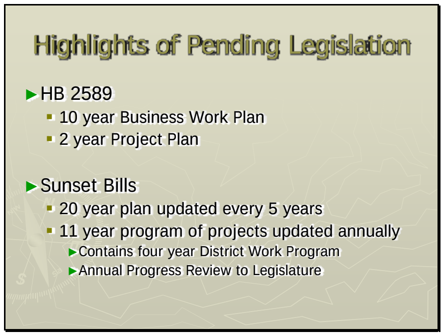
- Identification of existing Performance Reporting activities.

- Evaluation of DOT Performance Measurement Programs

- Evaluation of pending state and federal legislation defining performance measures and reporting requirements

- Finally, defining phases of implementation

Slide 10



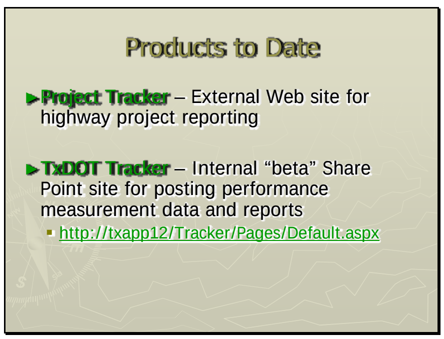
Current key themes under the Sunset and HB 2589 are

1. Consolidation and simplification of SP/TTP...planning documents

2. Collaboration and agreement of all planning entities... MPO/RPO/TXDOT

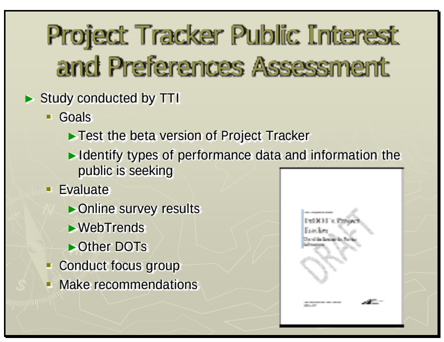
3. Development of a Project Plan (10 or 11 years)...tied to performance measures, financial constrained and updated annually

Slide 11



Invite you to sample the electronic data reporting tools developed by Technology Service Division.

Slide 12



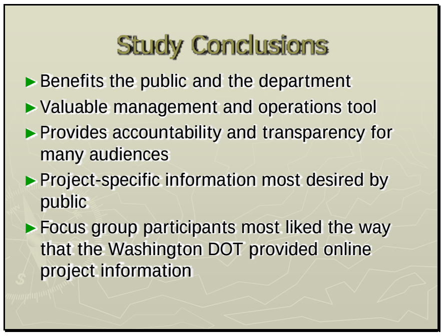
The Texas Transportation Institute conducted a public interest and preferences assessment for Project Tracker. They tested Project Tracker and identified performance data and information the public is seeking.

They evaluated our online survey results, looked at WebTrends, which is our software that tracks what people are looking at and the number of hits Project Tracker receives, and studied how other DOTs share project information.

Additionally, a focus group was held where participants evaluated Project Tracker and were given a tour of what other DOTs provide to the public.

Based on the feedback from the surveys, focus group, and evaluation of other DOTs, TTI developed recommendations for Project Tracker.

Slide 13

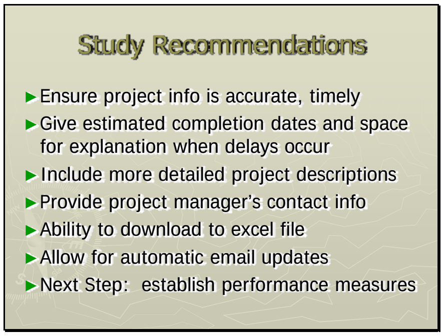


TTI found that :

Project Tracker benefits the public and the department.
Project Tracker is a valuable management and operations tool.
Project Tracker improves the department's transparency and accountability.

The public most desires project-specific information because projects are what they see and are faced with on their daily travels. What is being done or is planned for my routes to and from work, school, shopping? These projects impact them the most. After looking at four different DOT websites, the focus group participants expressed most favor toward Washington DOT's online project information. One participant commented on its user-friendliness, "The Washington project level webpages don't look like they were done for transportation professionals."

Slide 14



We need to ensure project information is accurate, timely, and explains changes. If unforeseen problems surface, use PT as a way to explain why.

Give estimated completion dates and allow room for explanation when unforseen delays occur.

Provide more detailed project descriptions and project manager's contact information (not just the public information officer).

