



## Rural Truck Traffic Needs in Texas

Texas is in many ways a rural state:

- ▶ 80 percent of the state's land area is rural (213,297 of 267,277 square miles); 196 of Texas' 254 counties are rural;
- ▶ Texas has 227,000 farms—twice as many as any other state;
- ▶ farm and ranch acreage comprises 78 percent of the total land area in Texas;
- ▶ Texas produces approximately 7 percent of the gross U.S. agricultural income (\$13.8 billion in 2000);
- ▶ about 15.2 percent (3.16 million) of Texas' total population lived in rural areas in 2000 (Office of Rural Community Affairs, 2002); and
- ▶ farming and farm-related jobs provide employment to about 15 percent of all Texans (Office of Rural Community Affairs, 2002).

Serving the transportation needs of the people and economy of rural Texas is not an easy matter. Policies and procedures there must be different from those applied in the much more populous

and compact urban and suburban regions of the state. At the same time, the same major transportation corridors that serve rural Texas are critical to the state and national economy as a whole and provide a vital link between the metropolitan areas.

### *What We Did...*

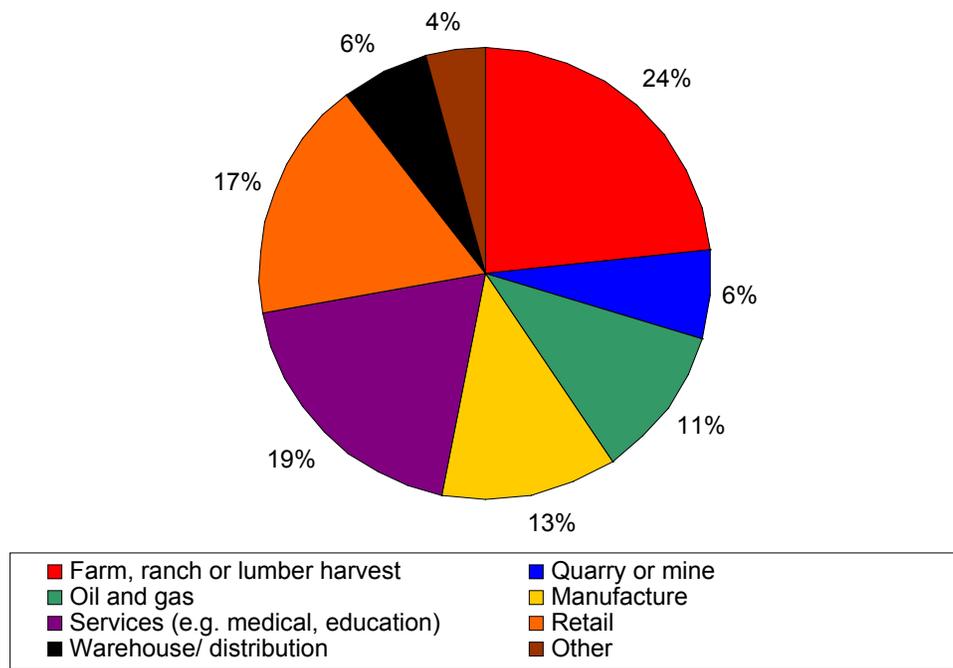
This study, prepared by a team of researchers from the Center for Transportation Research, The University of Texas at Austin, and Texas Tech University, had several objectives. First, the research team: assessed and described the condition of the existing rural road system; summarized the impacts of current truck traffic on the rural system; conducted a major survey to identify expected future truck traffic growth; and examined the potential for rural rail programs to absorb portions of the freight demand. The results of this initial work are contained in report O-4169-1, "Rural Truck Traffic and Pavement Conditions in Texas." The team then: collected the major rural stakeholder views concerning rural truck impacts; developed a way to estimate equivalent damage factors for use in calculating truck-pave-

ment impacts; and proposed a strategy for setting rural transportation priorities. Report O-4169-2, "Defining and Measuring Rural Truck Traffic Needs in Texas," summarizes this work.

### *What We Found...*

Rural traffic is derived from economic activities, so the researchers began by examining the major rural traffic generators in Texas. Data from the Bureau of Economic Analysis revealed that employment and economic opportunities in rural Texas are largely tied to four sectors: government, service, farming and ranching, and mining. "Government and Government Services" was the primary revenue-earning sector for 79 rural counties in 2000. That was followed by the service sector (45 counties), farming (30 counties), and finally, mining (22 counties). These four sectors were the major revenue earners in 176 of the 196 rural counties in Texas, representing almost 90 percent of the rural counties in Texas. Also, employment and economic opportunities in rural communities are localized, tied to a community's natural resources or comparative advantage. For





Other includes tourism and a power plant.

Number of responses = 47

Figure 1: Major Income/Economic Generators in Rural Texas

example, farming is the primary revenue generator in northern Texas, mining and government and government services are the major revenue earners in western Texas, and government and government services are the primary economic driver in southern and eastern Texas. This work was complemented by a survey of stakeholders sent to rural Chambers of Commerce.

Figure 1 shows the major economic generators revealed by this activity. More than 90 percent of the respondents indicated that rural transportation was a major issue or economic concern.

Many Texas Department of Transportation (TxDOT) districts have seen an increase in the volume of truck traffic on their networks and have found disequilibrium between rural demand and highway supply, often necessitating increased maintenance. In general, it was found that TxDOT dis-

tricts are maintaining the state’s rural roadbed section-miles well, although certain districts are more impacted by larger and heavier trucks traversing their roadways. Specifically, there is concern about the condition of the farm-to-market roads in a number of districts. Since individual TxDOT districts are responsible for balancing rural and metropolitan needs, priority is often given to higher-volume roads in urban areas. A growing number of districts are finding it increasingly challenging to maintain and repair all of their rural transportation system within current funding levels. Innovative measures therefore may be necessary to address rural maintenance and rehabilitation concerns.

