Technical Report Documentation Page

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
TX-96/2932-3F		

4. Title and Subtitle	5. Report Date
TEXAS' ROLE AS A U.S.-MEXICO TRADE GATEWAY	November 1995
	6. Performing Organization Code

7. Author(s)	8. Performing Organization Report No.
A. J. Weissmann, R. Harrison, M. Treviño, and S. Mandava	Research Report 2932-3F

9. Performing Organization Name and Address	10. Work Unit No. (TRAIS)
Center for Transportation Research The University of Texas at Austin 3208 Red River, Suite 200 Austin, Texas 78712-1075	11. Contract or Grant No. Research Study 7-2932
	13. Type of Report and Period Covered Final
12. Sponsoring Agency Name and Address Texas Department of Transportation Research and Technology Transfer Office P.O. Box 5080 Austin, TX 78763-5080	14. Sponsoring Agency Code

15. Supplementary Notes

Study conducted in cooperation with the Texas Department of Transportation.
Research study title: "Texas-Mexico Border: Transportation Planning Guidelines and Automated Database"

16. Abstract

In providing incentives for increased trade among the U.S., Canada, and Mexico, the North American Free Trade Agreement (NAFTA) could considerably liberalize freight carriage across these countries' respective borders. While Texas has a substantial economic interest in the increased trade, its strategic geographic location, as well as its 2000-km-long border with Mexico, ensures that the state will sustain a disproportionate share of such negative effects as traffic hazards, pavement consumption, and excessive capacity on its highways and at its border crossings. This report summarizes one important result of TxDOT's Project 7-2932, namely, the quantification of the amount of U.S.-Mexico trade that uses Texas highway and rail infrastructure, but which has its origins and destinations outside Texas. Despite some data limitations, the analysis indicates that Texas is the major gateway for U.S.-Mexico trade.

17. Key Words	18. Distribution Statement
North American Free Trade Agreement, U.S.-Mexico trade, border infrastructure, Texas-Mexico trade	No restrictions. This document is available to the public through the National Technical Information Service, Springfield, Virginia 22161.

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price
Unclassified	Unclassified	22	

TEXAS' ROLE AS A U.S.-MEXICO TRADE GATEWAY

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Research Report Number 2932-3F

Research Project 7-2932
Texas-Mexico Border: Transportation Planning Guidelines and Automated Database

conducted for the

Texas Department of Transportation

by the

CENTER FOR TRANSPORTATION RESEARCH
Bureau of Engineering Research
THE UNIVERSITY OF TEXAS AT AUSTIN

November 1995

IMPLEMENTATION STATEMENT

A 1992 report to Congress, pursuant to Intermodal Surface Transportation Efficiency Act (ISTEA) sections 1089 and 6015, acknowledges that the Texas cities of El Paso and Laredo are among the nation's busiest ports of entry. The ISTEA sections consequently recommend the development of federal-aid programs to improve transportation infrastructure related to international trade. For their part, border states must begin estimating what percentage of the U.S.-Mexico trade is utilizing their border facilities. Accordingly, this report discusses that portion of U.S.-Mexico trade that, while making use of Texas' infrastructure, has its origins and destinations in other states. These estimates are based on NAFTA overland trade data recently released by U.S. Customs through the U.S. Department of Transportation. The analysis estimates other states' foreign trade using Texas' infrastructure, along with the consequent accelerated pavement consumption and right-of-way needs, declining air quality in Texas, and the state's requirement for additional highway capacity. The results, which clearly indicate that Texas is the major gateway for U.S.-Mexico trade, may be used to assert priority in terms of funding for land transport infrastructure, as well as for such problems as additional highway capacity, pavement rehabilitation and right-of-way needs, and the non-attainment of air quality standards created by mobile sources of pollution.

ACKNOWLEDGMENTS

This project relied on a significant amount of data, the collection of which involved numerous sources. We are indebted to all U.S. Customs Port Directors and staff members assigned to the Texas-Mexico border, to all Texas-Mexico bridge managers and their staff members, to all city planners and managers on both sides of the Texas-Mexico border, to TxDOT personnel, to Cal y Mayor Asociados, our subcontractor, and to CTR graphical and editorial staff, especially Ms. María Saenz and Mr. Mike Gray, CTR graphic artists, and Mr. Ray Donley, CTR editor.

For their contributions to this study, we would also like to express our appreciation to:

Mr. Alvin Luedecke, Jr., TxDOT Director of Transportation Planning and Programming, and Director of this project;
Ms. Deborah Morris, PE, TxDOT TP&P supervisor of traffic data;
Mr. Henry Nevares, Director of TxDOT's International Relations Office;
Mr. Vic Garcia, from TxDOT International Relations Office;
Cal y Mayor Asociados project manager, Mr. Juan Carlos Espinosa;
Mr. Manuel Aguillera, PE, TxDOT's El Paso District;
Mr. Mohammed Niazi, CTR research assistant;
Ms. Suprya Mandava, CTR research assistant;
Mr. Manuel Treviño, CTR research assistant; and
Mr. Sherman White, CTR research assistant.

Prepared in cooperation with the Texas Department of Transportation.

DISCLAIMERS

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 views or policies of the Texas Department of Transportation. This report does not constitute a standard, specification, or regulation.

There was no invention or discovery conceived or first actually reduced to practice in the course of or under this contract, including any art, method, process, machine, manufacture, design or composition of matter, or any new useful improvement thereof, or any variety of plant, which is or may be patentable under the patent laws of the United States of America or any foreign country.