Give the user the ability to download files to excel (not just pdf).

Create the option to sign up for automatic email updates.

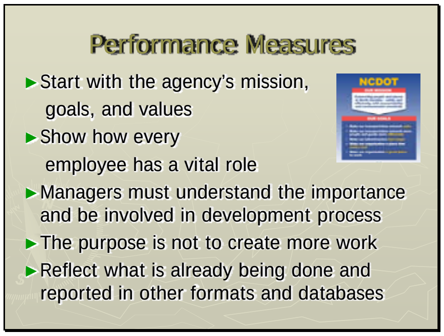
A comment from one participant was, "for complete transparency, all projects need to be included online."

Find ways to use the information that

we all use to do our jobs, rather than collecting some new pile of data "just for the report."

Based on department goals, establish performance measures to understand how we are meeting our goals. How will we know we are doing better if we don't have some way to measure our successes? We will show the public that we deserve their trust and their financial resources to make positive change in our transportation system.

Slide 15



How will we establish Performance Measures?
We will start with the agency's mission, goals and values. And we will start with you.

Each employee will have a role. They will be able to see how their job directly relates to at least one performance measure.

Managers will be involved in developing performance measures. This is where the accountability and empowerment comes in. We are working as a team to meet this challenge.

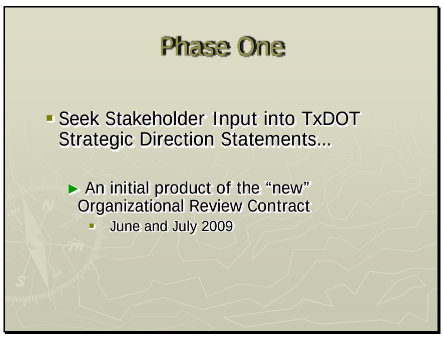
We certainly don't intend to create more work. In many cases, these data and measures are probably already being tracked and maybe even reported in some fashion.

Slide 16

Recognizing the comprehensive and collaborative requirements of the best Performance Management Programs, we suggest a Phased Implementation Approach.

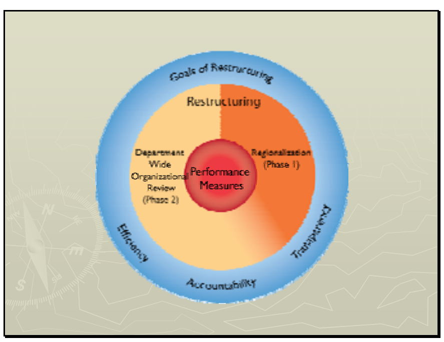
Performance Management is really just taking the performance measures and using them to improve what we do and how we do it.

Slide 17



- Utilize the recently approved Organizational Assessment Contract to engage our stakeholders and interested public in the development of strategic direction statements defined by "measurable" goals.
- These direction statements will become the foundation of the formal Performance Management Program.

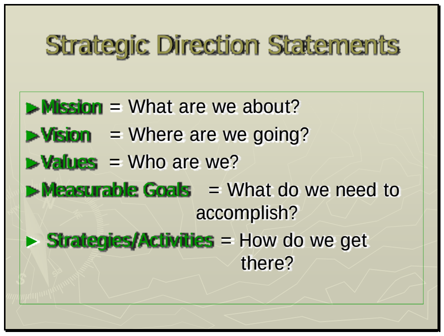
Slide 18



This circular graphic depicts the relationship of the ongoing organizational restructuring project, Phase I and Phase II, to the Department's Performance Management Program. The agency's organization should be formulated to address the expectations of the agency as defined by performance objectives and reported through measurement.

The Performance Management Program is at the hub of our ability to be more efficient, accountable and transparent in the conduct of our work programs.

Slide 19

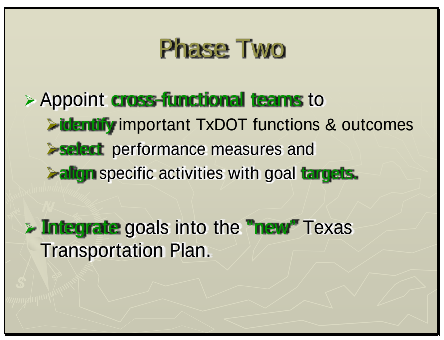


The Direction Statement
We will be asking our stakeholders and interested public to assist us in the drafting and refinement including:

Mission = What are we about?
Vision = Where are we going in the next 40 years?
Values = Who are we?
Goals = Where do we want to get to in the near term and how much do we use to get it done?

