

Texas NAFTA Study Update

Final Report

prepared for

Texas Department of Transportation (TxDOT)



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Table of Contents

Executive Summary	1
Current Conditions	1
Future Conditions	4
Conclusions and Recommendations	8
1.0 Introduction	9
1.1 NAFTA Trade Background	9
1.2 TxDOT’s NAFTA Role	10
1.3 Report Structure	11
2.0 NAFTA Trade on Texas Highways – Current Conditions	13
2.1 Texas NAFTA Highway System Overview	14
2.2 Methodology for Estimating Highway Trade Flows	19
2.3 Texas NAFTA Highway Usage Summary	24
2.4 Texas NAFTA Highway Corridor Profiles	27
2.5 NAFTA Mexico Highway System Overview	35
2.6 NAFTA Highway Trade Overview	37
2.7 Current NAFTA Highway Usage: Industry Perspective	41
3.0 Rail	49
3.1 NAFTA Rail Trade Background	49
3.2 Texas Rail Carriers	52
3.3 Mexican Rail Carrier Profiles	55
3.4 Gateways	56
3.5 Bottlenecks and Capacity Constraints on the Texas NAFTA Rail System	57
3.6 Rail Movements through Texas	61
3.7 NAFTA Rail Trends	65
4.0 Effects of 9/11 on the Texas Transportation System	69
4.1 Post-9/11 Trade Overview	69
4.2 Post-9/11 Trade and Transportation Analysis	71
4.3 Post-9/11 Technologies and Partnerships	74
4.4 Economic Impacts of 9/11	75
4.5 The Future of NAFTA Trade, Trade Security, and the Border Region	79
5.0 Future Conditions	83
5.1 Future NAFTA Trade Overview	83
5.2 Highway Growth Alternatives	88
5.3 Alternative 1: Future Growth on the Current System (No-Build)	90
5.4 Alternative 2: Highway Investment	94
5.5 Alternative 3: Global Growth and Trade on Improved Highway Infrastructure	99
5.6 Future NAFTA Rail Conditions	111

Table of Contents (continued)

6.0 Policy Findings, Conclusions, and Recommendations	113
6.1 Findings	113
6.2 Conclusions and Recommendations	115
7.0 Works Cited.....	117

List of Tables

2.1	Centerline Mileage of Texas’ Highways by Road Type	15
2.2	Northbound Texas Commercial Vehicle Border Crossings	17
2.3	SAM Commodity Classifications.....	21
2.4	NAFTA Origin-Destination Survey Results	23
2.5	Summary of 2003 NAFTA Truck Flows on Major Texas Highways	25
2.6	Texas/Mexico Trade – Top Tonnage Truck Commodities <i>2003 Millions of Annual Tons</i>	40
2.7	Texas/Mexico Trade – Top Value Truck Commodities <i>2003 Billions of Annual Dollars</i>	40
3.1	U.S.-Mexico Annual Train Crossings By Texas Gateway.....	51
3.2	Texas Railway Border Crossings	55
3.3	Texas/Mexico Trade – Top Carload Commodities <i>2003 Carloads</i>	63
3.4	Texas/Mexico Trade – Top Intermodal Commodities <i>2003 Intermodal Units</i>	64
3.5	Texas Imports from Mexico – Top Mexican States <i>2003 Carloads</i>	64
3.6	Texas Exports to Mexico – Top Mexican States <i>2003 Intermodal Units</i>	65
4.1	U.S.-Mexico Surface Trade – All U.S.-Mexico Border Crossings <i>Millions of 2002 Dollars</i>	69
4.2	Texas Ports of Entry Incoming Truck Traffic <i>Percent Change from Previous Year</i>	70
4.3	Texas Ports of Entry Incoming Train Crossings <i>Percent Change from Previous Year</i>	71
4.4	Post-9/11 Programs Summary.....	75
5.1	Texas/Mexico Trade – Top Tonnage Truck Commodities <i>2030 Millions of Annual Tons</i>	87
5.2	Texas/Mexico Trade – Top Tonnage Truck Commodities <i>2030 Billions of Dollars</i>	87
5.3	Summary of Future Scenarios	89
5.4	Summary of Current and Future NAFTA Truck Flows on Major Texas Highways for No-Build Alternative	93

List of Figures

ES.1 Daily NAFTA Truck Flows on Texas Highways 2003 <i>Average Annual Weekday Trucks – AAWT</i>	3
ES.2 Texas NAFTA Gateway Rail Flows 2003 <i>Total Annual Rail Tonnage (Millions of Tons)</i>	4
ES.3 NAFTA Growth on Texas Highway and Rail Systems <i>2003 to 2030 Millions of Annual Tons by Mode</i>	5
ES.4 2003 versus 2030 Daily NAFTA Truck Flows on the Current Texas Highway Network <i>Average Annual Weekday Trucks – AAWT</i>	6
ES.5 Daily NAFTA Truck Flows on Texas Highways – 2030 Highway Investment Scenario <i>Average Annual Weekday Trucks – AAWT</i>	7
2.1 Texas Highway System with International Border Crossings.....	14
2.2 Texas Commercial Vehicle Border Crossings	16
2.3 NAFTA Gateway 2005 Truck Crossings (<i>Millions</i>)	18
2.4 NAFTA Origin-Destination Survey Locations	23
2.5 Daily NAFTA Truck Flows on Texas Highways 2003 <i>Average Annual Weekday Trucks –AAWT</i>	26
2.6 Percentage NAFTA Trucks on Texas Highways 2003 <i>Average Annual Weekday Trucks – AAWT</i>	26
2.7 Mexico’s Highway Corridors.....	36
2.8 2003 Mexico Surface Freight and Port Volumes.....	37
2.9 NAFTA Truck Tonnage on Texas Highways 2003 <i>Millions of Tons</i>	38
2.10 NAFTA Truck Value on Texas Highways 2003 <i>Billions of Dollars</i>	38
2.11 Daily NAFTA Truck Tonnage Flows on Texas Highways 2003 <i>Millions of Daily Tons</i>	39
2.12 Daily NAFTA Truck Value Flows on Texas Highways 2003 <i>Millions of Dollars per Day</i>	39
3.1 Total NAFTA Rail Trade Growth – U.S. Ports versus Texas Ports 2005 <i>Millions of Dollars</i>	50
3.2 Texas Rail Gateways – 2005 Import and Export Value 2005 <i>Millions of Dollars</i>	50

List of Figures (continued)

3.3	Approximate Texas NAFTA Market Share among Class I Carriers.....	52
3.4	Texas NAFTA Railroad System (with Trackage Rights)	54
3.5	Mexican Rail Network	56
3.6	Texas NAFTA Rail Bottlenecks	58
3.7	NAFTA Gateway Rail Flows 2003 <i>Total Rail Units</i> <i>Thousands of Annual Railcars</i>	61
3.8	NAFTA Gateway Rail Flows 2003 <i>Total Rail Tonnage</i> <i>Millions of Annual Tons</i>	62
3.9	Texas Rail Trade with Mexico versus Through to Other U.S. States 2003 <i>Millions of Tons</i>	63
4.1	Cross-Border Truck Traffic 2000 versus 2001 <i>Monthly Comparison</i>	73
5.1	NAFTA Growth on Texas Highway and Rail Systems <i>2003 to 2030 Thousands of Units by Mode</i>	84
5.2	NAFTA Growth on Texas Highway and Rail Systems <i>2003 to 2030 Millions of Tons by Mode</i>	84
5.3	NAFTA Truck Tonnage on Texas Highways <i>2030 Millions of Tons</i>	85
5.4	NAFTA Truck Value on Texas Highways <i>2030 Billions of Dollars</i>	85
5.5	NAFTA Truck Tonnage Flows on Texas Highways <i>2030 Millions of Daily Tons</i>	86
5.6	NAFTA Truck Value Flows on Texas Highways <i>2030 Millions of Dollars per Day</i>	86
5.7	2030 No-Build Alternative NAFTA Truck Flows	91
5.8	2030 No-Build Alternative NAFTA Truck Flows Percentage.....	91
5.9	2003 to 2030 Change in NAFTA Truck Flows on Current Network.....	92
5.10	2030 Highway Investment Alternative NAFTA Truck Flows	97
5.11	2030 Highway Investment Alternative NAFTA Truck Flows Percentage	98
5.12	Current and Future NAFTA-Related Global Trade Flows.....	98
5.13	Daily NAFTA Truck Percentage Flows on Texas Highways <i>2003 Highway Investment Alternative</i>	99

List of Figures (continued)

5.14 Current and Future NAFTA-Related Global Trade Flows.....	102
5.15 Daily NAFTA Truck Flows on Texas Highways 2030 – Global Trade and Growth Alternative.....	107
5.16 Daily NAFTA Truck Percentage Flows on Texas Highways 2030 – Global Trade and Growth Alternative.....	108
5.17 Daily NAFTA Truck Flows on Texas Highways 2030 (<i>Average Annual Weekday Trucks – AAWT</i>).....	109
5.18 Daily NAFTA Truck Flows on Texas Highways 2030 – <i>No-Build Alternative (Average Annual Weekday Trucks – AAWT)</i>	109
5.19 Daily NAFTA Truck Flows on Texas Highways 2030 – <i>Highway Investment Alternative (Average Annual Weekday Trucks – AAWT)</i>	110
5.20 Daily NAFTA Truck Flows on Texas Highways 2030 – <i>Global Trade and Growth Alternative (Average Annual Weekday Trucks – AAWT)</i> .	110
5.21 NAFTA Gateway Rail Flows 2003 <i>Total Rail Tonnage (Millions of Annual Tons)</i>	112
5.22 NAFTA Gateway Rail Flows 2030 <i>Total Rail Tonnage (Millions of Annual Tons)</i>	112

Executive Summary

Texas has always been the principal gateway for trade between the United States and Mexico. In 1994, the North American Free Trade Agreement (NAFTA) was implemented between these historic trading partners, ushering in a new era of growth, and elevating the importance of the Texas highway and rail systems. Today, the Texas transportation system continues to be the single most important infrastructure link between the economies of the United States and Mexico. In 2003, the Texas highway system carried more than \$196 billion in trade between the United States and Mexico—roughly equivalent to 83 percent of the value of all U.S.- Mexico trade and 10 percent of *all* U.S. international trade for that year.¹ Texas is the single largest state trading partner with Mexico, and its highway system supports NAFTA-related economic growth within the State—but Texas’ highway system also supports the economies of other U.S. states that use the system to access gateways with Mexico. These are important considerations for state and national policy makers when determining financial allocations to highway maintenance and expansion and one of the primary reasons that the State of Texas commissioned this report, which serves as an update to TxDOT’s 1998 study “Effect of the North American Free Trade Agreement on the Texas Highway System.”

■ Current Conditions

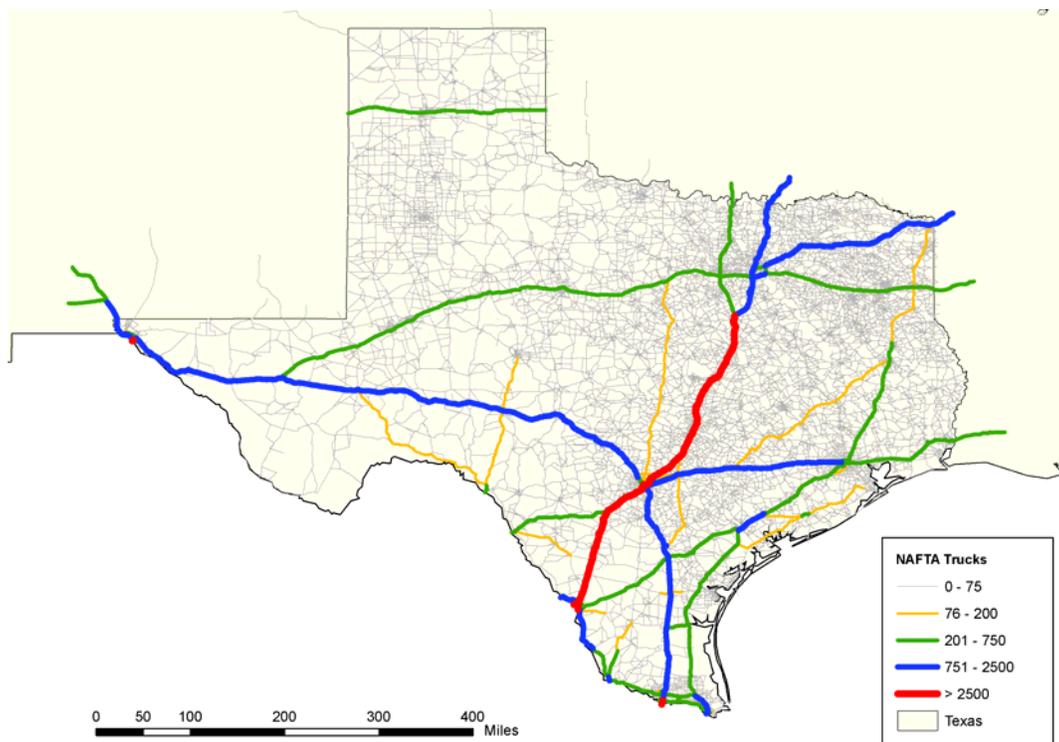
This report describes NAFTA trade and its effects in detail and serves as an update to TxDOT’s 1998 study “Effect of the North American Free Trade Agreement on the Texas Highway System.” The results of the study are based on the Statewide Analysis Model (SAM) and of the assignment by the SAM of the 2003 and 2030 Global Insight TRANSEARCH data to the current highway system as shown in Figure ES.1.

Highways – The following are major findings identifying current NAFTA truck impacts on the Texas Highway System:

- **Most NAFTA trucks use Texas ports of entries.** The majority of NAFTA truck freight between the U.S. and Mexico is carried on Texas highways. Recent Bureau of Transportation Statistics (BTS) data show that 68 percent of northbound NAFTA trucks crossed at Texas bridges in 2005. Data for U.S. southbound crossings are not available from BTS, but the proportion of exports by truck through Texas ports is presumably higher based on a U.S.-Mexico Binational Transportation Planning and Programming Study, which estimated that 79 percent of all U.S.-Mexico trucks crossed the border at Texas ports of entry in 1995.

- **An even higher percentage of NAFTA trucks use Texas highways when all U.S.-Mexico ports of entry are considered.** An estimated 83 percent of all NAFTA truck freight through all ports of entry—representing more than 3 million truck units per year—uses Texas highways during some part of their journey to reach Mexico.
- **A significant portion of NAFTA trucks pass through Texas to other destinations.** TRANSEARCH data acquired for this study show that 52 percent of NAFTA truck tonnage, and 62 percent of NAFTA truck value passes through Texas en route to destinations and origins in other U.S. states and Mexico.
- **NAFTA trucks are a significant portion of truck traffic in Texas.** Based on SAM modeled volumes as shown in Figure ES.1, NAFTA truck traffic comprised 9 percent of all truck traffic on Texas highways in 2003, with a total of nearly 4 million truck vehicle miles of travel daily. Approximately 96 percent of NAFTA truck traffic was on Interstate, U.S., and other State Highways. The remaining four percent was on farm to market and local roads.
- **NAFTA trucks are concentrated on a small number of highways.** Seven highway corridors—which comprise less than two percent of all Texas roadway mileage—carry almost 83 percent of the NAFTA truck traffic on the Texas highway system. IH-35, the major north-south corridor, carries 37 percent of all Texas NAFTA traffic; IH-10, the major east-west corridor, carries 22 percent of all NAFTA trucks; U.S. 59 and U.S. 281 each carry about 6 percent, while IH-20 accommodates about 5 percent, and IH-30 and U.S. 77 account for an additional 4 percent each of total Texas NAFTA traffic.

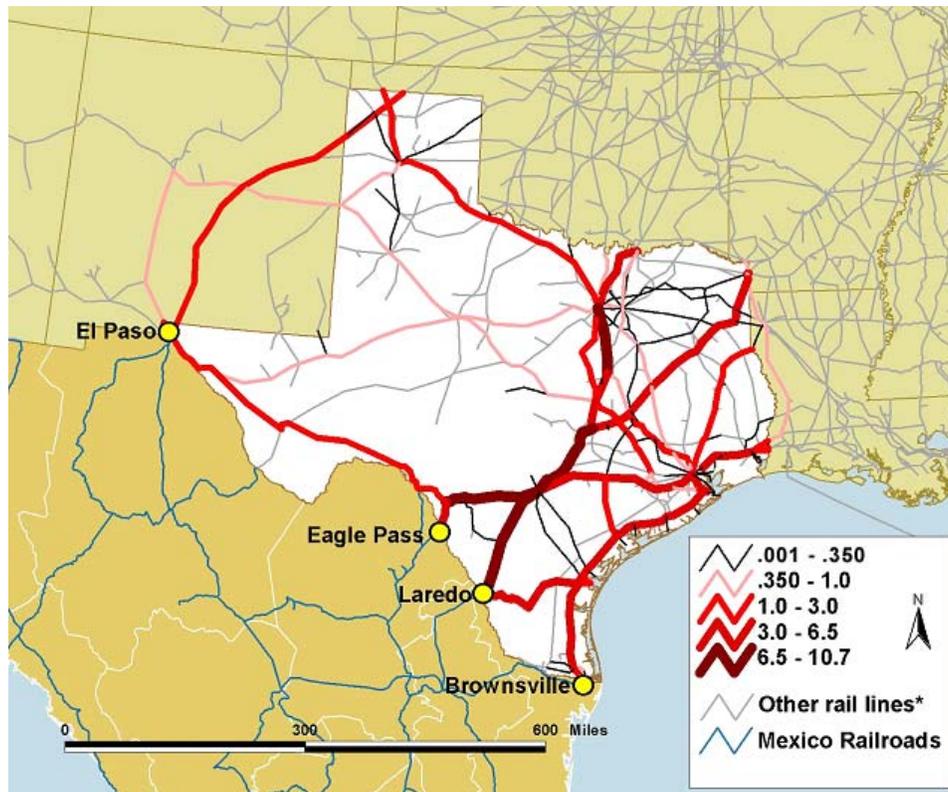
Figure ES.1 – Daily NAFTA Truck Flows on Texas Highways
 2003 (Average Annual Weekday Trucks – AAWT)



Rail – Movements of international freight via the Texas rail system are also a key component of NAFTA trade. While NAFTA has stimulated trade among NAFTA partners – where total NAFTA trade has grown by 80.9 percent² between 1994 and 2004 and rail movements between the U.S. and Mexico have grown at an even faster pace, increasing by 164 percent from 1994 to 2004. Figure ES.2 shows the rail flows to and from the major Texas NAFTA gateways in 2003. With future growth, the Texas rail system will encounter capacity constraints due to:

- Increasing container flows on nontraditional routes – i.e., north-south rather than east-west;
- Inadequate terminals in terms of both location and capacity;
- Bottlenecks in and around the border;
- Metropolitan bottlenecks; and
- General corridor capacity deficiencies.

Figure ES.2 – Texas NAFTA Gateway Rail Flows
2003 Total Annual Rail Tonnage (Millions of Tons)

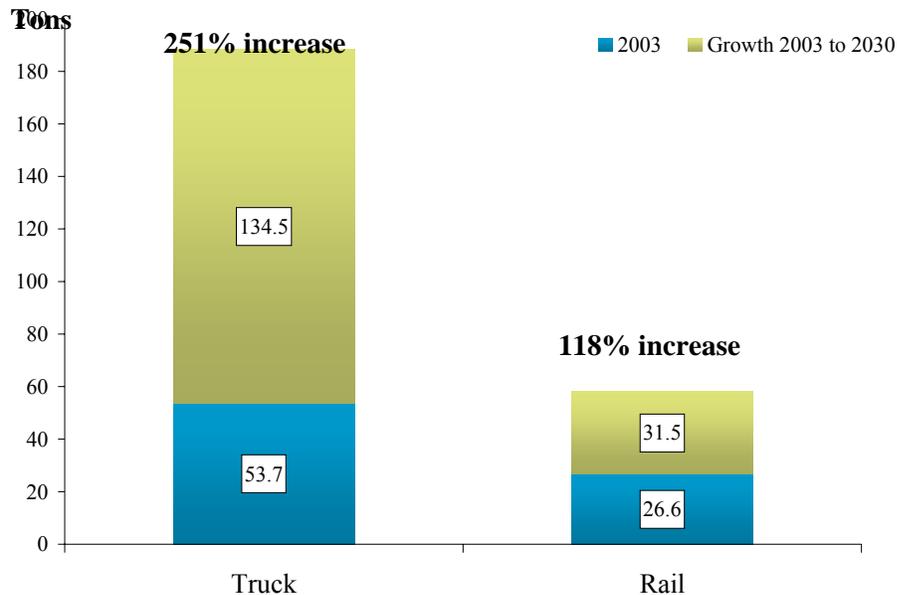


* Indicates no NAFTA traffic in TX. Traffic unassigned outside TX except in NM and LA.
 Source: 2003 TRANSEARCH data.

■ Future Conditions

Collectively, NAFTA tonnage on Texas highways and railroads is forecast by Global Insight TRANSEARCH to increase by nearly 207 percent through 2030, resulting in profound impacts on the Texas highway and rail systems. Truck tonnage will grow by 251 percent while rail tonnage is forecast to increase 118 percent. The number of trucks carrying NAFTA goods will increase by 263 percent and the number of rail units will grow by 195 percent. NAFTA truck VMT will grow by more than 330 percent by 2030. The NAFTA percentage of total statewide truck VMT is projected to grow from 9 percent in 2003 to 22 percent of all truck VMT in 2030. Figure ES.3 illustrates the overall growth of NAFTA truck and rail trade by tonnage.

Figure ES.3 – NAFTA Growth on Texas Highway and Rail Systems
2003 to 2030 Millions of Annual Tons by Mode

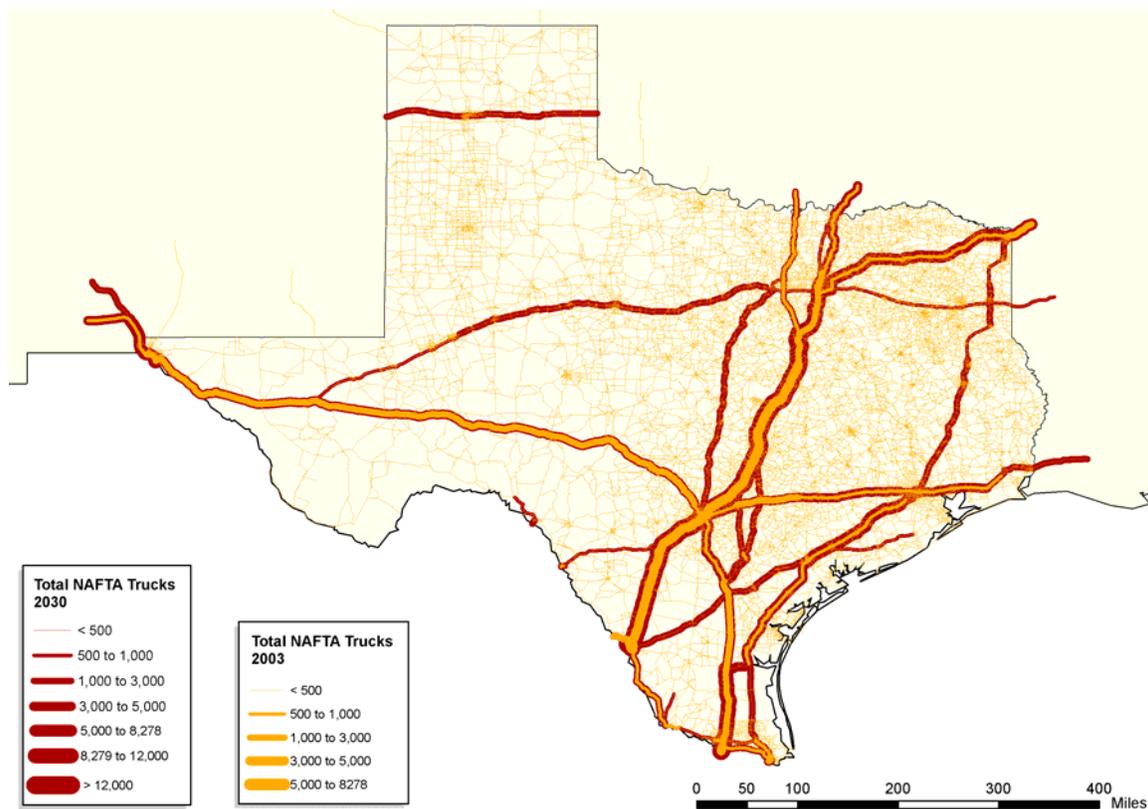


In order to estimate the effect of the future trade volumes on the Texas transportation system, three scenarios were developed within the Statewide Analysis Model framework. For each scenario, forecasted NAFTA truck volumes are mapped (assigned) to the Texas highway system. The three alternatives include:

- **Future No-Build Scenario** – The assignment of future NAFTA and non-NAFTA truck traffic to the existing SAM network shows future volumes without any capacity expansion to 2030;
- **Highway Investment Scenario** – This scenario uses the SAM network to show how future NAFTA and non-NAFTA truck flows react to new capacity, including projects identified in the Statewide Transportation Improvement Program (STIP) and the Trans-Texas Corridor IH-35 alignment (TTC-35);
- **Global Trade and Growth Scenario** – This scenario estimates the change in future NAFTA truck flows on the improved (Highway Investment) network assuming higher than forecast global trade from TRANSEARCH.

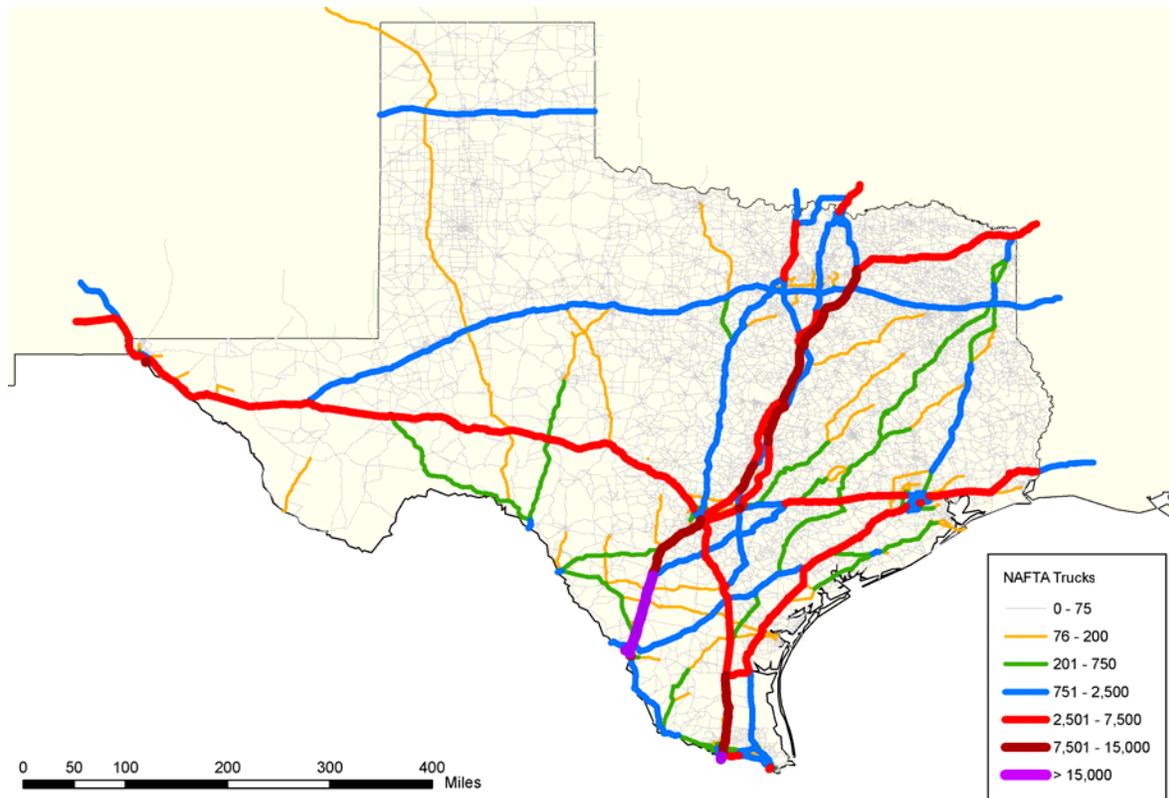
Figure ES.4 shows the Future No-Build with the assignment of the growth of NAFTA truck flows from 2003 (yellow bands) to 2030 (red bands) over the existing Texas highway corridors. The NAFTA truck percent of total trucks in the IH-35 corridor, for example, will go from 27 percent in 2003 to nearly 50 percent by 2030. Further, some IH-35 NAFTA demand will shift to parallel routes such as U.S. 281.

Figure ES.4 – 2003 versus 2030 Daily NAFTA Truck Flows on the Current Texas Highway Network
(Average Annual Weekday Trucks – AAWT)



Under the Highway Investment scenario (see Figure ES.5), plans for the Trans Texas Corridor (TTC-35) will help alleviate the impacts of this dramatic growth, especially on IH-35, the most heavily used NAFTA route today. Under this scenario more than half of NAFTA trucks in the corridor are expected to use the TTC-35. If Longer Combination Vehicles (LCVs) are allowed on TTC-35, even greater use of the TTC-35 would be expected and NAFTA industries would receive significant productivity improvement.

Figure ES.5 – Daily NAFTA Truck Flows on Texas Highways – 2030 Highway Investment Scenario
(Average Annual Weekday Trucks – AAWT)



Under the Global Trade and Growth scenario which assumes greater use of Mexican ports for international trade, greater Mexican production and consumption, and development of inland distribution ports with full opening of the southern border, the Texas highway and rail systems will experience even higher NAFTA volumes in the future. Under this scenario, statewide NAFTA truck VMT would increase by an additional 20 percent over the No-Build and Highway Improvement Scenarios.

With the overall NAFTA growth projected in this study, it is evident that Texas highways will see large increases in NAFTA truck usage and that traffic congestion will worsen in the State's largest metropolitan areas, because they all lie along the roadway network that funnels the vast majority of NAFTA goods into and through the country. Thus, the future effects of NAFTA trade along with internal growth of Texas' population and economy will further exacerbate the State's highway congestion, and increase investment needs for both highway capacity and highway maintenance. The NAFTA impacts on the Texas rail system will also be very significant.

■ Conclusions and Recommendations

The following conclusions and recommendations are presented based on the findings of this NAFTA study:

1. A projected quadrupling of NAFTA highway demand will significantly impact Texas highway planning and investments; the TTC-35 will be the single most important Texas transportation improvement to support NAFTA trade.
2. Highway NAFTA trade growth through the Lower Rio Grande Valley, and the growing NAFTA traffic from Laredo to Houston and on to the northeast support development of the IH-69/TTC corridor.
3. The large increase in NAFTA demand suggests that improved trucking productivity through allowance of heavier units (e.g., longer combination vehicles or LCVs) on the TTC corridors could produce both public and private industry benefits.
4. Key private and public rail investments in bottleneck removal, in intermodal facilities, and in mainline capacity will be needed to allow freight rail to accommodate its share of NAFTA trade growth and to prevent further pressure on Texas highways.
5. Growing NAFTA trade, including growth of inland ports and large warehousing distribution centers in the major Texas metropolitan areas for both trucking and intermodal transfers will need to be recognized in TxDOT and MPO planning and decision-making.
6. Binational border and corridor planning will continue to demand TxDOT's attention to key rail capacity and key highway bridge additions as well as to supporting improvements to connections on both sides of the border.
7. Proactive engagement with Mexico's Federal transportation agency (SCT) and Mexican border states will help to assure seamless NAFTA connections and trade movements.
8. Border trade facilitation and security will also require continuing coordination between TxDOT, the Texas DPS, and the U.S. Departments of Transportation and Homeland Security. The recent announcement that the U.S. government will now permit Mexican trucks beyond the commercial zone on a pilot basis will immediately require increased coordination between Texas authorities and Federal agencies.
9. Given that Texas bears the brunt of U.S. NAFTA trade now and into the future, TxDOT should proactively advocate its interests toward the next surface transportation reauthorization. Texas' interests include the core Federal-aid programs as well as the targeted programs for borders, corridors, and projects of national significance in the current Safe, Accountable, Flexible, and Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU). These targeted programs are designed to address NAFTA and other trade and competitiveness issues.

1.0 Introduction

Texas, as the most important North American Free Trade Agreement (NAFTA) state gateway and as the largest single U.S. trading partner with Mexico, has a special interest in the current and future levels of NAFTA trade. This report details the current and projected future NAFTA flows and describes the current effect and future implications for the Texas highway and rail systems. The intent of this report is to provide the Texas Department of Transportation (TxDOT) and other policy makers at the State and Federal level with insight into the current conditions and projected future impacts of NAFTA trade on the Texas highway and rail transportation systems. Ultimately, this document provides valuable information to enable planners and legislators to develop solutions to existing and emerging challenges.

■ 1.1 NAFTA Trade Background

Since the implementation of the North American Free Trade Agreement in 1994, trade between the United States, Mexico, and Canada has grown significantly as the three economies integrate.³ The implementation of NAFTA created a free-trade area in North America, and reduced barriers in the cross-border movement of goods and services between Mexico, the United States, and Canada. NAFTA immediately eliminated duties on many goods shipped between the member countries, gradually phasing out duties on all trade among the countries by 2008. The Mexican **maquila** production—which imports components duty free, adds value typically through assembly, and then exports—has continued to expand following NAFTA initiation.

With 23 international bridges along a 1,254-mile border with Mexico, Texas is the predominant port of entry and exit for U.S.-Mexico surface trade.⁴ The U.S. government, the State of Texas, local governments, and private entities own and operate the bridges on the U.S. side, which are located in Brownsville, Del Rio, Eagle Pass, El Paso, Fabens, Hidalgo, Laredo, Presidio, Progreso, Rio Grande City, and Roma. In 2005, the number of trucks entering Texas from Mexico along these 23 crossings, and traveling on the Texas highway network, topped 3.2 million.⁵ While railroads carry less transborder trade than the Texas highway network, Brownsville, Eagle Pass, El Paso, Laredo, and Presidio also have railroads that link Texas directly to Mexico and in 2005 the number of trains entering the U.S. through Texas from Mexico totaled 7,946.⁶

These general trends of NAFTA trade provide only a starting point for analyzing the effects of the agreement on the State's multimodal transportation network. This report describes NAFTA trade and its effects in detail and serves as an update to TxDOT's 1998 study "Effect of the North American Free Trade Agreement on the Texas Highway System."

NAFTA truck vehicle miles of travel (VMT) is projected to more than quadruple by 2030—with highways carrying an even larger share of total NAFTA trade than at present. This poses a

significant challenge to the Texas highway transportation system, particularly the corridors serving high volumes of NAFTA trade. At the same time, the Texas rail system faces capacity shortfalls and will be challenged to serve the projected growth of NAFTA trade served by rail.

NAFTA Trade Data – Defining “NAFTA”

For this report, the term “NAFTA” generally means trade moving between the United States and Mexico that utilizes either the Texas highway or rail system for at least a portion of its journey. This definition is used to describe the flows of NAFTA freight and should not be confused with the North American Free Trade Agreement itself, including its broader relationship to trade between all three NAFTA partners (U.S., Mexico, and Canada). While most trade described as “NAFTA” freight in this report falls under the traditional definition of goods moving between the United States and Mexico, a portion of the freight volume is actually part of a longer international move that is transiting the U.S. en route to or from Mexico. For example, there are certainly trip origins for commodity classes like intermodal containers from California that use the Texas highway system to reach a Mexican destination—but that have a true origin not in California but in China. These types of trips are not distinguished from a move, for example, between Michigan and Guadalajara that is more likely to have its true origin in the United States or Mexico. Globalization has made the tracing of true cargo origins and destinations more difficult—especially when the freight move is part of a global supply chain that results in a product manufactured from international components from multiple country origins. Ultimately, this report focuses on freight movement between the U.S. and Mexico via Texas, regardless of whether the cargo strictly fits within the traditional definition of NAFTA.

■ 1.2 TxDOT’s NAFTA Role

NAFTA and its related trade policies have obvious economic, political, and social impacts on the three participating countries. As congestion on the Texas highways, particularly in the metropolitan areas, continues to increase, the impacts of NAFTA trade on the Texas multimodal transportation network remain a high priority for TxDOT and the State of Texas. The impacts of NAFTA trade important to TxDOT’s mission – *To provide safe, effective, and efficient movement of people and goods* – include both the direct and indirect effects of the agreement on the Texas transportation system.

For example, the increase in truck traffic on Texas highways as a result of NAFTA is of great concern for TxDOT as they plan for, build, operate, and maintain statewide transportation infrastructure. Safety of these movements is also a high priority. The related economic effects of NAFTA-related transportation are also important as are the effects of the events of September 11, 2001 (9/11) on the Texas transportation network. Following the terrorist attacks of 9/11, international trade movements, specifically trade security, have taken even higher priority.