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B. Frank McCullough, P.E. (Texas No. 19914)
Research Supervisor

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SUMMARY

In providing incentives for increased trade among the U.S., Canada, and Mexico, the North American Free Trade Agreement (NAFTA) could considerably liberalize freight carriage across these countries' respective borders. While Texas has a substantial economic interest in the increased trade, its strategic geographic location, as well as its 2000-km-long border with Mexico, ensures that the state will sustain a disproportionate share of such negative effects as traffic hazards, pavement consumption, and excessive capacity on its highways and at its border crossings. This report summarizes one important result of TxDOT's Project 7-2932, namely, the quantification of the amount of U.S.-Mexico trade that uses Texas highway and rail infrastructure, but which has its origins and destinations outside Texas. Despite some data limitations, the analysis indicates that Texas is the major gateway for U.S.-Mexico trade. Among other equally important findings, the data indicate that, in 1994:

(1) Over $95 billion worth of trade crossed the U.S.-Mexico border;

(2) Of this total, $24.83 billion, or 27 percent, crossed the border either by way of New Mexico, Arizona, or California;

(3) The remaining $69.5, or 73 percent, crossed the border by way of Texas;

(4) Of this total, $60.69 billion, or 88 percent, crossed by truck, while $8.58 billion, or 12 percent of the total crossing through Texas, crossed by rail;

(5) Over 3.7 million truck shipments crossed the U.S.-Mexico border;

(6) Of this total, 1.15 million, or 31 percent, crossed the border either by way of New Mexico, Arizona, or California;

(7) The remaining 2.55 million, or 69 percent, crossed the border via Texas;

(8) Almost half (47 percent) of the 2.55 million truck shipments crossing through Texas had origins and destinations in other U.S. states;

(9) Over 89 percent of the U.S.-Mexico trade value by rail passed through Texas.

About to get underway is an ambitious binational study to be financed by the U.S. and Mexican Governments and the World Bank, and to be administered by the Arizona Department of Transportation. While the study's main objective is to develop guidelines for coordinated binational planning, it nevertheless will not pursue objectives that are Texas-specific; therefore, we propose that TxDOT begin the process of quantifying the infrastructure needs resulting from Texas' important mission as a major trade corridor. Accordingly, we recommend research to investigate such relevant issues as:

(1) additional highway capacity needed in Texas as a result of other states' international commerce passing through the state;

(2) pavement rehabilitation needs caused by other states' international commerce;

(3) traffic safety hazards related to other states' international commerce passing through the state; and

(4) mobile source emissions in Texas non-attainment areas (such as El Paso) generated by trucks and trains serving other states' international commerce.

Studies such as those listed above can ensure that Texas receives its share of funds appropriate for transportation infrastructure and Clean Air Act requirements. Results of these studies can also help Texas border communities — El Paso, Laredo, and many others — already overwhelmed by the problems created by the intensifying international traffic.

SUMMARY

This report quantifies the portion of U.S.-Mexico trade transported over Texas' highway and rail infrastructures, as well as the portion of that trade having origins and destinations outside Texas. The analysis confirms that Texas ports of entry provide the major gateways for U.S.-Mexico trade. The data show, for instance, that in 1994 total trade between the two nations totaled $95 million, of which 73 percent crossed Texas borders.

The report also notes that, in terms of modal split, 88 percent of all trade crossed by truck and 12 percent crossed by rail. Texas gateways handled 69 percent of the total truck shipments across the border, of which almost half (47 percent) had destinations in other U.S. states. Texas also dominated total rail movements, capturing almost 90 percent of that market. The report concludes with recommendations for further research on policy issues relating to U.S.-Mexico trade originating outside Texas.

THE TEXAS TRANSPORTATION SYSTEM AND NAFTA

The Texas transportation system comprises approximately 470,000 km of highways, 18,000 km of rail lines, several large airports, and a substantial network of ports and waterways (Ref 1). Clearly, this system is critical to the economic health of the state. Such systems, however, require substantial maintenance and periodic rehabilitation in order to provide acceptable levels of service to users. And highways appear to fall behind in this regard. The Federal Highway Administration (FHWA), for example, reported in 1993 that 25 percent of Texas' urban interstates already exceeded 95 percent of their capacity, and 43 percent were operating at over 80 percent of their design capacity. The resulting congestion is estimated to cost Texas motorists around $4 billion in delay and fuel costs each year. Pavement consumption is also rising as a result of the growth of truck traffic. The FHWA estimates that the condition of about 75 percent of the state's pavements are in the fair-to-poor range (Ref 2).

To be sure, though, international trade plays an important role in the state economy, and Texas, among all other U.S. states, benefits most from trade with Mexico (Ref 3). This trade has grown strongly since 1986, when Mexico joined the General Agreement on Tariffs and Trade (GATT) and began a program to lower tariffs and duties. This growth, combined with the liberalization of the Mexican economy under President Salinas de Gortari (1988–1994), has led to Mexico's emergence as the third leading U.S. trading partner. This relationship has been further bolstered by the recent passage of the North American Free Trade Agreement (NAFTA), which provides incentives for increased trade among the U.S., Canada, and Mexico, and liberalizes freight flows across these nations' respective borders (Ref 4). But again, the economic benefits accruing to Texas through increased trade are being offset by the substantial costs associated with traffic safety, additional pavement consumption, and highway and border-crossing congestion.

The Texas Department of Transportation (TxDOT) is addressing many of these problems by building new infrastructure at key crossings (e.g., at Laredo) and by undertaking a planned $2 billion multiyear border region investment program (Ref 5). Moreover, the agency has sponsored

a number of research studies on, among other issues, the impacts of NAFTA on the Texas transportation infrastructure (Ref 6), truck safety along the border (Ref 7), and the need for new border crossings (Ref 8). As part of the latter study, a transborder database was developed (Ref 9) that contains valuable socio-economic information. Study 7-2932, a follow-up project, builds on the transborder database while focusing on a variety of U.S. and Mexico trade issues.

The growth in U.S.-Mexico trade has led to a concomitant rise in truck traffic — a user category that not only consumes the most pavement, but also fails to cover its full provision and maintenance costs (Ref 10). In addition, we know that much of the truck traffic passing through Texas is en route to destinations in other states. Now, does the fact that such trucks fail to pay their share of user costs in some way penalize Texans? Looking into this question prompted a review of specific trade corridors. Interestingly, the authors of a large, federally sponsored study into trade corridors and border crossings conceded that they could not identify what constitutes a trade corridor for all modes of transportation (Ref 11). Yet subsequent research has demonstrated that trade corridors are clearly identifiable, that they can be measured in terms of value, and that their truck traffic can be estimated (Ref 12). Other subsequent research showed that the Texas-Mexico border can be divided into sectors, based on traffic demand criteria (Ref 13). Such U.S.-Mexico corridors, concentrated through Texas, are clearly contributing to the capacity crisis predicted for Texas interstates (Ref 14).