Agency leadership and staff will then develop the strategies and performance measurements.

Slide 20



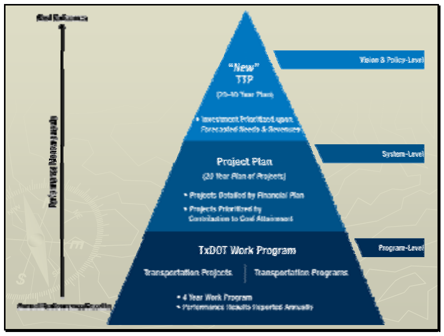
Once the Department's strategic direction statements have been adopted, then we invite internal and external subject matter experts to define activities, performance measures, and performance targets.

This is the beginning of a goal focused and performance accountable Strategic Transportation Plan.

Slide 21

For your edification, we have drafted a sample "measurable goal statement." Of particular interest is the ***Target*** and its commitment of the agency's resources.

Slide 22

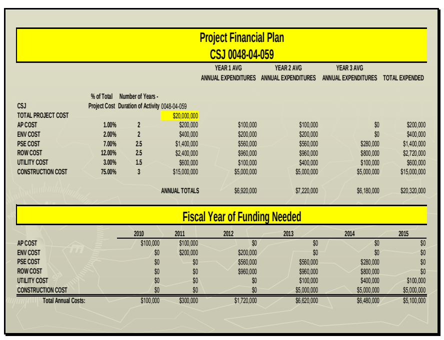


This Planning Pyramid provides graphic illustration of the interrelationship of a policy level long range plan to the system level Project Plan and the ultimate Work Program.

This depiction is consistent with both Maryland and Florida DOT planning process and is currently being discussed by our Uniform Transportation Plan Work Group.

The next slide depicts an "example" of a Project Level Financial Plan. These plans will be essential to the measurement and reporting of our agency's ability to deliver our product "on time" and "on budget."

Slide 23



Project Financial Plan
CSJ 0048-04-059

CSJ	% of Total Project Cost	Number of Years - Duration of Activity	0048-04-059	YEAR 1 AVG ANNUAL EXPENDITURES	YEAR 2 AVG ANNUAL EXPENDITURES	YEAR 3 AVG ANNUAL EXPENDITURES	TOTAL EXPENDED
TOTAL PROJECT COST			$20,000,000				
AP COST	1.00%	2	$200,000	$100,000	$100,000	$0	$200,000
ENV COST	2.00%	2	$400,000	$200,000	$200,000	$0	$400,000
PSE COST	7.00%	2.5	$1,400,000	$560,000	$560,000	$280,000	$1,400,000
ROW COST	12.00%	2.5	$2,400,000	$960,000	$960,000	$800,000	$2,720,000
UTILITY COST	3.00%	1.5	$600,000	$100,000	$400,000	$100,000	$600,000
CONSTRUCTION COST	75.00%	3	$15,000,000	$5,000,000	$5,000,000	$5,000,000	$15,000,000
			ANNUAL TOTALS	$6,920,000	$7,220,000	$6,180,000	$20,320,000

Fiscal Year of Funding Needed

	2010	2011	2012	2013	2014	2015
AP COST	$100,000	$100,000	$0	$0	$0	$0
ENV COST	$0	$200,000	$200,000	$0	$0	$0
PSE COST	$0	$0	$560,000	$560,000	$280,000	$0
ROW COST	$0	$0	$960,000	$960,000	$800,000	$0
UTILITY COST	$0	$0	$0	$100,000	$400,000	$100,000
CONSTRUCTION COST	$0	$0	$0	$5,000,000	$5,000,000	$5,000,000
Total Annual Costs:	$100,000	$300,000	$1,720,000	$6,620,000	$6,480,000	$5,100,000

Each project in the system level plan would be identified by a Project Financial Plan.

The Plan will require accountability in all areas of project expenditure:

- ✓ preliminary design,
- ✓ final design,
- ✓ environmental processing,
- ✓ right-of-way acquisition,
- ✓ utility relocation, and
- ✓ construction.

Slide 24

Two Performance Management reports will be supported…

- TxDOT TRACKER for monthly and quarterly project and program performance reporting and analysis.

- TxDOT RESULT for annual progress reporting and performance journalism. This report is essential to tracking progress towards strategic goals annually.

- These reports are used by and for the staff in their daily jobs. They rely on this data, thus have a vested interest in accurate data reporting. The usefulness of TxDOT results relies on the accuracy of TxDOT Tracker.