Although survey results are biased towards smaller truck generators and trucking companies, the results do provide useful insights into what constitutes the major rural truck-traffic generators, commodities transported,

trip patterns, and rural rail and road transportation concerns. As the users of rural infrastructure on a daily basis, rural truckers expressed a number of transportation concerns in rural communities. The concerns were about the width of rural roads, inadequate shoulders, the need for better maintenance and rehabilitation—especially with regard to county and farm-to-market roads—as well as the impact of increased truck traffic on rural roads and towns. Major factors impacting rural Texas roads include agricultural industrialization, heavy agricultural equipment, equipment from the oil and gas industry, the heavier loads permitted under House Bill 2060, the location of large distribution centers (“Big Boxes”), landfill sites, and finally, traffic linked to the North American Free Trade Agreement (NAFTA).

In the second year, researchers conducted a rural stakeholder survey to characterize rural truck generators,



thus describing the demand for rural highways. This was followed by a survey describing the TxDOT district perspective—describing the supply of highways to rural users. A major part of the second year was given over to evaluating a new mechanistic-based analysis developed through models reported in NCHRP 1-37A “2002 GUIDE: Using Mechanistic Principles to Improve Pavement Performance.” The four variables considered were (a) pavement structural capacity, (b) environmental conditions, (c) axle load distribution, and (d) rutting and fatigue cracking. A case study was undertaken with Waco conditions to test some of the models. There are a number of advantages to using this approach, ranging from equivalent damage factors that could be used to assess impacts of the 2060 legislation to forming inputs to economic evaluation models to prioritize district needs.

TxDOT rural districts spend substantial amounts of their maintenance budgets maintaining truck routes. However, many truck corridor users contribute little to the economic viability of the rural parts of Texas. This creates an asset management paradox that must be addressed at the state and national level.

Despite significant growth in average annual daily truck-traffic volumes across rural Texas, the research team found that the overall condition of the rural infrastructure remains adequate. Statewide, approximately 85 percent of the rural road network is rated good to very good in terms of the distress score, 88 percent is rated good to very good in terms of the overall condition score, and about 70 percent is rated good to very good in terms of the ride score. In general, it was found

that TxDOT districts are keeping up with maintenance needs, although certain districts are more impacted by larger and heavier trucks traversing their roadways. Specifically, there is concern about the condition of the farm-to-market roads in a number of districts.

## *The Researchers Recommend...*

TxDOT faces a huge challenge in maintaining the capacity and condition of Texas’ rural transportation system. Given current and anticipated funding levels, the following is a list of recommendations for consideration:

- ▶ The rural network should be carefully evaluated and reclassified to target maintenance and rehabilitation funding. First priority must go to the truck highway corridors. Second priority should go to those other parts of the system associated with significant rural employment and economic production. The remainder of the rural network may warrant only minimum levels of maintenance.
- ▶ Much more information needs to be collected in support of planning and decision making on future transportation needs in rural Texas. The research team suggests that this should be done through a panel system.
- ▶ Designate key state supply chains. This research recognizes that users develop their highway routes based on the needs of their shippers and the commodities being moved. The designation of supply chains for key commodities should therefore assist statewide planning and the target-

ing of funding for those sections of highways passing through rural areas. Moreover, it will link into those generators within different parts of the state and ensure that the supply chains are not simply portions of the interstate but cover the movement of goods from origin to destination within a district network.

- ▶ Install or expand Intelligent Transportation System (ITS) services (weather, accidents, incidents) along all truck corridors. Almost all medium to large trucking companies now have information technologies (IT) which allow the tracking of tractors and therefore more precise determination of fleet utilization and commercial opportunities for new business. The vehicles are capable of providing valuable information for highway management, and this is something that deserves further examination. As an example, the federal government has been evaluating the use of Freight Performance Measures (FPMs) to provide time/location information, which can then be translated to corridor speeds. In addition, FPMs are capable of transmitting other changes in the environment such as bad weather. FPMs offer the potential for transmitting useful information over the rural systems of ITS information, which will strengthen safety and efficiency for other truck users. If FPMs can be shared with truck dispatchers, there is a possibility of significantly improving not only the management of the rural system from a TxDOT perspective but also the operations systems of its users.



## *For More Details...*

Research Supervisor: Robert Harrison, Center for Transportation Research, (512) 232-3113  
email: [harrison@mail.utexas.edu](mailto:harrison@mail.utexas.edu)

TxDOT Project Director: William M. (Mike) Battles, P.E., Tyler District, (903) 510-9241  
email: [mbattle@dot.state.tx.us](mailto:mbattle@dot.state.tx.us)

TxDOT Research Engineer: Duncan Stewart, Ph.D., P.E., Research and Technology Implementation Office,  
(512) 465-7648  
email: [DSTEWART@dot.state.tx.us](mailto:DSTEWART@dot.state.tx.us)

The research is documented in the following reports:

- 0-4169-1 *Rural Truck Traffic and Pavement Conditions in Texas*
- 0-4169-2 *Defining and Measuring Rural Truck Needs in Texas*

To obtain copies of a report: CTR Library, Center for Transportation Research,  
(512) 232-3126, email: [ctrlib@uts.cc.utexas.edu](mailto:ctrlib@uts.cc.utexas.edu)

*Your Involvement Is Welcome!*

## *Disclaimer*

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



The University of Texas at Austin  
Center for Transportation Research Library  
3208 Red River #115  
Austin, TX 78705-2650