REPORT OBJECTIVES

The study team examined the portion of U.S.-Mexico commerce that uses Texas land transport infrastructure, but which has neither origins nor destinations in Texas. These estimates are based on NAFTA land transport trade data recently released by U.S. Customs through the U.S. Department of Transportation's Bureau of Transportation Statistics and discussed in another report from this study (Ref 15). The database focuses on quantifying the trade, rather than on accurately quantifying the number of trucks and rail cars using each port of entry. The information includes, but is not restricted to, export origins and import destinations of rail and truck shipments (by number of shipments and by dollar value), ports of entry utilized by each group of shipment, and commodity type.

This database is not comprehensive. Confidentiality agreements restricted access to a certain percentage of each type of data record (this percentage varied between 1 and 15 in 1994, depending on the type of information). It is important to observe that the number of truck shipments does not correspond to the number of trucks in each gateway. The difference is due to two factors: empty trucks and tractors, and multiple shipments in a single truck. Comparing traffic counts at each port of entry with the commodity data does not satisfactorily explain these differences, owing to the confidentiality of some information contained among the commodity data. Analogous situations occurred with respect to rail shipments and rail cars.

Furthermore, the origins and destinations of the exports and imports do not always reflect the location of manufacturers or end users; rather, they represent locations of importer/exporter

headquarters or other facilities. Nevertheless, these data provide a useful assessment of other states' use of the Texas infrastructure for moving their foreign trade.

TEXAS' ROLE IN U.S.-MEXICO COMMERCE

Texas is a strategic gateway for U.S.-Mexico traffic. Owing to its central location and to its 2,000-km-long border, the state claims 29 of the 46 U.S. border crossings shared with Mexico (Ref 16). Hence, it is no surprise that there is a significant imbalance between the amount of U.S.-Mexico trade utilizing Texas infrastructure and Texas-related trade. In 1994, about 67 percent of U.S.-Mexico imports and about 76 percent of exports utilized the Texas land infrastructure, while only 44 percent of the total trade related to Texas' commerce with Mexico.

In the following analyses, origins and destinations are always in the U.S. Thus, the term *trade origin* refers always to U.S. exports, while *trade destination* refers always to U.S. imports from Mexico. This summary report focuses on the analysis of total trade — that is, imports plus exports. Moreover, this report is restricted to 1994 trade. A previous 2932 report analyzed the U.S.-Mexico trade data disaggregated by imports and exports (Ref 15).

Overview

Figure 1 shows the 1994 distribution of total trade (imports plus exports) between the U.S. and Mexico using truck and rail by U.S. regions. The West Central region was responsible for 43 percent of the trade, while the Mountain Pacific and East Central regions ranked second, with nearly 23 percent each. The Atlantic region was responsible for the remaining 10 percent of the trade. Trucks and trains are the main modes of transportation for surface trade; trucks transport about 82 percent of the total trade value by land, while rail amounts to almost 13 percent. The remaining 5 percent represents mail and other land carriers, including small vehicles and, in some data records, undisclosed transport modes.

U.S.-Mexico Trade by Truck

Focusing on Texas and other state gateways, Figure 2 compares truck trade moving between the U.S. and Mexico in terms of value of trade. More than $49.69 billion, or 68 percent of the $72.46 billion total, entered or left the U.S. through Texas in 1994. However, only $29.63 billion of this trade had Texas origins or destinations. The remaining $20.06 billion represents 28 percent of total U.S.-Mexico trade. This means that almost 41 percent of the total truck trade crossing the Texas border actually served other states' commerce with Mexico. Because NAFTA is expected to increase trade among the three member nations, the use of Texas infrastructure by NAFTA trade is also expected to grow.

As shown in Figure 3, over 2.5 million (2,549,331) truck shipments passed over Texas bridges in 1994, a figure that amounts to over 69 percent of the total shipments. Of these, less than 1.5 million (1,360,658) had Texas origins or destinations. In other words, about 47 percent of the 2.55 million truck shipments using Texas infrastructure had origins and destinations in states other than Texas, while only about half (53 percent) related to Texas-Mexico commerce.