DRAFT FOCUS GROUP SCRIPT

Part 1 – Sign Consent Forms (prior to beginning of focus group) – 5 minutes
Participants will be asked to read and sign a consent form that has been approved by the Institutional Review Board at Texas A&M University. Participants will also be invited to enjoy beverages and snacks.

Part 2 – Welcome and Introductions – 10 minutes

Welcome to the focus group today. Thank you for taking time out of your busy schedules to talk with us. I'd like to begin by telling you about how the group will work and then we'll get down to the specifics of our topic for the day.

How many of you have participated in a focus group before?

The success of the group depends quite a bit on how willing you are to share with us what you think. So, I'm asking you right up front to be open and forthcoming, and not to worry about what I might think, or what others in the group might think about what you say, or even if you are giving a viewpoint that disagrees with someone else's. We're not really talking today about matters that would be considered very sensitive, but the topic is one that we would expect people to have differing opinions on, so I do want to encourage lots of dialogue. Don't worry about the tape recorder. We will keep the tape to ourselves and just use it to help us with our notes. Try to forget that it's there. Let me assure you that we will always keep everything you say anonymous.

Having said that, I want you to relax and enjoy the conversation. But I do have to ask that you talk one-at-a-time, you not have any side conversations, and you speak loudly so that everyone can hear what each person has to say. I don't expect our discussion to last more than about two hours. If you need to get more refreshments or use the facilities around the hall, please feel free to get up at any time.

First I'd like us to have some brief introductions. I'll start with us…

Now, let's go around the room and say your first name only (because we're keeping this anonymous), and a little bit about who you are, how long have you lived in the area, and what you do for a living.

OK, now we're ready to get on with the topic at hand. TTI is working with TxDOT to gain a better understanding of how people perceive transportation and travel throughout Texas. They are also interested in your priorities and the direction you feel the department should be moving in.

Part 3 – Impressions of TxDOT and transportation in Texas – 15 minutes

I'd like to begin by asking you to give me your impressions of TxDOT. Let's start with you telling me what you think the responsibilities of the department are. Do you feel the department meets these responsibilities? How so, or why not? What are your overall impressions of the agency? Have you had any personal dealings with the department? How was that experience?

Part 4 – What does success look like for the department– 10 minutes

What do you think makes TxDOT a successful agency? How would you change the department? What should the department focus be? If you had to think of 3 goals for the department, what would they be?

Part 5 – Priority scenarios – 45 minutes

I want to talk to you for a few minutes about transportation funding.

Here's the short version of how it's done in Texas at the state level. There are three main sources of money: the state fuel tax that you pay at the pump when you buy gasoline or diesel fuel; the federal fuel tax you also pay at the pump (most, but not all of that comes back to Texas; and vehicle registration fees that you pay every year. The money from those sources, plus a few others, then goes to fund roadwork and new roads for the state highway system. It can get much more complicated than that, but that's the basic process.

So here's the problem: the last time the gasoline and diesel fuel tax was increased was 1991. It's been 20 cents since then. But, because of inflation, because cars and trucks use less gas than they did 15 years ago to travel the same distance, and because our State continues to grow with more people and more vehicles, the amount of revenue that is available is now only enough to pay for about a third of the transportation needs we have. In short, as the Texas population and economy has grown, our revenues haven't kept pace.

Now we're going to play a game of sorts. We've talked a little bit about the responsibilities of TxDOT. One of the biggest challenges of the department is addressing competing priorities. So, we're going to get your help with this. In this hypothetical exercise you have $100 to allocate to projects in your area. The handout that you have tells you how much that $100 will buy. You need to address each of the 3 topic areas: pavement and bridge quality, connectivity and congestion, and safety. You have about 15 minutes to complete this.

(Hand out) – *There will be a customized scenario for each focus group location.*

Now, let's talk about your decisions and why you made them. (20 minutes).

Based on what you've heard, I'm going to give you a few minutes to re-spend your money (5 minutes).

Did anyone change their allocation? How? Why?

Part 6 – Future Scenarios -15 minutes

Knowing what you know now, where do you think the department is or should be headed in the future? How will this impact our transportation system? Thinking about your plans for next 5-10 years, will your driving patterns change, what about your vehicle type? Will you consider a transit alterative? What would you think of alternative funding sources rather than the gas tax? How do you imagine the highway system will look on the next 30 years? *(prompt with ITS applications, if necessary)*

Part 7 – Final Remarks – 5 minutes

Again, I want to thank you for your time and participation. I want to give everyone a chance to say any final comments.