It is also important that TxDOT continue to integrate its programs and cooperate with statewide and Federal agencies that operate and manage border infrastructure, including border cities, counties, and, on the Federal side, the U.S. Department of Transportation Federal Highway Administration (FHWA) and the Department of Homeland Security (DHS) Customs and Border Protection (CBP).

By integrating this NAFTA trade study with TxDOT's other plans, programs, and policies, TxDOT works to ensure high system performance for all transportation movements while supporting international trade and the statewide and national economies. As trade patterns, movements, and policies continue to evolve, TxDOT will continue to adjust its programs and policies to facilitate safe and efficient movement of people and goods including NAFTA trade movements.

■ 1.3 Report Structure

The goals of the study are to provide TxDOT with:

- A detailed assessment of the existing conditions for both road and rail as it relates to NAFTA;
- A projection of the future impacts of both highway and rail; and
- An analysis of the impacts on trade resulting from the events of 9/11.

This report represents a summary of the findings and work performed to accomplish these goals. These findings are presented in the following chapters, which were delivered to TxDOT as Technical Memoranda and compiled as the NAFTA trade study final report:

- **Chapter 2 – NAFTA Trade on Texas Highways:** This chapter summarizes the current condition and use of the Texas highway network as it relates to NAFTA shipments to and from Texas border crossings. This chapter also includes a summary of freight origins and destinations as well as summaries and findings from extensive freight shipper/industry interviews, which were conducted for this study.
- **Chapter 3 – NAFTA Trade on Texas Railways:** Chapter 3 details the current condition and use of the Texas rail network as it relates to NAFTA shipments to and from border crossings and Texas ports. This chapter includes a summary of data analyzed to determine usage as well as rail industry and shipper interviews, which were conducted as part of this study.

- **Chapter 4 – 9/11 Effects:** This chapter explores the effects of the events of 9/11 on the Texas transportation system, and includes a summary of technologies and programs implemented since 9/11 to increase freight security and facilitate the efficient flow of people and goods.
- **Chapter 5 – Future Growth:** Chapter 5 summarizes the results of the forecasts prepared for the NAFTA trade study through and 2030 and includes an analysis of potential trade patterns and implications of developing international trade policies.
- **Chapter 6 – Policy Findings, Conclusions, and Recommendations:** As trade patterns, movements, and policies continue to evolve, TxDOT will need to adjust its programs and policies to facilitate safe and efficient NAFTA trade movements. This chapter explores the potential policy implications and possible changes TxDOT should consider relative to future NAFTA trade movement.

2.0 NAFTA Trade on Texas Highways – Current Conditions

By all measures, the Texas highway system is the single most important infrastructure link between the economies of the United States and Mexico. In 2003, the Texas highway system carried more than \$196 billion in trade between the United States and Mexico—roughly equivalent to 83 percent of the value of all U.S.- Mexico trade and 10 percent of *all* U.S. international trade for that year.⁷ Texas is the single largest state trading partner with Mexico, and its highway system supports NAFTA-related economic growth within the State—but Texas’ highway system also supports the economies of other U.S. states that use the system to access gateways with Mexico. NAFTA truck traffic that is merely passing ‘through’ Texas en route between other states and Mexico accounts for more than 52 percent of all trucks and 62 percent of all NAFTA value moved over Texas highways. These are important considerations for state and national policy makers when determining financial allocations to highway maintenance and expansion and one of the principal reasons the State of Texas commissioned this report.

This chapter provides details on the current conditions of the Texas NAFTA highway system—consisting of gateways (bridge crossings), corridors, intermediate activity centers (transfer locations), origins, and destinations used to move goods between the United States and Mexico. The trucking industry that operates over the NAFTA highway system is also an important component of the NAFTA highway trade system, since it affects highway pavements and operations. Other key stakeholders—including industrial shippers and brokers or other agents that facilitate most international moves—make many of the decisions that affect the highway system within Texas. Each of these elements—the physical system, the users, and those who arrange trip routes—has an impact on the intensity of NAFTA truck traffic in Texas. In order to assist Texas highway officials determine how best to plan for the future of NAFTA truck demand on their State’s highway system, this chapter focuses on the following topics:

- Texas NAFTA highway system overview;
- Methodology for estimating NAFTA truck volumes in Texas;
- A summary of NAFTA truck flows on the current Texas highway network and the impact of the NAFTA truck traffic on the system;
- Corridor profiles of the most important NAFTA trade routes;
- NAFTA Mexico highway system overview;

- NAFTA truck trade, including the top commodities and trading partners using Texas highways; and
- Industry perspectives on the current condition and usage of the Texas system for NAFTA trade, including bottlenecks and routing.

■ 2.1 Texas NAFTA Highway System Overview

The Texas highway network serves as the primary medium of transportation for both personal and freight travel within the State. Texas has the largest state highway system in the country with 79,649 (2006) centerline miles of highway owned and operated by the State, as well as the largest total highway system of any state.⁸ Key transportation corridors within the Lone Star State support local, domestic, and international trade movements and are the means by which two of the world’s largest economies—the U.S. and Mexico—are linked physically, culturally, and economically. Figure 2.1 illustrates the extent of the Texas highway system and highlights important national and regional corridors, international gateways, and Texas’ large urban centers.

Figure 2.1 – Texas Highway System with International Border Crossings

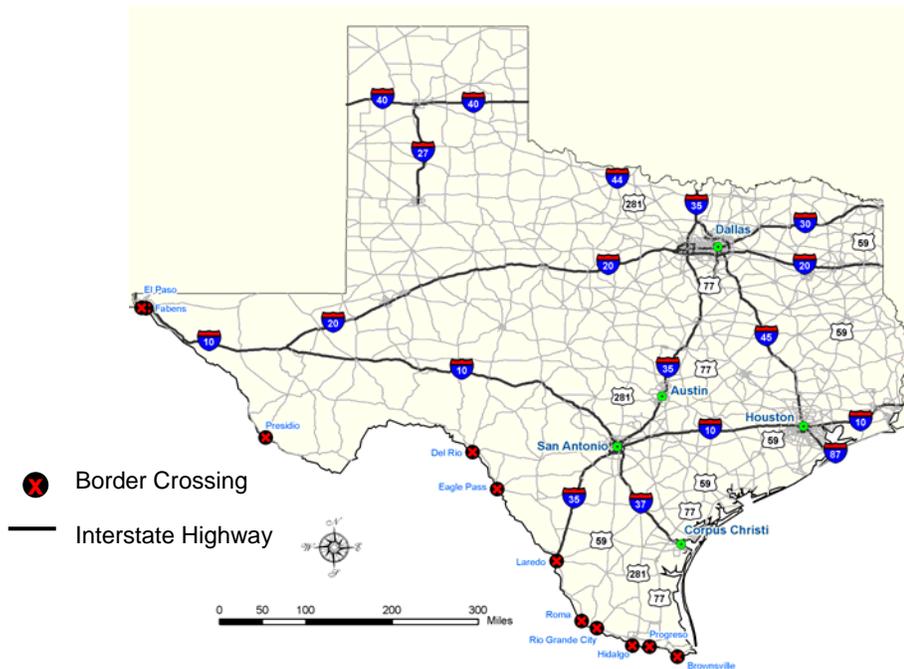


Table 2.1 presents the major highway types of the state system by centerline mileage and indicates the percentage of total system miles each represents.

Table 2.1 Centerline Mileage of Texas' Highways by Road Type

Road Type	Centerline Miles	Percent of Total System Miles
Interstate Highways	3,233	1%
U.S. Highways	12,101	5%
State Highways	16,256	7%
Farm to Market Roads	40,996	18%
Frontage Roads	6,719	3%
Park Roads	339	0.2%

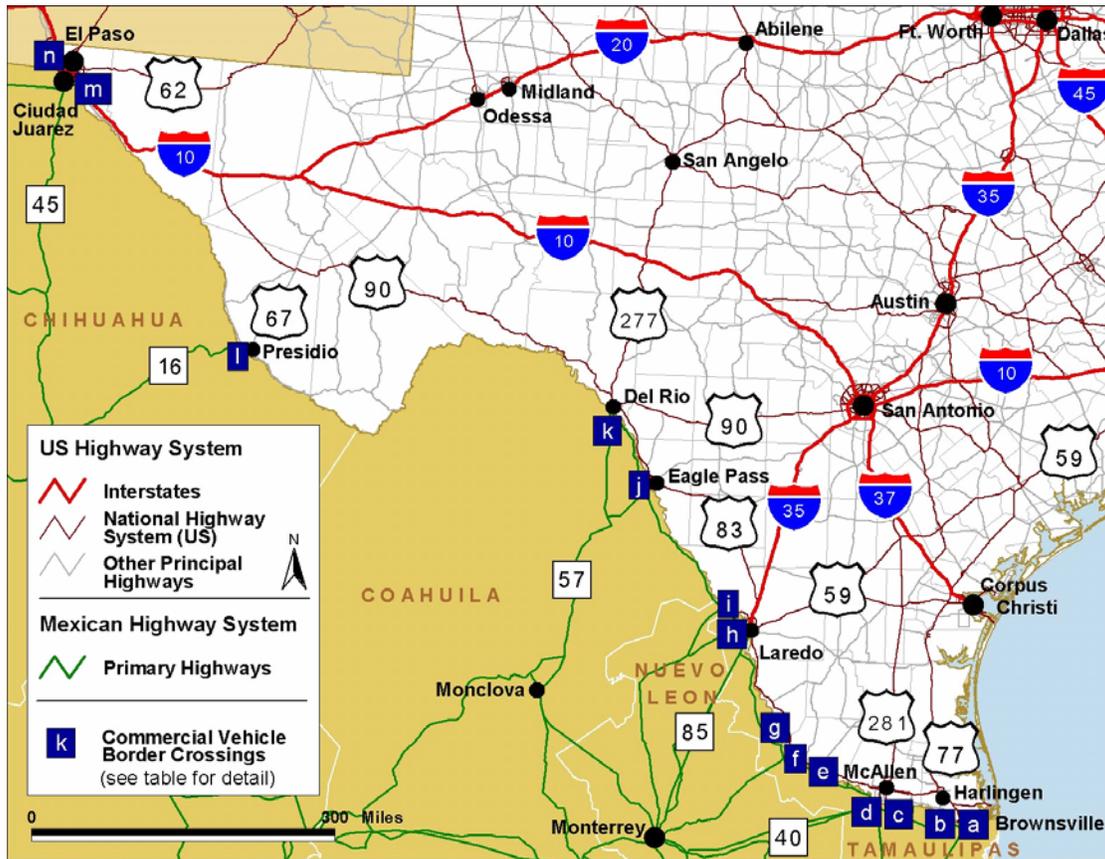
Source: TxDOT Pocket Facts 2006.

Texas International Gateways

Of the 40 active highway border crossings between the U.S. and Mexico, 26 (65 percent) are located on the Texas-Mexico international border and are owned and operated by either the U.S. government, the State of Texas, local governments, or private entities. The Texas crossings include 23 vehicular bridges, two dam crossings, and one hand-drawn ferry.⁹ Of these crossings, 13 bridges and one dam crossing allow commercial vehicle traffic. Figure 2.2 shows the location of these 14 NAFTA freight crossings in Texas. Table 2.2 corresponds to the reference codes on the map and contains additional information on the characteristics of the crossings—including the number of truck-only lanes, the 2005 northbound truck crossings, and the percentage of total truck traffic relative to the total truck crossings.¹⁰

The top four bridge crossings account for nearly 75 percent of all northbound NAFTA truck crossings. As shown in Table 2.2, the World Trade Bridge in Laredo had the most truck crossings (1.14 million trucks) and carried over 36 percent of all northbound truck crossings. The Pharr-Reynosa International Bridge (Pharr), Bridge of the Americas (El Paso), and Ysleta-Zaragoza Bridge (El Paso) represent 15.3 percent, 12.4 percent, and 11.0 percent of total northbound truck crossings, respectively. Figure 2.3 graphically depicts the magnitude of crossings at each gateway community and shows that Laredo and El Paso accommodated the most truck traffic in 2005.

Figure 2.2 – Texas Commercial Vehicle Border Crossings



Source: Cambridge Systematics and TxDOT.

Table 2.2 – Northbound Texas Commercial Vehicle Border Crossings

Map Ref.	Bridge	U.S. Gateway	Mexico Gateway	NB Traffic 2005	NB Truck Lanes	Percentage of Total NB Truck Traffic 2005
A	Veterans International Bridge	Brownsville	Matamoros	192,060	1	6.1%
B	Free Trade Bridge	Los Indios	Lucio Blanco	42,580	1	1.3%
C	Progreso International Bridge	Progreso	Nuevo Progreso	23,807	1	0.8%
D	Pharr-Reynosa Int. Bridge on the Rise	Pharr	Reynosa	483,889	2	15.3%
E	Rio Grande City-Camargo Bridge	Rio Grande City	Camargo	46,308	-	1.5%
F	Roma-Ciudad Miguel Aleman Bridge	Roma	Ciudad M. Aleman	8,269	-	0.3%
G	Lake Falcon Dam Crossing	Falcon Heights	Ciudad Guerrero	76	-	0.0%
H	World Trade Bridge	Laredo	Nuevo Laredo	1,144,908	4	36.2%
I	Laredo-Colombia Solidarity Bridge	Laredo	Colombia	310,699	2	9.8%
J	Camino Real International Bridge	Eagle Pass	Piedras Negras	97,729	-	3.1%
K	Del Rio-Ciudad Acuña Int. Bridge	Del Rio	Ciudad Acuña	64,075	-	2.0%
L	Presidio Bridge	Presidio	Ojinaga	5,763	-	0.2%
M	Ysleta-Zaragoza Bridge	El Paso	Ciudad Juarez	347,212	2	11.0%
N	Bridge of the Americas	El Paso	Ciudad Juarez	393,442	2	12.4%

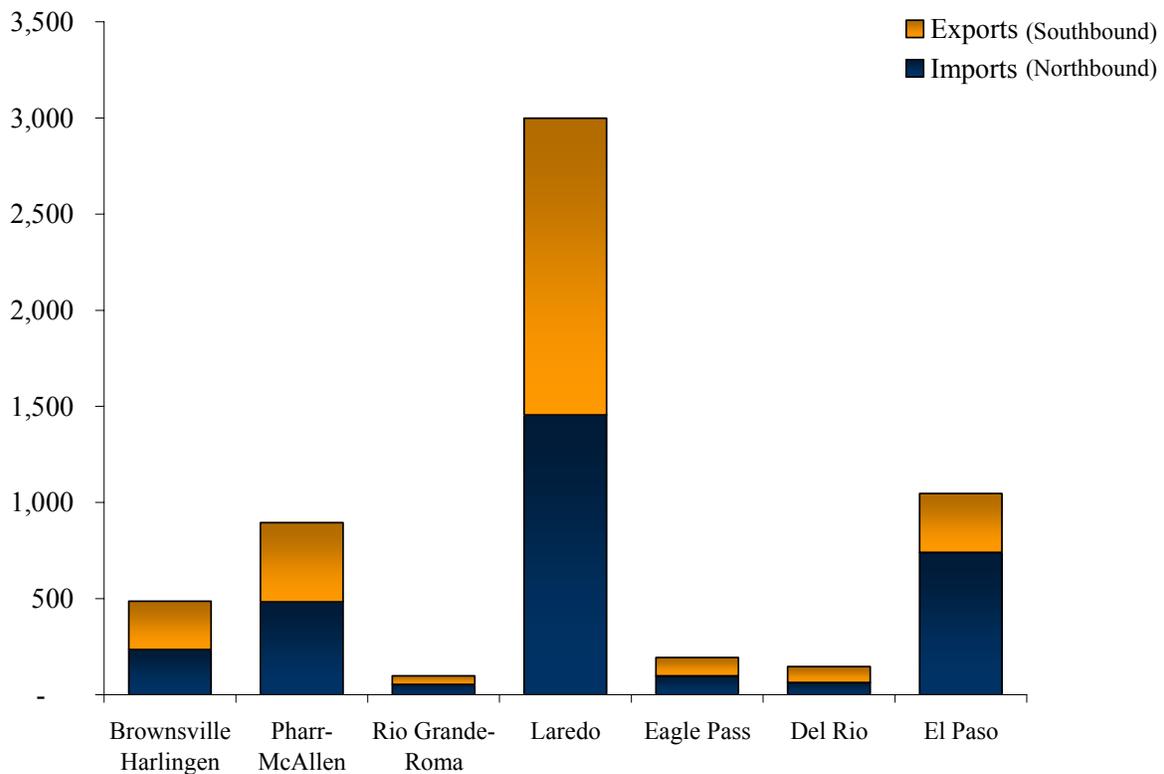
Source: TxDOT International Relations Division. 2006 Texas-Mexico International Bridges and Border Crossings Existing and Proposed.

Role of Gateway Communities in NAFTA Trade

NAFTA gateways in Texas serve as intermediate activity centers in typically much longer distance moves between Mexican and U.S. origins and destinations. Texas gateway communities—including their Mexican counterparts—typically function in one of two ways in NAFTA supply chains—either as a support center for transportation of locally produced manufactured goods or as an intermediate service center for goods transported long distances. El Paso and McAllen are the best examples of the first type of gateway community—supporting local manufacturing in the fast-growing maquila production cities of Ciudad Juarez, Chihuahua and Reynosa, Tamaulipas, respectively. Laredo and Eagle Pass typify the long-distance service center typology. In either case, Texas border communities specialize in the facilitation of international trade, including activities associated with clearing U.S. or Mexican customs.

In each of the major gateway communities, large industrial parks and distribution centers have been established near international crossings in locations with good access to major NAFTA corridors. Upon arrival in the border community southbound truck shipments, for example, are typically dropped in industrial parks from which they are subsequently transferred across the U.S.-Mexico border by a local drayage carrier to a similar transfer or warehousing or manufacturing facility on the Mexican side. The same is true of northbound moves—which are typically dropped by a Mexican long-haul carrier at a brokerage warehouse in Mexico and then drayed to a similar facility on the U.S. side where a U.S. long-haul carrier retrieves the load and travels northward. Laredo is the best example of this type of move. Manufacturing-based gateway communities such as Ciudad Juarez or Reynosa generate fewer long-haul moves because the manufacturing or distribution activities are occurring near the border and are serving growing urban populations (the Lower Rio Grande Valley and El Paso regions are home to more than 1 million and 750,000 residents, respectively).

Figure 2.3 – NAFTA Gateway 2005 Truck Crossings (Millions)



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

■ 2.2 Methodology for Estimating Highway Trade Flows

NAFTA freight flows on the Texas highway system were estimated by assigning a database of international and domestic truck trips to the TxDOT's Statewide Analysis Model (SAM) and the Texas-North American Freight Flow Model (Tx-NAFF). The Tx-NAFF model is used in concert with the SAM to extend the SAM's analysis capabilities into Mexico. The SAM is the primary analysis platform used by State and local planners to forecast passenger and freight flows on the State's highway network and is one of the most powerful statewide models of its kind in the United States. Through this study, the freight element of the SAM was updated for the first time since its initial development in 1998. The Tx-NAFF model is used in concert with the SAM to extend the SAM's analysis capabilities into Mexico. Tx-NAFF was first developed in 2002 and through this study several of its network and geographic characteristics were updated. The TRANSEARCH database, a product of Global Insight, was the primary input for the SAM U.S.-Mexico and U.S. domestic truck flows. The process of estimating the NAFTA flows using the SAM and Tx-NAFF required three major steps, each of which is summarized in this section:

- Development of a trip table of NAFTA flows;
- Preparation of the highway network, and
- Assignment of the trip table flows to the highway network.

Trip Table Development

The trip table prepared for the SAM and Tx-NAFF was derived from a TRANSEARCH database developed by Global Insight (GI). This database contains statewide commodity flow information for 2003 drawn from existing proprietary, commercial, and publicly available data sources and is supplemented by economic forecasting techniques. The TRANSEARCH database was organized and analyzed using Freight Tools^{cs}, a proprietary software tool developed by Cambridge Systematics, Inc. to quickly and uniformly process and manage large freight data sets. Freight Tools^{cs} was used to describe commodity flows moving into, out of, within, and through the State of Texas, including flows to and from Mexico. The TRANSEARCH domestic and international flows include:

- **Domestic U.S. Flows** – freight flows originating and terminating in the United States that utilize Texas highways for at least part of their route and include:
 - **Texas Internal Flows** – intrastate trade between Texas counties (provided at the county level);
 - **Texas – U.S. Flows** – trade between Texas and other U.S. states (provided at the county level in Texas and the state level for other U.S. states);
 - **U.S. through Flows** – trade between U.S. states that passes through Texas;

- **U.S. – Mexico (NAFTA) Flows** – freight flows originating or terminating in Mexico;
 - **Texas – Mexico Flows** – trade between Texas and Mexico (provided at the county level for Texas and the state level for Mexico);
 - **U.S.-Mexico Through Flows** – trade between U.S. states and Mexican states passing through Texas.

While this study focuses on the estimation of U.S. – Mexico (referred to as “NAFTA”) flows, the process of setting up the trip table and calibrating the SAM model required the inclusion of domestic freight flows on the network. It should also be noted that NAFTA flows include freight moving over *any* part of the Texas highways to access Mexico—which largely consists of trips that use Texas international border crossings but also includes trips through gateways in other southern border states (California, Arizona, and New Mexico) that pass through Texas—usually on a major east-west corridor like IH-10 or IH-20—en route to other U.S. states.

While TRANSEARCH is generally accepted as the best available commodity flow database, there are some limitations which affect how the database should be used and interpreted. As explained in the following section, considerable data reconciliation was necessary to get an acceptable base year highway assignment.

Data Comparison and Reconciliation

During the preparation of the trip table for the SAM and Tx-NAFF, the TRANSEARCH database was rigorously compared to publicly available state, national, and international freight flow data to ensure the reasonableness of the data going into the model. This iterative and lengthy process compared and reconciled the TRANSEARCH data with the Bureau of Transportation Statistics’ Border Crossing and Transborder data, the existing truck trip tables of the SAM model (last updated in 1998); and the Federal Highway Administration’s newly released Freight Analysis Framework₂ dataset. Upon initial receipt of the TRANSEARCH data, wide variations were discovered between it and the aforementioned national data sets, especially for domestic truck movements to and from Texas. Specific commodity discrepancies were identified and rectified. Subsequent rounds of correction by Global Insight yielded a suitable database for integration into the SAM. Part of this iterative reconciliation activity required the “test fitting” of corrected TRANSEARCH datasets to the SAM network several times.

This section will summarize the process of assigning the trip table to the SAM and Tx-NAFF networks. Ultimately, a suitable TRANSEARCH data set was established and organized into a trip table for integration into the SAM and Tx-NAFF. The TRANSEARCH data were summarized as commodity flows according to eleven SAM commodity classes shown in Table 2.3:

Table 2.3 – SAM Commodity Classifications

• Agriculture	• Miscellaneous Mixed
• Building Materials	• Raw Material
• Chemicals/Petroleum	• Secondary
• Food	• Textiles
• Hazardous	• Wood
• Machinery	

Other adjustments to the trip table included the computation of several Texas-specific factors, such as truck tonnage and value payloads (tons and value-per-truck) by commodity class. These values were calculated for semi-trailer combination units in order to more closely approximate the NAFTA trucking industry in which long-haul trucks predominate. Empty mileage is factored into the trip table as a percentage of each commodity class.

Model Preparation

Concurrent with trip table development, the SAM and Tx-NAFF were updated to the 2003 base year. The demographics of the SAM were updated with data obtained from the Texas State Demographer. Since the SAM network is used on a continuous basis for many TxDOT products, its network structure was updated through 2003. Both the SAM and Tx-NAFF were revised to function with the most recent transportation modeling software—TransCAD version 4.8.

The geography of the Tx-NAFF model was modified to match the geography of the TRANSEARCH database: Texas Counties, U.S. States, and Mexican states. The Mexican highway network was updated in the Tx-NAFF using the North American Transportation Atlas Database’s Mexico Highways data. Additional attributes of the key Mexican highways connecting to the Texas system were updated using information obtained from Mexico’s Secretaría de Transportes y Comunicaciones (SCT) including physical and operational characteristics (speed, lanes, tolls, and truck counts).

Assignment of Flows

With the trip table and model updates complete, the commodity flow data was loaded into the SAM and Tx-NAFF and the models were “run” to assign truck flows to the highway network. The Tx-NAFF was run first to generate Mexican flows and then to assign the flows to the appropriate Texas gateways. The SAM model was run subsequently, with some further adjustment made at the international crossings using a Border Accessibility Index that was developed specifically to improve the accuracy of this project’s assignment.

The assignment process, complicated in part by the reconciliation activities to the trip tables, also required several iterations and adjustments to properly allocate flows. During the validation process, the data used to confirm the reasonableness of the flows included TxDOT Vehicle Classification and Traffic Counts; SCT (Mexico) Vehicle Counts on key corridors; Bureau of Transportation Statistics Border Crossings data and Transborder value data (converted to truck units); other bridge crossing data; previous studies; information from industry interviews with trucking companies; and data on NAFTA and non-NAFTA truck volumes derived from the origin-destination intercept surveys and associated truck counts collected for this study. Collectively, these data sources led to additional adjustments to the trip table and routing and required subsequent model runs to reach a satisfactory assignment on the statewide network.

Most of the data sources used to assess the reasonableness of the highway assignment were collected as part of other efforts, including state and national traffic and freight programs. Two additional data sources—the industry interviews and origin-destination intercept surveys and associated truck counts—were developed specifically for this study and were helpful in assessing the validity of the assignment on key NAFTA corridors.

Origin-Destination Surveys and Industry Interviews

Vehicle intercept surveys were conducted at 12 sites near the border (see the Figure 2.4) and used as a supplemental source of data for the NAFTA study—including the assignment validation process. Surveys were conducted during October and November 2005 for approximately 10 hours per site (daylight hours) between the hours of 7:30 am and 6:30 p.m. All survey sites were located at Border Patrol Checkpoints with the exception of Sites 5.2, which was located at a Texas Department of Public Safety weigh station facility on IH-35 south of Devine. The twelve sites are displayed on the map in Figure 2.4. The commercial vehicle intercept surveys were complimented by traffic counts taken at the same location and used for expanding the data. The surveys ascertained characteristics of truck trips and cargoes, including origin, destination, cargo type, intermediate transfer points, and truck physical attributes. The team also classified each trip as NAFTA or non-NAFTA based on several criteria to estimate percentage NAFTA truck volumes by corridor. Results were used for calibration in the assignment process.

Information collected from industry interviews with shippers, carriers, brokers, and public officials engaged in NAFTA trade in the border regions of Texas was used to further validate truck data on the network.

Assignment Limitations

Overall, the resulting assignment reflects the goal of accurately estimating order of magnitude flows on primary NAFTA corridors. Because the assignment routing focuses on major corridors, NAFTA flows on some rural corridors—especially those oriented north-south—may be underestimated. While the model correctly estimated flows on most primary NAFTA routes,

some manual assignment changes were made, including corrections to IH-40 and IH-37. Summary results of the assignment are presented in the subsequent section.

Figure 2.4 – NAFTA Origin-Destination Survey Locations

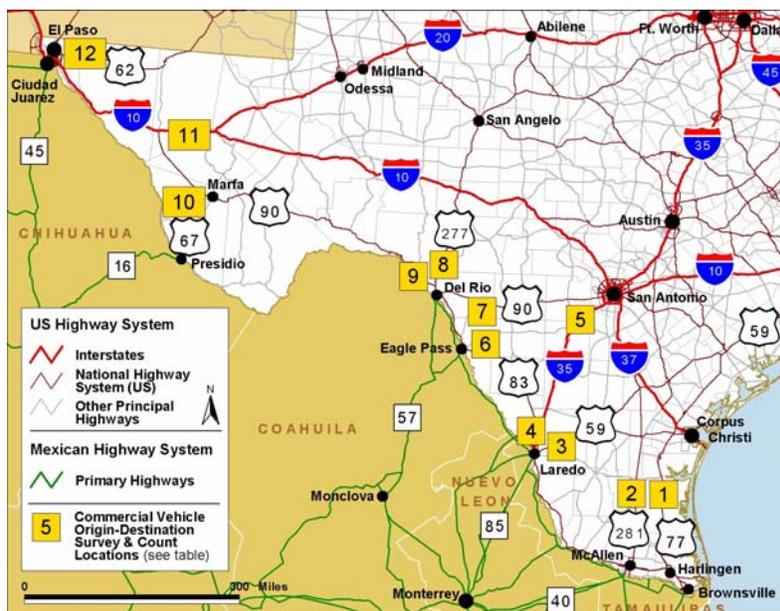


Table 2.4 – NAFTA Origin-Destination Survey Results

Map Ref.	Route	Location	Partial or Completed
1	U.S. 77	Sarita	335
2	U.S. 281	Falfurrias	312
3	U.S. 59	Laredo	130
4	IH-35	Laredo	273
5.1	IH-35 NB	Devine	173
5.2	IH-35 SB	Devine	114
6	U.S. 57	Eagle Pass	149
7	U.S. 90	Uvalde	121
8	U.S. 277	Del Rio	44
9	U.S. 90	Comstock	108
10	U.S. 67	Marfa	17
11	IH-10	Sierra Blanca	126
12	U.S. 62/180	El Paso	68
Total			1,970

■ 2.3 Texas NAFTA Highway Usage Summary

Based on the assignment of the final TRANSEARCH data for 2003 to the current highway system, the following are major findings concerning current NAFTA truck impacts on the Texas Highway System:

- **Most NAFTA trucks use Texas ports of entries.** The majority of NAFTA truck freight between the U.S. and Mexico is carried on Texas highways. Recent Bureau of Transportation Statistics (BTS) data show that 68 percent of northbound NAFTA trucks crossed at Texas bridges in 2005. Data for U.S. southbound crossings are not available from BTS, but the proportion of exports by truck through Texas ports is presumably higher based on a U.S.-Mexico Binational Transportation Planning and Programming Study, which estimated that 79 percent of all U.S.-Mexico trucks crossed the border at Texas ports of entry in 1995.
- **An even higher percentage of NAFTA trucks use Texas highways when all U.S.-Mexico ports of entry are considered.** An estimated 83 percent of all NAFTA truck freight through all ports of entry—representing more than 3 million truck units per year—uses Texas highways during some part of their journey to reach Mexico.
- **A significant portion of NAFTA trucks pass through Texas to other destinations.** TRANSEARCH data acquired for this study show that 52 percent of NAFTA truck tonnage, and 62 percent of NAFTA truck value passes through Texas en route to destinations and origins in other U.S. states and Mexico.
- **NAFTA trucks are a significant portion of truck traffic in Texas.** Based on SAM modeled volumes as shown in Figure 2.5, NAFTA truck traffic comprised 9 percent of all truck traffic on Texas highways in 2003, with a total of nearly 4 million truck vehicle miles of travel daily. Approximately 96 percent of NAFTA truck traffic was on Interstate, U.S., and other State Highways. The remaining four percent was on farm to market and local roads.
- **NAFTA trucks are concentrated on a small number of highways.** Seven highway corridors—which comprise less than two percent of all Texas roadway mileage—carry almost 83 percent of the NAFTA truck traffic on the Texas highway system. IH-35, the major north-south corridor, carries 37 percent of all Texas NAFTA traffic; IH-10, the major east-west corridor, carries 22 percent of all NAFTA trucks; U.S. 59 and U.S. 281 each carry about 6 percent, while IH-20 accommodates about 5 percent, and IH-30 and U.S. 77 account for an additional 4 percent each of total Texas NAFTA traffic.
- **Highways with the highest NAFTA truck percentage are concentrated near the border.** Highways carrying a high percentage of NAFTA trucks (See Figure 2.6) generally fall within two categories: 1) rural highways beginning at or near the border that are used chiefly by the trucks as lateral routes (typically north-south, sometimes east-west) to reach major corridors; and 2) major long-distance highways—such as IH-35,

U.S. 59, and U.S. 281 from the border region until they intersect with another major national freight corridor or a large urban area where the relative share of NAFTA trucks diminishes against the background of many types of commercial vehicles serving the local population.

- **The NAFTA trade axis runs in a Southwest – Northeast orientation.** Most NAFTA trade moves between the center of U.S. and Mexican centers of manufacturing and population—the Midwestern and Northeast U.S. and Central Mexico. Flow volumes on Texas highways reflect this orientation.

Table 2.5 – Summary of 2003 NAFTA Truck Flows on Major Texas Highways

Corridor	Total Truck VMT (Daily)	NAFTA Truck VMT (Daily)	NAFTA Truck Percent of Total Trucks in corridor	Percentage of Total Statewide NAFTA Truck VMT
IH-35	5,314,072	1,451,922	27.3%	36.6%
IH-10	6,081,728	881,498	14.5%	22.2%
U.S. 281	929,295	234,969	25.3%	5.9%
U.S. 59	2,466,933	224,596	9.1%	5.7%
IH-20	3,484,420	183,107	5.3%	4.6%
IH-30	1,456,930	167,481	11.5%	4.2%
U.S. 77	970,054	142,839	14.7%	3.6%
Subtotal of Top Corridors	20,703,432	3,286,412	15.9%	82.9%
Remainder of Texas Roadways	22,750,547	679,050	3.0%	17.1%
Summary of All Texas Interstate, U.S., and State Highway facilities	41,016,427	3,823,022	9.3%	96.4%
Total of All Texas Roadways	43,453,980	3,965,462	9.1%	100.0%

NAFTA truck results are calculated for long-distance type combination unit trucks and exclude VMT for small trucks (local delivery, construction, and municipal/utility type trucks). All percentages, including the NAFTA percentage map (Figure 2.6) are calculated for NAFTA trucks/total trucks (excluding small trucks).

Figure 2.5 – Daily NAFTA Truck Flows on Texas Highways
2003 (Average Annual Weekday Trucks –AAWT)

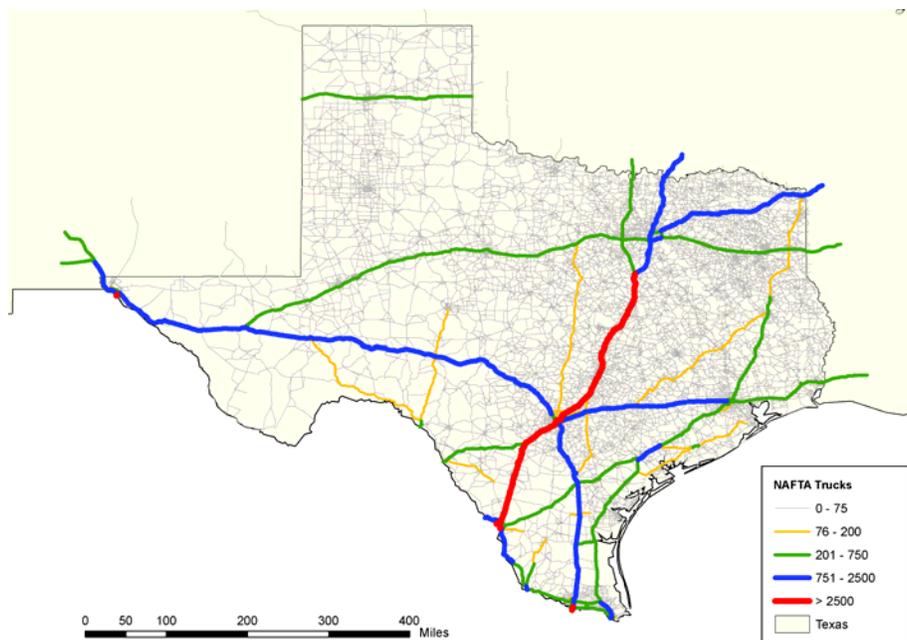
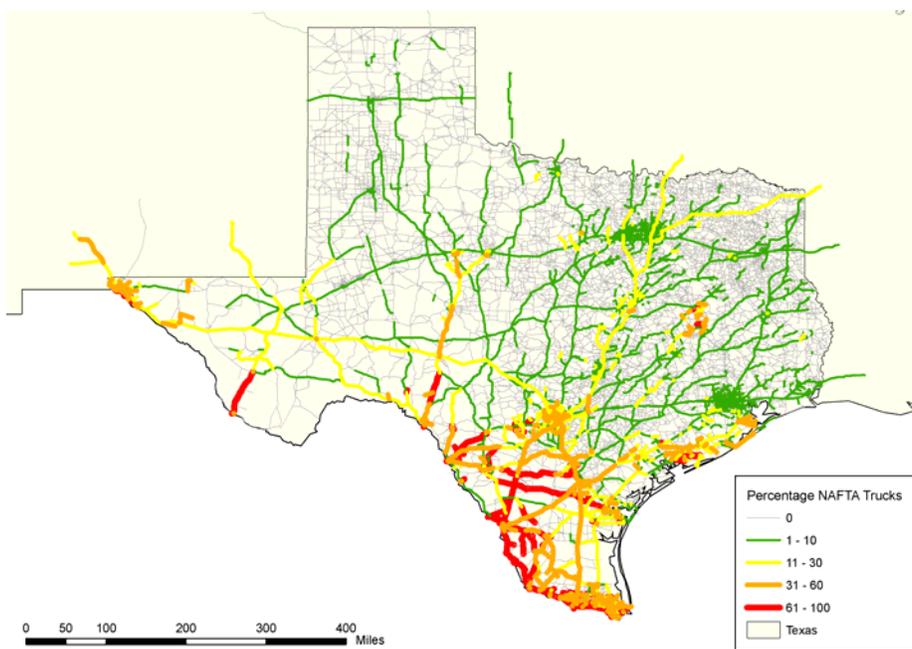


Figure 2.6 – Percentage NAFTA Trucks on Texas Highways
2003 (Average Annual Weekday Trucks – AAWT)



Comparisons to previous NAFTA studies

The last study examining the “Effects of the North American Free Trade Agreement on the Texas Highway System” was completed in 1998. As directed by the Texas Department of Transportation, the study evaluated the impact of NAFTA truck traffic on the Texas highway system. The goal of the “TxDOT NAFTA Study” is to update the findings from 1998. Since 1998, several other studies have also been conducted related to NAFTA and Texas highways. These studies include:

- *International Trade Data Corridor Plan*, first completed by Cambridge Systematics in 2004 and updated recently by the Texas Transportation Institute;
- *Truck Trade Corridors Between the U.S. and Mexico* by the Center for Transportation Research at the University of Texas at Austin; and
- Various studies by John McCray, Robert Harrison, and others on NAFTA trade flows.