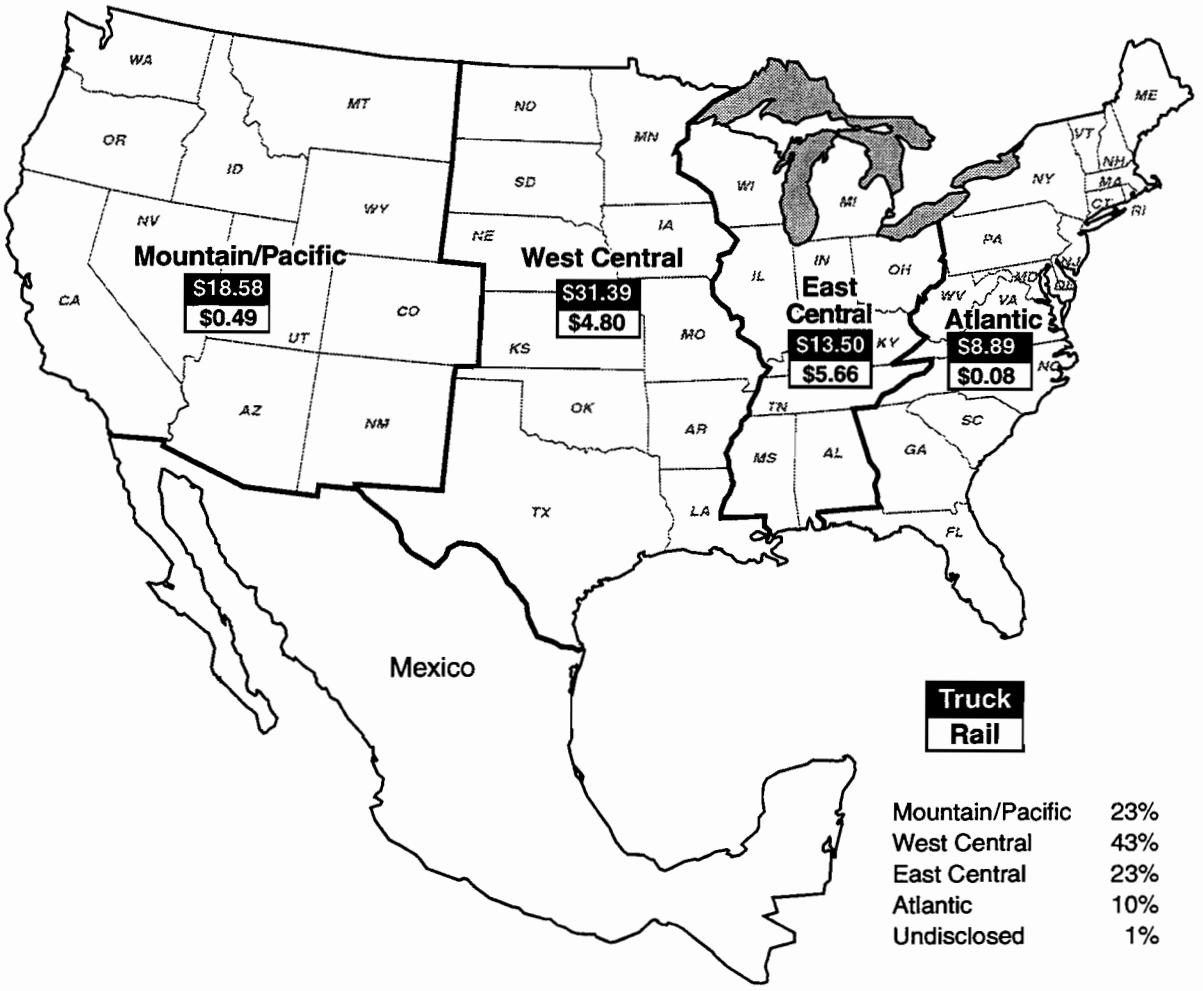

Figure 1. U.S.-Mexico trade by U.S. regions in 1994 (billions of dollars)

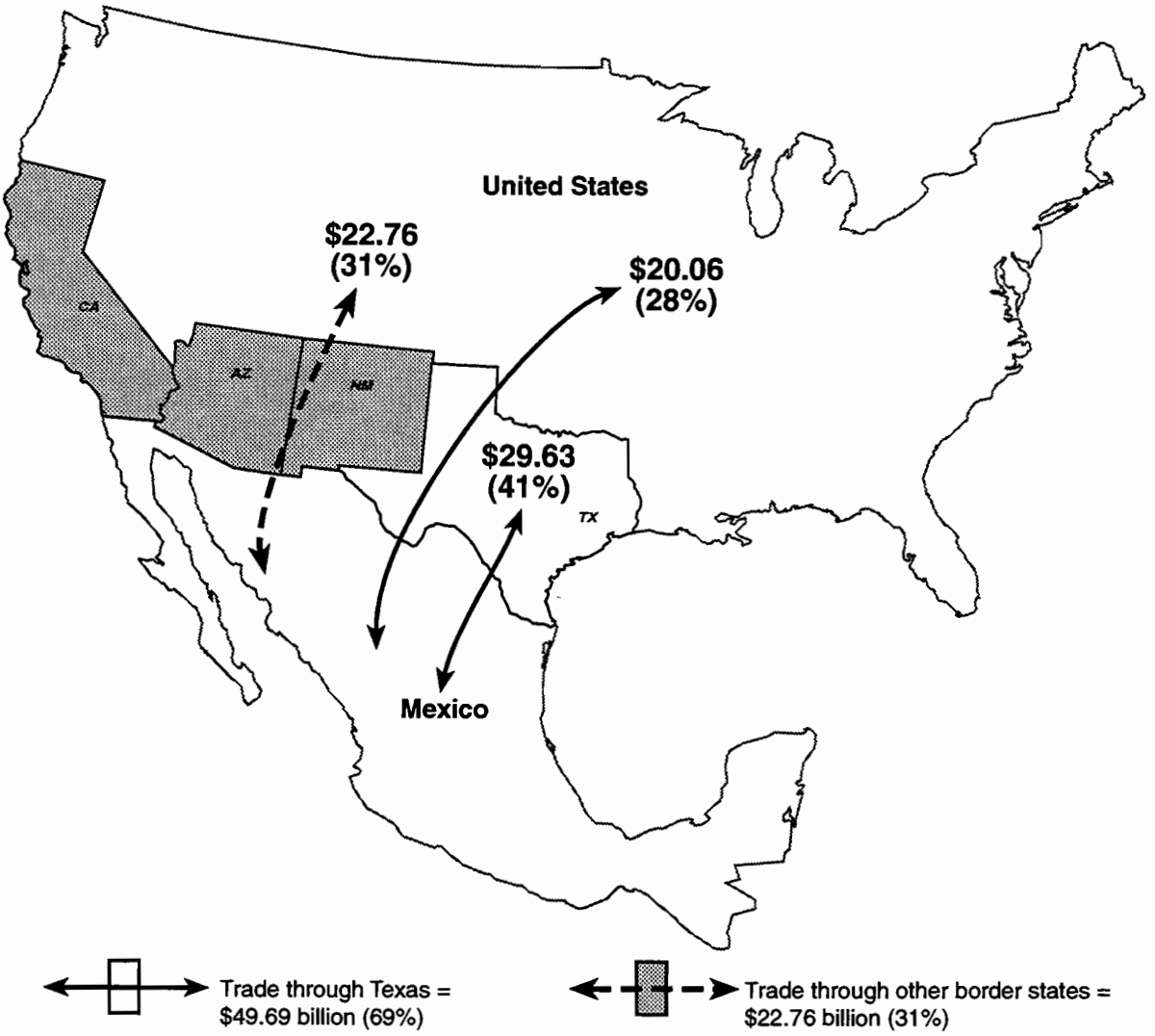

Figure 2. Value of truck shipments through Texas and other border states in 1994 (billions of dollars)