Part 8 – Have participants sign payment sheet and distribute $50.00/person.

FOCUS GROUP PROJECT PRIORITIZATION GAME SCENARIO – NACOGDOCHES EXAMPLE – FOR ILLUSTRATIVE PURPOSES

Prioritizing Texas Transportation Expenditures

The goal of the effort is to identify how citizens understand transportation funding and how they would deal with competing priorities.

Session Schedule – General Timing

- The session will begin with a 10-minute overview of funding and needs issues.
- Participants will be given 10 or 15 minutes to "spend" $100 on the transportation programs.
- They will be brought together to talk about their choices for 20 minutes.
- Then asked to "re-spend" their $100.

TTI staff will compare initial spending values to final and identify topics or messages that seemed to excite or agitate citizens.

The way this program provides value for the research staff is if the citizens understand the effect of their choices. The choice set can be informed by the current condition, spending and performance data, as well as future needs; the observations should be localized for each region. To the extent possible the choices should result in outcomes that are familiar to the participants. An example of the topics and possible choices/outcomes is below. Each focus group area would have a similar set of data put together using the 2030 Needs Report, current spending, and current condition and performance information.

The $100 value should be calibrated so that if citizens spent $100 in the way that current transportation decisions are made, the results would be similar. These not only have to be correlated with the state revenue situation, but they also have to relate to the amount of funding that a local area can expect to receive. So the $100 in funding that Abilene receives should not result in perfect, safe, congestion-free roads with citizens having $40 left to spend.

Participant Instructions

We want to know how you would prioritize TxDOT's spending. We have grouped projects and programs into three topics. You have $100 to "spend" on safety, pavement quality, and mobility improvements over the next 20 years.

- Safety would include wide breakdown shoulders, better structures, signs, and markings that guide motorists and absorb crashes with less injury to occupants. *Safety improvements could also include expanded law enforcement programs to crackdown on speeding, drunk driving, and reckless driving.*

- Pavement quality includes smooth surfaces and bridges and roads that can carry the loads they were designed for.

- Mobility would include investments in 4-lane divided highways between major cities.

For Nacogdoches (caution: draft numbers)
Estimated Lufkin District revenue for mobility and pavement - $700 million 2009 to 2030
Rural Connectivity needs (best scenario) $1.4 billion
Pavement needs (90% of miles "Good" or better) - $700 million (estimated from statewide values – 2030 did not produce District level values).
Safety – No estimate available or achievable. No Safety version of 2030 Needs has been developed and there is no realistic process for creating an estimate.

Dollar Value	Pavement and Bridge Quality	Mobility & Connections to Other Cities
10	10 percent of all roads have pavement quality "good" or better. All roads are like or better than ABC Road.	A few major four-lane roads that do not have a median are divided
20	20 percent of all roads have pavement quality "good" or better. All roads are like or better than ABC Road.	Half of the major four-lane roads that do not have a median are divided
30	30 percent of all roads have pavement quality "good" or better. All roads are like or better than ABC Road.	All major four-lane roads that do not have a median are divided
40	40 percent of all roads have pavement quality "good" or better. All roads are like or better than ABC Road.	All major and a few minor four-lane roads that do not have a median are divided
50	50 percent of all roads have pavement quality "good" or better. All roads are like or better than ABC Road.	All major and many minor four-lane roads that do not have a median are divided
60	60 percent of all roads have pavement quality "good" or better. All roads are like or better than ABC Road.	All major and most minor four-lane roads that do not have a median are divided.
70	70 percent of all roads have pavement quality "good" or better. All roads are like or better than ABC Road.	All major and minor four-lane roads that do not have a median are divided.
80	3/4s of all roads have pavement quality "good" or better. All roads are like or better than ABC Road.	All major and minor four-lane roads that do not have a median are divided. One major congested street is widened.
90	83 percent of all roads have pavement quality "good" or better. All roads are like or better than ABC Road. This is close to the average current condition.	All major and minor four-lane roads that do not have a median are divided. A few major congested streets are widened.
100	90 percent of all roads have pavement quality "good" or better. All roads are like or better than MNO Road.	All major and minor four-lane roads that do not have a median are divided. A few major congested streets are widened and one major congested rural road is widened.