The results of this study differ from past findings; the major differences relate to the newer data sources and reconciliations that were now possible and updated SAM network that results in more accurate assignment of flows. For this reason, direct comparisons of results are not possible.

■ 2.4 Texas NAFTA Highway Corridor Profiles

NAFTA trade is highly concentrated on a relatively select group of highway corridors in the State of Texas—typically Interstate Highways and U.S. Highways linking the border region to the manufacturing centers of the Midwest and Southeast. This section breaks down the statewide NAFTA highway system characteristics and current use into greater detail by profiling seven principal NAFTA highway corridors in the State. In this analysis, a ‘NAFTA corridor’ is a principal long-distance route carrying trade through Texas. The top seven NAFTA corridors are listed in Table 2.5 and include IH-35, IH-10, U.S. 281, U.S. 59, IH-20, IH-30, and U.S. 77. Collectively, these seven NAFTA corridors carry approximately 83 percent of total NAFTA truck VMT in the State and connect the highest volume Mexican gateways with large Texas urban areas and major U.S. population and industrial centers. The following corridor profiles explain the physical characteristics of these trade routes, and important intermediate activity centers within Texas where loads originate, terminate, or transfer. In this section they are ranked according to total [daily] NAFTA truck VMT, which is the best performance measure indicative of impact on the Texas system. Additional information on these corridors, including commodity flow information, is contained in the Technical Memorandum 2A.

Interstate Highway 35 (#1)

Key NAFTA Statistics 2003 Daily

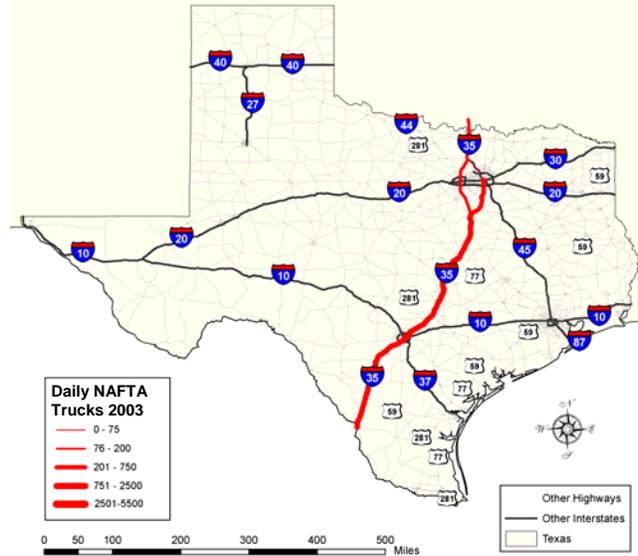
NAFTA truck VMT (millions daily) 1.5

Percentage of Texas NAFTA truck VMT 36.6%

Total corridor truck VMT (millions daily) 5.3

Percentage of total truck VMT in the corridor 27.3%

Note: Includes U.S. 75 North of Dallas



The IH-35 corridor is the most important U.S. – Mexico NAFTA trade corridor in the country. Within Texas, IH-35 ranks first in total NAFTA vehicle miles traveled (1.5 million daily in 2003) and carries a higher percentage of NAFTA trucks than other major NAFTA corridors in the State—with 36.6 percent of all NAFTA VMT in Texas. Interstate Highway 35 begins at the Juarez-Lincoln Bridge in Downtown Laredo but this route’s role as a NAFTA corridor truly begins about 7 miles to the north where truck traffic from the U.S.-Mexico border’s busiest freight gateway—Laredo World Trade Bridge—merges with IH-35 via State Highway 20 “Bob Bullock Loop.” Additional traffic joins IH-35 a few miles north at the junction of the Camino Columbia Toll Road.

The segment of IH-35 between Laredo and San Antonio carries the highest average annual weekday trip (AAWT) volume of NAFTA trucks of any highway section in the State of Texas, and arguably in the nation. San Antonio is a critical junction point in the State’s NAFTA system because IH-35 (the busiest) and IH-10 (the next busiest) long-haul NAFTA routes meet here. NAFTA volume diminishes slightly after San Antonio to Austin and then to Dallas-Ft. Worth which serves as the principal inland distribution center for NAFTA trade in the State.

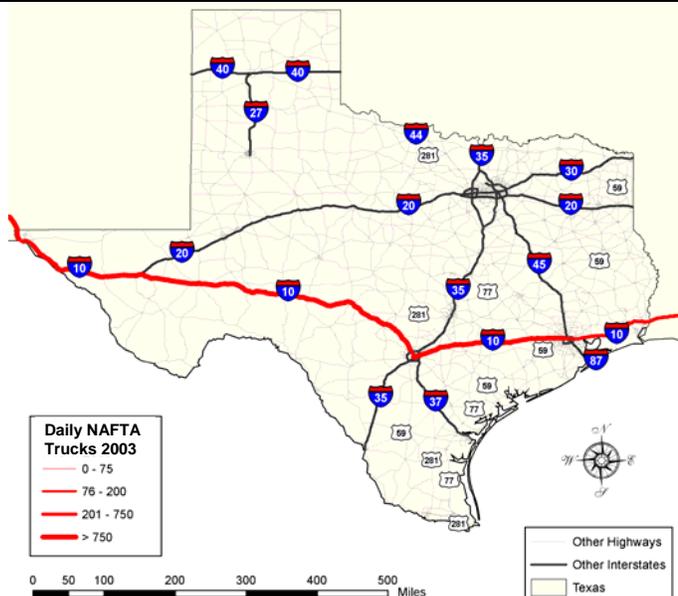
NAFTA Segment	2003 Volumes AAWT (Daily)
Laredo to San Antonio	3,500 – 4,000
San Antonio to Dallas	2,500 – 3,000
Dallas to Oklahoma	1,000 – 1,500

Many NAFTA oriented carriers maintain hub operations and terminals in the Dallas region where imports are distributed for regional industrial or consumer use and where imports and exports are consolidated. Roughly 2/3 of the IH-35 NAFTA trucks utilize IH-35E through the Dallas region while the remaining 1/3 use IH-35W via Ft. Worth. North of the Dallas-Ft. Worth region, the share of NAFTA trade remaining on IH-35 (and U.S. 75) is significantly less as traffic uses IH-30 and IH-20 to more directly reach industrial centers in the Midwest, Southeast, and Northeast.

Interstate Highway 10 (#2)

Key NAFTA Statistics 2003 Daily

NAFTA truck VMT <i>(millions daily)</i>	0.9
Percentage of Texas NAFTA truck VMT	22.2%
Total corridor truck VMT <i>(millions daily)</i>	6.1
Percentage of total truck VMT in the corridor	14.5%



Interstate Highway 10 is one of the most critical transcontinental trade and transportation corridors in the United States—connecting Southern California with Florida via Arizona, New Mexico, Texas, Louisiana, Mississippi, Alabama, and Florida. Anchored by Los Angeles on the west, Interstate 10 passes through Texas from El Paso to Orange (on the Louisiana border). Covering nearly 874 miles in Texas, it is the longest NAFTA corridor in the State and it serves as the primary NAFTA trade corridor for the Gulf States region. Moving east from Downtown El Paso, IH-10 picks up significant NAFTA flows from both the Bridge of the Americas and the Ysleta-Zaragoza Bridge.

In general, NAFTA flows on IH-10 are heaviest beginning in West Texas and diminish to the east. The highest volume segment is from east of El Paso to the IH-10/IH-20 split, with nearly 1,500 average annual weekday NAFTA trucks. East of the IH-20 split, IH-10 maintains NAFTA flows of between 1,000 and 1,200 trucks to San Antonio where traffic frequently joins from IH-35 south to Laredo. For a short distance east of San Antonio—where IH-10 picks up trips from IH-35 with an orientation toward the U.S. Midwest—traffic increases until the junction with U.S. 59 where some trucks divert. East through Houston, the amount of truck traffic incrementally declines as trucks diver to follow other corridors to Texas and regional interstate destinations.

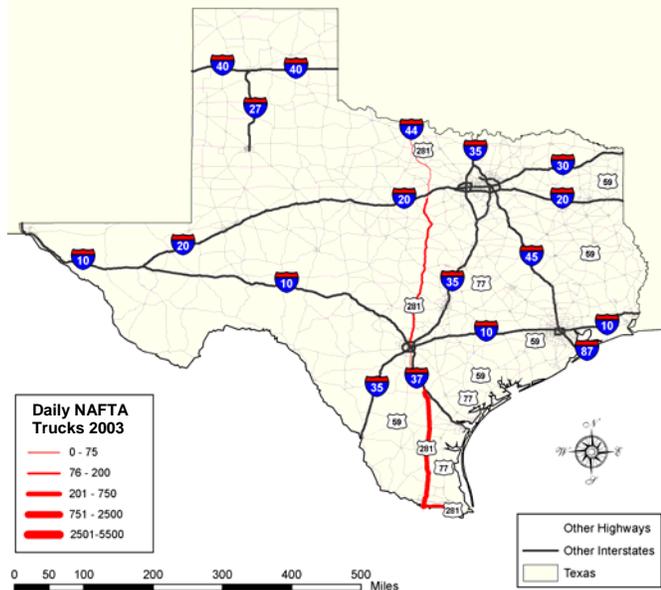
NAFTA Segment	2003 Volumes AAWT (Daily)
El Paso to IH-10/IH-10 Split	1,000 – 1,500
IH-10/IH-20 Split to San Antonio	2,500 – 3,000
San Antonio to Houston	800 – 1,000
Houston to Louisiana	300 – 600

Of the intermediate activity centers on IH-10, San Antonio is the most important junction, but Houston is the most important distribution center with its large metropolitan population and established warehousing capabilities.

► **U.S. Highway 281 (#3)**

Key NAFTA Statistics	2003 Daily
NAFTA truck VMT <i>(millions daily)</i>	0.2
Percentage of Texas NAFTA truck VMT	5.9%
Total corridor truck VMT <i>(millions daily)</i>	0.9
Percentage of total truck VMT in the corridor	25.3%

Note – totals do not include section of IH-37 that is cosigned as U.S. 281.



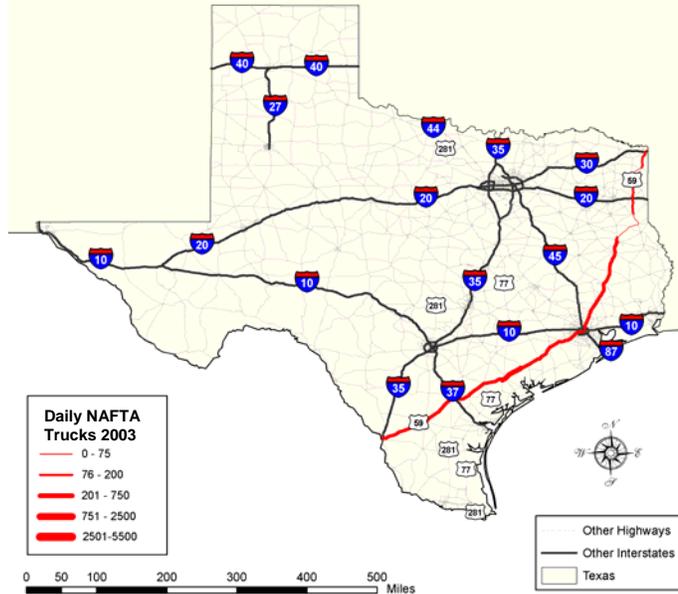
Beginning in the Lower Rio Grande Valley, U.S. 281 is the most important NAFTA corridor connecting the burgeoning maquila cluster centered around Reynosa, Tampaulipas, with U.S. consumer markets and industrial suppliers. Unlike IH-35 and IH-10, U.S. 281 is most relevant as a NAFTA corridor between Pharr and its junction with IH-37. This portion of the corridor is a heavy truck corridor for NAFTA goods while north of San Antonio, where U.S. 281 heads north through Texas Hill Country finally joining IH-44 at Wichita Falls, its NAFTA flows are significantly less.

While IH-37 is not individually highlighted in this report, it is an important NAFTA corridor inasmuch as it carries NAFTA trucks from both the U.S. 281 and U.S. 77 corridors originating and terminating in the Lower Rio Grande Valley. The portion of IH-37 with NAFTA characteristics begins near Three Rivers, Texas where most U.S. 281 traffic joins the Interstate Highway System, continuing on IH-35 and IH-10 from San Antonio.

NAFTA Segment	2003 Volumes AAWT (Daily)
Pharr/McAllen to IH-37	1,000 – 1,300
Joint IH-37 – U.S. 281*	800 – 1,000
San Antonio to Wichita Falls	75 – 200

► **U.S. Highway 59 (#4)**

Key NAFTA Statistics	2003 Daily
NAFTA truck VMT <i>(millions daily)</i>	0.2
Percentage of Texas NAFTA truck VMT	5.7%
Total corridor truck VMT <i>(millions daily)</i>	2.5
Percentage of total truck VMT in the corridor	9.1%



The U.S. 59 corridor generally traces the route of the proposed IH-69 corridor between Laredo and Texarkana. It is the second most important NAFTA corridor anchored by the Laredo gateway after IH-35 and it has the fourth highest daily VMT of any NAFTA corridor in the State. Like IH-35, the U.S. 59 corridor is oriented northeast to southwest, following the NAFTA population and industrial axis between the Midwest U.S. and Central Mexico. Because of these characteristics, U.S. 59 serves as an important alternative to the IH-35 corridor through Texas.

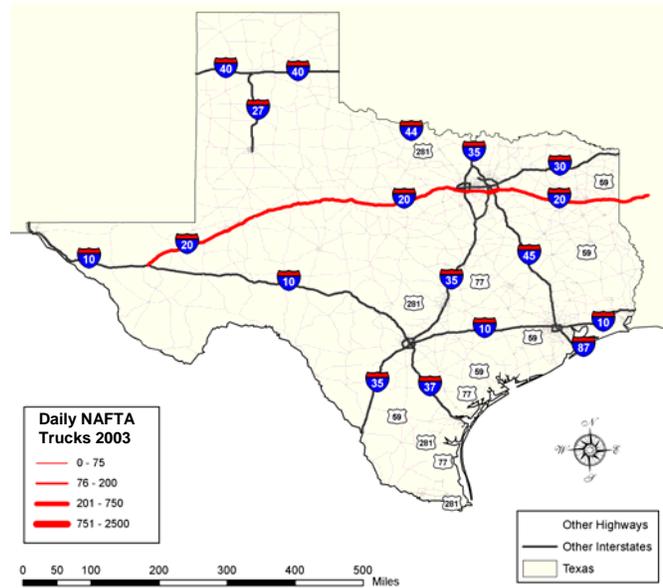
Beginning at Laredo and continuing to Victoria U.S. 59 carries between 400 and 500 NAFTA trucks on an average weekday. Because of its nearly perpendicular orientation to U.S. 281 and IH-37, U.S. 59 loses very few NAFTA trucks at junctions with those corridors as long-distance routing decisions maintain consistency through this section. At Victoria, significant traffic merges from U.S. 77, nearly doubling the flow. Moving east toward Houston, the flow gradually decreases as trips exit and enter U.S. 59 through the metro area. Since U.S. 59 is the shortest distance route between much of the Southeastern U.S. and the Rio Grande Valley, its volumes increase southwest of Houston where traffic from IH-10 merges. Additional NAFTA traffic originating and terminating at manufacturing and distribution centers in the Houston metro area, and to a limited degree the Port of Houston, also add to the flows southwest of the City.

NAFTA Segment	2003 Volumes AAWT (Daily)
Laredo to Victoria	400 – 500
Victoria to Houston	700 – 1,000
Houston to Nacogdoches	200 – 250
Nacogdoches to Texarkana	150 – 200

Northeast of Houston to Nacogdoches, NAFTA flows on U.S. 59 range between 200 and 250 daily trucks. At Nacogdoches, the SAM model shows a split in U.S. 59 corridor traffic, with traffic diverting on several generally parallel routes (most notably SH 315) and continuing north to IH-20 and IH-30 at Texarkana.

► Interstate Highway 20 (#5)

Key NAFTA Statistics	2003 Daily
NAFTA truck VMT <i>(millions daily)</i>	0.2
Percentage of total NAFTA truck VMT	4.6%
Total corridor truck VMT <i>(millions daily)</i>	3.5
Percentage of total truck VMT in the corridor	5.3%



Interstate 20 is the primary east-west trade corridor of the U.S. Mid-South, connecting Dallas-Ft. Worth to Atlanta. This Interstate begins in Reeves County, Texas where it splits from Interstate 10 and takes an east by northeast trajectory toward Ft. Worth via Midland, Odessa, and other important regional cities.

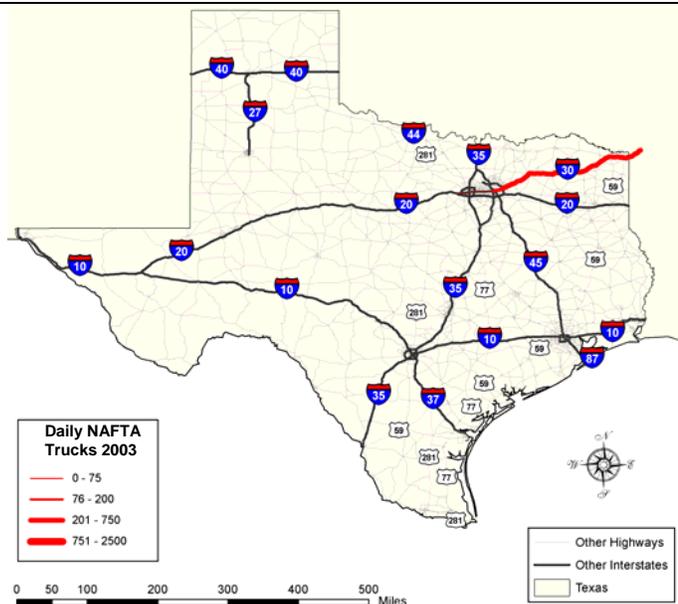
Located outside the immediate border region and without a direct connection to any international gateway, Interstate 20 is a critical intermediate and long-distance route for NAFTA trade that join IH-20 from feeder routes from gateways. Within Texas, the section of IH-20 between El Paso and Dallas-Ft. Worth serves as the main route for carriers moving shipments between the maquila clusters of Ciudad Juarez and Chihuahua. Several shippers interviewed in the El Paso area reported that IH-20 was the second most important access route (after IH-10) for moving NAFTA goods to and from the El Paso gateway.

Within Texas, IH-20 flows are relatively consistent, reflecting the long-distance and interstate characteristics of the trucks using this route. Daily NAFTA truck traffic ranges between 275 and 325 trucks from the IH-10 split in West Texas to the Dallas-Ft. Worth Metropolitan Area. As IH-20 passes along the south side of the City of Dallas, NAFTA traffic increases significantly—to around 800 daily trucks—as IH-20 serves as a bypass for through trips moving between the IH-30 and IH-35E corridors. East of the Metroplex, traffic diminishes slightly continuing to the Louisiana border.

NAFTA Segment	2003 Volumes AAWT (Daily)
IH-10 Split to Dallas-Ft. Worth	275 – 325
Dallas-Ft. Worth to Louisiana	200 – 250

Interstate Highway 30 (#6)

Key NAFTA Statistics	2003 Daily
NAFTA truck VMT <i>(millions daily)</i>	0.2
Percentage of total NAFTA truck VMT	4.2%
Total corridor truck VMT <i>(millions daily)</i>	1.5
Percentage of total truck VMT in the corridor	11.5%



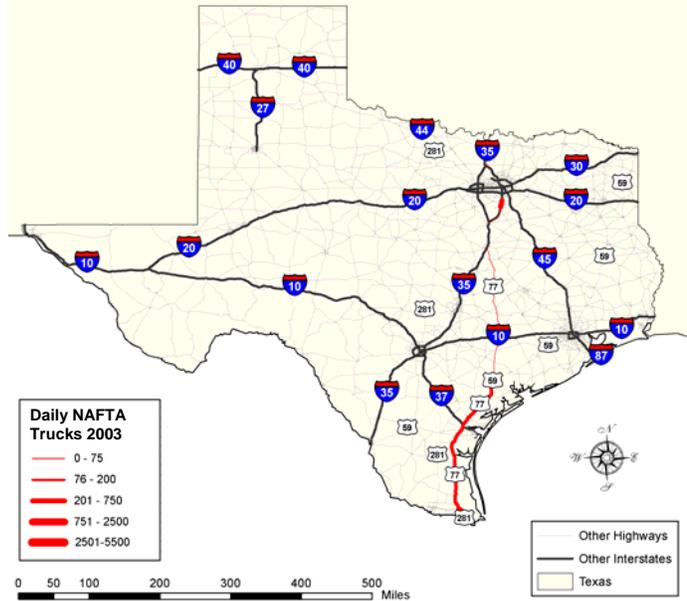
This short but intensively used NAFTA corridor extends from the Dallas-Ft. Worth Metropolitan Area—originating just west of Ft. Worth—northeast to Texarkana, ultimately joining IH-40 at Little Rock, Arkansas. For many NAFTA trips moving through the Texas gateways, IH-30 is part of a longer corridor linking the industrial and automotive industries of Indiana, Michigan, and other Midwest states to factories and markets in Mexico. Dallas is the key junction on IH-30 because it is where northbound and southbound traffic from IH-35 and IH-20 join or split from IH-30, respectively.

Within the Dallas-Ft. Worth area, NAFTA truck volumes are relatively low from the first miles of IH-30 (after splitting from IH-20) west of Ft. Worth until the interchange with IH-35E in Downtown Dallas. At that interchange, a portion of the IH-35 corridor traffic merges onto IH-30 with even more traffic joining at the junction with IH-635, which carries IH-20 and IH-35E flows around the Southeast side of Dallas. Northeast from IH-635, IH-30 maintains flows between 950 and 1,000 daily NAFTA trucks to Texarkana at the Arkansas border.

NAFTA Segment	2003 Volumes AAWT (Daily)
IH-20 (West of Ft. Worth) to Dallas (IH-635)	50 – 450
Dallas to Texarkana	950 – 1,000

► **U.S. Highway 77 (#7)**

Key NAFTA Statistics	2003 Daily
NAFTA truck VMT <i>(millions daily)</i>	0.1
Percentage of total NAFTA truck VMT	3.6%
Total corridor truck VMT <i>(millions daily)</i>	1.0
Percentage of total truck VMT	14.7%



The U.S. 77 corridor ties international gateways in the Lower Rio Grande Valley with other major NAFTA corridors and primarily serves as a feeder to the U.S. 59 corridor at Victoria. This corridor begins at Brownsville but NAFTA truck flows are heaviest from Riviera (where some U.S. 281 traffic joins U.S. 77 via SH 285) to the U.S. 59 junction. North of Victoria, there is little NAFTA traffic on U.S. 77.

Beginning in Brownsville-Harlingen, U.S. 77 flows range from 400 to 500 daily NAFTA trucks. Flows increase on the section of U.S. 77 between Riviera and Robstown as the corridor adds NAFTA trucks traveling between U.S. 77 and U.S. 281 on several east-west connecting routes, including SH 44 and especially SH 285 between Falfurrias and Riviera. From Robstown to Victoria U.S. 77 maintains NAFTA truck volumes between 500 and 700 on an average weekday, with some diversion to the SH 35 corridor via SH 239. North of Victoria, flows on U.S. 77 drop to insignificant levels and remain low—except for a slight up tick in flows between IH-10 and IH-35 in Waco.

Generally, NAFTA flows seeking through routes north of U.S. 59 use other NAFTA corridors and highways with a southeast-northeast orientation. U.S. 281 and U.S. 77 and U.S. 59 all serve traffic that would utilize the future IH-69 corridor through Texas.

NAFTA Segment	2003 Volumes AAWT (Daily)
Brownsville to Robstown	400 – 450
Robstown to Victoria	550 – 650

■ 2.5 NAFTA Mexico Highway System Overview

Mexico is the second largest trading partner with the United States, accounting for 11.3 percent of U.S. international trade in 2005.¹¹ It's population of 107.5 million has per capita income about one-fourth that of the United States, but its growing middle class is fueling demand for products that are manufactured domestically or are imported from the United States (53.4 percent), from China (8 percent), and from Japan (5.9 percent) (2005).¹²

Mexico's highway system is the 17th largest in the world and is comprised of 72,655 miles of paved roads, including 4,337 miles of expressways. The majority of expressways are privately operated toll roads known as "Autopistas de Cuota." Most of Mexico's top freight corridors are served by a combination of Autopistas de Cuota and free national highways and with a few exceptions, generally run north-south. The network of major highways—including expressways and other major roads—links Mexico's industrial and population centers and serves as the primary conduit for trade with the United States. The top highway freight corridors in Mexico, include:

- **Highway 85/57 Corridor: Nuevo Laredo – Mexico City Corridor** (Corridor 2 on Figure 2.7). This route commences on the U.S. border—at Laredo (Highway 85) and Eagle Pass (Highway 57) and passes through the industrial centers of Monterrey/Salttillo, San Luis Potosi, and Querétaro en route to Mexico City. This corridor connects one of the major industrial areas located north of Mexico City, the City of Querétaro, with the northern states of Coahuila, Tamaulipas, and Nuevo Leon where 30 percent of Mexico's maquila production is concentrated. This is the most important NAFTA trade highway and ties into IH-35 in Laredo, Texas. It is the closest access to the eastern portion of the U.S., where more than 50 percent of Mexican exports to the U.S. are sent, this explains why it is the heaviest volume freight corridor within Mexico. This corridor faces heavy congestion south of Querétaro to Mexico City.
- **Highway 15: Nogales – Mexico City Corridor** (Corridor 1 on Figure 2.7). The most important section of this corridor connects Mexico's largest cities-Guadalajara, Toluca, and Mexico City-and continues north along the Pacific Coast through Hermosillo to the U.S. border at Nogales, Sonora/Nogales, Arizona. This corridor faces heavy congestion north of Toluca and all the way to Mexico City.
- **Highway 45/49 Corridor: Ciudad Juarez – Querétaro.** (Corridor 3 on Figure 2.7). Beginning at Ciudad Juarez, this corridor connects important cities along Mexico's mountainous interior, including Chihuahua, Torreon, Zacatecas, Aguascalientes, and Querétaro-where it joins Highway 57 to Mexico City. This corridor links the major maquiladora state, Chihuahua, which accounts for almost 30 percent of national production, with Mexico City.

- **Highway 40 Corridor: Mazatlan to Matamoros.** (Corridor 5 on Figure 2.7). This is the most important east-west corridor in Northern Mexico, running from the Pacific to the Gulf via Saltillo and Monterrey.
- **Highway 101/180 Corridor: Matamoros-Monterrey – Veracruz.** (Corridor 8 on Figure 2.7). This corridor follows the Gulf of Mexico coast and links two major Mexican seaports—Veracruz and Altamira—with the third largest city of the country, Monterrey, Nuevo Leon. Sections of Autopista are under development in this corridor and recently the segment between Ciudad Victoria and Matamoros was completed.
- **Highway 150/180: Merida/Progreso – Puebla/Mexico City Corridor.** (Corridor 11 on Figure 2.7). Beginning on the Yucatan Peninsula, this route links the Gulf ports of Progreso, Dos Bocas (Campeche), Coatzacoalcos, and Veracruz to Mexico City via the industrial center of Puebla. The section between Veracruz and Mexico City is one of the highest volume trade corridors in the country.

Figures 2.7 and 2.8 describe the major highway and freight corridors in Mexico.

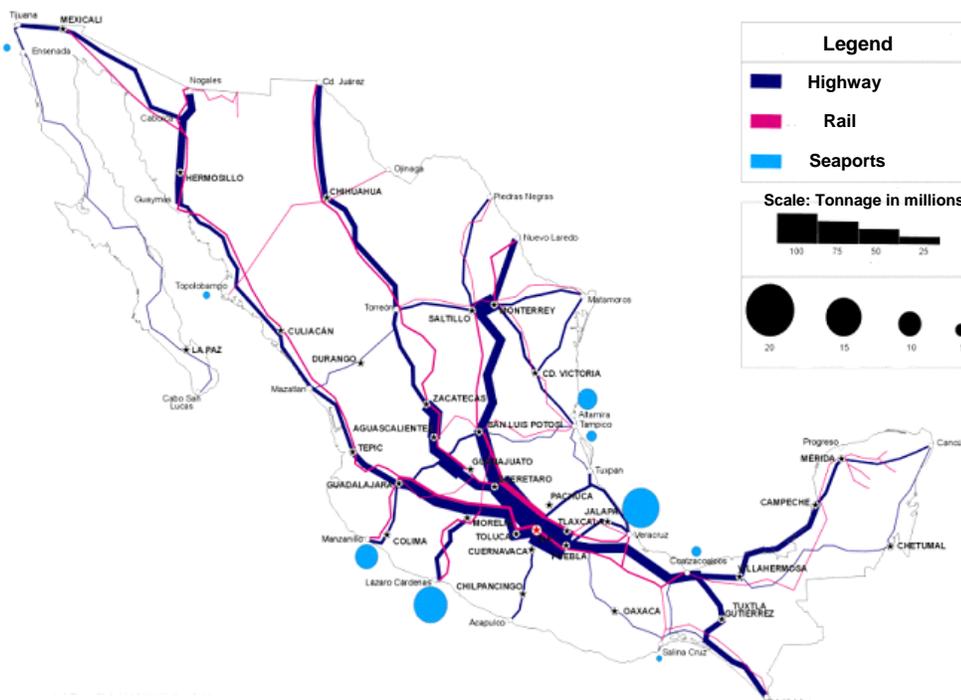
Figure 2.7 – Mexico’s Highway Corridors



Source: SCT.

The following map shows additional detail on the volumes of trade by corridor for highway, rail, and principal ports.

Figure 2.8 – 2003 Mexico Surface Freight and Port Volumes



Source: Cal y Mayor.

2.6 NAFTA Highway Trade Overview

In 2003, trucks carried nearly 54 million tons of NAFTA goods between the U.S. and Mexico over the Texas highway system. These goods were valued at nearly \$146 billion dollars, representing approximately 83 percent of the total trade between the U.S. and Mexico by all transportation modes during that year. The largest share of NAFTA freight over the Texas highways is through movements terminating or originating in other U.S. states en route to or from Mexico. Figures 2.9 and 2.10 illustrate the directional splits for truck tonnage and values, respectively and demonstrate the magnitude of through moves versus outbound (exports originating in Texas) and inbound (imports terminating in Texas) flows.

Figure 2.9 – NAFTA Truck Tonnage on Texas Highways
 2003 (Millions of Tons)

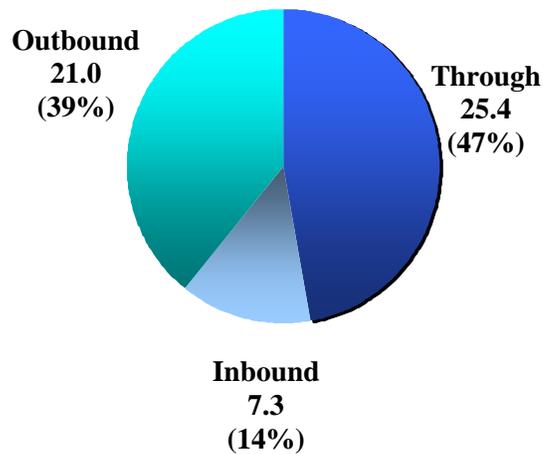


Figure 2.10 – NAFTA Truck Value on Texas Highways
 2003 (Billions of Dollars)

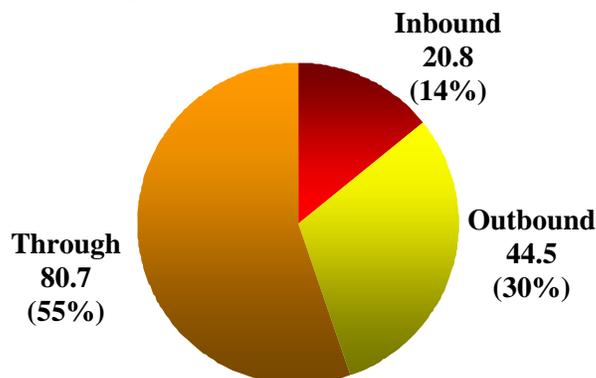
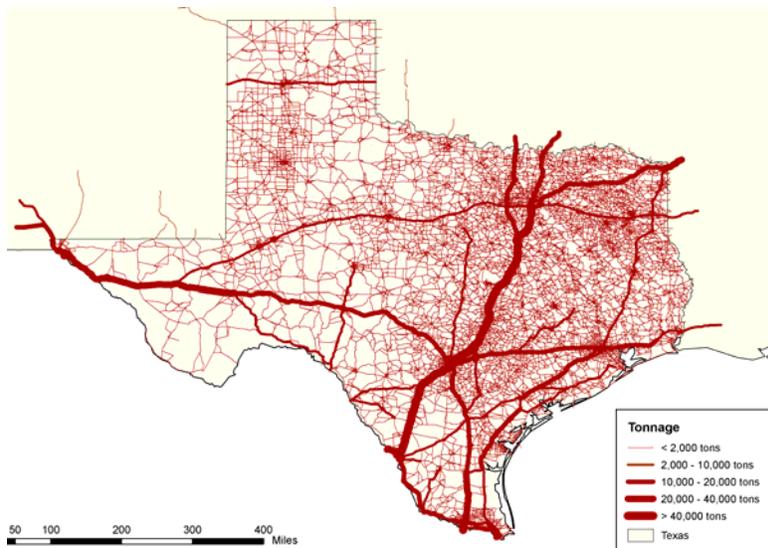


Figure 2.10 shows that through truck value (55 percent) comprises a larger percentage of total truck trade than tonnage 47 percent. This is an important finding in relation to the benefits of other states' economies derived from the Texas transportation system. The next two figures depict truck tonnage and truck value assigned to the Texas highway network. The first map (Figure 2.11) shows high tonnage flows on the major NAFTA corridors described above. The second map (Figure 2.12) illustrates which NAFTA corridors carry the most value of trade. The IH-35 carries a particularly high flow by value. Both maps are accompanied by a table (Table 2.6 and 2.7, respectively) that rank the top ten NAFTA commodities by tonnage and value.

**Figure 2.11 – Daily NAFTA Truck Tonnage Flows on Texas Highways
2003 (Millions of Daily Tons)**



**Figure 2.12 – Daily NAFTA Truck Value Flows on Texas Highways
2003 (Millions of Dollars Per Day)**

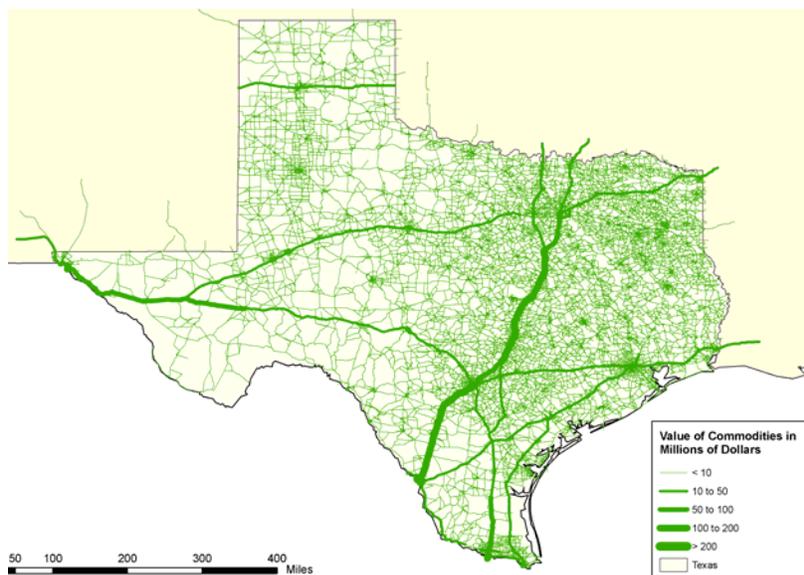


Table 2.6 Texas/Mexico Trade – Top Tonnage Truck Commodities
2003 Millions of Annual Tons

STCC2	Commodity	Millions of Tons
28	Chemicals/Allied	3.8
01	Farm	3.5
20	Food/Kindred	2.2
33	Primary Metal	2.2
32	Clay/Concrete/Glass/Stone	2.1
29	Petroleum/Coal	1.8
36	Electrical Machinery	1.6
10	Metallic Ores	1.5
35	Machinery Ex. Electrical	1.3
37	Transportation Equipment	1.1

Source: TRANSEARCH, 2003.