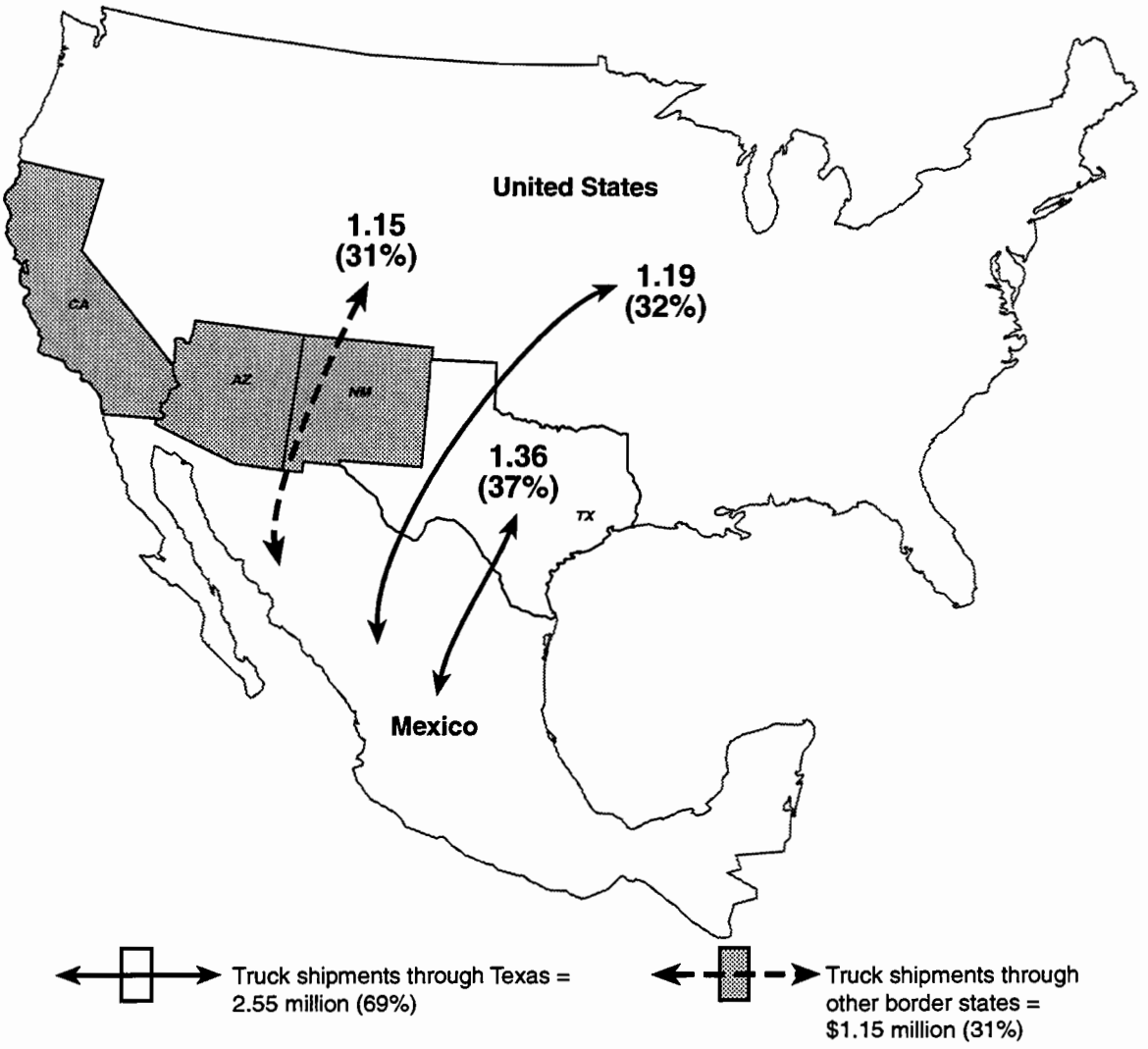

Figure 3. Truck shipments through Texas and other border states in 1994 (millions)

Figure 4 clearly indicates that, for the West Central, East Central, and Atlantic regions, Texas bridges are the main truck gateways for Mexican imports and exports. More than 85 percent of the trade flowing between Mexico and the Atlantic region, 83 percent of the East Central region trade, and 89 percent of the West Central region trade are served by Texas bridges. Only the Mountain Pacific region predominantly uses other states, which are undoubtedly a more favorable route to and from Mexico. Still, Texas serves almost 15 percent of the trade going to and coming from the western part of the U.S. by truck. Together, the other three border states — California, Arizona, and New Mexico — served only 31.4 percent of the total trade by truck, and only 12.8 percent of the trade had origins and destinations in the Atlantic, East Central, and West Central regions.