TASK 6: CONGESTION ESTIMATION TOOLS

Technical Memorandum - Estimating Mobility Progress

Tim Lomax, Texas Transportation Institute

The spreadsheets used to prepare data for the Texas Mobility Plans and the 2030 Needs Study were modified for the purpose of creating a tool to answer the question, "Where are we versus the pace required to achieve mobility goals?" The spreadsheets have been modified to accommodate this analysis at the region or state level. This technical memorandum summarizes the analysis procedure and findings.

Procedure - Overview

The four goal scenarios from the 2030 Needs Study were expressed in terms of the number of lane-mile equivalents required to achieve each goal. Determining the "pace of change" needed to meet those goals was derived as a simple average across the 22 years from 2008 to 2030. The number of years since 2008 is entered and used to calculate the "Where should we be?" value.

Columns are provided to allow the analyst to enter the number of lane-miles of additional capacity added (in either the freeway or arterial street categories) for each year from 2009 to 2030. Adding this new capacity to the base year (2008) answers the question "Where are we now?"

The left side of the spreadsheet brings these two questions together for each urban area, functional roadway class, and goal scenario. The table also includes a cost value that represents a rough estimate of how much additional funding (if any) is required to "catch up" to the pace needed to achieve each goal.

Procedure – Detailed Explanation of Spreadsheet

Two files were constructed with identical procedures and assumptions. The original plans were done in two groups—the eight large regions termed "metro" and the 17 smaller regions termed "urban." The mobility progress calculation is performed at the bottom of the "Summary Page" worksheet in each file. The operations performed in each group of columns are described below in the typical order they will be used. The operations are generally arranged from right to left to allow the summary table to be on the left side of the spreadsheet.

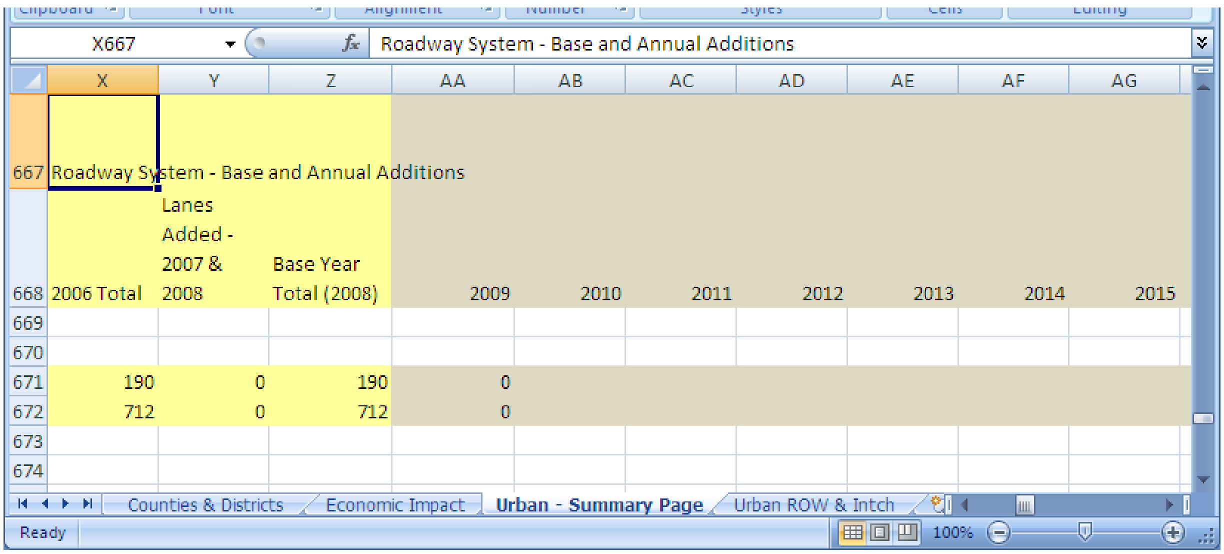
Color Formatting

Colored shading is used in the spreadsheet to identify locations for analysts to input values and locations of calculation or display of values generated in other portions of the spreadsheet.

- Yellow - cells that reference previously derived data from the upper portion of the spreadsheet
- Gray - cells that are used for input data to perform analysis
- Purple - calculation cells
- Tan - results

Column Descriptions

Columns AA to AV	Lane-miles of capacity that have been added in each year from 2009 to 2030.
Column X	Lane-miles in 2006 [the final year of roadway inventory (RINO) data when the spreadsheet was initially developed for the Mobility Plans]. The Roadway Inventory data were used to estimate the growth in capacity from the various base years used in the urban transportation planning models.
Column Y	Lane-miles added in 2007 and 2008 were derived from the transportation improvement program and projects let for construction from 2004 to 2008. These can be updated when 2007 and 2008 RINO data are available.
Column Z	The base year total for this analysis—2008—is the sum of 2006 lane-miles and additions in 2007 and 2008.