Table 2.7 Texas/Mexico Trade – Top Value Truck Commodities
2003 Billions of Annual Dollars

STCC2	Commodity	Billions of Dollars
37	Transportation Equipment	55.4
36	Electrical Machinery	31.5
35	Machinery Ex. Electrical	31.0
28	Chemicals/Allied	10.0
22	Textile Mill	8.6
20	Food/Kindred	8.2
01	Farm	8.0
33	Primary Metal	7.9
25	Furniture/Fixtures	5.5
30	Rubber/Plastics	5.2

Source: TRANSEARCH, 2003.

Based on the map outputs from the SAM, the flows of truck value appear to be more concentrated on fewer corridors than the tonnage flow—especially on the Interstate System. This is likely due to the time value of the higher value commodities and the savings in speed achieved on the higher functional classification system.

Tables 2.6 and 2.7 provide additional detail on the top tonnage and value commodities on the Texas NAFTA highway system. The top tonnage commodities include chemicals, farm, and food products while the top value commodities are dominated by transportation equipment and electrical machinery—much of it related to components for automotive assembly plants on both sides of the border.

■ 2.7 Current NAFTA Highway Usage: Industry Perspective

The users of the Texas NAFTA highway system—including the carriers, shippers, and their brokers—rely on the system to sustain their businesses each day. For these companies, the reliability of the highway system is one of the most important factors affecting their bottom lines. Consequently, the NAFTA freight community is a valuable source of insight on the current conditions and emerging trends in usage of TxDOT infrastructure.

More than 40 carriers, customs brokers, forwarders, agencies, and manufacturers operating in the Texas border regions of El Paso, Laredo, Eagle Pass/Del Rio, and the Rio Grande Valley were interviewed in order to collect data relevant to the research topic. In addition, two inland ports (Alliance and KellyUSA) and four maritime ports were interviewed to determine their current and future potential to accommodate waterborne freight related to NAFTA. The freight industry interviews were conducted in order to supplement and validate the truck driver origin-destination surveys that were also conducted for this study. The anecdotal information acquired through the interview process was also used as one of several tools to help calibrate and forecast NAFTA trade growth on Texas’s highway and rail systems. While the interview findings represent opinions and perceptions of the individuals interviewed, they provide valuable insight as to the impacts of NAFTA on Texas and its infrastructure. Following is a summary of the findings.

Key Findings – Trucking

Many of the current issues affecting NAFTA trucking are the same that affect trucking in general in the United States. This section presents those issues with an orientation toward NAFTA trade based on the perspectives of the companies engaged in it. The issues discussed fall into five principal categories:

- Truck driver shortage;
- Carrier integration and interoperability;

- Heightened security and regulatory compliance;
- Congestion and delay; and
- Evolving trade patterns.

Truck Driver Shortage

Motor carriers transporting NAFTA trade have not been immune to the national driver shortage and its adverse effects on shipment reliability. Among trucking firms interviewed the annual turnover rate of drivers hovers between 90 and 120 percent. The high attrition rate is due to a number of factors, including quality of life, and is fed by the driver shortage itself as drivers jump from one firm to another for incremental pay increases. The shortage has been fueled by declining numbers of qualified drivers compounded by increasing demand for freight transportation. The dearth of long haul drivers is having a profound affect on NAFTA trade, including shipment delays of up to three days. Trucking companies are adapting by maximizing the number of drivers they hire through the H1-B visa program that permits mostly Mexican nationals to operate vehicles carrying NAFTA trade. Motor carriers are also establishing “Pony Express” style relay operations on high-density NAFTA routes in an attempt to increase speed of delivery and concurrently enhance driver retention by keeping drivers on set rotations that allow them to domicile in one location. This should not be confused with nonstop relays where a team of drivers ride in the tractor together and rotate on a continuous basis to keep the vehicle moving.

This particular type of relay operation is typically instituted on routes between major border entry points and large destination markets and consists of a series of drop yards, each spaced approximately 250 to 300 miles apart, to allow for drivers stationed along the route to each drive one round trip a day while observing Federal Motor Carrier Safety Administration (FMCSA) Hours of Service Regulations. This type of relay system helps to ameliorate the driver attrition by reducing the number of nights drivers spend away from home. For example, a carrier might establish a relay route between Laredo, Texas and Detroit, Michigan to serve a high-volume customer moving auto components southbound and electrical equipment northbound. On this relay route, a driver or set of drivers might be permanently stationed in Little Rock, Arkansas in order to cover the portion of the route 250 miles north and south. Each day, the driver would pick up a trailer containing electrical equipment at a designated drop yard north of Little Rock, and carry the load to another drop yard near Cairo, Illinois. In Cairo, an Indianapolis-based tractor would meet the Little Rock-based driver and relay the northbound shipment further upstream. Meanwhile, the Little Rock based driver would hook and haul the southbound trailer containing auto components back to Little Rock in the opposite direction. These types of relay routes operate on a schedule, where predictability allows the driver to sleep at home while achieving a high level of customer service and speed in a nearly nonstop trailer movement.

Carrier Integration and Multimodal Interoperability

NAFTA oriented motor carriers are seeking ways to lower shipment cost and increase speed and efficiency through acquisitions, alliances, and multimodal interoperability. These actions are

allowing carriers to realize the cost savings associated with these efficiencies. The first way that NAFTA oriented carriers are realizing these cost savings is through the continued industry wide trend toward mergers, acquisitions, and international alliances among motor carriers. Recently, U.S. trucking firms have purchased Mexican firms in order to establish more seamless NAFTA operations. Swift, for example, recently acquired Transmex, a moderately sized Mexican long haul and dray carrier based in Nuevo Laredo. Other carriers, including Con-Way, have established operating units in Mexico or have established partnerships with large Mexican trucking companies to create more seamless international operations. Regardless of the type of internationalized operation, most freight is still transferred from Mexican equipment to U.S. equipment at cross docking facilities in border gateway communities to minimize the use of domestic trailers in either country. Power units are not used internationally and even with these enhancements toward seamless international operations, the intermediate use of a drayage provider persists.

Carriers are also making significant investments in domestic type 53-foot containers to increase modal flexibility and interoperability. Carriers are using the domestic containers for NAFTA trade in the same way they use them for shipments within the 48 contiguous states. For example, shipments of industrial components produced in China and destined for Mexican assembly plants (maquilas) are transferred from international shipping containers to domestic after disembarking from a major U.S. port and are subsequently shipped by a combination of rail and truck to their final destination in Mexico. The advantage of containerization is to decrease the unit cost of the move by shifting a portion of the trip to rail where marginal costs are lower. Often, the rail portion of the move occurs in the U.S., frequently from a break bulk site near the entry port to an intermodal ramp within a short distance of the border. Carriers interviewed said the shift to containerization will continue in the future to the degree the rail system can accommodate the additional units. There is some worry, as discussed further in this paper, that rail congestion will limit the growth of this multimodal shift.

Heightened Security and Regulatory Compliance

There are several issues related to heightened security and regulatory compliance that affect NAFTA-oriented motor carriers. Increased costs associated with border security programs and delay, recognition of alternative gateways, and hours of service compliance are the principal issues cited by interviewees.

For most of the companies interviewed, the heightened security measures following the terrorist attacks of 9/11 resulted in only moderate inconvenience and delay on the U.S.-Mexican border (See Chapter 4 for greater discussion of post 9/11 impacts). Initially following 9/11, the extensive delays at all U.S.-Mexico border crossings caused the border to function as if it were closed. However, new technologies and programs implemented post-9/11 have facilitated the safe and secure flow of cross-border trade.

Most carriers, especially large firms and those transporting shipments for high-volume manufacturers, have quickly adapted to the increased security at the border and have adopted new programs such as the Customs-Trade Partnership Against Terrorism (C-TPAT) and the Free and Secure Trade Program (FAST). There are significant time savings associated with these

programs. For example, one El Paso-based carrier reported that C-TPAT registration reduces wait times from upwards of 2.5 hours to 30 minutes or less. Smaller carriers, however, may not have the same level of potential participation in these programs due to the high cost of implementation and because they are often transporting shipments for small firms that may not be C-TPAT or FAST certified. Overall, the greatest impact of heightened security measures to the NAFTA carriers is the increased cost of business to maintain the security standards required by the Customs and Border Protection programs such as C-TPAT and FAST.

In this post-9/11 environment of added security and awareness of potential terrorist threats to international trade infrastructure, supply chain managers, and carriers are recognizing the importance of alternative gateways in their logistics planning. Many firms interviewed said they have conducted reconnaissance of alternative gateways, especially smaller crossings outside their normal operating routes, as potential diversion paths in case of another terrorist event or disruption caused by natural disaster.

The potential shifting of trucks between crossings to reduce wait times may seem like an option, but crossing location is often dictated by the location of maquila industries and the infrastructure linkages within Mexico. Additionally, the Mexican state to which the international bridge links is critical to crossing location. For example, Laredo's Columbia Solidarity Bridge offers significantly less wait to enter the U.S.; however, it links to the Mexican State of Nuevo Leon whereas the World Trade Bridge links to Tamaulipas. Relationships within the Mexican customs community are currently such that the World Trade Bridge is much more heavily utilized than the Columbia solidarity Bridge.

Beyond cross-border wait times, a far greater issue in the eyes of NAFTA oriented carriers is the recent implementation of FMCSA Hours of Service Restrictions. The regulations have caused all U.S. carriers, including those specializing in NAFTA trade, to rethink and reprogram how they allocate personnel and equipment. Firms interviewed seem to be adapting well to the new requirements, but complain that the requirements are difficult to interpret and adversely affect the productivity of the fleets and timeliness of shipments. Combined with the ongoing driver shortage, the Hours of Service Restrictions are limiting the ability of carriers to provide reliable, on-time service.

Congestion and Delay

Highway congestion is increasing throughout the United States but it most frequently affects trucking operations at major bottlenecks in urban areas and international gateways. According to the carriers and supply chain participants interviewed for this study, there are several capacity issues impeding NAFTA trucking operations. These issues include border congestion and delay, especially at peak hour; highway congestion on key NAFTA corridors; and rail capacity limitations that restrict multimodal interoperability.

Border Delays

Trucking companies, brokers, and shippers realize that border congestion is an inevitable part of doing international business. Border delays differ at each port of entry, but are generally more

pronounced during peak crossing periods. At the crossings near Reynosa and Juarez, for example, the border delays correspond to production shifts at large border maquilas. In order to spread these peak hour delays, a program of coordinated shifts in production schedules would have to be instituted. Because the border crossing is part of the production supply chain infrastructure, the delays are tolerated and there is not yet enough delay to adversely affect production to the degree manufacturers would be spurred to action. Peak hour delays at crossings that are not tied directly to maquila production schedules are also common, but there is no consensus among interviewees on how to address the congestion at ports such as Laredo.

Highway Congestion

While border crossing delays top the list of infrastructure capacity complaints, carriers interviewed for this paper report that highway congestion is increasing on key Interstate highway corridors that support NAFTA trade. These routes include IH-10 and IH-35 in Texas but congestion effects extend to busy corridors well beyond the border—especially in the U.S. Northeast. Overall interviewees report that highways linking Mexico to the United States are not yet congested enough to push carriers to develop alternative non-Interstate routes, but carriers acknowledge that future freight demand will outpace the supply of highway capacity, leading to greater delay. In all cases, the carriers are supportive of projects that add new capacity, but they remain apprehensive concerning toll-based proposals.

Evolving Trade Patterns

The movement of production location to minimize labor costs has resulted in broad changes to the trade patterns and composition of the commodities hauled by NAFTA oriented motor carriers. Fundamentally, the most important change is related to the rising importance of Asian inputs to maquila production.

As industries have adjusted geographically to locations with lower labor and other costs, the range of NAFTA truck commodities has changed. Mexican industry continues to evolve from low-wage, low-skill, labor-intensive assembly of low-cost products to higher-wage, higher-level technical skill, high-value production. For example, NAFTA trucking companies are no longer moving large quantities of finished textiles north from Mexico. Now they are more likely to carry electrical equipment or finished consumer appliances. The motor carriers interviewed have simply adapted to these changes in customer base and will continue to do so as the future dictates.

Motor carriers engaged in NAFTA trade between the United States and Mexico are well positioned to adapt to future market changes if they can overcome some of the challenges currently facing the industry, most importantly the prolonged driver shortage. The industry will continue to adopt post 9-11 security programs, including C-TPAT and FAST, and will develop strategies to enhance efficiency while complying with Hours of Service Restrictions. The motor carrier industry believes that capacity constraints at international gateways, on key NAFTA corridors, and on the rail system, are additional impediments to growth and must be reconciled in the future.

Key Findings-Carrier/Broker/Shippers

Commodity Movements

Freight patterns along the Texas/Mexico border consist of raw materials traveling from distant regions of the United States or overseas through ports crossing the border southbound into Mexico, production occurring in the border regions or interior of Mexico. Final assembled products then travel north into the United States to a distribution center in the border region or other large Texas city. A significant portion of finished products are also being shipped directly to final destinations.

Southbound raw materials are either shipped directly to Mexican destinations or they are temporarily stored in warehouse facilities north of the border for shipment consolidation. In both cases, a dray operator is typically used to move the shipment through the border. This is also true for southbound shipments destined for maquilas near the border or deeper into interior Mexico. When maquila facilities are close to the border (Juarez or Reynosa, for example) southbound industrial inputs are transported by dray operators through the border directly to maquiladora facilities. These dray trips average 30-40 miles in between warehouse/transfer and manufacturing facilities. Long-haul trips (Guadalajara or Puebla, for example) are transferred to Mexican long-haul carriers from dray operators after crossing the border. According to interviewees, raw materials bound for maquila facilities account for the majority of southbound NAFTA trips with the remaining shipments comprised of consumer goods and general merchandise destined for interior Mexico. In both cases, shipments typically originate in the Midwest or the Southeast United States.

Southbound commodities and assembly inputs originating in the United States commonly include automotive components from the Midwest, electrical components from the East Coast, textiles, aluminum, and steel from the United States and, from overseas, paper, packaging materials and chemicals, heavy machinery and building materials.

The northbound movement of finished goods and other commodities generally mirrors the southbound moves with use of dray operators to cross the border and some transfer, short-term warehousing functions occurring on one or both sides of the border.

Northbound finished products include computers, auto parts, appliances, frozen and fresh produce, building materials such as lumber and stone, and a small percentage of handicrafts. The primary destination for northbound carriers of frozen produce is Chicago followed by New York/New Jersey, Los Angeles, and Florida. A majority of northbound products come from cities in Mexico such as Saltillo, Monterrey (automotive parts, steel), San Luis, Mexico City (paper finished product) and are shipped to the Midwest. Other shipments are commonly headed towards the southeast, California, and Florida. Typically freight from the heart of Mexico headed to the West Coast will go through El Paso.

Interviewees also report that some domestic and international commodities transit Texas en route to and from Mexico via U.S. maritime ports. A high percentage of European goods transiting the State, for example, move through Texas to markets in Mexico via U.S. Gulf and Atlantic Ports. Similarly, a high percentage of Asian maritime traffic originating or terminating in Mexico uses both U.S. Pacific and Gulf ports (the latter via Panama Canal) and subsequently crosses Texas by highway or rail. The development of Mexican ports and increasing congestion at U.S. ports may lead to a shift of some of this traffic to Mexican ports in the future (see Chapter 5).

Heightened Security

Manufacturers reported that much change has come due to 9/11 including the addition of security cameras, guards, and personnel badge systems. One major change is compliance with several mandatory and voluntary programs such as Customs-Trade Partnership Against Terrorism (C-TPAT), the Operation Safe Commerce (OSC), and the Business Anti-Smuggling Coalition (BASC). Physical changes due to 9/11 include significant perimeter fencing projects. Prior to 9/11, the port facilities were open to the general public at all times and docks were utilized by fishermen and sightseers. New additions of security cameras, guards, and personnel badge systems have all occurred due to Homeland Security regulations. The post 9/11 impacts are further discussed in Chapter 4.

3.0 Rail

Movements of international freight via the Texas rail system are a key component of NAFTA trade. While NAFTA has stimulated trade among NAFTA partners – where total NAFTA trade has grown by 80.9 percent¹³ between 1994 and 2004 – rail movements between the U.S. and Mexico have grown at an even faster pace. Between 1994 and 2004, in the ten years after NAFTA took effect, rail trade between NAFTA trading partners increased by 164 percent, underlying the importance of the analysis of rail movements on the Texas multimodal transportation network.

This chapter details the current operational characteristics, traffic flows, and trade patterns of the Texas NAFTA rail system. Emerging and future rail trends and issues are summarized in Chapter 5 – Future Conditions.

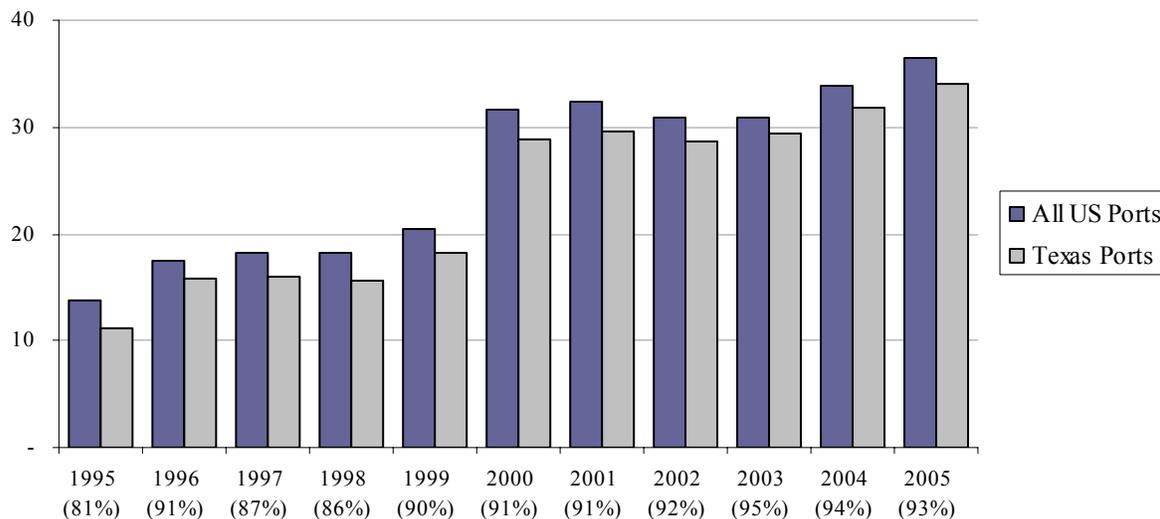
■ 3.1 NAFTA Rail Trade Background

Figure 3.1 shows the overall growth trend of U.S.-Mexico NAFTA freight rail trade between 1995 and 2005. Figure 3.1 also shows that NAFTA rail trade through Texas ports grew at a slightly faster pace than total U.S. NAFTA rail trade, from 1995 to 2005, as indicated by its gains in total share of the U.S. NAFTA rail value. Between 1995 and 2005, U.S.-Mexico NAFTA rail trade through Texas ports grew by 202 percent, from \$11 to \$34 billion (unadjusted for inflation), compared to 164 percent growth for all U.S. ports.¹⁴

Among the seven rail ports of entry on the U.S.-Mexico border, five are located in Texas: Brownsville-Matamoros; Laredo-Nuevo Laredo; Eagle Pass-Piedras Negras; Presidio-Ojinaga; and El Paso- Ciudad Juárez. In 2005, the Texas crossings collectively accommodated more than 93 percent of the total U.S.-Mexico NAFTA rail trade by value.

Among all U.S.-Mexico rail ports of entry, Laredo is the largest single freight rail gateway, capturing 73 percent of the total value. Eagle Pass is the second highest value Texas-Mexico rail gateway with 9.2 percent share of the total value followed by El Paso with 8.3 percent of the value and Brownsville with approximately 2.5 percent of the total value. Presidio is the lowest tonnage gateway with less than .03 percent of the total U.S.-Mexican rail trade value. Figure 3.2 shows the comparative value shares by Texas port of entry.

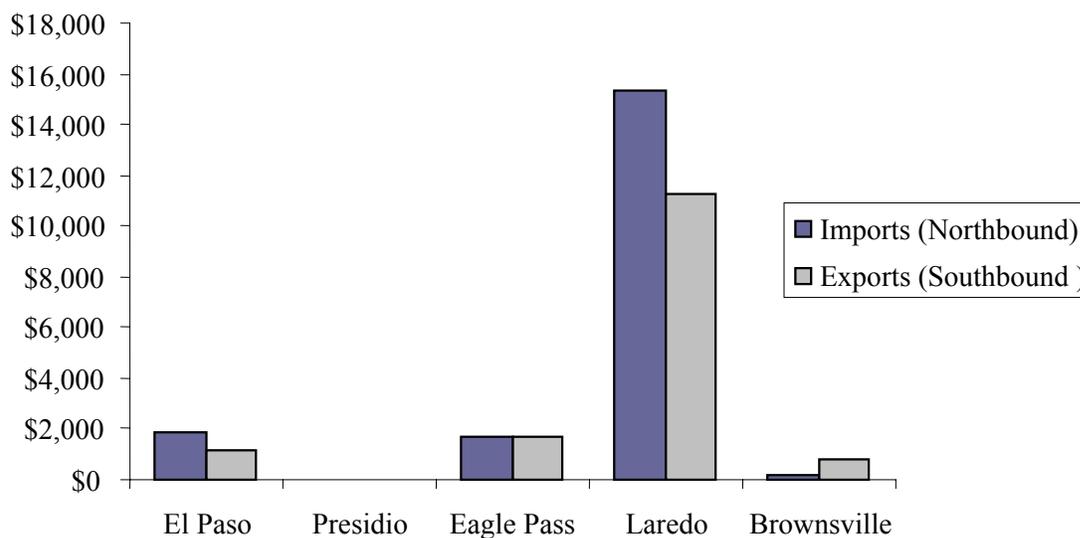
Figure 3.1 – Total NAFTA Rail Trade Growth – U.S. Ports versus Texas Ports
 2005 (Millions of Dollars)



Note: Percentage beneath years shows Texas share of U.S. rail trade. 1995 is the first year of full annual data following NAFTA enactment.

Source: U.S. Bureau of Transportation Statistics.

Figure 3.2 – Texas Rail Gateways – 2005 Import and Export Value
 2005 (Millions of Dollars)



Source: U.S. Bureau of Transportation Statistics.

Since 1995, El Paso has experienced the highest percentage growth of any NAFTA rail gateway in Texas, increasing its share of NAFTA rail value by more than 700 percent. As the primary U.S. rail crossing with Mexico, Laredo also grew at a rapid rate of 260 percent. Laredo grew by the largest absolute amount of any Texas gateway, increasing from \$7.4 billion in 1995 to \$19.4 billion in 2005. Brownsville also experienced growth of nearly 55 percent followed by Eagle Pass at 18 percent. The Presidio gateway lost rail share during the decade, declining by 54 percent or \$13.4 million.

An analysis of imports versus exports during this period by Texas ports reveals that overall, exports to Mexico increased at a faster rate than imports, growing by 230 percent versus 183 percent, respectively. Exports at each of the Texas rail crossings, except Presidio, also grew faster than imports between 1995 and 2005.

Other measures of rail traffic trends include train crossings and railcar crossings. Train crossing data recorded by the U.S. Bureau of Transportation Statistics show that inbound Texas rail crossings have also steadily increased (see Table 3.1) since 1998, except at Presidio, where the number of annual train crossings dropped from 20 in 1998 to one crossing in 2001 but bounced back to 12 crossings in 2005. The total number of inbound train crossings in 2005 through Texas ports totaled 7,946, up by more than 16 percent from a year earlier (6,838 in 2004). The El Paso gateway saw the largest one-year increase, nearly doubling the number of train crossings from 2004 to 2005.

Table 3.1 – U.S.-Mexico Annual Train Crossings By Texas Gateway

	1998	1999	2000	2001	2002	2003	2004	2005
Laredo	2,141	2,276	2,700	2,941	3,270	3,510	3,443	3,459
El Paso	644	621	970	785	620	629	744	1,618
Brownsville	631	663	694	803	964	1,045	998	1,045
Eagle Pass	1,265	1,322	1,448	1,676	1,718	1,624	1,653	1,812
Presidio	20			1				12
Total	4,701	4,882	5,812	6,206	6,572	6,808	6,838	7,946

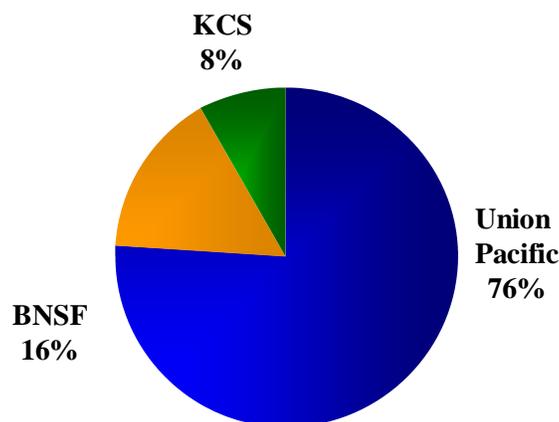
Source: BTS Border Crossing Data. <http://www.transtats.bts.gov/bordercrossing.aspx>.

In addition to the landside gateways presented in this section, the Texas rail system also accommodates a portion of the waterborne trade between the U.S. and Mexico en route to or from Texas maritime ports. The top inbound commodity class for rail is petroleum and chemicals while the top outbound commodity transported by rail through Texas ports is grain. A higher overall percentage of imported petroleum and chemicals is transported by pipeline after disembarking.

■ 3.2 Texas Rail Carriers

Three Class I national railroads and several Class III railroads carry NAFTA goods in the State of Texas. By track mileage and total market share, the largest NAFTA rail carrier in the State is Union Pacific Railroad Corporation (UP), based in Omaha, Nebraska. UP is followed by Ft. Worth, Texas-based BNSF Railway (BNSF), and Kansas City Southern (KCS), with headquarters in Kansas City, Missouri. Collectively, these three railroads operate over 11,432 miles or (81 percent) of Texas' total track mileage and together they move nearly 100 percent of NAFTA rail shipments in Texas. Figure 3.3 shows the approximate Texas NAFTA market share of the three Class I railroads.

Figure 3.3 – Approximate Texas NAFTA Market Share among Class I Carriers



*Note: Market share is based on revenue estimates and is rounded to the nearest whole number. Other NAFTA oriented rail carriers account for less than 0.5 percent of the total.

The Texas NAFTA rail system consists of the rail carriers and the system components over which they operate, including the corridors serving international ports of entry at Texas' five international crossings with Mexico: Brownsville, Laredo, Eagle Pass, Presidio, and El Paso. The system also consists of important intermodal terminals, yards, and interconnections along the corridors. Each corridor is characterized by distinct operating attributes including ownership, trackage rights, capacity, speed, and connectivity to the external U.S. national and Mexican rail networks.

Class I Rail Carriers

Figure 3.4 shows the location of the rail lines for Texas Class I railroads. Table 3.2 provides additional detail on each of the Texas international rail crossings, including the carriers and interconnections.

- **The Union Pacific Railroad** is a Class I railroad operating the most extensive rail network in the United States and the largest network in Texas, with 6,377 mile operated in the State. Union Pacific provides direct international connections at four of the five Texas rail crossings with Mexico: El Paso (with Ferromex); Eagle Pass (Ferromex); Laredo (Kansas City Southern de Mexico (KCSM)); and Brownsville (KCSM).
- **BNSF Railway** operates over 4,995 miles of track in the State of Texas and is the State’s second largest carrier. BNSF interchanges with Ferromex at El Paso and Eagle Pass and with KCSM at Laredo and Brownsville. BNSF’s only direct connection (over BNSF owned track) is at El Paso although BNSF can access Eagle Pass through haulage rights over UP. The railroad accesses Laredo through KCSM trackage rights and Brownsville through UP trackage rights.
- **The Kansas City Southern Railway**, or KCS, is a wholly owned division of Kansas City Southern Industries, the parent company of KCSM and the Texas Mexican Railway Company (Tex-Mex). Together, KCS, KCSM, and Tex-Mex comprise what Kansas City Southern Industries refers to as the “NAFTA Railway.” Within Texas, KCS operates over 893 miles, including trackage rights. Its principal connections to the rest of the KCS network are in Dallas and Beaumont and its interchange with Mexico is at Laredo where it connects with “NAFTA Railway” partner KCSM.

Class III Rail Carriers

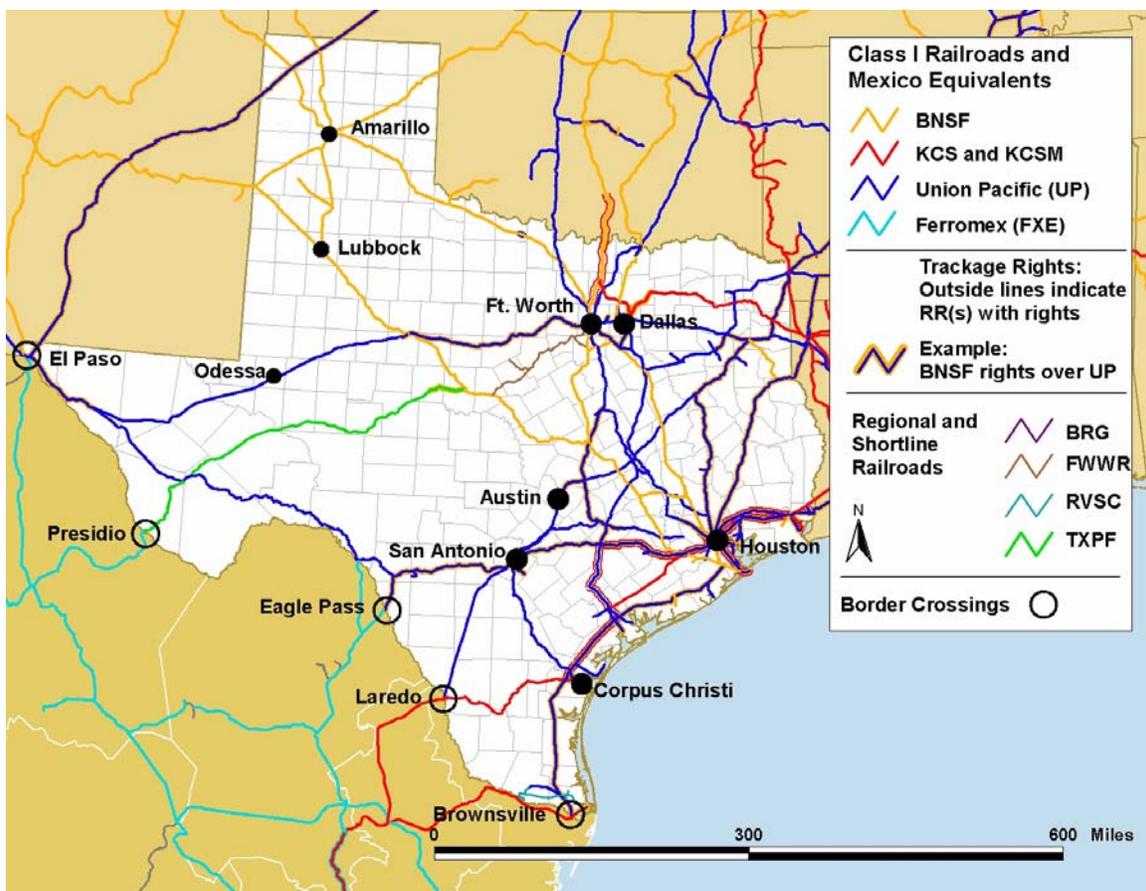
Texas is also home several Class III railroads oriented toward NAFTA trade.

- **Texas Pacifico Transportation, Ltd. (TXPF)**¹⁵ is a Class III railroad operating over the State-owned South Orient Line between Presidio and San Angelo for 391 miles and interconnecting with the Ft. Worth and Western (FWWR) at San Angelo.
- **Ft. Worth and Western (FWWR)**¹⁶ is a Class III railroad operating between San Angelo and Ft. Worth. FWWR does not engage in any Texas/Mexico border crossing, but it connects with Texas Pacifico Transportation Limited (TXPF) to move freight originating in Mexico via the Presidio gateway. TXPF is a sister company of Ferromex. The TXPF/FWWR interchange is located in San Angelo. FWWR has 276 miles of track, which extends from San Angelo to Carrollton, passing through Fort Worth.
- **The Brownsville & Rio Grande International (BGRR)**¹⁷ is a Class III short line railroad that principally serves the Port of Brownsville (Brownsville Navigation District

of Cameron County, Texas). BGRR owns 42 miles of track and interchanges with Union Pacific at UP’s Olmito Yard in Brownsville. Through an interline agreement, BGRR also interconnects with BNSF at Houston, accessed via Union Pacific’s route through Corpus Christi. The railroad’s principal commodity is iron ore and primary metal products destined for manufacturing facilities in and around Monterrey, Nuevo Leon.

- **Rio Valley Switching Company (RVSC)**¹⁸ is a Class III short line railroad that interchanges with UP in Harlingen, operating a total of 75 track miles. RVSC extends west 55 miles to Mission, Edinburg, to the McAllen Foreign Trade Zone and 11 miles northwest to Santa Rosa.

Figure 3.4 – Texas NAFTA Railroad System (with Trackage Rights)



Source: Cambridge Systematics, BTS, FRA.

Table 3.2 – Texas Railway Border Crossings

Border Pair Cities		Railroad Interchange at Border	
Texas Gateway	Mexico Gateway	U.S. Carrier	Mexico Carrier
Brownsville	Matamoros, Tamaulipas	UP, BNSF*	KCSM
Laredo	Nuevo Laredo, Tamaulipas	UP, TexMex (KCS)	KCSM
Eagle Pass	Piedras Negras, Coahuilla	UP, BNSF*	Ferromex
Presidio	Ojinaga, Chihuahua	TXPF	Ferromex
El Paso	Ciudad Juárez, Chihuahua	UP, BNSF	Ferromex

* Through trackage rights.

Source: Adapted from Texas State Rail Plan.

■ 3.3 Mexican Rail Carrier Profiles

The Texas NAFTA rail system is complimented by two Mexican national carriers: Ferrocarril Mexicano or Ferromex (FXE); and Kansas City Southern de México (KCSM). These rail lines are shown in Figure 3.5. Both carriers are significantly smaller than their U.S. national counterparts but they are both significantly large enough they would be classified as Class I carriers by the U.S. Surface Transportation Board if they operated in the United States. Since privatization Mexico’s freight rail market—including the NAFTA markets—has been dominated by the same two carriers: Ferromex and Kansas City Southern de Mexico.

- **Ferromex**, largest freight railroad in Mexico, owns 4,929 track miles and operates on more than 5,375 track miles. Union Pacific owns a 26 percent stake in Ferromex, which it purchased after losing the bid for Transportacion Ferroviaria Mexicana (TFM) to Kansas City Southern during the privatization process of the late 1990s. In the past, Ferromex has focused its development and investment efforts on building domestic market share and revenue. Recently, Ferromex has reoriented itself to include a new emphasis on international shipments. This contrasts with KCSM which has always been focused on NAFTA markets.
- **The Kansas City Southern de México** is a wholly owned subsidiary of Kansas City Southern Industries recently rebranded as Kansas City Southern de Mexico, or KCSM. TFM was originally established in 1873 as the National Railways of Mexico (FNM) and operated until 1997 when KCS and its Mexican equity partners successfully bid for its concession, which now allows KCSM to operate over the track for 50 years (from 1996). KCSM operates over 3,043 route miles in northern and central Mexico,

including the important corridors between Mexico City, Monterrey, and Laredo. Of the 3,043 route miles, KCSM owns 2,502. This KCSM corridor provides the shortest link to the heartland of Mexico and its largest population centers.

Figure 3.5 – Mexican Rail Network



Source: Cambridge Systematics, NORTAD, FRA, BTS.