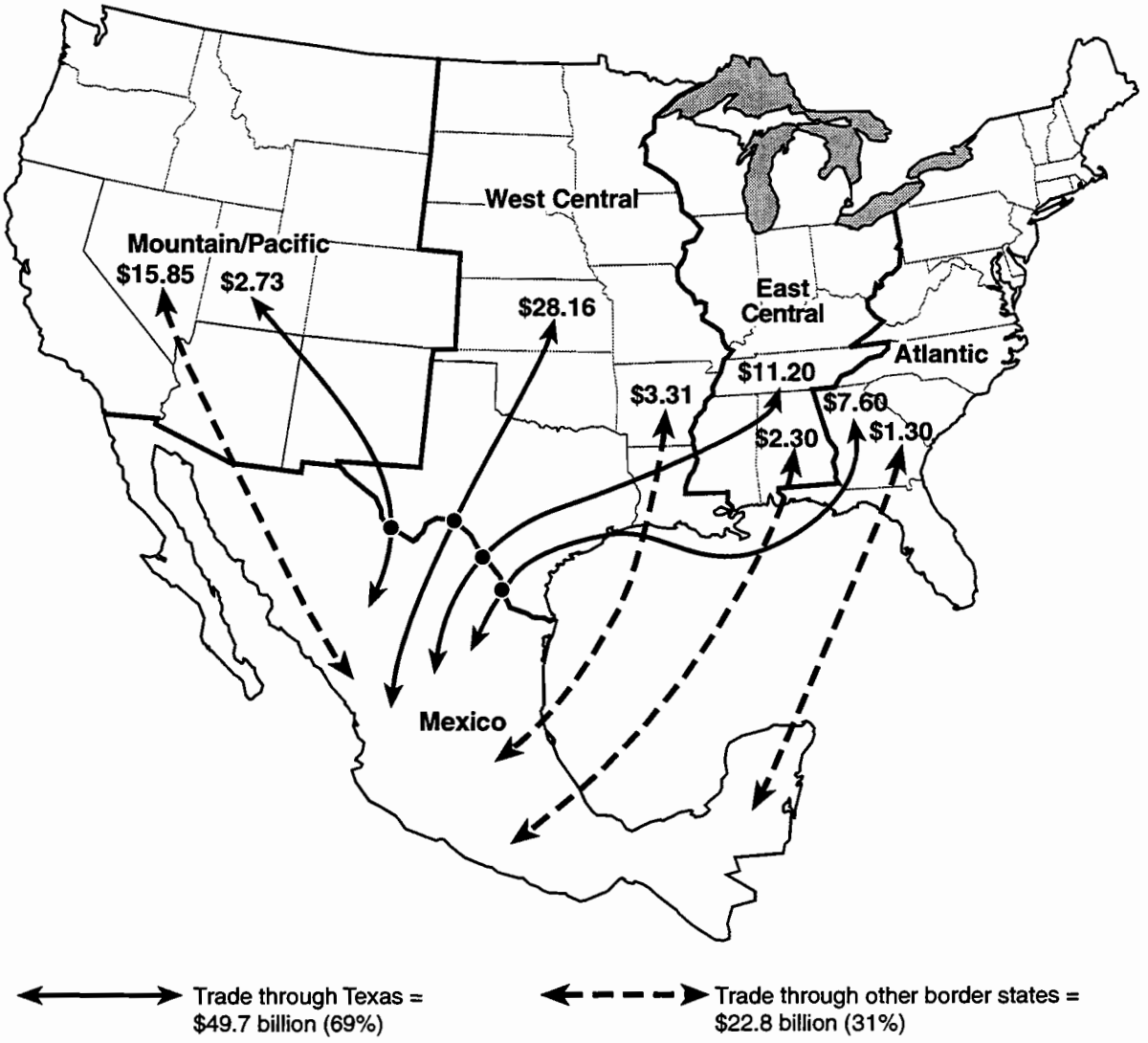

Figure 4. U.S. regions trade with Mexico by truck in 1994 (billions of dollars)

U.S.-Mexico Trade by Rail

Figures 5 through 7 illustrate the distribution of U.S.-Mexico trade by rail in terms of value of trade, number of rail shipments, and distribution across various U.S. regions. As discussed previously, it is important to observe that the number of rail shipments does not correspond to the number of rail cars in each gateway. The difference is due primarily to empty rail cars, since multiple shipments in a single rail car are uncommon. A simple comparison of traffic counts at each port of entry with the commodity data does not satisfactorily explain these differences, owing to confidential information contained in the commodity data.

As depicted in Figure 5, $8.58 billion of the total $11.77 billion trade by rail crossed the Texas border, while only $3.81 billion had Texas origins or destinations. Therefore, Texas serves about 73 percent of the total trade by rail, which means that over 41 percent of the trade value by rail passes through Texas but does not have Texas origins or destinations. It also means that 56 percent of the total trade passing through Texas rail bridges has origins and destinations other than in Texas.

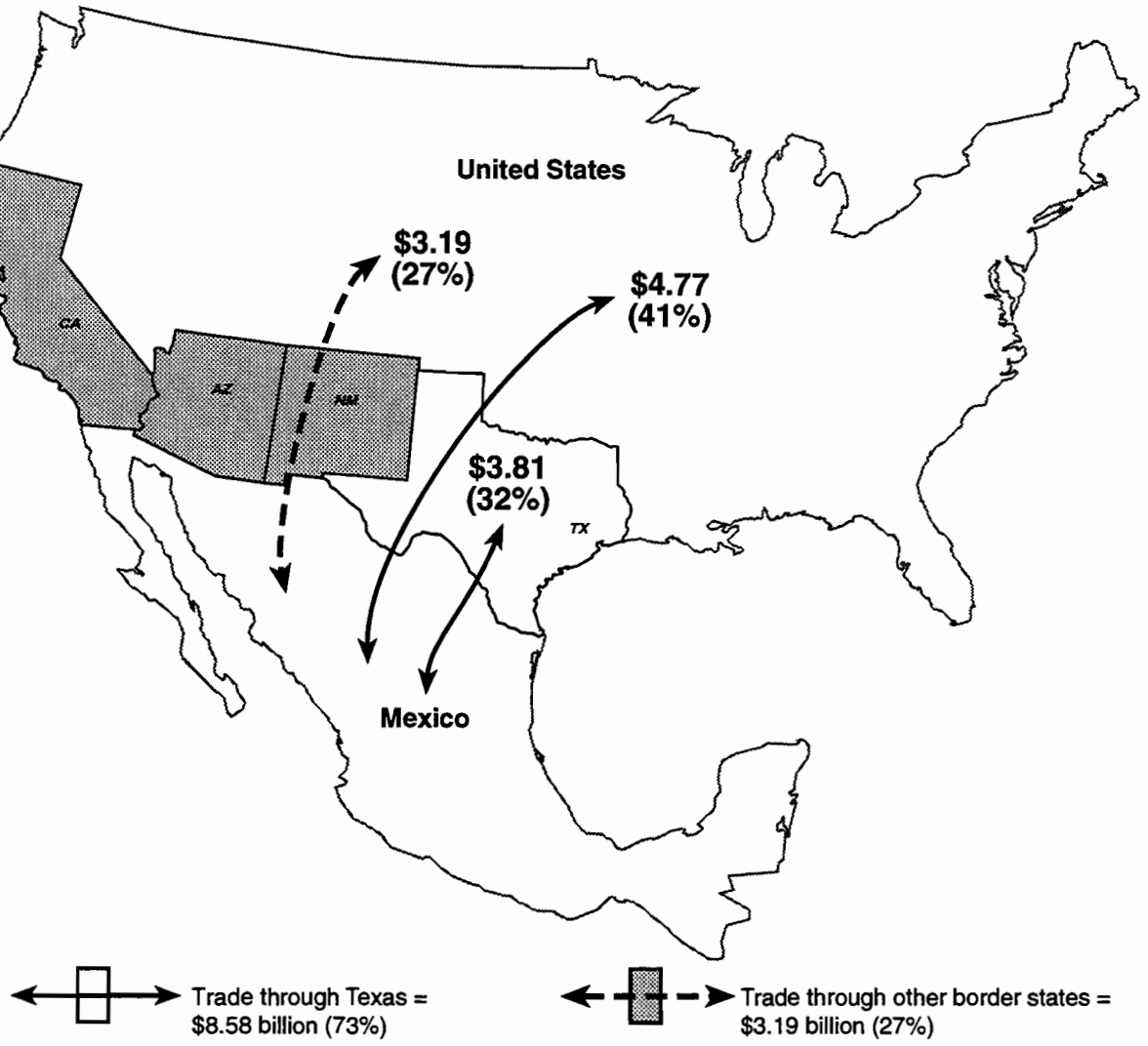

Figure 5. U.S.-Mexico trade value by rail and state of entry in 1994 (billions of dollars)

Figure 6 shows that 110,272 of the 123,487 total rail shipments passed through Texas ports in 1994. This means Texas served almost 90 percent of the 123,000 rail shipments between the U.S. and Mexico in 1994, while only 80,972, or 23 percent of this total, related to Texas-

Mexico commerce. This also means that 27 percent of the rail shipments through Texas did not have origins and destinations in Texas.