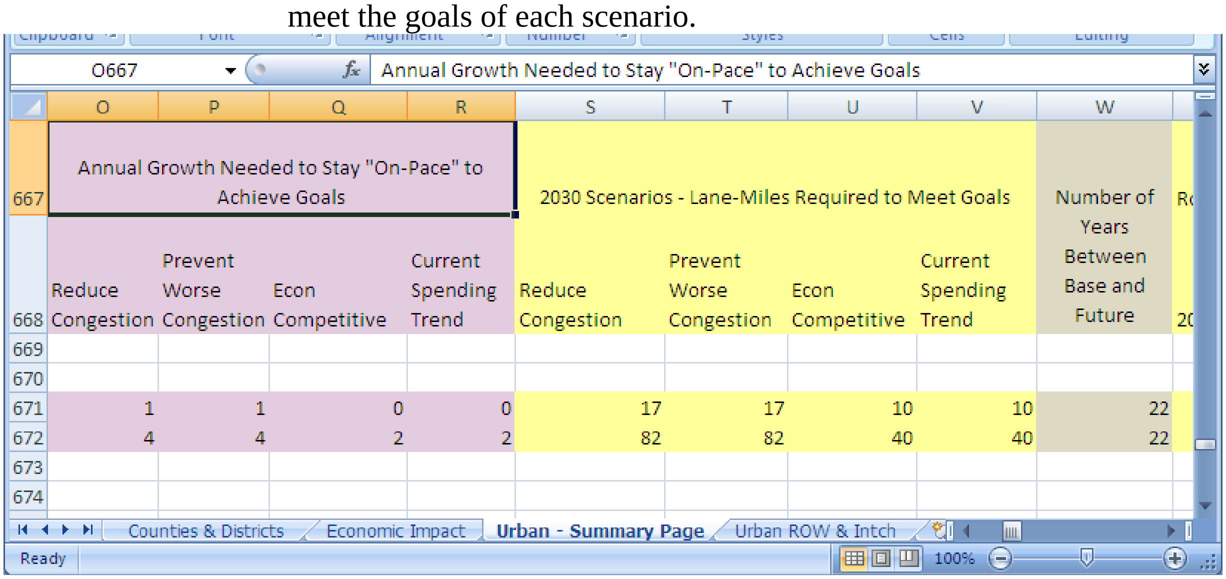


X667 | Roadway System - Base and Annual Additions

	X	Y	Z	AA	AB	AC	AD	AE	AF	AG
667	Roadway System - Base and Annual Additions									
668	2006 Total	Lanes Added - 2007 & 2008	Base Year Total (2008)	2009	2010	2011	2012	2013	2014	2015
669										
670										
671	190	0	190	0						
672	712	0	712	0						
673										
674										

Counties & Districts | Economic Impact | Urban - Summary Page | Urban ROW & Intch

Column W	Number of years between base and future years – used to calculate rate of growth.
Columns S to V	Lane-mile additions required from 2008 to 2030 to meet each scenario.
Columns O to R	Annual growth in lane-miles needed to stay "on-pace" from 2008 to 2030 to meet the goals of each scenario.



O667 | Annual Growth Needed to Stay "On-Pace" to Achieve Goals

	O	P	Q	R	S	T	U	V	W
667	Annual Growth Needed to Stay "On-Pace" to Achieve Goals				2030 Scenarios - Lane-Miles Required to Meet Goals				Number of Years Between Base and Future
668	Reduce Congestion	Prevent Worse Congestion	Econ Competitive	Current Spending Trend	Reduce Congestion	Prevent Worse Congestion	Econ Competitive	Current Spending Trend	
669									
670									
671	1	1	0	0	17	17	10	10	22
672	4	4	2	2	82	82	40	40	22
673									
674									

Counties & Districts | Economic Impact | Urban - Summary Page | Urban ROW & Intch

Columns G and M	Analysis year and number of years since the base year (2008).
Column H	Current estimate of lane-miles based on 2008 base year and additions since 2009.
Columns I to L	Estimate of total lane-miles that should be in place in analysis year in order to stay "on-pace."