■ 3.4 Gateways

Five of the seven international rail crossings between the United States and Mexico are located on the Texas border. Each of the crossings is a single track bridge except for El Paso, which has two single track bridges. Figures 3.4 and 3.5 shows the location of the Texas rail gateways with Mexico:

- **Brownsville:** The crossing at Brownsville connects two U.S. carriers with Kansas City Southern de Mexico in Matamoros, Tamaulipas. Union Pacific and the Brownsville and Rio Grande Railroad have direct access to this crossing.
- **Laredo:** The Laredo rail bridge is owned by Kansas City Southern de Mexico, S.A. (formerly known as TFM). All three Texas Class I NAFTA railroads have access to Laredo but Union Pacific owns the tracks leading to the Laredo Bridge and operates the locomotive power on behalf of BNSF and KCS leading up to the bridge. At the bridge, Union Pacific connects with Kansas City Southern de Mexico. In the past, locomotives were switched between KCSM and UP at the bridge crossing. Recently, UP and KCSM have instituted directional running on the bridge to raise capacity and many trains now move over the bridge without stopping because crews are switched prior to their arrival at the bridge facility.
- **Eagle Pass:** Eagle Pass is served by BNSF and UP from the north and by Ferromex from the south. Like the other crossings, this is a single track crossing.
- **Presidio:** The crossing between Presidio, Texas and Ojinaga, Chihuahua is a single track span across the Rio Grande River. Texas al Pacifico, a railroad wholly owned by Grupo Mexico, operates over the South Orient Line (owned by TxDOT) leading up to the bridge. On the south side, Ojinaga is served by Ferromex.
- **El Paso:** Both UP and BNSF have direct access to Ferromex via the crossing between El Paso, Texas and Ciudad Juárez, Chihuahua. Capacity at this crossing is constrained by the current restrictions on freight traffic through Ciudad Juárez, where freight operations are limited to a window between 10 PM and 6 AM each day. South of El Paso, the Ferromex line is in good condition and will permit speeds up to 60 miles-per-hour.¹⁹ In the future, this line may be relocated to the west of El Paso to a new crossing at Santa Teresa, New Mexico (as detailed in this report).

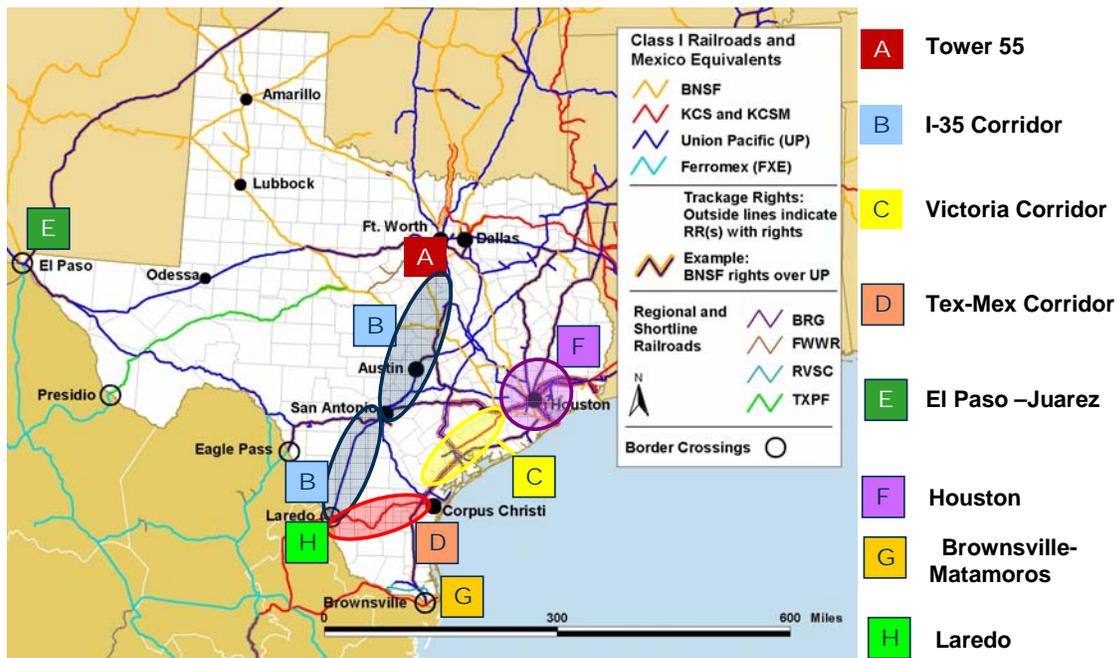
■ 3.5 Bottlenecks and Capacity Constraints on the Texas NAFTA Rail System

Shippers interviewed for this study routinely reported their dissatisfaction with the inability of the rail industry to move NAFTA shipments efficiently. Many reported they have shifted most freight to truck over the last several years because rail delivery times have worsened and rail capacity is overloaded on major rail facilities in the State. Most said they would use rail if the service were better.

Recent and ongoing studies by the Texas Department of Transportation—including the Texas State Rail Plan and the Freight Mobility Project—are addressing bottleneck issues. Another study—the La Entrada al Pacifico (LEAP) or “Entrance to the Pacific”—is studying the possibility of connecting the South Orient line to the rail network in the Texas Panhandle to

provide a potential reliever route for NAFTA and domestic rail traffic. Overall, several key bottlenecks throughout the State are limiting the ability of the rail system to perform effectively and to accommodate a greater share of freight. Throughout the State, rail networks are impacted by the rapid growth of metropolitan areas which creates conflicts at grade crossings. NAFTA traffic is negatively affected by the large urban bottlenecks—such as those in Houston and Fort Worth—but is also impacted by capacity constraints in gateway communities and on several NAFTA corridors. Figure 3.6 summarizes the location of the bottlenecks and the following paragraphs describe the bottlenecks that specifically affect NAFTA rail traffic.

Figure 3.6 – Texas NAFTA Rail Bottlenecks



Urban and Corridor Rail Bottlenecks

Tower 55

Tower 55 is the single busiest at-grade railroad crossing in the Texas. It is located at the junction of Union Pacific and BNSF main lines beneath the interchange of I-35W and I-30 near Downtown Ft. Worth. This bottleneck slows train speed for both railroads as dispatchers alternate and control the flow of traffic. Union Pacific and BNSF both cite Tower 55 as their major impediment to domestic and NAFTA traffic. Both railroads are actively seeking alternative routes for key commodities.

Tower 55 is one of several urban bottlenecks that are being addressed through ongoing and planned studies to alleviate congestion in the Dallas-Fort Worth Metroplex. The Texas

Department of Transportation is working with the North Central Texas Council of Governments (NCTCOG) to identify a solution to the Tower 55 Bottleneck which may include relocating rail lines outside the Ft. Worth urban area on new alignments. NCTCOG is also working toward expanded passenger rail services through its Regional Rail Corridor Study, which includes relocating freight rail operations to the urban periphery.

IH-35 Corridor

The State is analyzing rail operations and congestion on the freight rail corridor roughly paralleling IH-35 from Laredo to Dallas-Ft. Worth. NAFTA traffic is especially affected in urban areas such as San Antonio, Austin, and Ft. Worth and faces the added challenge of balancing growth in freight demand with proposals for commuter rail. This corridor is especially critical as a bottleneck to the State's economy as it serves as the busiest NAFTA rail route in the U.S.

The potential for improvement in this corridor has not gone unnoticed and has resulted in a serious proposal for a public-private partnership. In March of 2006, the Spanish-American consortium of Cintra-Zachary, which has entered into an agreement with the State to develop Trans Texas Corridor facilities in the I-35 corridor, unveiled plans to construct a new 600-mile toll freight railway between Laredo and Dallas to alleviate congestion and provide additional capacity. The proposal cites the potential to divert up to 1 million annual trucks off IH-35 and would be financed through a carload toll similar to the Alameda Corridor in Los Angeles. Prospective shippers will find the route attractive because it has the potential to lower rates.

NAFTA rail carriers have differing opinions on this proposal. BNSF and KCS have the most to gain from this proposal as they currently lack good routes to Laredo. KCS may benefit the most as this new corridor would compliment its high-quality, high-speed Mexican network. Union Pacific, which currently dominates market share in the corridor, is in the process of expanding its IH-35 route between Laredo and San Antonio to double-tracks, which may make the Cintra-Zachary proposal moot in the short to medium term.

Houston

The rail network converging at Houston is an amalgamation of several former competing railroads that were eventually absorbed into Union Pacific through mergers and acquisitions. Historically, the railroads operating in the metropolitan region constructed infrastructure largely incompatible with competitors. The result today is a complicated system that impedes all rail traffic passing through the metropolitan area. NAFTA traffic, en route from all of the State's Mexico gateways, is affected as it passes through the Houston region. All of this is complicated by proposals for commuter service and the growing needs of the Ports of Houston and Galveston. Finally, while the Houston bottlenecks primarily affect Union Pacific—because it owns most of the network in the region—they also impact BNSF operations and KCS, which relies on the UP Houston region network to access its Tex-Mex line to Laredo. Currently, the State and local

agencies are currently working to identify solutions to the rail congestion in and around Texas' second largest urban area. Resolving this bottleneck is a top State priority that will result in improved productivity for NAFTA carriers.

Victoria Corridor

Kansas City Southern subsidiary Texas-Mexican Railroad purchased this line from Union Pacific in 2000 with the intention of improving it as an alternative to using UP trackage rights to move freight from Houston to Laredo via Corpus Christi. The line begins southwest of Houston (Rosenburg) and continues to Corpus Christi via Victoria. Since its purchase, however, KCS has continued to use its trackage rights over UP's Sunset Line. Improvement of the Victoria-Rosenburg Corridor would provide additional NAFTA rail capacity by freeing up UP's Sunset Route and by granting KCS direct access to Mexico via its own network.

Within the City of Victoria, NAFTA rail operations of KCS are constrained by more than 60 at-grade crossings which slow speeds and negatively impact safety. The most viable alternative identified is a relocation project to move the rail lines outside the urbanized area.

Tex-Mex Corridor

Providing alternative access to Laredo, KCS' Tex-Mex line has recently been upgraded to increase speed from 25 to 40 mph between Laredo and Corpus Christi. Additional improvements are proposed to further enhance this corridor's speed and capacity and to provide a more viable connection to KCS' anticipated role in Asian transshipment from the Mexican port of Lázaro Cardenas to U.S. markets.

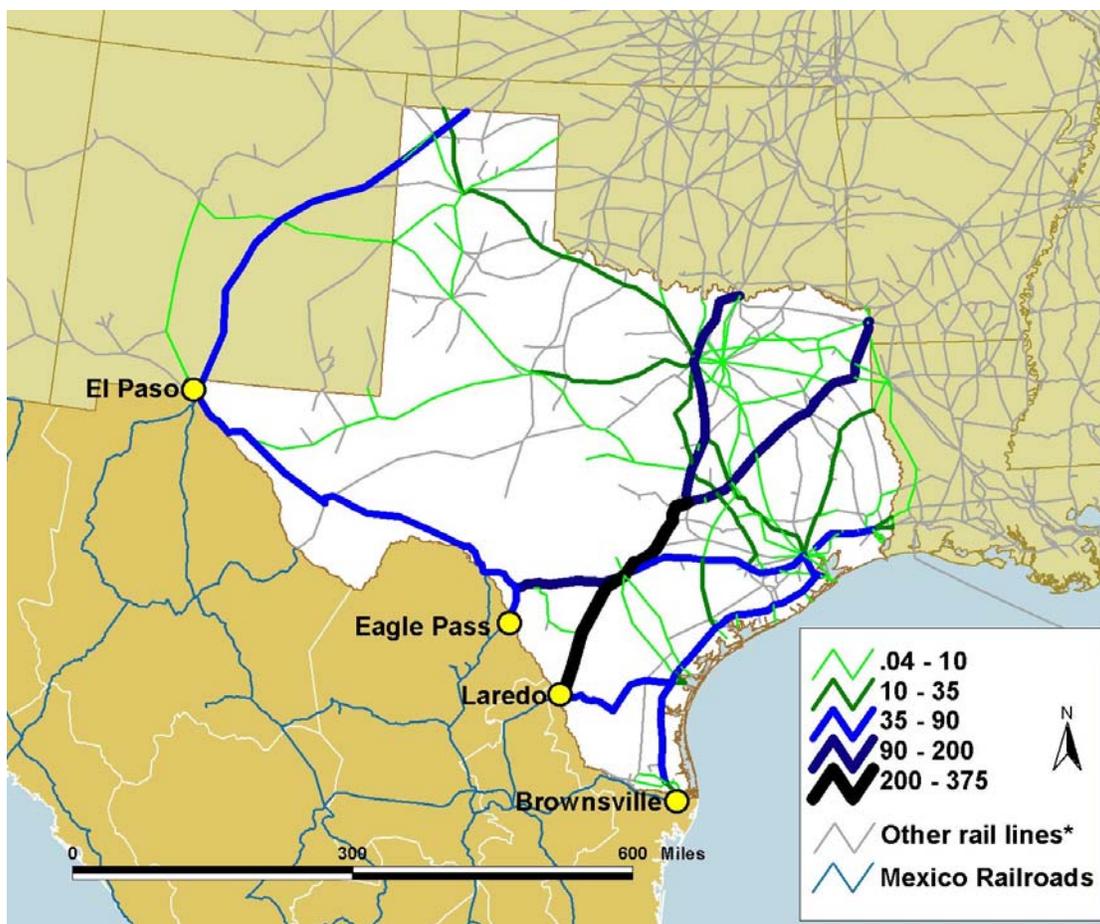
Gateway Bottlenecks

One of the most severely limiting factors to the growth of NAFTA rail tonnage are the urban bottlenecks at gateway communities. Each gateway community faces a slightly different set of issues related to NAFTA rail operations, but in most cases, operating speed and safety are compromised because of at-grade crossings, poor geometry, and high land use density of residential and commercial activity. These constraints typically exist on both sides of the border and unless addressed in both Mexico and the Texas the potential for reducing truck vehicle-miles-traveled (VMT) will not be fully realized as a rail improvement on one side of the border will generate additional truck trips to the other. These are complicated issues, but of critical importance to the future of U.S.-Mexico trade. To address these issues, several ongoing and planned studies and projects are engaging Federal, State, and local planners and railroad operators from both sides of the border. The most severe gateway community bottlenecks include Matamoros-Brownsville, Nuevo Laredo-Laredo, and Ciudad Juarez-El Paso.

■ 3.6 Rail Movements through Texas

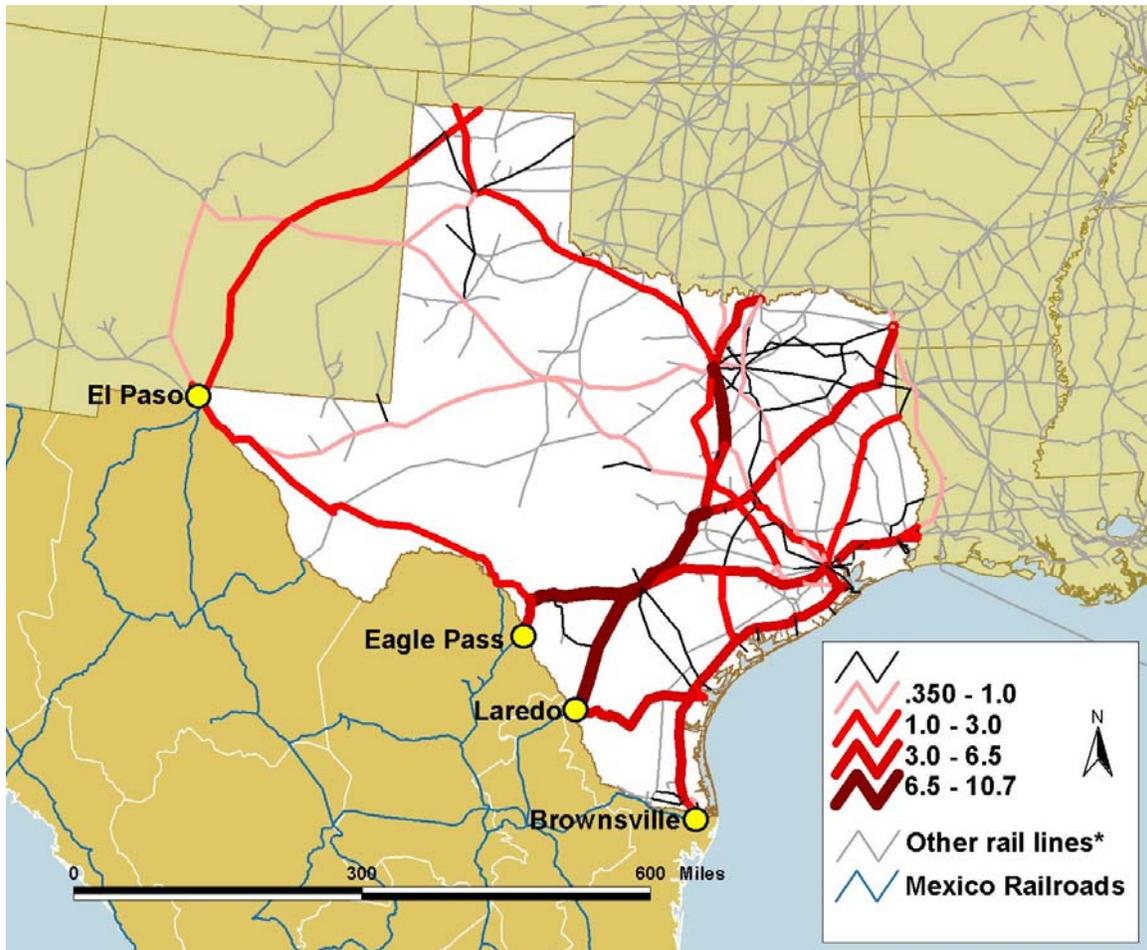
Figures 3.7 and 3.8 show estimated statewide NAFTA rail flows through Texas by total tonnage and total rail units, respectively. These maps reflect the network assignment of the 2003 Texas Rail Database developed by Global Insight as one of its TRANSEARCH products. The maps represent domestic flows but show tonnage and units either originating or terminating at the U.S.-Mexican border. These maps provide corridor-level estimates of NAFTA flows separated from other originations and terminations in the State.

Figure 3.7 – NAFTA Gateway Rail Flows 2003
Total Rail Units (Thousands of Annual Railcars)



* Indicates no NAFTA traffic in TX. Traffic unassigned outside TX except in NM and LA.
Source: 2003 TRANSEARCH data.

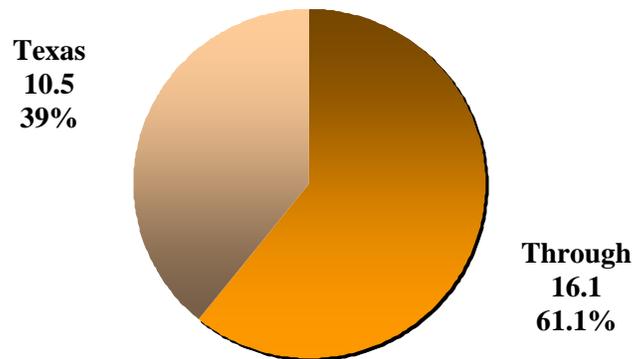
Figure 3.8 – NAFTA Gateway Rail Flows 2003
Total Rail Tonnage (Millions of Annual Tons)



* Indicates no NAFTA traffic in TX. Traffic unassigned outside TX except in NM and LA.
 Source: 2003 TRANSEARCH data.

NAFTA freight moving through Texas en route between Mexico and other U.S. states was 16.1 million tons in 2003 and was valued at \$39.7 billion. Figure 3.9 shows the proportion of Texas-Mexico terminating or originating (begins or ends in Texas *and* begins or ends in Mexico) versus through tonnage to other U.S. states.

Figure 3.9 – Texas Rail Trade with Mexico versus Through to Other U.S. States
2003 (Millions of Tons)



Trade between Texas and Mexican states moved by rail was 10.5 million tons in 2003 and valued at \$9.8 billion. The top commodities traded between Mexico and Texas are highlighted in Table 3.3 and include transportation equipment, farm products, and food/kindred products. The intermodal commodities (moved in intermodal shipping containers or trailers) traded between Mexico and Texas are highlighted in Table 3.4 and include food/kindred products, paper products, and chemicals.

Table 3.3 – Texas/Mexico Trade – Top Carload Commodities
2003 Carloads

STCC2	Commodity	Carloads
37	Transportation Equipment	148,545
01	Farm	120,544
20	Food/Kindred	34,963
28	Chemicals/Allied	16,042
14	Nonmetallic Minerals	12,593
33	Primary Metal	11,154
35	Machinery Ex. Electrical	8,155
32	Clay/Concrete/Glass/Stone	7,802
29	Petroleum/Coal	7,615
26	Pulp/Paper/Allied	6,345

Source: TRANSEARCH, 2003.

Table 3.4 – Texas/Mexico Trade – Top Intermodal Commodities
2003 Intermodal Units

STCC2	Commodity	IM Units
20	Food/Kindred	30,044
26	Pulp/Paper/Allied	5,767
28	Chemicals/Allied	5,423
14	Nonmetallic Minerals	2,443
35	Machinery Ex. Electrical	2,294
30	Rubber/Plastics	1,823
40	Waste/Scrap Materials	1,680
33	Primary Metal	1,606
32	Clay/Concrete/Glass/Stone	1,001
34	Fabricated Metal	541

Source: TRANSEARCH, 2003.

Texas imports (inbound) from Mexican states by rail weighed 2.5 million tons in 2003 and were valued at \$2.9 billion. By contrast, Texas exports (outbound) to Mexican states by rail weighed 7.9 million tons in 2003 and were valued at \$6.9 billion. The top outbound trading partners for carload and intermodal are shown in Tables 3.5 and 3.6, respectively.

Table 3.5 – Texas Imports from Mexico – Top Mexican States
2003 Carloads

State	Carloads	% Share
Mexico (State)	31,996	35%
Nuevo León	16,656	18%
Guanajuato	9,439	10%
Coahuila De Zaragoza	7,875	9%
Distrito Federal	7,286	8%
Jalisco	5,898	6%
Durango	2,214	2%
Sonora	1,999	2%
Baja California Norte	1,891	2%

Source: TRANSEARCH, 2003.

Table 3.6 – Texas Exports to Mexico – Top Mexican States
2003 Intermodal Units

State	IM Units	% Share
Sonora	431	28%
Distrito Federal	274	18%
Mexico (State)	188	12%
Guanajuato	168	11%
Sinaloa	91	6%
Chihuahua	82	5%
Querétaro	72	5%
Coahuila De Zaragoza	64	4%
Durango	61	4%

Source: TRANSEARCH, 2003.

■ 3.7 NAFTA Rail Trends

Several market trends are affecting NAFTA rail operations. The most important of these is the growth of intermodal service and the prioritization that railroads are placing on intermodal as a means of maximizing revenue without large capital investments in new capacity. Other trends include the seeking of alternative gateways to avoid congestion, and the early development of service to Mexican ports. The intent of this section is to provide some background on recent NAFTA rail trends and their potential impact on the Texas transportation system. The future role of rail in NAFTA trade is considered in Chapter 5.

Intermodal Growth

Due to the capacity constraints on existing infrastructure and to increase carload revenue, NAFTA railroads are focusing a large share of capital investment and marketing efforts on intermodal operations, especially double-stack container unit trains. This trend is manifest through the continuing shift from trailer-on-flat-car (TOFC) movements to container-on-flat-car movements (COFC). Union Pacific, for example, is moving toward 100 percent double-stack operations in the future. This is not to say that TOFC business with private trucking companies is not profitable, it simply indicates a fundamental shift by the NAFTA carriers toward higher revenue return on increasingly scarce railcar space.

The trucking companies, which have been highly reliant upon railroads to handle as many trailers as can be accommodated, are responding to the railroad intermodal prioritization trend by purchasing large quantities of domestic-type shipping containers to facilitate intermodal moves. Domestic-type shipping containers differ from the international shipping containers in their structure, material, and size. They are typically made of lighter weight materials and consequently have a less rigid structure as required for maritime transport where units are stacked many deep on transoceanic vessels. Equally important, domestic-type containers are larger than international containers – 53-feet versus 40- to 45-feet for international shipping containers. The additional length allows truck and rail carriers to more fully utilize truck length limits on the Interstate Highway System.

The physical manifestation of the growth of intermodal is evident in the number of new intermodal terminals proposed or recently completed, including Union Pacific’s new Wilmer, Texas facility southeast of Dallas. As related in this report, UP is proposing other facilities near El Paso and San Antonio to serve this growing market.

Shift to Underutilized Ports of Entry

Just as NAFTA rail carriers are seeking to grow intermodal operations, they are also finding ways to more fully utilize the existing NAFTA rail system. One of the principal trends in the future will be the continued movement of international rail shipments to underutilized ports of entry. Union Pacific, for example, views Eagle Pass as an underutilized gateway, especially for shipments to the U.S. Midwest and Ferromex considers Eagle Pass a potential gateway for increased intermodal service. UP, BNSF, and Ferromex foresee continued growth at El Paso.

Recent trends in railcar crossings show that all Texas rail ports of entry experienced more than double-digit growth in railcar crossings between 2004 and 2005 except Laredo. The Presidio gateway is notable because train crossings increased from zero in 2004 to 12 in 2005, according to the U.S. Bureau of Transportation Statistics. The highest growth was experienced by Eagle Pass, which increased by approximately 18 over the prior year.

In the long-term, railroads may also gain interest in Presidio, which is currently the least used rail gateway in the State. Ferromex owns the line between Chihuahua and Ojinaga (Presidio) and is assessing the future role of the corridor using existing rail access on the U.S. segment of the line, including the Southern Orient line, which TxDOT owns, as an alternative access route to the Dallas-Ft. Worth Metroplex.

Mexican Ports

One of the topics of greatest interest in this study is the potential for Mexican ports to affect rail traffic in Texas. The basic premise of this trend is that increasing demand by U.S. and Mexican consumers and industries for Asian-produced goods and components will overwhelm the U.S. maritime ports and that shippers and steamship lines will divert to emerging ports in Mexico. This idea gained significant strength in 2004 during the Longshoreman's strike at the U.S. West Coast ports. During that period, international steamship lines called on Mexican ports, including Manzanillo and Lázaro Cardenas to provide relief from the backlog at Los Angeles/Long Beach. The NAFTA railroads responded and moved U.S.-bound containers through Mexico to large U.S. markets traditionally served by one of the U.S. transcontinental "land bridge" routes, like Union Pacific's Sunset Route. Following the resolution of the West Coast port labor disputes, steamship lines reoriented to previous ports of call but the promise of relief to U.S. ports through development of Mexican ports and landside multimodal infrastructure remains firmly entrenched. The Mexican Secretaría de Transportes y Comunicaciones (SCT) has espoused the idea of trans-Mexican movements of international container shipments and of increased domestic shipment directly to Mexico.

The development of existing and future Mexican ports is likely to have a modest impact on the Texas NAFTA rail system, at least in the near-term. As Mexican ports develop and KCSM and Ferromex learn how to handle containers more efficiently, the Mexican ports may be able to accommodate some of the inbound Mexican containers that currently call on U.S. ports and transit Texas southbound, which may ultimately reduce traffic from U.S. ports to Mexican destinations. In the long-term, KCSM and others predict an increase in rail traffic as congestion of U.S. West Coast ports pushes some U.S.-bound traffic through Mexican ports.



4.0 Effects of 9/11 on the Texas Transportation System

■ 4.1 Post-9/11 Trade Overview

Since the enactment of the North American Free Trade Agreement (NAFTA) in 1994, U.S. international trade with NAFTA partners – Mexico and Canada – has increased substantially. Between 1994 and 2004 trade using surface transportation between NAFTA trading partners grew 80.9 percent.²⁰ In 2006, NAFTA trade hit record levels and was 14.8 percent higher in March 2006 than in March 2005, reaching \$68.2 billion, the highest monthly level ever recorded by the Bureau of Transportation Statistics (BTS). U.S.-Mexico surface transportation trade totaled \$24.2 billion in March 2006, up 21.5 percent in comparison to March 2005.²¹

The increase in NAFTA trade has been significant, but not always constant. The attacks on New York City's World Trade Center and the U.S. Pentagon Building in Washington, D.C., on 9/11, shifted the policy focus from one of expediting trade efficiency to one of enhancing trade security. In 2001, particularly after 9/11, additional security on the border slowed the passage of goods and people. At the same time, the value of U.S. trade by truck, rail, and pipeline with Canada and Mexico fell in 2001 for the first time under NAFTA. The biggest decline took place at the Canadian border, although the Texas-Mexico border did show some signs of a slowdown.

Table 4.1 shows the decline in NAFTA trade with Mexico from 2000 to 2001. During that time, total U.S.-Mexico trade (imports and exports through all U.S.-Mexico land border ports of entry) decreased by 4.7 percent, with imports decreasing by 1.4 percent and exports by 8.5 percent.²²

Table 4.1 – U.S.-Mexico Surface Trade – All U.S.-Mexico Border Crossings
Millions of 2002 Dollars

	2000	2001	Percent Change
U.S. Imports	\$113,437	\$111,870	-1.4%
U.S. Exports	\$97,159	\$88,926	-8.5%
Total U.S.-Mexico Trade (All Surface Modes)	\$210,595	\$200,767	-4.7%

Source: BTS Transborder Data, 2003.

Table 4.2 shows the percent change in incoming truck crossings at the busiest Texas-Mexico border crossings as well as for all ports of entry along the Texas-Mexico border. From 1999 to 2000, there was a 3.4 percent increase in northbound truck traffic from Mexico (for all Texas ports of entry); however, in 2001, 6.6 percent fewer trucks crossed the Texas-Mexico border. Following 9/11, the most significant decreases in cross-border truck traffic along the southern border were seen at Brownsville and El Paso, which showed decreases of 15.9 percent and 8.3 percent, respectively.

Table 4.2 – Texas Ports of Entry Incoming Truck Traffic
Percent Change from Previous Year

	2000	2001	2002	2003	2004
Laredo	0.4%	-6.0%	.7%	6.1%	.8%
El Paso	7.0%	-8.3%	.8%	6.5%	.1%
Pharr/Hidalgo	5.0%	-1.5%	.9%	.0%	1.9%
Brownsville	1.4%	-15.9%	1.1%	7.8%	1.4%
Total Change – All Texas-Mexico Crossings <i>(includes smaller crossings of Del Rio, Eagle Pass, Fabens, Presidio, Progresso, Rio Grande City, and Roma)</i>	3.4%	-6.6%	.7%	4.7%	.7%

Source: BTS Border Crossing Data. <http://www.transtats.bts.gov/bordercrossing.aspx>.

Table 4.3 shows the change in train crossings as a percent change from the previous year for Texas border crossings with viable rail facilities. Following 9/11, train crossings did not decrease significantly. El Paso did show a decrease in crossings for both 2001 and 2002. However, El Paso also showed a marked increase in train crossings in 2000 (an increase of more than 56 percent over 1999). Even following 9/11, train crossings in El Paso remained at or above 1999 levels, according to the Bureau of Transportation Statistics Border Crossing dataset.

Table 4.3 – Texas Ports of Entry Incoming Train Crossings
Percent Change from Previous Year

	2000	2001	2002	2003	2004
Laredo	18.63%	8.93%	11.19%	7.34%	1.91%
El Paso	56.20%	19.07%	21.02%	1.45%	18.28%
Brownsville	4.68%	15.71%	20.05%	8.40%	4.50%
Eagle Pass	9.53%	15.75%	2.51%	5.47%	1.79%
Total	19.05%	6.76%	5.91%	3.59%	0.44%

Source: BTS Border Crossing Data. <http://www.transtats.bts.gov/bordercrossing.aspx>.

In Brownsville and Laredo, rail traffic showed a definite *increase* following 9/11. Train crossings through Brownsville and Laredo increased significantly in 2001 (by 15.7 percent and 8.9 percent for Brownsville and Laredo, respectively) and again in 2002 (by 20.1 percent and 11.2 percent for Brownsville and Laredo, respectively). These numbers suggest a significant mode shift from truck to rail following 9/11.

■ 4.2 Post-9/11 Trade and Transportation Analysis

In comparison to the size and scale of the terrorist attacks on the World Trade Center and the Pentagon, it is important to note that the total decreases in trade between NAFTA trade partners following 9/11 was not nearly as devastating. U.S. merchandise trade with Canada and Mexico by all surface modes was approximately 5.0 percent less in 2001 than in 2000 and U.S.-Mexico trade (i.e., the majority of trade passing through Texas ports of entry) decreased by only 4.7 percent from 2000 to 2001.²³

These minor decreases suggest that the events of 9/11 may have had minimal effect on NAFTA trade in 2001. In looking at the BTS statistics on a calendar year basis, for example, September 11 would fall near the end of the third quarter of the year, suggesting that any changes to trade for 2001 would have been well underway before 9/11. Officials at the largest ports of entry in Texas (Laredo, being the largest, followed by El Paso, Pharr/Hidalgo, and Brownsville) noted changes to trade prior to 9/11, including economic changes of NAFTA economies and changes to the localized maquila industry.

The following sections summarize the effects of 9/11 on the Texas transportation system for both commercial and noncommercial movements.

Cross-Border Commercial Movements

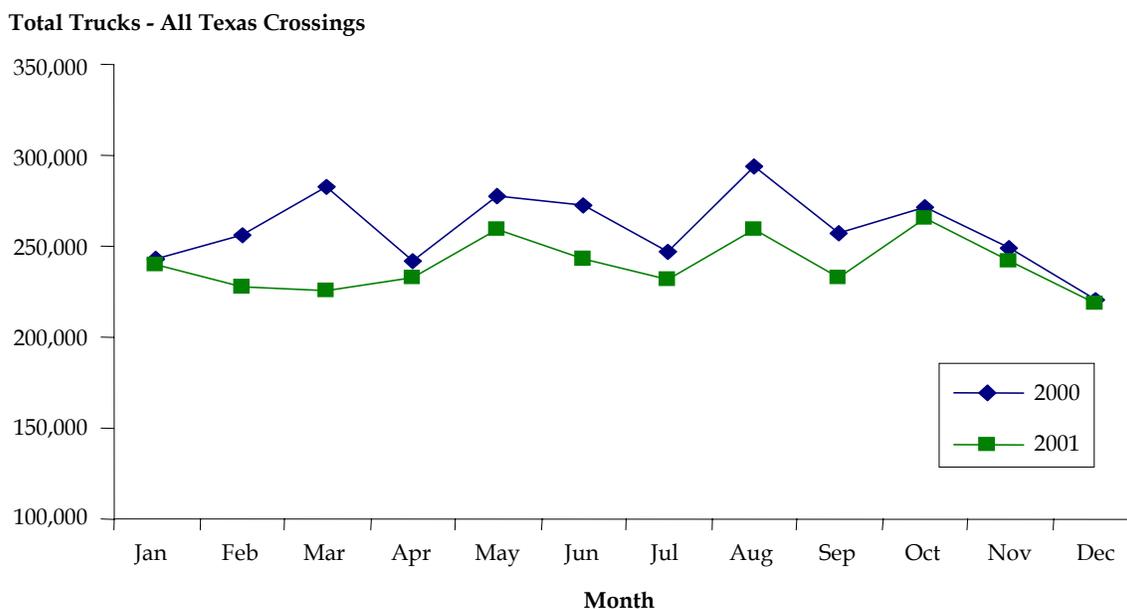
Officials at the Port of Laredo noted that following 9/11, trucks were “sitting at the border waiting to cross.” This reinforces the assumption from Customs and Border Protection (CBP) that at southern crossings, decreases in trade following 9/11 may have had more to do with increased wait times rather than negative economic impacts of 9/11 at least initially;²⁴ however, there is conflicting evidence that suggests that pre-9/11 economic uncertainty may have also played a part in post-9/11 trade reductions. In any case, the relatively small reductions in total trade between NAFTA partners following 9/11 shows the resiliency of the U.S. economy and to some extent that ability of the nation’s trade and transportation systems to adjust to changes at the border.

Post-9/11 Wait Times

The challenge for customs officials and the newly created Department of Homeland Security (DHS), which was implemented just a few weeks after 9/11, became one of balancing economic efficiency with security. Idle time and delays result in monetary losses in the freight business, particularly the trucking business. Increased security measures following 9/11 immediately increased the cost of doing business for NAFTA trade partners by slowing trade. Limited technologies to support increased security priorities left CBP with a manual system that slowed the inspections process dramatically. Slow operations significantly limited the number of trips U.S.-bound drayage trucks from Mexico could make in a day.²⁵

Wait times at border ports of entry following 9/11 are seen by customs officials as having a significant impact on any decline in trade in late September 2001; however, BTS data shown in Figure 4.1 also show a slowdown in NAFTA trade even before 9/11. In the months prior to September 2001 (January through August 2001), NAFTA truck crossings through Texas ports of entry, for example, decreased by 9.28 percent in comparison to the same period from 2000. In September 2001, truck crossings decreased by 9.8 percent in comparison to September 2000.²⁶

Figure 4.1 – Cross-Border Truck Traffic
2000 versus 2001 Monthly Comparison



Source: BTS Border Crossing Data, Texas. <http://www.transtats.bts.gov/>.

Wait times at the border increased significantly following 9/11, initially. While there was never an official closing of the southern border, increased wait times due to additional inspection and processing times lasted initially for about two weeks at Texas southern crossings. However, officials at the ports of Laredo, Pharr, and Brownsville all noted that wait times stabilized after only a few weeks.

Cross-Border Noncommercial Movements

Although not directly related to NAFTA, cross-border noncommercial vehicle movements following 9/11 have also taken high-priority as northbound passenger vehicle movements from Mexico account for up to twenty times those of commercial movements. While increases in noncommercial movements in the years since NAFTA inception are not considered a direct effect of the agreement, passenger movements through Texas crossings constitute a large part of border infrastructure demand and contribute significantly to demand on Texas highways.