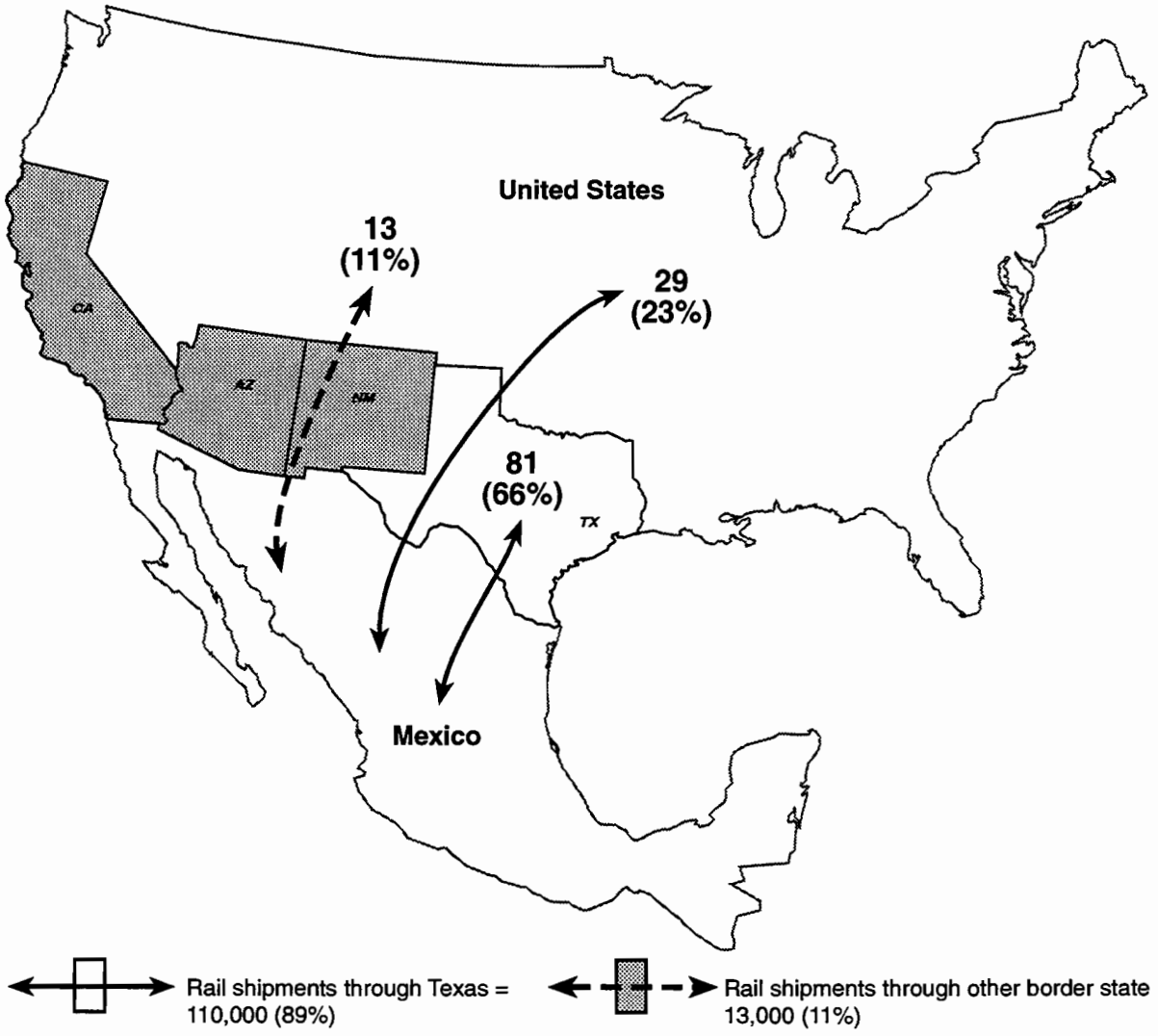

Figure 6. U.S. Rail shipments through Texas and other border states in 1994 (thousands)

Figure 7 depicts the distribution of U.S.-Mexico trade by rail across the various U.S. regions in 1994. More than 84 percent of the Atlantic region trade, 63 percent of East Central trade, 85 percent of West Central trade, and 36 percent of Mountain/Pacific region trade utilized Texas rail gateways. The value of this trade amounted to $8.58 billion in 1994, of which only $3.81 billion consisted of Texas-Mexico trade.