G667 — Year of Analysis

	G	H	I	J	K	L	M
667	Year of Analysis		Annual On-Pace Lane-Miles Factored up to Year of Analysis				Number of Years Since Base
668		Current Estimate of Lane-miles	Reduce Congestion	Prevent Worse Congestion	Econ Competitive	Current Spending Trend	
669							
670							
671	2009	190	191	191	191	191	1
672	2009	712	716	716	714	714	1
673							
674							

Columns A to E	Results – "behind" is indicated by negative values on top row of each city's data. Cost is calculated using overall cost per lane-mile for the scenario in each urban/metro region. (If "behind," the cost is positive and if "ahead," the cost cell has a dash, indicating no cost is needed to "catch up").

B667 — How far ahead or behind are we? (17 Urban

	A	B	C	D	E
667		**How far ahead or behind are we? (17 Urban Areas)**			
668	Urban Area	Reduce Congestion	Prevent Worse Congestion	Econ Competitive	Current Spending Trend
669					
670	Abilene -- Summary Aug 08	-4	-4	-2	-2
671	Freeway	-1	-1	0	0
672	Arterial	-4	-4	-2	-2
673	Cost if "Behind" ($Mill)	$ 9	$ 9	$ 5	$ 5
674					

Operation of the Spreadsheet

The analyst enters the appropriate values in columns G, W, and AA through AV. The analyst should also check the scenario lane-miles and adjust for any changes due to long-range plan updates, growth rates, or financial changes. The results in columns B through E will show the amount of capacity required to "catch up" and a cost for that capacity, or it will show how much capacity has been added in addition to that needed to keep pace.

Interpreting the Results

A conclusion of "ahead" or "behind" should also consider the recent past and future capacity additions schedule. An area may, for example, show an "ahead" status due to a recently completed large project, but have no more substantial projects scheduled for many years. Likewise, a "behind" area may have a major project soon-to-be-completed.

The calculation process does not depend on traffic volume trends or fluctuations because it is tied to achieving goals. If expectations for population, job, or traffic growth change, the adjustments to the long-range plan should be incorporated in the spreadsheet (e.g., the yellow shaded columns).

The Results

Exhibits 1 and 2 summarize the findings of the preliminary estimate of the 2009 status. These estimates are derived from estimates about the amount of construction activity in 2009, and should be revisited when final values for the amount of road construction are included in the TxDOT roadway inventory database. Exhibits 1 and 2 show the expected trend – more investment yields lower congestion levels – and therefore the state is farther behind if it wishes to reach targets associated with greater mobility (and lower congestion). The state's urban areas are farther behind on the freeway additions in this early analysis than on the arterial additions. The metro regions are the opposite, with freeways leading arterials, perhaps due to the toll road mileage.

Exhibit 1. Summary Results for the 17 Urban Areas in Texas

How far ahead or behind are we? (17 Urban Areas)	Reduce Congestion	Prevent Worse Congestion	Econ Competitive	Current Spending Trend
Total Lane-Miles Behind	-184	-101	-4	23
Freeway	-40	-35	-10	-11
Arterial	-140	-63	8	36
Cost if "Behind" ($Mill)	$ 369	$ 204	$ 98	$ 47

Exhibit 2. Summary Results for the 8 Metro Areas in Texas

How far ahead or behind are we? (8 Metro Areas)	Reduce Congestion	Prevent Worse Congestion	Econ Competitive	Current Spending Trend
Total Lane-Miles Behind	-1177	-931	-524	4
Freeway	-244	-166	-51	115
Arterial	-877	-709	-419	-78
HOV	-57	-56	-55	-33
Cost if "Behind" ($Mill)	$ 4,707	$ 3,344	$ 2,007	$ 550

Due to a large number of projects let during the mid-2000s and estimated to be completed in 2009, the urban and metro regions are slightly ahead of the “Current Trend” pace at the regional lane-mile level (23 lane-miles ahead for the urban areas and 4 lane-miles ahead for the metro regions). Even within this comparatively good news, there are needs within the urban arterials and the metro arterials and HOV network. Larger numbers of positive or “ahead of pace” construction in other functional classes make the overall number positive for this scenario. The results vary by urban region as well, with 12 regions showing “ahead of pace” values for their systems and the remaining 13 showing needs or “right on pace.”

All the remaining news is negative. There is a total of 1,032 lane-miles needed to get back on pace to achieve the 2030 Needs Committee recommendation of “Prevent Worse Congestion” with only two urban regions showing an “ahead of pace” value for that scenario. The total cost to catch up to the Prevent Worse Congestion trend is $3.5 billion in 2008 dollars. The value might be lower if 2009 costs are used (the recession has reduced highway construction price pressures), but there remains a substantial gap.