On October 1, 2001, only a few weeks after 9/11, Mexico changed its processes for exit from paper to biometric temporary visas. Also following 9/11, DHS implemented Section 110 of the Illegal Immigrant Reform and Immigrant Responsibility Act of 1996 (IIRIRA), which was known as the Automated Entry/Exit Control System. This program was later renamed the U.S. Visitor and Immigrant Status Indicators Technology (U.S. VISIT System). Under the U.S. VISIT program, foreign visitors, students, and business travelers are tracked by using as least

two forms of biometric identifiers, such as iris scans, digital fingerprints, and digital photographs when entering and leaving the United States.²⁷

These programs caused an initial decline in cross-border noncommercial traffic as well as changes in cross-border noncommercial travel patterns which may affect the economies of Texas border regions in the future as described further in 4.3 and 4.4. However, noncommercial traffic is expected to remain an important part of border operations and should continue to increase.

■ 4.3 Post-9/11 Technologies and Partnerships

Following 9/11, the CBP began to implement three key programs for cross-border commercial vehicle movements increasing both security and cross-border trade efficiency:

- The Customs Trade Partnership Against Terrorism (C-TPAT);
- The Free and Secure Trade (FAST) program; and
- The Automated Commercial Environment (ACE).

The C-TPAT and FAST programs are closely related. The C-TPAT program provides an expedited point of entry to the United States via FAST lanes entering the United States from Mexico. To use FAST Lanes, the international importer, manufacturer, carrier, and driver must all be C-TPAT certified, which includes a detailed review and approval from CBP of the entire manufacturing and shipping supply chain. Together, C-TPAT and FAST provide an expedited process for entry into the United States and may potentially result in a lower frequency of secondary inspections at the border for those who participate.

The ACE program provides enhanced prearrival processing capability for shippers. ACE includes the e-manifest/e-truck system, which allows for pre-filing of importer paperwork before the shipment even reaches the border. The manifest must be available to CBP one hour in advance of the truck reaching the border (two hours for agricultural shipments) so that CBP can make decisions in advance of any reason to hold or further inspect the shipment. This program complements other efforts to facilitate efficiency at the border by allowing comprehensive risk assessments to be performed in advance of a shipment reaching the crossing. Some of the actions typically taken at primary inspection can then be completed in advance, potentially lowering wait times and shortening queues.

Cross-border passenger movements also continue to be a large focus of CBP programs and infrastructure investment and CBP officials expect the demand for noncommercial cross-border movements to continue to grow.²⁸ The implementation of the Secure Electronic Network for Travelers Rapid Inspection (SENTRI) program at all Texas major ports of entry (El Paso, Laredo, Pharr/Hidalgo, and Brownsville), while not directly related to NAFTA, is an important CBP initiative that will have an effect on cross-border, noncommercial movements described in more detail in this section. SENTRI is an immigration-related program that uses prescreening to

identify low-risk border crossing users, and technology to quickly identify them and access records at the crossing. This program also contributes to shorter wait times.

Post-9/11 Technologies and Partnerships Deployment Summary

By August 2006, the largest Texas border ports of entry had instituted the technologies and programs described in the above. Table 4.4 provides a summary of these programs at the busiest Texas border ports of entry (Laredo, El Paso, Pharr/Hidalgo, and Brownsville).

Table 4.4 – Post-9/11 Programs Summary

Port of Entry	C-TPAT	FAST	ACE	SENTRI
Laredo	✓	1 FAST lane on the World Trade Bridge; 6-7% total FAST usage (as a percentage of total commercial crossings)	✓	1 SENTRI lane opening on the Juarez-Lincoln Bridge (open since summer 2006)
El Paso	✓	2 FAST lanes, 1 on the Bridge of the Americas and 1 on the Ysleta Bridge; 17-18% total FAST usage	✓	3 SENTRI lanes on the Stanton Street Bridge (open since 1999)
Pharr/Hidalgo	✓	1 FAST lane on the Pharr International Bridge; 9-10% FAST usage	✓	3 SENTRI on the Hidalgo-Reynosa International Bridge (open since summer 2006)
Brownsville	✓	1 FAST lane on the Veteran's International Bridge; 8-9% FAST usage	✓	1 SENTRI lane on the Veteran's International Bridge (open since summer 2006)

■ 4.4 Economic Impacts of 9/11

Official figures show that both the U.S. and Mexican economies were slowing prior to 9/11, particularly in the second quarter of 2001.²⁹ Economic figures for the summer of 2001 are generally consistent with those marking the beginning of a recession. The terrorist attacks of 9/11, however, are seen in many cases as the catalyst to a full economic slowdown in U.S. financial markets after having caused unthinkable destruction in two of the country's key financial and policy centers: New York City and Washington, D.C.

Overall, however, the short-term adverse economic impacts from the attacks were far less than initially feared as the Federal Reserve and Congress acted quickly to restore confidence in U.S. markets. The Federal Reserve, for example, lowered the price of credit temporarily to help safeguard the integrity of the financial system saving many firms from bankruptcy.³⁰

The freight shipping industry did, however, sustain a longer-term economic burden following 9/11 due to:

- Commercial shipping costs and the general costs of doing business, including higher operating costs and higher risk premiums; and
- Increased wait times and changes to border processing and inspection systems.

The local border economy itself has also changed since 9/11 due to not only the effects of 9/11 on the shipping industry, but more so due to the effects of 9/11 on cross-border passenger movements.

Commercial Costs

The cost of shipping international goods following 9/11 has increased, especially for shippers interested in maintaining a high level of security. The C-TPAT program provides an expedited point of entry to the United States via FAST lanes entering the United States from Mexico and reduced secondary inspections at the border. In terms of reduced wait times, C-TPAT can be then viewed as a potential cost savings for shippers and carriers. To use FAST Lanes, however, the international importer, manufacturer, carrier, and driver must all be C-TPAT certified, which includes a detailed review and approval from CBP of the entire manufacturing and shipping supply chain.

While CBP views C-TPAT as a successful program, C-TPAT reviews from the private sector are mixed, particularly due to the high costs of doing business that C-TPAT requires. C-TPAT is expensive to implement and in many cases requires hiring of additional staff to keep up with certification requirements.

However, the freight carrier community also notes that C-TPAT can give them a business edge for commodities that are copyright sensitive. For example, shippers of DVDs will pay more for a C-TPAT carrier to protect from piracy.

Perhaps the biggest economic advantage of acquiring and retaining C-TPAT certification is the advantage that these carriers would have in case of another terrorist attack, after which current C-TPAT participants believe that the border may be closed to all non-C-TPAT carriers. Carriers also note that they believe that if their shipments were ever tampered with, having C-TPAT certification could help insulate them from potential liability.

Therefore, while programs like C-TPAT add to the cost of doing business for some carriers, they can also provide a business case for those carriers who specialize in shipping copy write- or

security-sensitive goods. At the same time, other shippers may not see C-TPAT or FAST as providing a business advantage and have not implemented the C-TPAT program.

Economic Impacts of Wait Times

In today's global economy, and particularly between NAFTA partners, economic growth is directly related to the accessibility of transportation systems to the nation and the connections between trading partners. Border regions, like the ports of entry in Texas, provide the links between the international economies of the United States and Mexico. Passenger movements between the United States and Mexico fuel the economies of the border towns. Freight movements, however, affect not only the economies of the border region, but also the labor markets in Mexico, the retail and manufacturing markets in the United States, and the capital markets on both sides of the border.³¹

Wait times at border ports of entry, therefore, have significant effects not only on the shipping community and regional economies of the various ports of entry, but on the national economy as well. Wait times at Texas border crossings following 9/11 did stabilize after the initial shock of the attacks and the initial changes to security procedures at the border.

Wait times at the largest, and generally most congested, Texas ports of entry (Laredo, El Paso, Pharr/Hidalgo, and Brownsville), based on CBP input, are average estimates and the range will be somewhat larger:

- Laredo: Average wait-times of 45-50 minutes for northbound commercial vehicles crossing at the World Trade Bridge.³²
- El Paso: 25-40 minutes for northbound commercial vehicles crossing at the Bridge of the Americas and Ysleta Bridges.³³
- Pharr/Hidalgo: 30 minutes for northbound commercial vehicles crossing at the Pharr International Bridge.³⁴
- Brownsville: 20 minutes for northbound commercial vehicles crossing at the Veteran's International Bridge.³⁵

A study by the San Diego Regional Planning Agency (SANDAG) estimates that for every 45 minutes of commercial wait time at U.S.-Mexico ports of entry (using California's San Ysidro, Otay Mesa, and Tecate ports of entry as the example crossings) the corresponding border region (in this case San Diego) loses nearly \$1.3 million in potential revenues – mostly in the retail sector; three million potential working hours; 28,000 to 35,000 jobs; and \$42 million in wages annually. Wait times also affect overall regional productivity where the total economic impact to the region is an output loss of between \$2.0 billion and \$2.5 billion annually.³⁶

High wait times are often associated with a lack of adequate infrastructure. However, Texas crossings seem to have the necessary infrastructure to accommodate current NAFTA trade.

Laredo's World Trade Bridge, for example, was designed to provide adequate transportation infrastructure to move trucks to primary and secondary inspections. As trucks leave the World Trade Bridge, a State-maintained major arterial (Loop 20, Bob Bullock Loop) provides a direct connection to IH-35 North to San Antonio and beyond. Before the opening of the World Trade Bridge, Laredo freight movements experienced more significant wait times at Bridge II in downtown Laredo. For the Laredo port of entry, the addition of new lanes through the opening of the World Trade Bridge has been cited as having a much larger positive impact on commercial movements and wait times than 9/11 itself or any security program that has been implemented since 9/11.

In general, additional factors affecting wait times at Texas ports of entry have more to do with operations and procedures on the Mexico side. Mexican Customs requires the inspection of northbound shipments, which slows traffic even before it gets to the U.S. border. Directors of the ports on the Mexican side are also prone to "batching," that is, releasing groups of trucks at a time rather than on a consistent basis. This may cause U.S. entries to experience large gaps in commercial crossings throughout the day going from a standstill to complete gridlock. The Pharr International Bridge, for example, has the necessary capacity to handle today's NAFTA trade with little or no waits; however, due to batching on the Mexican side, wait times at certain times of day can exceed one hour.

Aside from the actual inspection procedures on northbound movements from Mexico, the culture of the cross-border shipping industry also contributes to congestion at the Texas ports of entry. Mexican Customs requires that southbound shipments be filed and finalized on the morning of the shipment. Because most dray trucks originate in Mexico, they tend to get a late start crossing northbound (due to both culture and Customs filing procedures) and may not cross until late morning. This further delays southbound dray movements and causes a peak of operations from about 11 a.m. on into the evening with significant capacity available in the morning (at little or no wait).

While there seemingly could be a relatively straightforward solution to "spreading out" the movements throughout the day (starting in the early morning thereby reducing wait times throughout the day), there is great resistance on the Mexican side to getting an earlier start. However, the industry continues to adapt slowly and things are beginning to change such that there is a gradual increase in morning traffic that may take hold in future years.³⁷

Effects of 9/11 on the Cross-Border Retail Industry

There is a significant degree of interdependence between the border towns in Texas and their neighboring Mexican counterparts, which is illustrated by the level of passenger movements across Texas ports of entry. Cross-border passenger travel also generates significant revenues in retail, hotel and lodging, and recreation sectors.

Following 9/11, increased passenger wait times did have an initial effect on the border economies. Many Mexican citizens cross the border for work and shopping trips; however, increased wait times initially increased the opportunity cost of these trips. Tighter border

controls did affect some categories of international bridge passenger traffic and reduced cross-border passenger vehicle volumes. This resulted in a fall-off in cross-border shoppers initially following 9/11 of approximately 5.0 percent.³⁸

At the same time, there is limited evidence that retail sales in the border regions following 9/11 decreased for more than a short time. A study conducted by the University of Texas at El Paso concluded that despite reduced vehicle passenger trips following 9/11, retail sales in El Paso following 9/11 did not decrease and that the reduction in trips must have been offset by consumers purchasing more goods once they arrive.³⁹ As a whole, cross-border shopping trips rebounded by early 2002 and actually surpassed 2001 levels, suggesting that the impacts of 9/11 on the cross-border retail industry were minimal, if any.⁴⁰

■ 4.5 The Future of NAFTA Trade, Trade Security, and the Border Region

The future of NAFTA trade and security implications is important to TxDOT in planning for investments that will support TxDOT’s mission – *to provide for the safe, effective, and efficient movement of people and goods*. Important considerations in exploring the effects of security on NAFTA trade over time include the following:

- The role of technology in facilitating border operations and processing;
- The location of border operations; and
- The border economy and its dependence on cross-border passenger movements.

Role of Technology

As NAFTA trade grows, technology is expected to play an increasingly important role in improving both security and efficiency at the border. The U.S.-Mexico Border Security Accord agreement is resulting in more cooperative binational planning for the southern border. For example, Mexico is developing a tool similar to that used by U.S. border agencies (called Border Wizard) to simulate and assess improved operations. This may lead to binational border simulation and analysis at ports of entry.

More importantly, CBP continues to pursue technology as a tool to increase border throughput and enhance border security. In addition to programs like C-TPAT, FAST, ACE, and SENTRI, there are a number of efforts underway to further secure international supply chains from being used as vectors or facilitators of attacks against the U.S. Electronic cargo seals and in-transit visibility initiatives now being examined offer trading partners and public safety agencies partnership opportunities in order to improve cross-border trade transportation efficiency and security.

Despite these advancements, and the promise they hold, it is highly unlikely that the U.S.-Mexico border will become fully open. Though the prospect of an European Union-type international border between the two nations represents an intriguing concept, there is currently no stated interest on the part of either country to move in that direction. Until such a major policy shift occurs, CBP will remain responsible for controlling the entry of goods and people into the United States, and will do so at the border. For CBP staff, the ability to “look the driver in the eye” represents a critically important line of defense.

Border Operations

The physical border with Mexico will, of course, remain at the boundary of the Rio Grande; however, there has been some speculation in recent years that portions of the border operations may “move” north. That is, certain import and export processing would be located further north in the United States. Both San Antonio (the Free Trade Alliance) and Kansas City (Kansas City SmartPort) have developed coalitions to explore the opportunities that their respective cities could provide in facilitating intermodal border operations. These alliances cite intermodal connectivity, free trade zones, and air cargo capabilities as having the capacity to handle in-bond shipments to/from Mexico for international processing.

While the plans for inland international port operations in San Antonio and Kansas City have advanced beyond planning stages, many in the private sector and within CBP are hesitant to believe that the border will ever “move.” Mexican Customs requires filing on the same day as shipping for southbound movements and drayage operations have developed around this requirement. Logistically, it may make more sense for all border operations to remain at the border because of the Mexican Customs filing processes.

Closely related to the Mexican Customs process is the relationship that customs brokers have with Mexican Customs and international freight movements at Texas land border ports of entry. Customs brokers must be Mexican nationals and are responsible for filing, and to some extent policing, shipments traveling from the United States into Mexico. Mexican customs brokers are in many ways critical to all customs operations for exports, and are deeply-rooted in both the international trade process as well as the economies of the border towns. They are, therefore, unlikely to support the northbound movement of border operations.

Finally, the nature of international trucking represents a barrier to significant changes in border operations. At Texas’ largest border port of entry, Laredo, 90 percent of the trucks crossing the border are dray trucks (similar percentages for drayage also apply to Pharr and Brownsville).⁴¹ These dray trucks are, in most cases, lower-cost tractors, operated by lower wage workers. This practice was instituted, in part, because it does not make economic sense for carriers to have their most expensive over-the-road equipment, operated by more highly compensated long-distance drivers, delayed by border crossing inspections. In addition, cabotage rights that prevent foreign carriers from transporting domestic shipments would force these long-haul carriers to either locate a return shipment from the U.S. interior, or return to Mexico empty.⁴²

Over time, this practice will likely continue to evolve as border operations become more efficient, supply chains become more secure, and full NAFTA implementation occurs. A 2007 program, for example, will allow U.S. trucks to make deliveries in Mexico and select Mexican trucking companies will be allowed to operate beyond the commercial zone in place on the Texas-Mexico border. This year-long pilot program will help U.S. CBP and the U.S. Department of Homeland Security assess the transportation, safety, and security issues associated with allowing these international movements.

For this pilot test, the U.S. DOT has put in place a rigorous inspection program to ensure the safe operation of Mexican trucks crossing the border. On February 24, 2007, U.S. DOT Secretary Mary Peters and Mexican Secretary of Communications and Transportation Luis Téllez announced a program to have U.S. inspectors conduct in-person safety audits to make sure that participating Mexican companies comply with U.S. safety regulations. The regulations require all Mexican truck drivers to hold a valid commercial drivers license, carry proof they are medically fit, comply with all U.S. hours-of-service rules, and be able to understand questions and directions in English.⁴³

Passenger Movements and the Border Economy

The symbiotic relationship that exists between Texas and Mexico in Texas border towns is unlikely to change. Mexicans commute to the United States daily for work and school and continue to shop across the border supporting the retail economies of Texas border towns. Moreover, border communities have historically demonstrated a strong resilience in the face of shocks to their economies, bouncing back from peso devaluations as well as the events of 9/11. For example, the decline in cross-border shoppers following the 1995 peso devaluation was approximately 6.0 percent. By 1996, the number of cross-border shoppers had returned to pre-1995 levels. Following the 9/11 attacks, border shopping exceeded pre-2001 levels by early 2002.⁴⁴

There are some who predict that the U.S. VISIT program will discourage cross-border noncommercial movements as evidence suggests that “shipping and traffic delays [caused by the U.S. VISIT Program] *could* result in the loss of thousands of jobs at the border” and could “choke commercial exports from the United States to Mexico.”⁴⁵ Today, however, cross-border passenger movements continue to be a large focus of CBP programs and infrastructure investment and no studies to date confirm that economics, security, or programs will discourage passenger trips through Texas ports of entry in the future.



5.0 Future Conditions

The Texas transportation system is the critical physical link between the U.S. and Mexican economies—but with growth of nearly 207 percent in tonnage and 280 percent by value forecast through 2030—the capability of the transportation system to reliably move NAFTA freight is uncertain. Further complicating the future outlook is the uncertainty of continually evolving global trends in production and consumption. One of the primary purposes of this study is to help clarify the future for Texas and U.S. transportation officials and other policy makers—to provide understanding of the potential effects of NAFTA trade growth on the State’s highway and rail transportation network given several possible outcomes by 2030 including:

- What happens if nothing is done – if the highway and rail systems receive little or no investment through 2030;
- Serious investment by public and private sectors in the State’s highway and rail infrastructure, including commitment to the full construction of the highway portion of Trans-Texas Corridor IH-35;
- Several trends mature more significantly than captured in the baseline forecast – including the development of Mexican ports and the consequent shift in some freight flows, the opening of the U.S.-Mexico border to fully internationalized NAFTA trucking operations and the implications that would likely have on inland ports and distribution, and higher-than-forecast growth of Mexico manufacturing output and consumer demand.

Each of these trends is assessed using the Statewide Analysis Model (SAM) to gauge the effect on truck flows on the Texas highway system. Effects of other trends—including changes in rail demand, operations, and investment are also considered “offline” without the SAM to support Texas transportation officials and policy makers in accommodating the next generation of multimodal NAFTA trade.

■ 5.1 Future NAFTA Trade Overview

Through 2030, NAFTA trade will increase by nearly 207 percent by tonnage, resulting in profound impacts on the Texas highway and rail systems. The number of trucks carrying NAFTA goods will increase by 263 percent and the number of rail units will grow by 195 percent. The following diagrams illustrate the overall growth of NAFTA truck and rail trade by units (Figure 5.1) and tonnage (Figure 5.2). Both figures show that freight moved by truck will increase at a faster rate than rail and Figure 5.2 shows that rail will lose market share to truck through 2030.

Figure 5.1 – NAFTA Growth on Texas Highway and Rail Systems
2003 to 2030 Thousands of Annual Trucks and Rail Cars

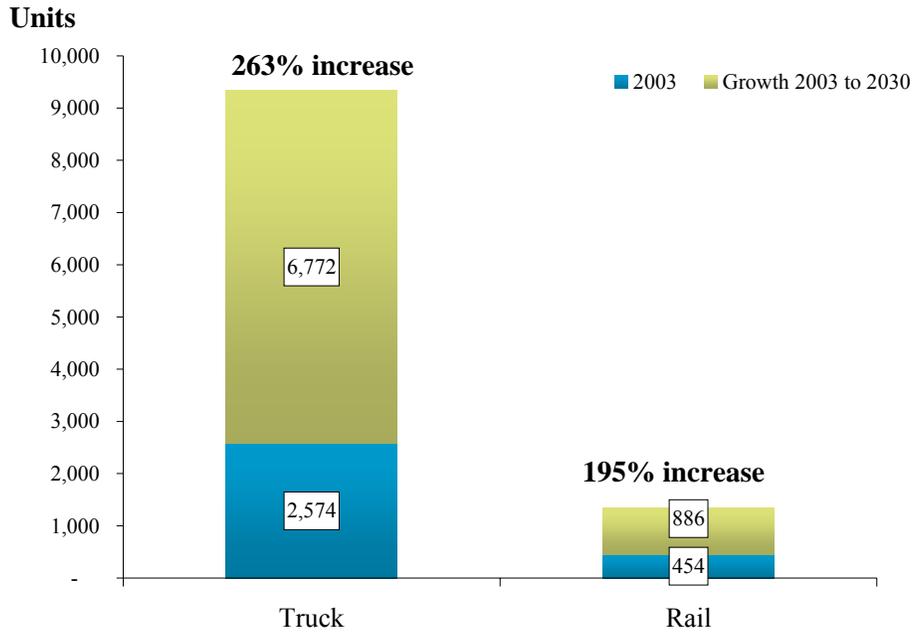
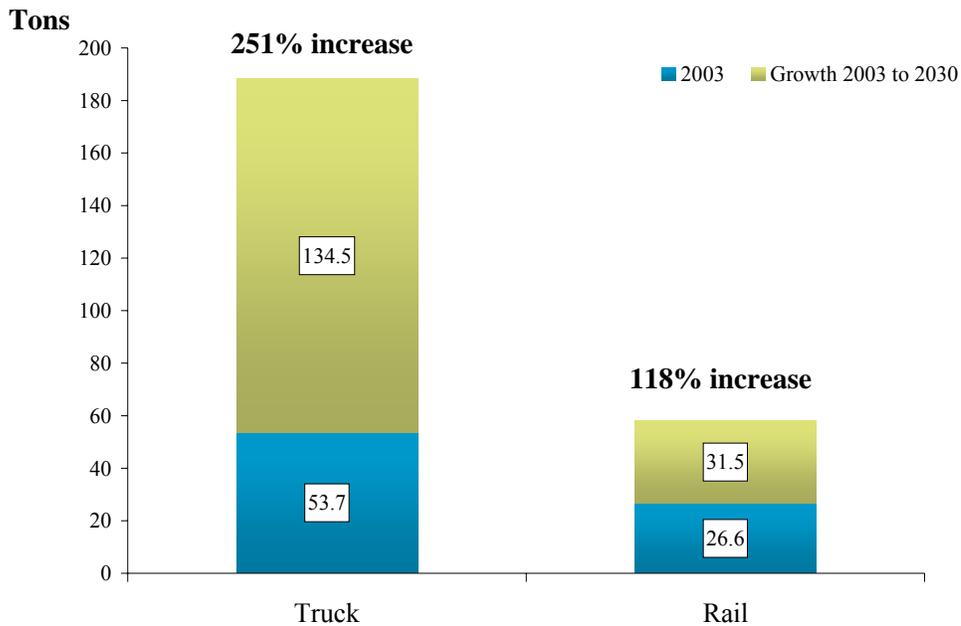


Figure 5.2 – NAFTA Growth on Texas Highway and Rail Systems
2003 to 2030 Millions of Annual Tons



Between 2003 and 2030, the direction that goods are moving by highway and rail will shift towards greater volumes of tonnage and value passing through Texas than originating or terminating in Texas as shown in Figures 5.3 and 5.4. NAFTA truck tonnage and value for 2003 are illustrated in Figures 2.9 and 2.10 found in Chapter 2. Thus, Texas will become more of a NAFTA “through” state in 2030 than in 2003, with the share of through tonnage increasing by 4 percent over 2003 levels. The value share of through truck tonnage will increase by 2 percent during the same period.

Figure 5.3 – NAFTA Truck Tonnage on Texas Highways
2030 (Millions of Tons)

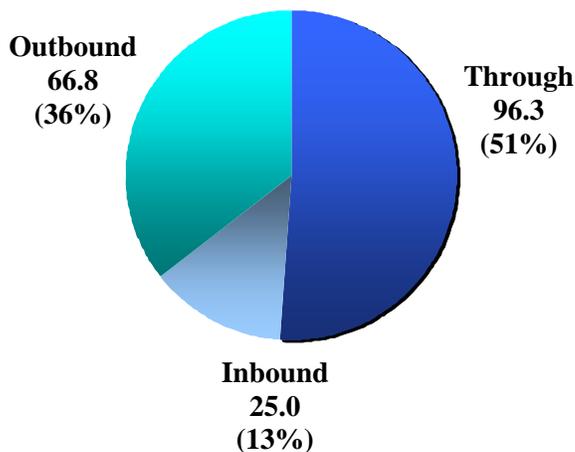
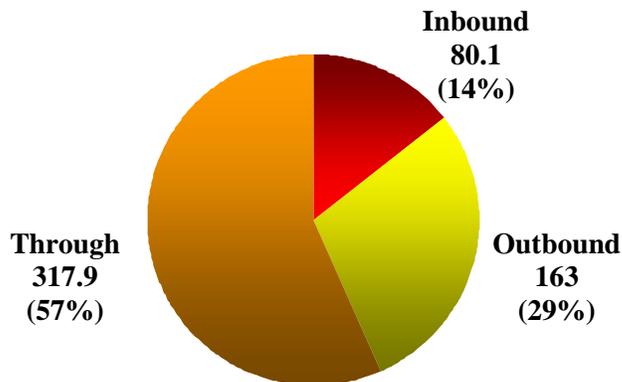


Figure 5.4 – NAFTA Truck Value on Texas Highways
2030 (Billions of Dollars)



Source for Figures 5.3 and 5.4: TRANSEARCH 2030.

The next two figures show the assignment of NAFTA tonnage and value carried by truck on Texas highways in 2030. Figure 5.5 illustrates that tonnage flows are diverting from primary corridors to alternative routes (assuming no new construction) through 2030. Figure 5.6, which illustrates value flows, shows a similar trend. Both figures are complemented by Tables 5.1 and 5.2, which summarize the top tonnage and top value commodities for truck in 2030 respectively.

Figure 5.5 – Daily NAFTA Truck Tonnage Flows on Texas Highways
 2030 (Millions of Daily Tons)

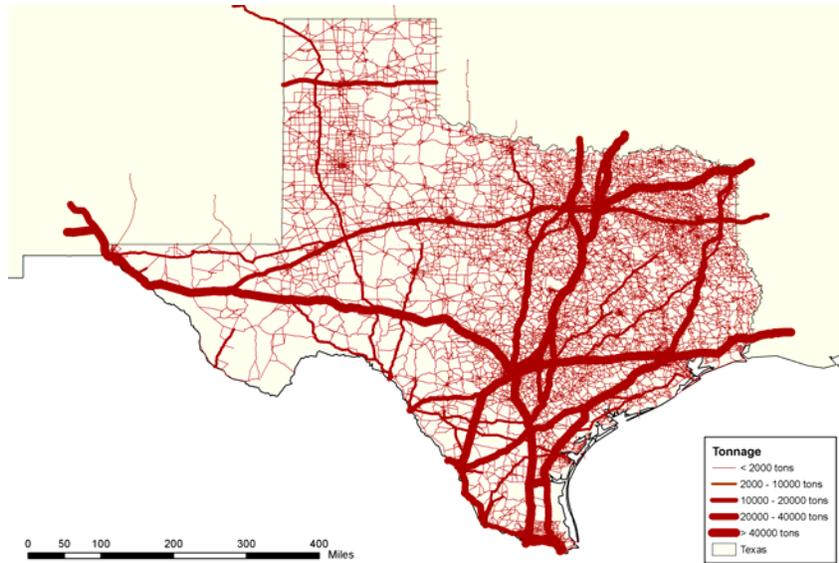


Figure 5.6 – Daily NAFTA Truck Value Flows on Texas Highways
 2030 (Millions of Dollars Per Day)

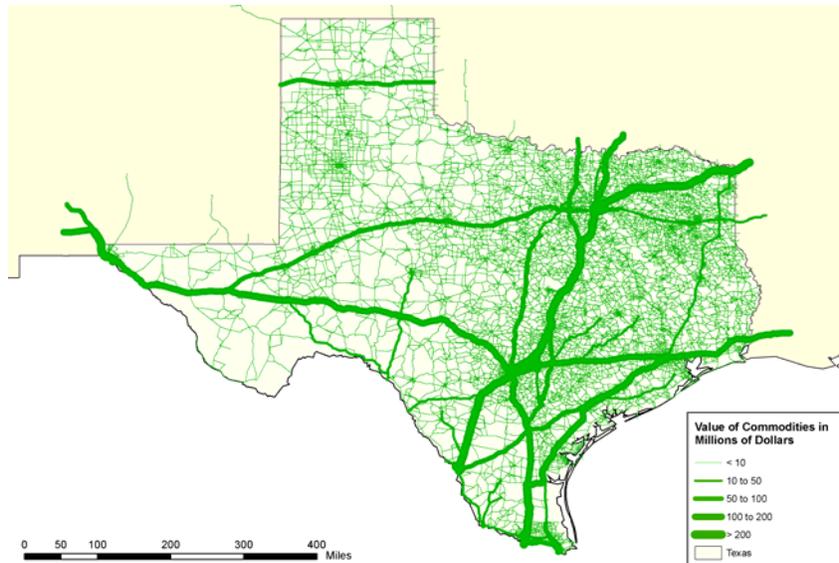


Table 5.1 Texas/Mexico Trade – Top Tonnage Truck Commodities
2030 Millions of Annual Tons

STCC2	Commodity	Millions of Tons
28	Chemicals/Allied	53.6
32	Clay/Concrete/Glass/Stone	19.8
36	Electrical Machinery	14.1
20	Food/Kindred	13.8
37	Transportation Equipment	12.4
01	Farm	9.3
33	Primary Metal	9.0
30	Rubber/Plastics	8.5
22	Textile Mill	8.1
35	Machinery Ex. Electrical	7.1

Source: TRANSEARCH, 2030.

Table 5.2 Texas/Mexico Trade – Top Value Truck Commodities
2030 Billions of Annual Dollars

STCC2	Commodity	Billions of Dollars
37	Transportation Equipment	238.3
36	Electrical Machinery	125.8
35	Machinery Ex. Electrical	73.9
28	Chemicals/Allied	60.6
22	Textile Mill	48.9
25	Furniture/Fixtures	45.4
20	Food/Kindred	25.9
30	Rubber/Plastics	21.2
33	Primary Metal	18.2
32	Clay/Concrete/Glass/Stone	14.8

Source: TRANSEARCH, 2003.

■ 5.2 Highway Growth Alternatives

Many trends have the ability to effect changes in NAFTA trade flows in the State of Texas. Several of the most important include structural changes to the U.S. and Mexican economies, the cost of Mexican manufacturing—especially labor, but also land—relative to other developing nations; transportation system investment in the U.S. and Mexico; and consumer demand in the U.S. and Mexico. Other important trends will be discussed in the context of the future growth scenarios outlined in this chapter. Ultimately, some of these trends were selected for analysis in this study based on their potential to change the characteristics of highway freight flows. The intent of the analysis of alternatives is to give TxDOT a sense of potential future highway impacts under a group of possible future conditions.

In order to estimate the effect of the future trade volumes on the Texas transportation system, three scenarios were developed within the Statewide Analysis Model framework. For each scenario, forecasted NAFTA truck volumes are mapped (assigned) to Texas highway segments. The three alternatives include:

- **Future No-Build Scenario** – The assignment of future NAFTA and non-NAFTA truck traffic to the existing SAM network shows future volumes without any capacity expansion to 2030;
- **Highway Investment Scenario** – This scenario uses the SAM network to show how future NAFTA and non-NAFTA truck flows react to new capacity, including projects identified in the Statewide Transportation Improvement Program (STIP) and the Trans-Texas Corridor IH-35 alignment (TTC-35); and
- **Global Trade and Growth Scenario** – This scenario estimates the change in future NAFTA truck flows on the improved (Highway Investment) network assuming higher than forecast global trade from TRANSEARCH.

The following table summarizes the components, data, and network inputs of each of the three alternatives. For each of the scenarios, the 2030 TRANSEARCH commodity flow data is used as the basis for truck travel demand. The forecast assumptions used by Global Insight to develop the 2030 forecast are proprietary but are based on intelligence from their Mexico economic unit and several econometric and trade flow forecast models.

Table 5.3 Summary of Future Scenarios

Core Questions:			
Future Scenarios	<i>What is the future impact of NAFTA truck flows on Texas highways....</i>	Data Inputs	Network Inputs
1. No-Build	Without investment in highway capacity?	2030 TRANSEARCH Trip Table	SAM Base (2003) Network
2. Highway Investment	With investment in highway capacity?	2030 TRANSEARCH Trip Table	SAM Base (2003) Network with: a) future planned projects already coded to SAM; b) Trans-Texas Corridor IH-35; and c) TxDOT STIP NAFTA significant projects.
3. Global Trade and Growth	If: a) Mexico port and intermodal infrastructure is improved; b) Mexico's industrial growth outpaces TRANSEARCH forecasted growth; c) the border is opened for full NAFTA bi-national trucking?	2030 TRANSEARCH Trip Table adapted to reflect changing trade patterns and Mexican industrial growth	Same as Scenario 2

Results of the analysis are presented in the following sections. Methodological assumptions and adjustments to the commodity flow data and the network for each of the scenarios are also detailed.

■ 5.3 Alternative 1: Future Growth on the Current System (No-Build)

This scenario illustrates the potential effect of future freight flows on the current highway system. It provides an answer to the question: “*What is the future impact of NAFTA truck flows on Texas highways without additional investment in highway capacity?*”

Methodology

The methodology of this alternative is straightforward. Following the initial assignment and calibration of the 2003 TRANSEARCH commodity flow data to the Statewide Analysis Model, as described in Chapter 2 of this report, the 2030 TRANSEARCH data were loaded into the SAM model and using the same highway network attributes as the base year (2003), the 2030 truck flows were simulated. Before running the model for this and other future scenarios, the demographics were updated to 2030 based on forecasts obtained from the Texas State Demographer.

Results

Figure 5.7 shows the results of the simulation on the Texas highway system by illustrating the order of magnitude NAFTA truck flows displayed as average weekday truck volumes. Figure 5.8 demonstrates the 2030 percentage of NAFTA trucks by highway segment. The percentage reflects the number of NAFTA trucks divided by the total number of trucks on the segment and excludes, to the degree possible, local delivery, construction, and utility trucks (generally less than 6 axles). Finally, Figure 5.9 shows the growth of NAFTA trucks by superimposing the 2003 results over the 2030 results.