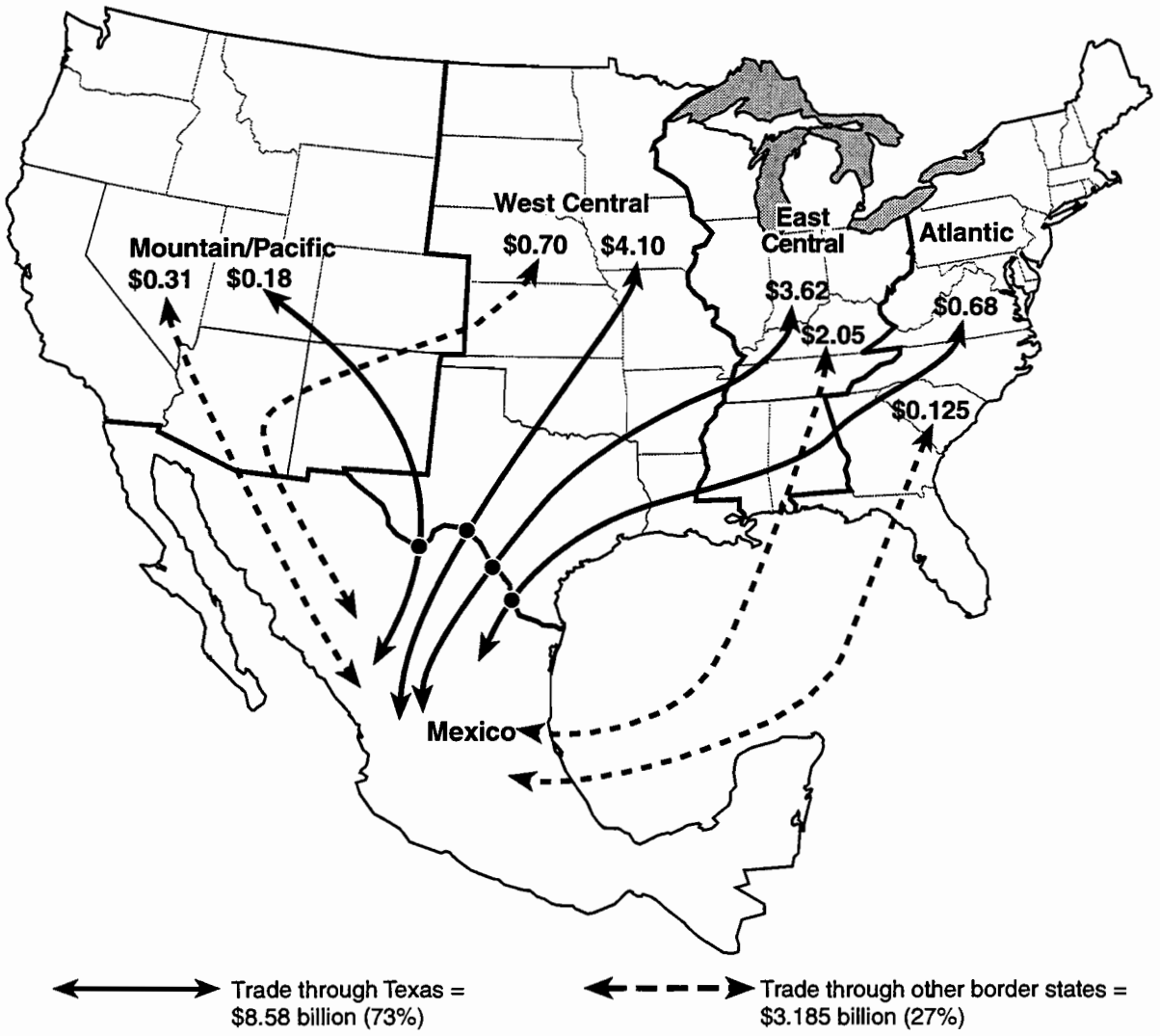

Figure 7. U.S. regions trade with Mexico by rail in 1994 (billions of dollars)

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

The USDOT data on transborder commodity flows by land clearly identify Texas as the primary land corridor for U.S.-Mexico trade. In 1994, $58.3 billion in trade crossed the Texas-Mexico border by truck and rail, an amount that represents over 2.6 million (2,659,603) merchandise shipments. About 70 percent of the truck shipments and 27 percent of rail shipments through Texas represented other states' commerce with Mexico. Although these truck and rail shipments originated in other states, their adverse impacts — congestion, pavement consumption, and pollution — directly affected Texas.

Summary

The analyses presented above verify Texas' role as the primary trade corridor for U.S.-Mexico overland commerce. Among other equally important findings, the data indicate that, in 1994:

(1) Over $95 billion worth of trade crossed the U.S.-Mexico border.

(2) Of this amount, $24.83 billion, or 27 percent of the total, crossed the border via New Mexico, Arizona, or California.

(3) The remaining $69.5, or 73 percent of the total, crossed the border via Texas.

(4) Of this amount, $60.69 billion, or 88 percent of the total, crossed by truck, while $8.58 billion, or 12 percent of the total through Texas, crossed by rail.

(5) Over 3.7 million truck shipments crossed the U.S.-Mexico border.

(6) Of these, 1.15 million, or 31 percent of the total, crossed the border via New Mexico, Arizona, or California.

(7) The remaining 2.55 million, or 69 percent of the total, crossed the border via Texas.

(8) Almost half (47 percent) of these 2.55 million truck shipments through Texas had origins and destinations in other states.

(9) Over 89 percent of the U.S.-Mexico trade value by rail passed through Texas.

The results discussed in this report were calculated using the portion of the data having known origins, destinations, transport modes, and port-of-entry locations. The percentages of undisclosed information varied between 2 and 15 percent of the data records, depending on the data category and file type. Nevertheless, even assuming that all undisclosed records relate to commerce going through other border states, the data still assert the importance of Texas as a major trade gateway.

Conclusions and Recommendations

While the numbers discussed in this report clearly define Texas' role as a major U.S.-Mexico trade corridor, transportation planners must still accurately translate dollars of trade and number of shipments into numbers of trucks and rail cars. TxDOT should investigate the amount and cost of additional infrastructure required to handle the demand from other states' overland commerce. International trade currently generates a substantial number of truck movements; as a result, fossil fuel consumption has increased and, at times, the state's air quality has deteriorated. Issues related to these consequences have been investigated at the state level elsewhere (Ref 17).

About to get underway is an ambitious binational study financed by the U.S. and Mexican governments and the World Bank, and administered by the Arizona Department of Transportation. This study will include consultants from both the U.S. and Mexico, as well as advisory committees from all border states in both countries. While the study's objective is to develop guidelines for coordinated binational planning, it will not pursue issues that are Texas-specific. The effects of the peso devaluation on traffic between Mexico and Texas are already being

investigated by TxDOT Study 1319 (Ref 1). However, we recommend further research on the preliminary results obtained in Project 2932 in order to investigate such relevant issues as:

(1) additional highway capacity needed in Texas as a result of other states' international commerce passing through the state;

(2) pavement rehabilitation needs generated by other states' international commerce;

(3) traffic safety hazards related to other states' international commerce passing through the state; and

(4) mobile source emissions in Texas non-attainment areas (e.g., El Paso) generated by trucks and trains serving other states' international commerce.

Studies such as those listed above can ensure that Texas receives the funds necessary for meeting transportation infrastructure and Clean Air Act requirements. Results of these studies can also reduce the congestion that increasingly burdens El Paso, Laredo, and many others Texas border communities.

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