Figure 5.7 – Daily NAFTA Truck Flows on Texas Highways 2030 - No-Build Alternative
(Average Annual Weekday Trucks – AAWT)

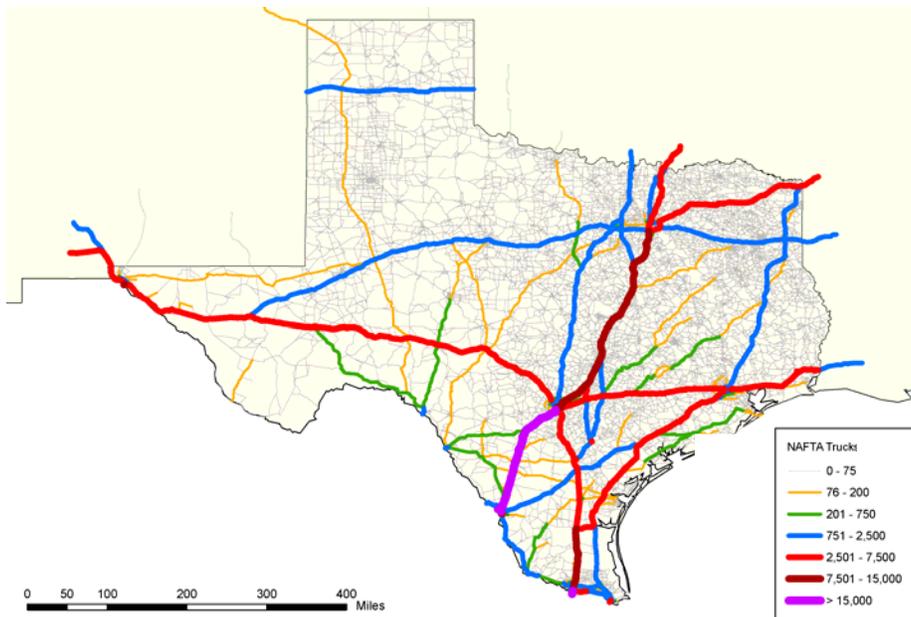


Figure 5.8 – Daily NAFTA Truck Percentage Flows on Texas Highways 2030 - No-Build Alternative
(Average Annual Weekday Trucks – AAWT)

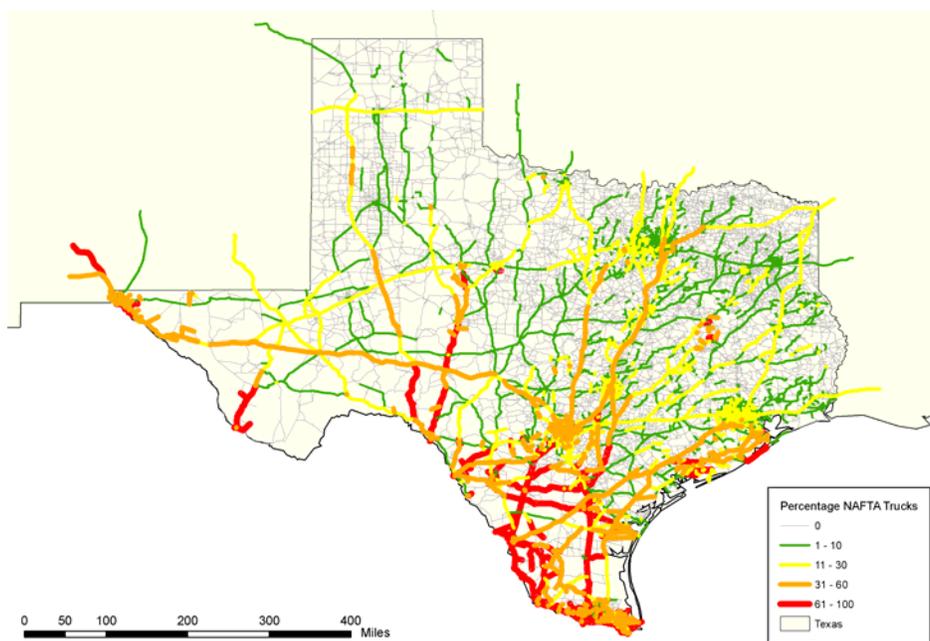
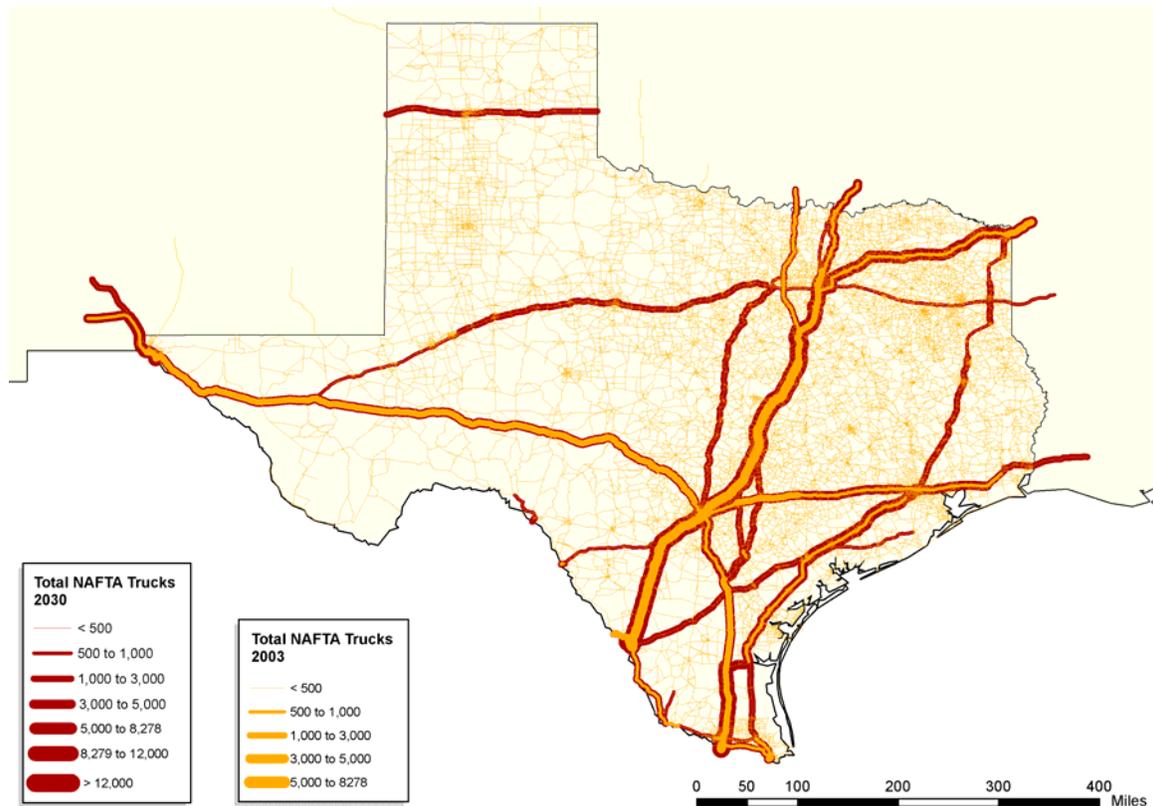


Figure 5.9 – 2003 versus 2030 Daily NAFTA Truck Flows on the Current Texas Highway Network
(Average Annual Weekday Trucks – AAWT)



Visually, the results of the no-build scenario indicate substantial growth on current NAFTA corridors, including IH-35, U.S. 59, U.S. 77, U.S. 281, IH-20, and IH-30. The extent of highways with high percentages of NAFTA trucks is also enlarged over 2003, with many of the highways in the border regions and key corridors throughout the State exceeding 50 percent NAFTA trucks. Detailed statewide and corridor-level results, including changes in VMT, are featured in Table 5.4.

Table 5.4 – Summary of Current and Future NAFTA Truck Flows on Major Texas Highways for No-Build Alternative

Corridor	2003				2030				2003 to 2030 Growth	
	Total Truck VMT (Daily)	NAFTA Truck VMT (Daily)	NAFTA Truck Percent of Total Trucks in corridor	Percent of Total Statewide NAFTA Truck VMT	Total Truck VMT (Daily)	NAFTA Truck VMT (Daily)	NAFTA Truck Percent of Total Trucks in corridor	Percent of Total Statewide NAFTA Truck VMT	Total Truck VMT % Growth (Daily)	NAFTA Truck VMT % Growth (Daily)
I-35	5,314,072	1,451,922	27.3%	36.6%	13,102,996	6,431,449	49.1%	37.7%	147%	343%
I-10	6,081,728	881,498	14.5%	22.2%	11,042,430	2,979,738	27.0%	17.5%	82%	238%
U.S. 281	929,295	234,969	25.3%	5.9%	2,543,045	1,390,817	54.7%	8.2%	174%	492%
U.S. 59	2,466,933	224,596	9.1%	5.7%	4,438,198	1,228,074	27.7%	7.2%	80%	447%
I-20	3,484,420	183,107	5.3%	4.6%	6,271,503	669,922	10.7%	3.9%	80%	266%
I-30	1,456,930	167,481	11.5%	4.2%	3,924,048	1,048,206	26.7%	6.1%	169%	526%
U.S. 77	970,054	142,839	14.7%	3.6%	1,757,992	701,373	39.9%	4.1%	81%	391%
Subtotal of Top Corridors	20,703,432	3,286,412	15.9%	82.9%	43,080,212	14,449,579	33.5%	84.7%	108%	340%
Remainder of Texas Roadways	22,750,547	679,050	3.0%	17.1%	36,118,477	2,608,408	7.2%	15.3%	59%	284%
Summary of All Texas Interstate, U.S., and State Highway facilities	41,016,427	3,823,022	9.3%	96.4%	75,420,211	16,603,670	22.0%	97.3%	84%	334%
Total of All Texas Roadways	43,453,980	3,965,462	9.1%	100.0%	79,198,689	17,057,987	22.0%	100.0%	82%	330%

As shown in Table 5.4, overall, the no-build future forecast grows average weekday NAFTA truck VMT by 340 percent (more than quadrupling) to 2030—well above the growth for non-NAFTA trucks (108 percent). The NAFTA percent of total statewide truck VMT grows from 9 percent in 2003 to 22 percent of all truck VMT in 2030. The NAFTA truck percent of total trucks in the IH-35 corridor will go from 27 percent in 2003 to nearly 50 percent by 2030. Further, some IH-35 NAFTA demand is shifted to parallel routes such as U.S. 281 as can be noted in Figure 5.9. Plans for the IH-35 Trans Texas Corridor will help alleviate the impacts of this dramatic growth. With this level of NAFTA truck growth, it is inevitable that traffic congestion will worsen in the State’s largest metropolitan areas, because they all lie along the roadway network that funnels the vast majority of NAFTA goods into the country. Thus, the future effects of NAFTA trade will further exacerbate the State’s highway congestion, in conjunction with the parallel trends of population growth. These emerging NAFTA challenges will be important considerations for the State and MPO planning processes.

■ 5.4 Alternative 2: Highway Investment

This scenario illustrates the potential effect of future freight flows on an improved highway system where significant capital investment has enabled the State to add capacity in the IH-35 corridor and at other locations throughout the State. It provides an answer to the question: “*What is the future impact of NAFTA truck flows on Texas highways with investment in highway capacity?*”

Methodology

This alternative, like the “no-build” utilizes the 2030 TRANSEARCH commodity flow data and the Texas State Demographer forecasts for 2030 to reflect demand. The primary difference between this and the first scenario is the addition of several planned and proposed highway investments on the State network. Those investments include:

- Trans-Texas Corridor IH-35 (TTC-35);
- NAFTA-significant Statewide Transportation Improvement Program projects;
- Other planned projects previously coded onto the 2003 SAM network.

Trans-Texas Corridor IH-35

The Trans Texas Corridor is the largest engineering project ever proposed for Texas. The planning and work involved in the corridor would exceed any public works project in the State’s history. The concept for the Trans Texas Corridor involves connecting the entire State by a 4,000-mile network of corridors up to 1,200 feet wide with separate lanes for trucks (two in each direction) and passenger vehicles (three in each direction). Currently, four corridors have been

identified as priority segments of the Trans Texas Corridor. These corridors parallel IH-35 from Oklahoma State line to Laredo, IH-37, from San Antonio to Corpus Christi, IH-69 (proposed) from Texarkana to Houston to Laredo and to the Rio Grande Valley, IH-45 from Dallas-Fort Worth to Houston, and IH-10 from El Paso to Orange.⁴⁶

For the purposes of this scenario, the Trans-Texas Corridor IH-35 alignment was added to the SAM highway network from Laredo to the Oklahoma border using geographic information obtained from TxDOT's Texas Turnpike Authority Division (TTA), the State agency responsible for development of toll facilities. For the purposes of this project, TTC-35 was modeled as a fully grade separated facility with four truck lanes (two in each direction) and an 80 mile-per-hour speed limit as directed by TTA.

- A fully grade-separated and limited access facility;
- Four truck lanes; 2 in each direction;
- 80 mile-per-hour speed limit as directed by TTA;
- Limited connections to SH-130 (Segments 5 and 6 south of Austin only, as directed by TTA); and
- Truck toll rate of \$0.25 per mile in urban areas and \$0.15 per mile in rural areas.

Passenger traffic was not modeled on the TTC-35 for this project; passenger volumes were only used to reduce capacity. Since the TTC-35 has separate truck lanes in the 2030 scenario, there were no issues with capacity being reduced by passenger traffic. Finally, no shifts in demographics were factored into the modeling process related to TTC-35 development.

NAFTA-Significant STIP Projects

Large highway projects generally with a price tag of \$50 million or more, or groups of smaller projects being constructed as a series of improvements on the same road, were coded into the SAM network from the 2006-2008 TxDOT STIP. The rationale was to identify and include large projects that would be attractive to NAFTA traffic.

Future planned projects already coded to SAM

The SAM has a number of planned projects already coded to its network that were activated for this scenario. The set of highway improvements consists of capacity projects to be built within a ten-year period (2004-2014) originating from the Texas Unified Transportation Plan (UTP) and Metropolitan Transportation Plan (MTP) projects from the urbanized areas' MPOs, which had already been coded into the SAM network. Many of the projects were coded during the creation of the original SAM network in 2000. In either case, this scenario includes these planned projects as new or improved highway segments.

Other Considerations

In addition to those listed above, several other planned or proposed highway investment projects were considered for inclusion—new international bridges and improvements to key NAFTA corridors in Mexico based on information acquired from TxDOT, public agencies on the border, and SCT. After careful consideration, these projects—except for bridge capacity—were not coded into the SAM or Tx-NAFF future networks because of their lack of potential to affect corridor flows in Texas.

Potential for Longer Combination Vehicle (LCV) Use

A post model analysis of the potential for longer combination vehicles (LCVs) in the TTC-35 corridor was conducted to assess the opportunity for improved productivity of NAFTA trade. NAFTA trips from Laredo that went at least to Dallas (where breakdown and transfer of loads often occurs at warehousing and distribution centers) were considered highly likely candidates for LCV use. Another factor encouraging longer distance NAFTA trade to use LCVs in the I-35 corridor is the fact that LCVs are allowed in Oklahoma and Kansas, thus facilitating LCV access all the way into Kansas city, another warehousing and distribution hub. Some of the shorter distance NAFTA trips could also potentially benefit but would be more dependent on the particular commodities and logistics operations. Truck load carriers would have strong incentive to use the so called ‘NAFTA truck’ (a 97,000 pound tridem axle semi-trailer unit that is permitted in Canada and Mexico) and/or turnpike doubles (i.e. two 53-foot trailer combinations) because of the labor productivity improvement and less-than-truckload carriers (LTL) would have strong incentive to use triple 28 foot trailer combinations because of the increased productivity. It is assumed that loads and trailers would be assembled and broken down at warehouse and distribution centers near the IH-35 corridor in Laredo and interior cities such as Dallas where this type of activity often occurs anyway. Weights of up to 144,000 pounds for turnpike doubles were assumed as are currently allowed on the New York Thruway for similar operations.

Analysis of assigned trips in the IH-35 corridor for the Highway Investment Scenario indicates that well over half of the NAFTA trips in the corridor are longer than the approximately 400 mile distance between Laredo and Dallas and that over 90 percent of the corridor NAFTA trips are greater than 200 miles. We believe that virtually all the Laredo to Dallas or longer NAFTA trips would be candidates for LCVs because of the large productivity benefits from the 97,000 pound ‘NAFTA’ semi-trailer and the multiple trailer combination units. Even a good portion of the shorter distance NAFTA trips between Laredo and San Antonio, and Austin would likely benefit from LCVs. Specifically, we assumed that 90 percent of all NAFTA trips over 400 miles would shift to the heavier units and that at least 60 percent of the trips between 200 and 400 miles would shift. Even for some shorter than 200 mile trips, use of the 97,000 pound ‘NAFTA’ semi-trailer may offer productivity advantages. We estimated that 30 percent of these NAFTA trips would use the LCV configuration.

Results

The highway investment scenario results are depicted in the following figures. Figure 5.10 shows the results of the scenario; the 2030 NAFTA truck flows are displayed as average weekday truck volumes. The IH-35 Trans Texas Corridor helps accommodate the dramatic increase in corridor NAFTA truck movement through 2030. Figure 5.11 shows the effect of allowing LCVs on TTC-35. Figure 5.12 demonstrates the LCV effect on the San Antonio portion of the corridor. Figure 5.13 shows 2030 percentage of NAFTA trucks by highway segment under this scenario.

If LCVs are allowed on TTC-35 truck lanes as proposed for the analysis, the TTC-35 NAFTA usage would be very high and would provide very significant productivity and safety benefits compared to use of parallel routes by conventional trucks. Our post model analysis suggests that up to 3/4, or about 12,000 daily NAFTA trips, would take advantage of the increased LCV productivity on TTC-35. This would include diversion of NAFTA trucks from the parallel IH-35 and U.S. 281 routes to LCV use on TTC-35 and shifting of NAFTA trucks already assigned on the TTC-35 corridor to LCV use. In addition, some non-NAFTA combination trucks would likely take advantage of these more productive trucks.

Figure 5.10 – Daily NAFTA Truck Flows on Texas Highways 2030 – Highway Investment Alternative
(Average Annual Weekday Trucks – AAWT)

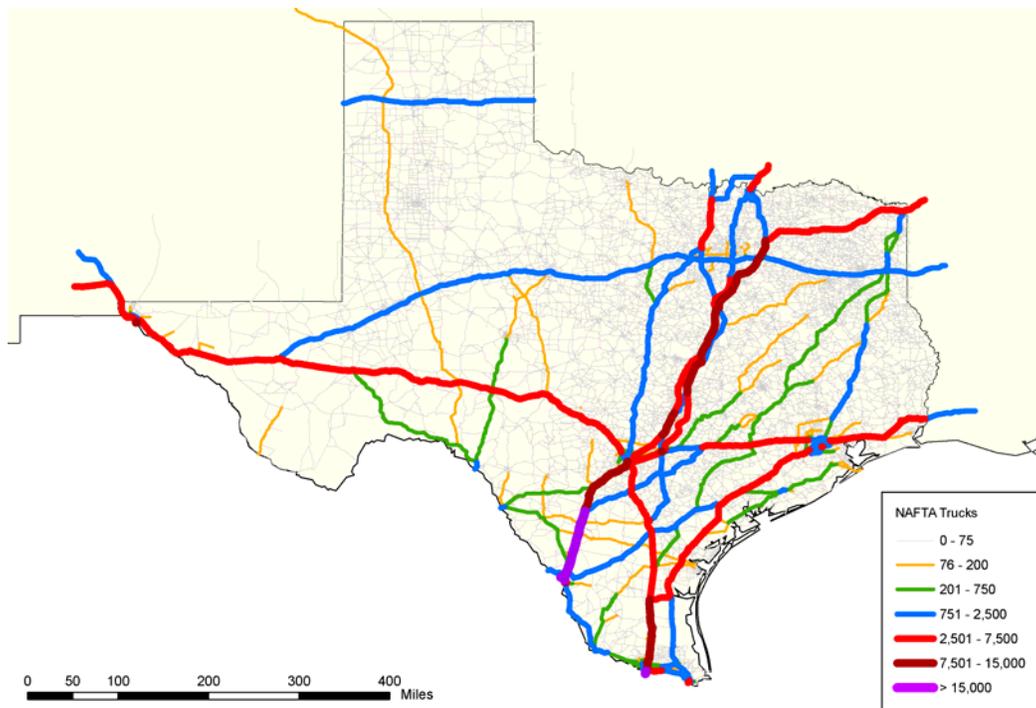


Figure 5.11 – Daily NAFTA Truck Flows on Texas Highways 2030 – Highway Investment Alternative *with* LCVs Allowed on TTC-35 (Average Annual Weekday Trucks – AAWT)

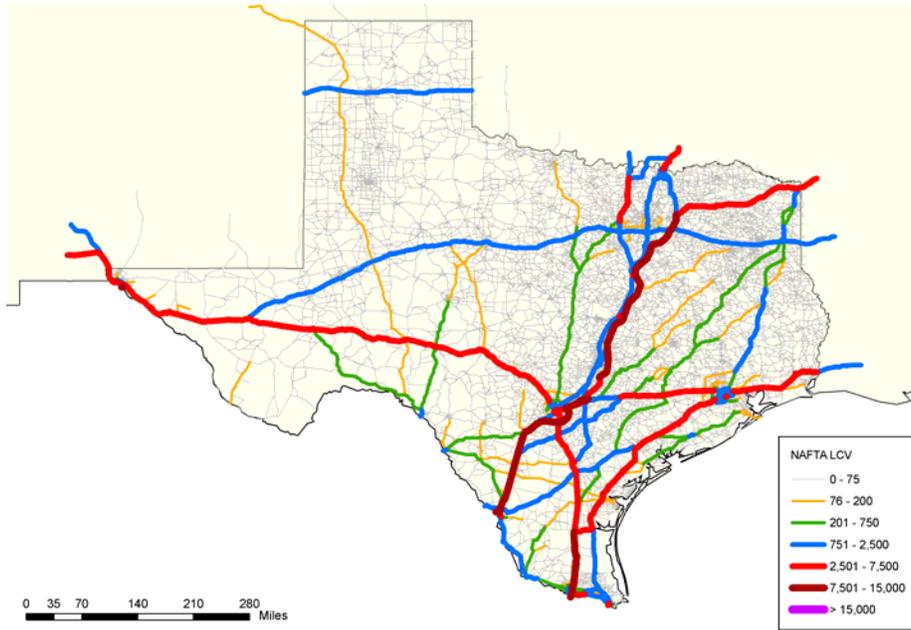
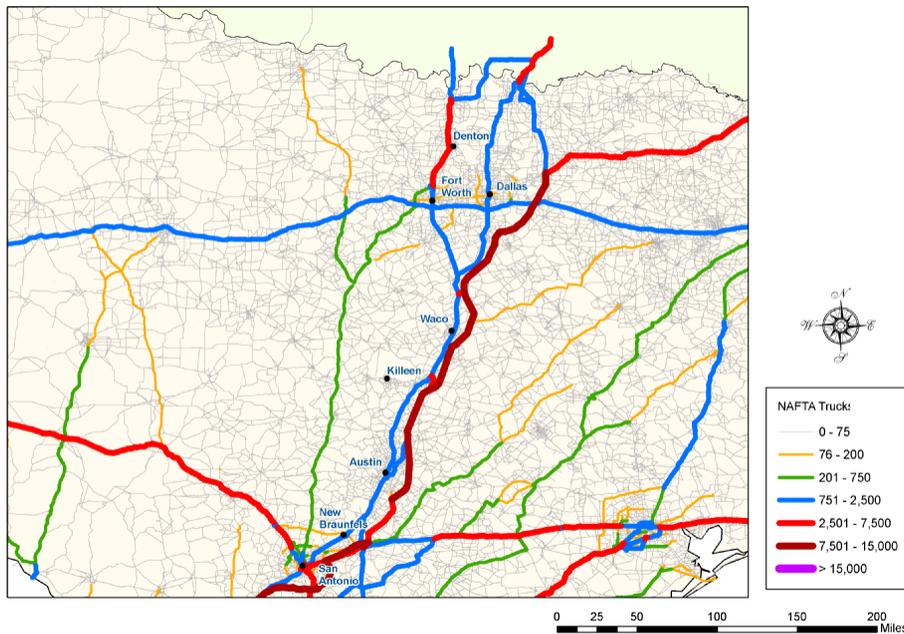
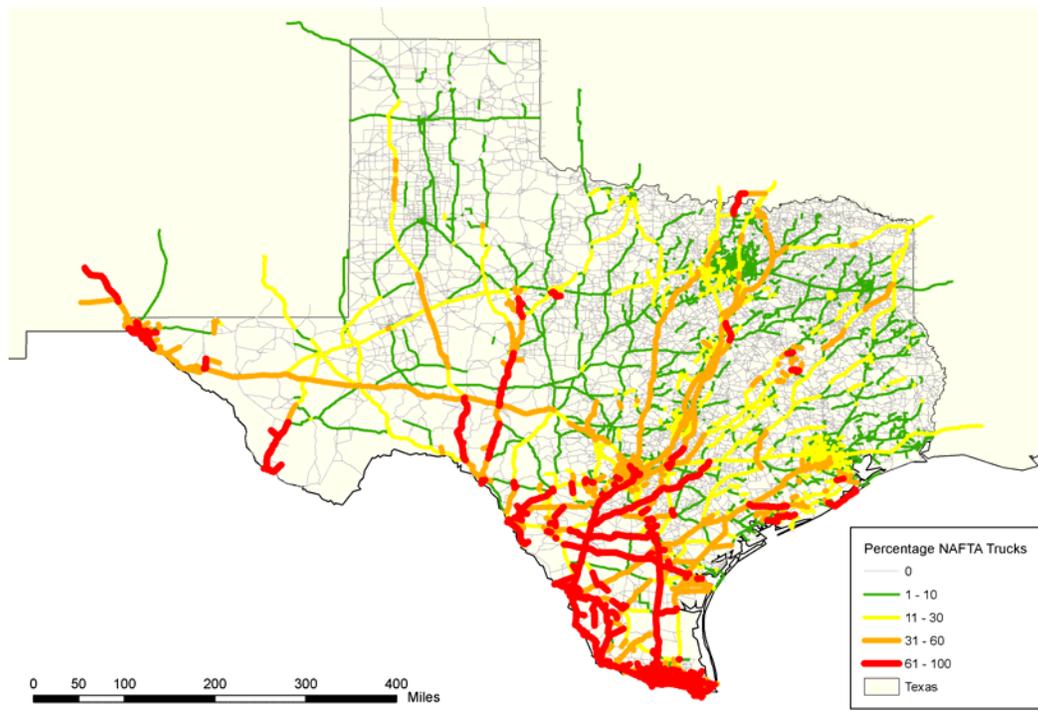


Figure 5.12 – Daily NAFTA Truck Flows on Texas Highways 2030 – Highway Investment Alternative *with* LCVs Allowed on TTC-35 – Detail Map (Average Annual Weekday Trucks – AAWT)



**Figure 5.13 – Daily NAFTA Truck Percentage Flows on Texas Highways 2030
Highway Investment Alternative**
(Average Annual Weekday Trucks – AAWT)



■ 5.5 Alternative 3: Global Growth and Trade on Improved Highway Infrastructure

This Alternative illustrates the potential effect of additional increases in freight demand flows beyond what is predicted for 2030, along with an improved highway system (as in Alternative 2). It provides an answer to the question: “*What is the future impact of NAFTA truck flows on Texas highways if they significantly exceed expectations?*”

This Alternative is not intended to represent the extent of NAFTA trade growth above forecasts we believe most likely to occur, or the specific nature of the occurrences that would stimulate such over-performance. Rather, this Alternative presents a hypothetical basis by which such an increase could be explained. In effect, it represents a sensitivity analysis, grounded in realistic possibility, for analysis of a potential high forecast for Texas highway needs related to NAFTA flows. These higher-than-forecast flows are likely to result from the following three factors:

- A. Global maritime trade, Mexico seaport competitiveness increases and intermodal infrastructure improvements all exceed projections;
- B. Mexico’s industrial and economic growth outpaces TRANSEARCH forecasted growth and population growth in northern Mexico surpasses forecasts; and
- C. The border is fully opened for bi-national trucking and shippers and carriers shift significant logistics operations to inland ports.

The main goal of this Alternative scenario is to adjust the TRANSEARCH trip table to “exaggerate” some possible trends revealed through the project interviews, that, if they happen could have significant effects on NAFTA highway flows in Texas by 2030.

Methodology

The impacts of this scenario are simulated through changes to the TRANSEARCH 2030 trip table, illustrated through a broad increase in truck trips. The network used was the same as that for Alternative 2. The following paragraphs outline the assumptions underpinning the trip table adjustments.

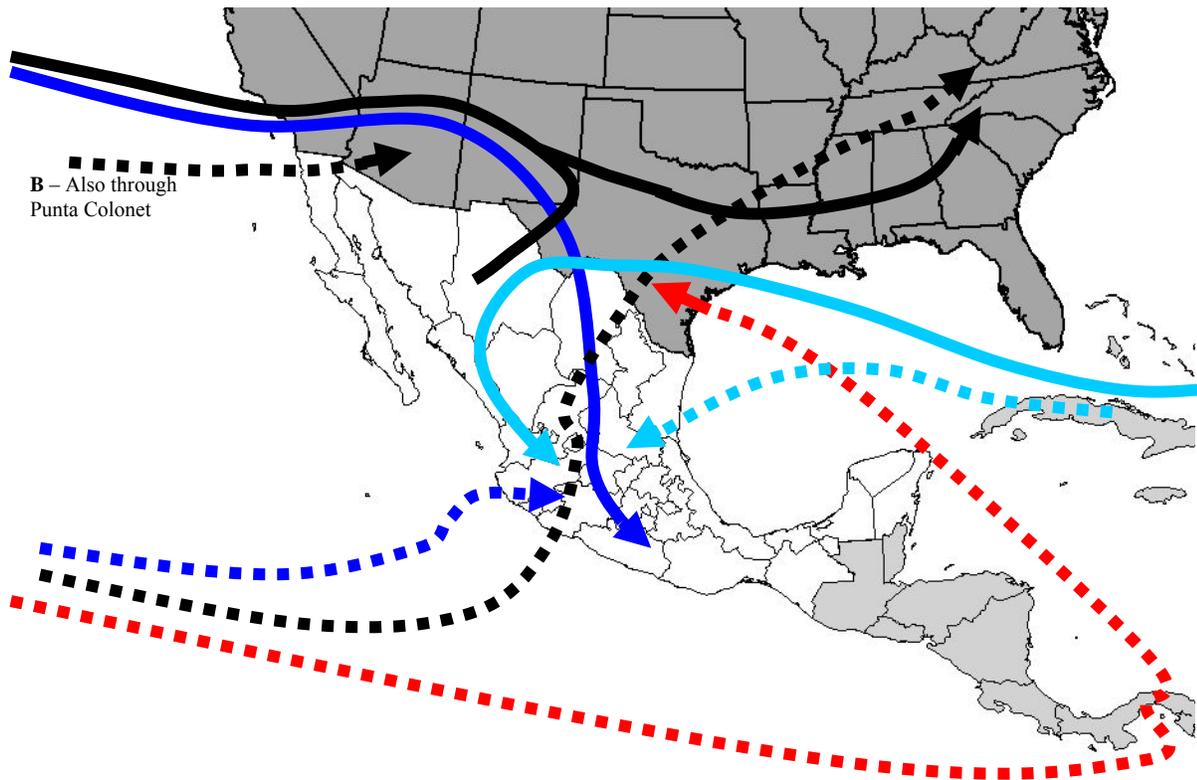
Growth and distribution of international ocean trade due to continued globalization

Overall growth in international oceanborne container traffic will continue to outpace other segments of the freight industry, exceeding TRANSEARCH projections. Intermodal corridor and seaport investments, institutional changes and increased productivity and reliability will allow Texan ports and Mexican ports on both coasts to induce and/or capture a higher share of container traffic traveling to, from, or through Texas. The basic assumptions of Part A are that total volumes of maritime cargo will grow beyond expectations; that Mexican ports will increase in volume; and that NAFTA related flows through certain ports will capture a larger share of the growth. The overall growth of global trade is reflected in the TRANSEARCH 2030 forecast—but for specific trends identified in this study, this part of the scenario exaggerates their effects to demonstrate the “high forecast” effect of the growth.

Possible Change Factors:

- 1) Texas and Mexico container ports will handle increasing volumes of traffic.
 - Improvements to Mexican container ports on the Pacific and Gulf coasts, along with improvements to Mexico’s landbridge system, will reduce the overall role of Texas highways and rail in handling Mexico-international cargo, but will increase the role for Texas-international cargo via Mexico. For example, these improvements will increase the amount of cargo from Asia, Australia and West Coast South America transshipped through Mexican west coast ports and Mexican landbridge to destinations in Texas and the U.S. Southeast and South Central (e.g., via IH-35). This may also increase cargo (on already Gulf-bound vessels) from the Caribbean, East Coast South America, Africa, and possibly Europe transshipped through Altamira/Tampico to Texas and to Southwest and Mountain States (e.g., via US 77, US 281, IH-35 or Torréon-El Paso).
 - Widening of the Panama Canal will allow a greater share of Texas and Northern Mexico imports from Asia to be handled directly through Texas (or Mexico east coast) container ports, rather than moving through US west coast ports and via highway and rail.
 - Overall trade with the Atlantic Basin (Europe, Africa, Asia-Suez) will continue to grow through Texas ports but will grow faster through Mexican Gulf ports (Altamira, Tampico, Veracruz). Illustrative current and future predicted flows are demonstrated in Figure 5.14.

Figure 5.14 Current and Future NAFTA-Related Global Trade Flows



-  A. Asia--Tx/US SE/Northern Mexico via West Coast (present)
-  B. Asia--Tx/US SE/Northern Mexico via Lázaro Cárdenas (future)
-  C. Asia—Tx/US SE and Northern Mexico via expanded Panama Canal and Texas Ports. Also captures Europe/Brazil/Africa/Asia (Suez)—Northern Mexico via Texas (future)
-  D. Asia—Central Mexico via West Coast Ports and Texas (present)
-  E. Asia—Central Mexico via Mexico Pacific Ports (Manzanillo and Lázaro Cárdenas - future)
-  F. Europe/Brazil/Africa/Asia (Suez)—Mexico via Texas Ports (present)
-  G. Europe/Brazil/Africa/Asia (Suez)—Central Mexico via Mexico Gulf Ports (future)

- 2) There will be corresponding changes in the demand on Texas roads and railroads.
- The current modal share between truck and rail would shift slightly in favor of rail, assuming major investments in rail corridors in Texas, including the IH-35 corridor and KCS Tex-Mex corridor in Mexico. We do not model the effect on the railroads in this scenario, *per se*, but do control the growth of trucks on port corridors to reflect this assumption.
 - Port-related traffic on highway and rail systems connecting Texas with U.S. west coast ports would also grow. But assuming development of Lázaro Cárdenas/Manzanillo and improvements to landbridge connections between Lázaro Cárdenas/Manzanillo and Texas, greater traffic growth would come via Mexican ports as a reliever to southern California ports. This could have the effect of less growth of eastbound traffic on the IH-10 corridor from California than now reflected in the 2030 TRANSEARCH forecast. Westbound flows on IH-10 may somewhat surpass forecasts, as increased global trade would increase Texas port traffic. Increasing competitiveness and cargo shares for the Mexican Gulf ports of Altamira and Tampico likely would result in some small traffic increase on the South Texas corridors and El Paso crossings.

Overall, development of Mexican ports and intermodal service is expected to have relatively small impacts on the Texas Highway System.

Growth of cross-border trade due to Mexican industrial, economic and population growth

The Global Trade and Growth Alternative assumes that overall growth in the size and breadth of the Mexican manufacturing sector will increase exports of goods beyond expectations. This will occur for both maquila and non-maquila production and be associated with broad increases in flows. These production increases will also result in increased imports of intermediate goods from the U.S. Higher results for productivity and income levels will increase consumer spending power in Mexico, and thus lead to increased imports of U.S. consumer goods. Greater than expected population growth in northern Mexico will further increase total income in that region and will provide additional labor to allow strong industrial growth. These change factors, further discussed below, are expected to be the most influential drivers of growth under Alternative 3.

Possible Change Factors

1) After NAFTA was first ratified, Mexico experienced a first wave of growth in low-cost, lower value-to-weight industries (textiles etc.) that have now moved elsewhere. The current industry mix for NAFTA trade is comprised of manufacturing of material and industrial goods that are either 1) too heavy to ship from Asia, 2) are time-sensitive to market but too heavy to ship by air, or 3) are part of a supply chain that requires U.S. components. This scenario assumes that this growth in the size and breadth of the Mexican manufacturing sector continues to a greater extent than in the TRANSEARCH 2030 forecast, thus increasing Mexican exports to the U.S.

Global manufacturers (especially Asian and U.S.) continue to site industrial facilities in locations that minimize production costs and transportation costs. For Mexico, this means that manufacturing will continue to grow for products that require relatively low labor costs, economical access to primary or intermediate goods and low transportation unit costs from assembly to market (presumably in the U.S. and Canada). Such products include automotive, appliances, machinery, equipment, and steel fabrication – where there are time and weight sensitivities that affect factory-to-market transportation costs, and where proximity to the U.S. market while minimizing labor costs is the optimal nexus. Overall, its proximity to the U.S. market makes Mexico a favorable location for all types of manufacturing—not just maquila production. This growth in non-maquila manufacturing would also experience increasing economies of scale and scope in this scenario, increasing productivity and/or decreasing costs, thus facilitating greater-than-expected growth.

There has been a trend of change in the destinations of components and origins of manufactured products due to the southward shift of maquila production to states in Central and Southern Mexico with lower labor costs. An examination of data from the Mexican National Institute of Statistics, Geography, and Information (INEGI) conducted for this study concluded that maquila activity has increased throughout the country, but has grown more rapidly in Central and Southern Mexico than Northern Mexico. Despite this finding, the analysis illustrated that shifts in maquila geography would have only marginal effects on Texas corridor flows in the forecast year.

2) Mexican industrial growth and productivity discussed above will increase income levels and purchasing power above expectations, thus increasing Mexican imports of consumer goods. Further, the growth in manufacturing will necessitate increases in the import of U.S. intermediate goods, increasing imports of these commodities roughly proportionately to the increases in Mexican exports to the U.S. (and even more should Mexican competitiveness increase in the regional or global market). These factors will balance against the export increases, thus supporting a broad multi-corridor, bi-directional increase in NAFTA flows.

3) Mexican population will grow at a faster rate, especially in Mexico’s border states. This will drive higher demand for U.S. exports of consumer goods to Mexico through Texas. Increased labor availability may be important for some sub-sectors of industrial growth. Further, it may put some downward pressure on labor costs (perhaps balancing out the greater than expected industrial growth), so that increases in Mexican income levels from point 2) do not inhibit industrial competitiveness.

Binational trucking (with open border and inland port development)

By 2030, NAFTA trade has been fully internationalized and through technology and diplomacy the border is fully opened. Many procedural, institutional, and cultural barriers are lowered, driven by economic motivations. An expansion of inland ports for customs clearance, co-located with distribution centers in major metropolitan areas, will also result. The opening of the border to bi-national trucking will reduce costs associated with short border region drayage moves and avoidable re-consolidation/break bulk, with the lower transport costs potentially fueling increased trans-border trade. In fact, U.S. DOT announced on February 23 that the United States

will grant Mexican trucks access to U.S. highways under a pilot program for up to 100 Mexican trucking companies to make deliveries beyond the commercial zone near the border.

Possible Change Factors:

1) The firms interviewed for this study believe the full opening of the border will eventually occur and that it could have significant impacts on their logistics operations. If the border is fully opened to international truck shipments, full integration of cross border trade will not be immediately realized because of hesitation by U.S. and Mexican firms to utilize their equipment outside their respective home countries. This hesitation is driven by the existing regulatory and institutional arrangements associated with border crossings and by a general reluctance to use equipment customized for domestic use for international shipments. Both U.S. and Mexican carriers are especially adverse to utilizing their power units internationally, especially because of the potential wear and tear inflicted by the rigorous stop-and-go border crossing process. Insurance restrictions and language barriers are further impediments.

This scenario posits that many of these obstacles are substantially overcome by 2030 through a variety of mechanisms – legal, technological, and cultural – motivated by economic considerations. Many fuel, environmental and safety standards become harmonized. Technology and procedural advances greatly smooth border crossings, equipment tracking, load matching, and inland customs clearance. Spurred by early entrant niche services from a few firms, cross-border insurance becomes readily available. Finally, immigration trends and driver shortages lead to the significant lessening of cross-border cultural and language barriers.

2) Currently, trailers are drayed across the border by tractors typically owned by Mexican forwarders. If the border is opened, the most likely short-term operational change would be lengthier in-bond drayage moves to distribution centers further inland, such as the Dallas or Houston Metropolitan Area. According to interviewees, these longer drayage moves would be advantageous because they would eliminate any intermediate warehousing or transfer operations in border gateway communities. Instead, the shipment would travel in-bond to a customs clearance center located at a population center further inland where regional distribution activities directly serve metropolitan consumers. The reverse might be true for southbound shipments, which may be able to bypass Mexican border communities to travel further inland to Monterrey or San Luis Potosi before break bulk or further transit to a location further interior.

Based on interviews, the immediate effect is a shift of border region ‘intermediate’ stops further inland to existing and new exurban warehousing distribution centers concentrated in large consuming metropolitan areas, especially Dallas, but also Houston and San Antonio—both at a lesser degree. The drayage portion of the international move is essentially lengthened and/or eliminated. Initially, the opening of the border may push up to 25 percent of the trips further inland in the first few years, perhaps maturing to 50 percent or more as border opening provides increasing options for consolidation and distribution outside of the border communities. The net effect could be to reduce some border community dray traffic while potentially moderately increasing corridor traffic to inland locations. Overall, this is expected to be a small change factor contributing to demand growth in this Alternative.

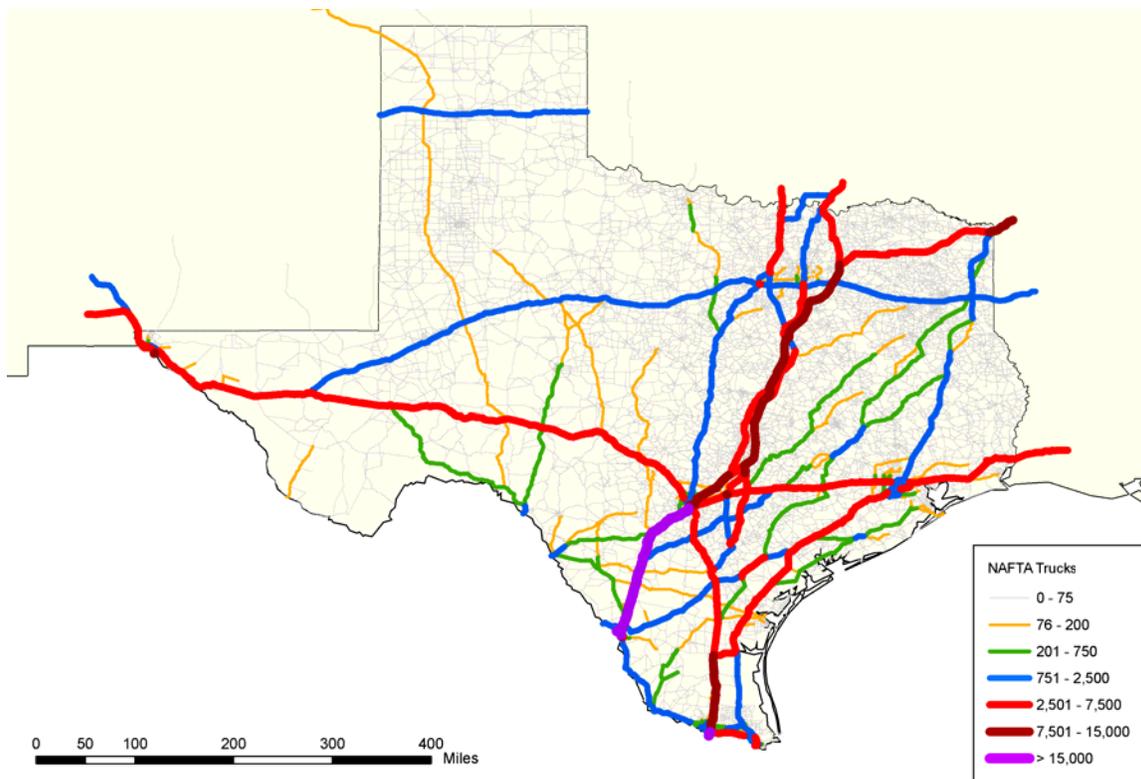
Adjustments to the Trip Table

The final adjustments made to the trip table – considering the three drivers of demand growth above – included a consistent 20 percent growth in truck trips on top of forecast 2030 truck TRANSEARCH flows for all ports of entry to the SAM network. The largest change factors that were analyzed above – Mexican industrial, economic, and population growth - particularly support such an even growth in cargo flows. The factors of Mexican port development and inland port development may have some differential impacts among ports of entry, but are expected to be too small to discern with confidence.

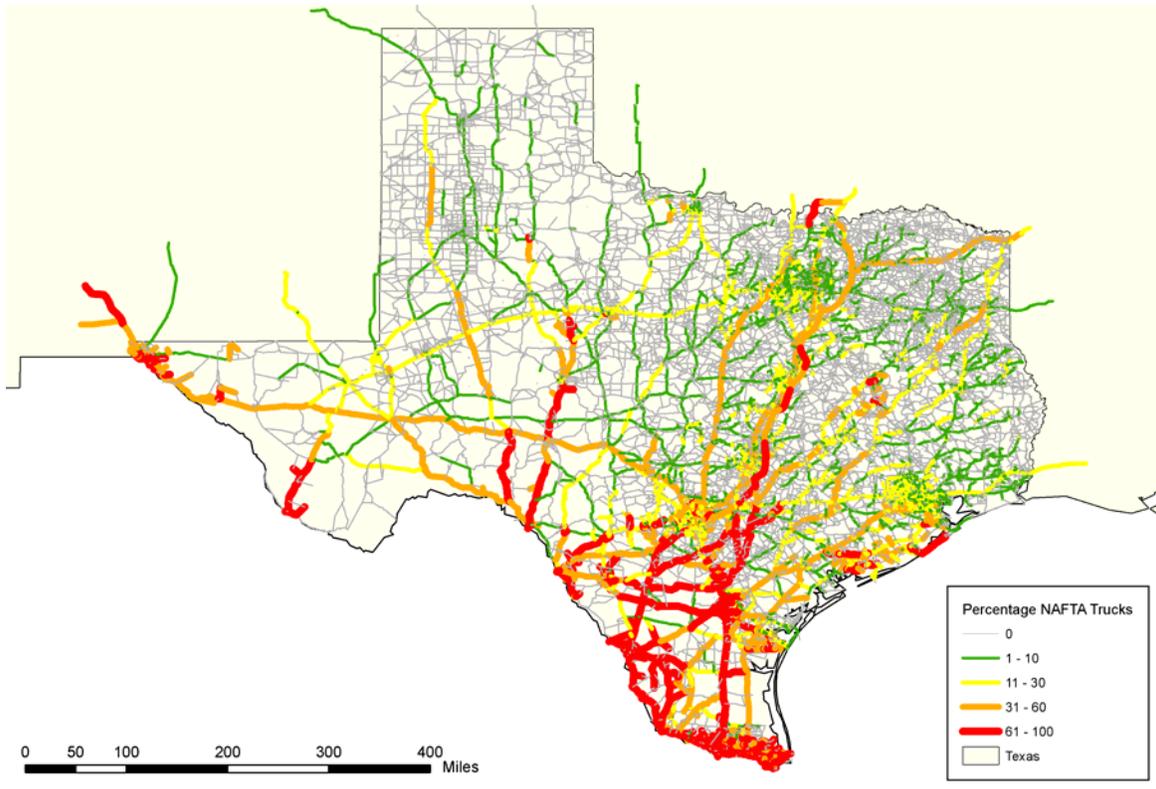
Results

The Global Trade and Growth scenario results are depicted in Figures 5.15 and 5.16. As expected, routes leading from the major ports of entry experience significant increases in NAFTA truck volumes. For example, truck traffic on the IH-35 corridor north of Laredo increases by approximately 3,100 trucks, or 20 percent. The availability of the TTC-35 would be critical to absorbing the larger than expected growth. The allowance of LCVs would also be very beneficial in this Alternative.

**Figure 5.15 – Daily NAFTA Truck Flows on Texas Highways 2030 –
Global Trade and Growth Alternative**
(Average Annual Weekday Trucks – AAWT)



**Figure 5.16 – Daily NAFTA Truck Percentage Flows on Texas Highways 2030 –
Global Trade and Growth Alternative**
(Average Annual Weekday Trucks – AAWT)



Summary Scenario Comparisons

The following four maps demonstrate the range of NAFTA flows on the Texas highway system. The first map (Figure 5.17) shows base year flows in 2003; the second map (Figure 5.18) shows flows in 2030 without construction of new highway facilities; the third map (Figure 5.19) shows the effect of NAFTA flows with new highway construction (Highway Investment scenario); and the fourth map (Figure 5.20) shows the impact of accelerated growth in trade with Mexico.

Figure 5.17 – Daily NAFTA Truck Flows on Texas Highways
 2003 (Average Annual Weekday Trucks – AAWT)

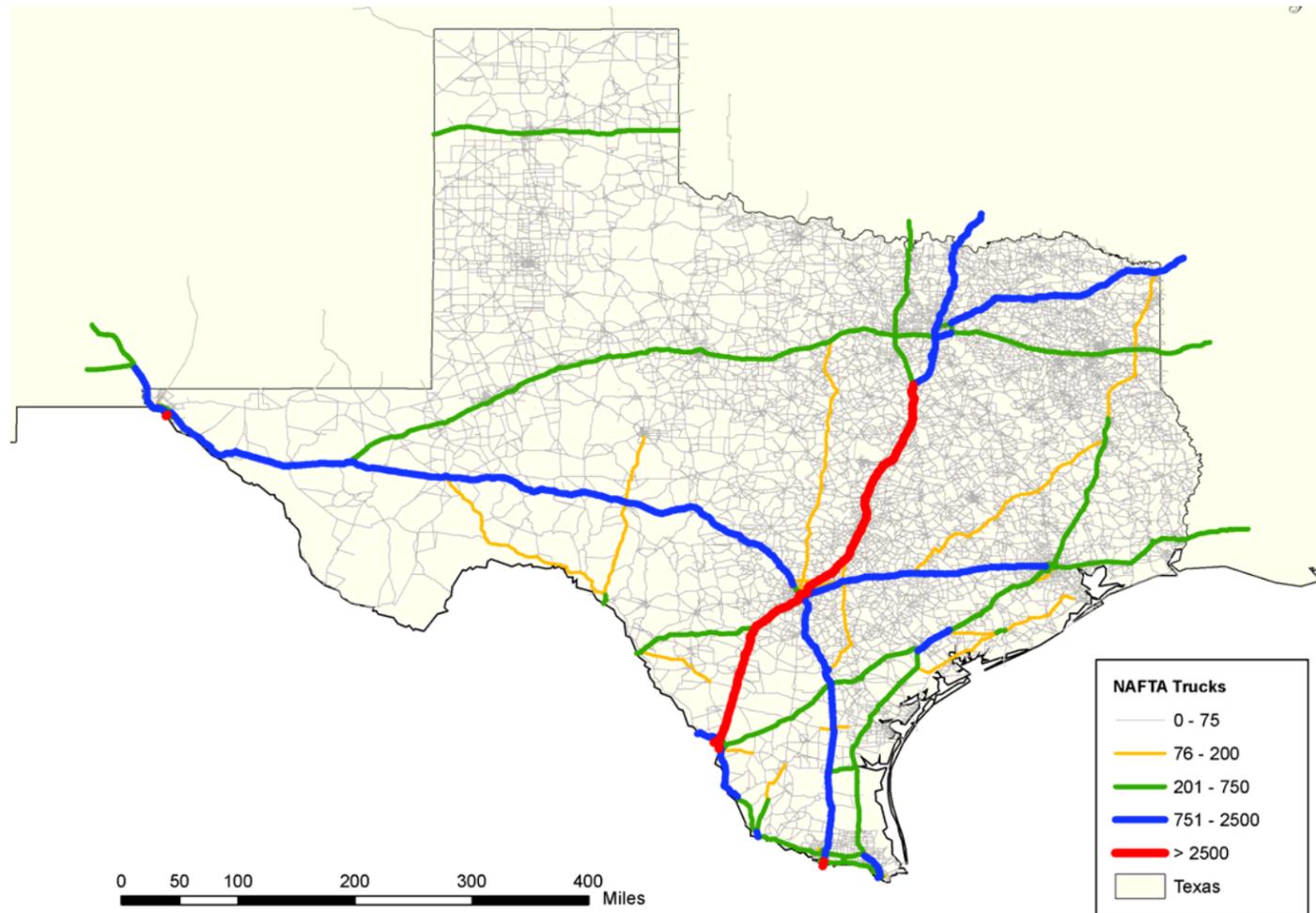


Figure 5.18 – Daily NAFTA Truck Flows on Texas Highways
 2030 - No-Build Alternative (Average Annual Weekday Trucks – AAWT)

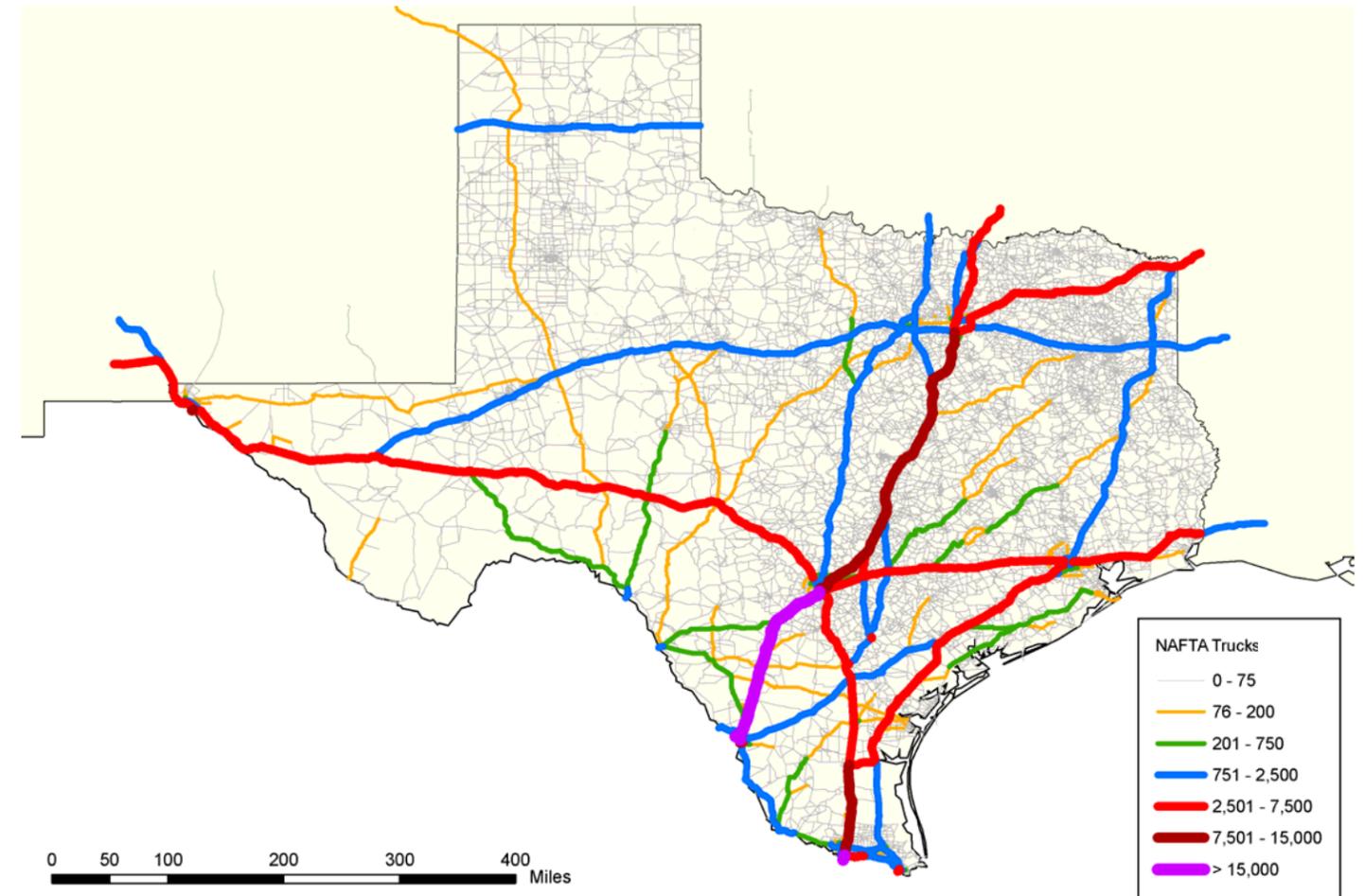


Figure 5.19 – Daily NAFTA Truck Flows on Texas Highways
 2030 – Highway Investment Alternative (Average Annual Weekday Trucks – AAWT)

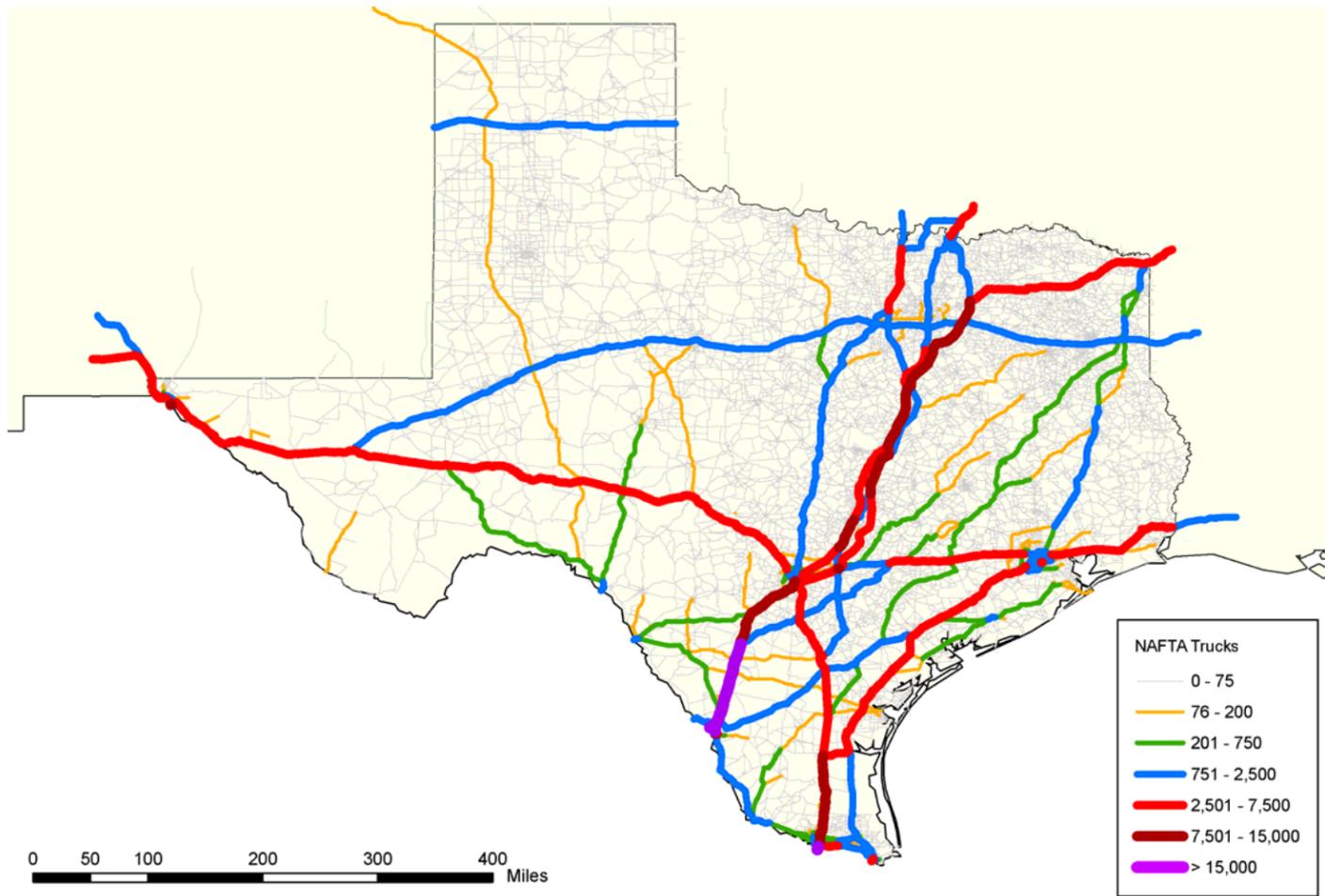
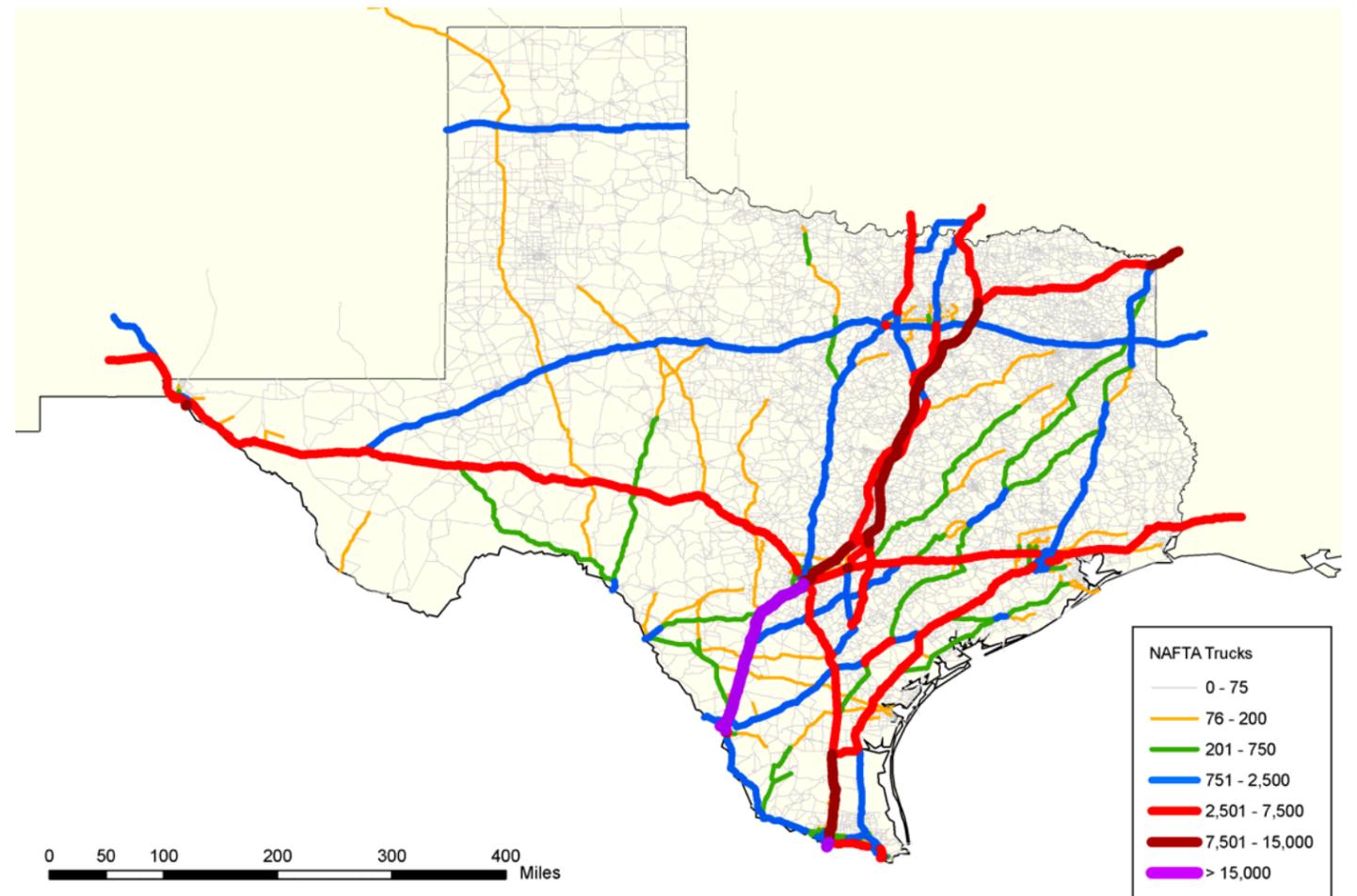


Figure 5.20 – Daily NAFTA Truck Flows on Texas Highways
 2030 – Global Trade and Growth Alternative (Average Annual Weekday Trucks – AAWT)



■ 5.6 Future NAFTA Rail Conditions

Shifting Market Share

Railroads will play a major role in the transportation of NAFTA goods through Texas, but their overall market share against trucks will fall slightly, from 33 percent of tonnage in 2003 to 24 percent in 2030 according to the Global Insight TRANSEARCH forecasts. However, rail will gain some market share in higher value commodities and will rise one percent to 25 percent of the total dollar share of ground modes moving NAFTA goods in the State. These changes in mode share—especially the change in forecast tonnage share—will have profound effects on the Texas transportation system, most notably an increase in truck VMT as the highway freight industry captures a larger portion of the growth than the rail industry.

Why will the rail share of NAFTA freight tonnage decline? There are several reasons—the two most important are 1) that the bulk commodities that rail traditionally carries will be growing at a slower rate than manufactured goods and other commodities carried by truck, and 2) lack of capacity on the rail system. In order to counter the capacity shortfall, significant investments in rail capacity and bottlenecks are necessary. Freight rail bottlenecks, such as those described in Technical Memorandum 2B will not be able to accommodate the future demand of NAFTA freight on the Texas rail system and will increasingly force shippers to choose trucking for its inherent flexibility. The railroads will continue to attract higher value commodities to maximize carload revenue.

Figures 5.21 and 5.22 illustrate the growth of NAFTA tonnage on the Texas rail system between 2003 and 2030.

Summary

Rail is going to remain an important transportation mode for NAFTA trade to 2030 although capacity and connectivity limitations will dampen demand. Without a concerted bi-national investment program and substantial investment in north-south rail lines, rail may be unable to reach its full potential in competing with trucks and highways.

Figure 5.21 – NAFTA Gateway Rail Flows 2003
Total Rail Tonnage (Millions of Annual Tons)

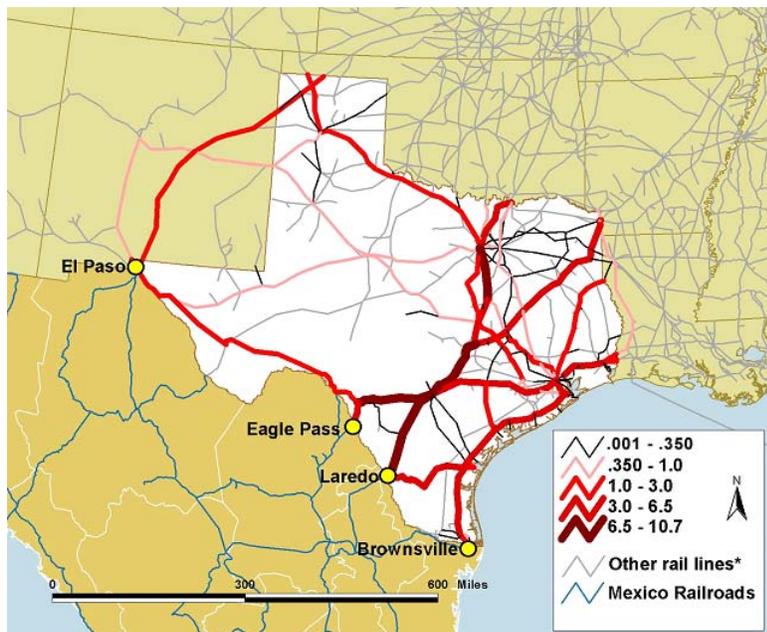
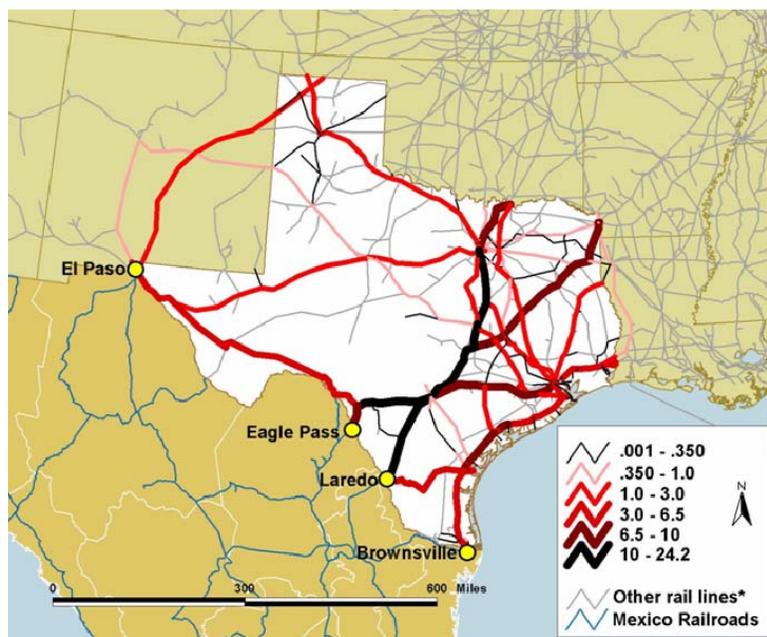


Figure 5.22 – NAFTA Gateway Rail Flows 2030
Total Rail Tonnage (Millions of Annual Tons)



* Indicates no NAFTA traffic in TX. Traffic unassigned outside TX except in NM and LA.
 Source: 2003 TRANSEARCH data.

6.0 Policy Findings, Conclusions, and Recommendations

■ 6.1 Findings

The current and future implications of NAFTA trade on the Texas transportation system are dramatic. The most important findings from this study follow:

Highway

- It is estimated that Texas handles approximately 80 percent of all U.S. NAFTA trade flows with Mexico.
- Texas NAFTA truck VMT is growing significantly faster than domestic truck travel and is projected to more than quadruple by 2030.
- Seven highway corridors (IH-35, 10, 20, and 30 and U.S. 59, U.S. 281, and U.S. 77) in Texas carry over 80 percent of all NAFTA trade. The IH-35 corridor carries the largest portion of NAFTA truck VMT now and into the future at over 35 percent of total Texas NAFTA VMT. The NAFTA truck percent of total trucks in the IH-35 corridor will go from 27 percent in 2003 to nearly 50 percent by 2030. Plans for the IH-35 Trans Texas Corridor will help alleviate the impacts of this dramatic growth.
- With this overall NAFTA growth, it is inevitable that traffic congestion will worsen in the State's largest cities, because they all lie along the roadway network that funnels the vast majority of NAFTA goods into the country. Thus, the future effects of NAFTA trade will further exacerbate the State's urban congestion, in conjunction with the parallel trends of population growth.
- Full implementation of NAFTA is likely to result in some shift of warehousing and distribution away from the border to inland locations such as Dallas. Trucking industry interviews suggest that Mexican drays would likely be extended inland to major population and warehousing/distribution centers around Dallas and Houston and to a lesser extent to San Antonio. The major Texas NAFTA corridors are not likely to be impacted significantly by this trend. Local border communities could see a lessening of local dray traffic while inland locations may see more warehousing/distribution activity.

Rail

- The Texas rail system will encounter capacity constraints as bottlenecks in metropolitan areas—especially Houston and Ft. Worth—limit the operational ability of the railroads to handle increased freight capacity.
- Gateway bottlenecks in Laredo and especially Ciudad Juarez/El Paso, unless corrected, will increasingly force long-distance NAFTA shippers to move to truck or to use truck more extensively for at least a portion of the move—deramping before reaching the border and consequently adding truck VMT on key NAFTA highways.
- Rail congestion resulting from heavy traffic on primary and secondary corridors—including increasing container flows on non-traditional routes – i.e., north-south rather than east-west—will restrict volume growth. The lack of double tracking on many principal routes will further restrict growth unless the railroads make significant capital investments.
- New intermodal terminals under development in several Texas urban areas are part of the modest investment strategy that will allow railroads to increase their market share of valuable commodities through 2030. However, without additional investment in more intermodal capacity and in existing freight terminals, bottlenecks will continue to severely limit rail’s promise to alleviate some truck trips off primary NAFTA routes.
- The Mexican railway system will probably go through further consolidation. The resulting “merged” entity will be able to provide profitable intermodal service, first domestic (within Mexico) then in-bond service to the U.S. – most of it through Texas.

Trade

- NAFTA trade tonnage to and through Texas will more than double, growing by 207 percent through 2030. Value will increase by a greater margin, increasing 280 percent over the period from 2003-2030.
- Mexico’s population will grow and become more affluent, driving demand for additional manufacturing growth to serve both internal and external demands.
- Mexico’s manufacturing base will continue to expand to serve the growing demand of U.S. consumers seeking to minimize labor costs while ensuring low transportation costs, good quality control, and speed of delivery to U.S. consumers.
- Growth in international maritime trade will be matched by port investment in Mexico that will allow that country to serve a greater share of its own domestic demand through its own ports rather than through U.S. ports. Thus, anticipated shifts of Asian trade away from LA/Long Beach to Mexico ports and/or through an expanded Panama Canal

would have only a modest effect on future demand flows on Texas roadways according to analyses in this study.

Security

- Although there was some post 9/11 impacts on NAFTA movements, they were relatively modest and trade has fully recovered.
- Border security is currently not a major constraint to trade. Increased movement to new technology, electronic manifests, advance clearance processes, and dedicated trade lanes have all helped alleviate impacts of enhanced security at the border

■ 6.2 Conclusions and Recommendations

1. A projected quadrupling of NAFTA highway demand will significantly impact Texas highway planning and investments; the TTC-35 will be the single most important Texas transportation improvement to support NAFTA trade.
2. Highway NAFTA trade growth through the Lower Rio Grande Valley, and the growing NAFTA traffic from Laredo to Houston and on to the northeast support development of the IH-69/TTC corridor.
3. The large increase in NAFTA demand suggests that improved trucking productivity through allowance of heavier units (e.g., longer combination vehicles or LCVs) on the TTC corridors could produce both public and private industry benefits.
4. Key private and public rail investments in bottleneck removal, in intermodal facilities, and in mainline capacity will be needed to allow freight rail to accommodate its share of NAFTA trade growth and to prevent further pressure on Texas highways.
5. Growing NAFTA trade, including growth of inland ports and large distribution centers in the major Texas metropolitan areas for both trucking and intermodal transfers will need to be recognized in TxDOT and MPO planning and decision making.
6. Bi-national border and corridor planning will continue to demand TxDOT's attention to key rail capacity and key highway bridge additions as well as to supporting improvements to connections on both sides of the border.
7. Proactive engagement with Mexico's Federal transportation agency (SCT) and Mexican border states will help to assure seamless NAFTA connections and trade movements.

8. Border trade facilitation and security will also require continuing coordination between TxDOT, the Texas DPS, and the U.S. Departments of Transportation and Homeland Security. The recent announcement that the U.S. government will now permit Mexican trucks beyond the commercial zone on a pilot basis will immediately require increased coordination between Texas authorities and Federal agencies.
9. Given that Texas bears the brunt of U.S. NAFTA trade now and into the future, TxDOT should proactively advocate its interests toward the next surface transportation reauthorization. Texas' interests include the core Federal-aid programs as well as the targeted programs for borders, corridors, and projects of national significance in the current SAFETEA-LU. These targeted programs are designed to address NAFTA and other trade and competitiveness issues.

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