WEST TEXAS FREIGHT STUDY

HNTB

Texas Department of Transportation

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ACKNOWLEDGMENTS

The *West Texas Freight Study* could not be undertaken without the cooperative participation of public, private, and governmental representatives from the West Texas region and the State of Texas.

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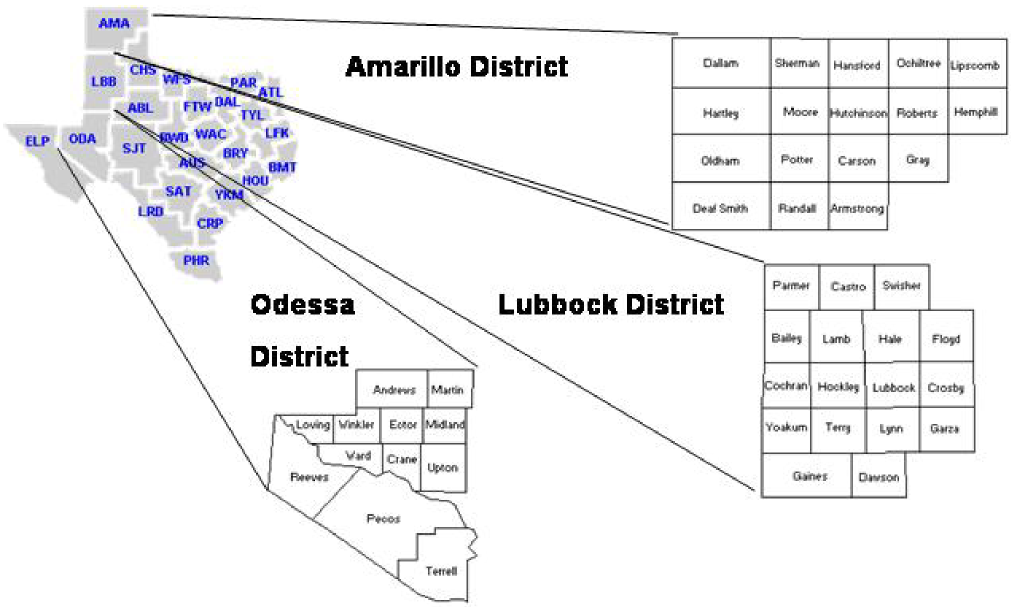
EXECUTIVE SUMMARY

This report is the beginning of an analysis of the West Texas region's freight network (roads, railroads, and intermodal facilities) and to the process of developing ways to accommodate and capitalize on future freight movements. It identifies improvements that may provide relief to residents and the traveling public adversely affected by delays, interruptions, and noise attributed to the movement of freight within the region. It also identifies alternatives that may improve regional freight capacity by enhancing roadway capacity.



This report identifies nearly $597 million of improvements for the 46-county West Texas region comprised of the TxDOT Amarillo, Lubbock, and Odessa Districts. These improvements are categorized as:

- Grade Separations (bridges to separate the railroad from streets) - $83.4 million
- Grade Crossing Closures (closing and re-routing the street at the intersection with the railroad) - $550 thousand
- Roadway Capacity Enhancements (adding roadway lanes to existing highways or improving traffic operations) - $347.4 million
- New Roadway Bypasses - $165.2 million

The West Texas Region Freight Study identifies existing and projected truck and freight rail transportation operations, bottlenecks, and constraints with the goal of establishing a slate of potential infrastructure improvements geared toward providing solutions that may resolve the problems associated with rising congestion levels and the expected growth of commodity movements.

Over the next twenty years, given growth rates for both vehicle and train traffic, the total public cost of delay at the roadway-rail crossings in the 46-county West Texas region is estimated to be more than $193 million. The cost of lost time is estimated at $3.0 million per year; the cost of collisions is estimated at $1.4 million per year; and the combined cost of emissions and wasted fuel is $276 thousand per year. The estimated 20-year public benefit of the grade separations and crossing closures identified in this report is more than $28.7 million.

Train and vehicular traffic at roadway-rail crossings is prevalent throughout the state, and the West Texas region is no exception. The Federal Railroad Administration (FRA) has reported, for the West Texas region alone, 123 incidents between trains and vehicles at public and private railroad crossings occurring between 2002 through 2006, including 45 injuries and 17 fatalities. The grade separations and crossing closures identified in this report play an instrumental role in improving public safety at roadway-rail crossings within the region.

Existing Freight Movements and Operations

The West Texas regional rail network is comprised of tracks owned and operated by the BNSF Railway Company (BNSF), the Union Pacific Railroad (UP), and multiple shortline railroads. The region's infrastructure includes more than 1,700 miles of mainline track and nearly eight miles of railroad bridges.

The overall freight rail tonnage is projected to more than double by 2025. The commodity with the largest tonnage increase is raw materials, which accounts for the coal movement through the region. The movement of agriculture is projected to increase approximately 151 percent, due in part to the large growth in the agriculture industry that includes corn grain, ethanol plants, feed supplements, dairy industry, and cotton. Food was also projected to result in high growth rates. Although high percentages of growth are projected for wood, building materials, textiles, machinery, chemical/petroleum, and secondary products, they result in a small portion of the overall commodity rail movement. The majority of other rail commodities occur in the Amarillo District.

Like the rail freight network, the overall truck tonnage is projected to nearly double within the West Texas region by 2025. Food will be the largest growing commodity in terms of the weight of increased tonnage, accounting for approximately one-third of the total truck freight tonnage moved. The development of the Reese Technology Center in the Lubbock District is also projected to be a major origin and destination for truck and rail freight in the West Texas region.

Identified Improvements

At an estimated cost of $83.4 million, ten identified potential grade separations would separate railroad lines from streets, thereby reducing safety hazards and delays. For the citizens that travel across these roadway-rail crossings these projects could provide relief from blocked intersections and traffic congestion on the roadways. It also means improved safety by allowing emergency and law enforcement vehicles to respond without delay, while improving the quality of life for residents in the impacted neighborhoods. The estimated 20-year public benefit value of the identified grade separations totals $26.2 million.

Also identified are 11 locations where grade crossings may be closed for an estimated cost of $550 thousand. These safety improvements minimize conflict points between trains and cars by closing crossings and encouraging motorists to use grade-separated roadways or alternate streets, which have been better safety systems in place. The estimated 20-year public benefit value for the crossing closures totals nearly $2.5 million.

In addition to improvements that address safety to the traveling public, the report also identifies four roadway capacity enhancements for an estimated cost of $347.4 million. Also, new roadway bypasses around Dumas and Dalhart are included for a cost of $165.2 million. Roadway capacity enhancements foster the economic growth of the region by improving the efficiency of operations as well as minimizing disturbance to residents of the region. Providing additional roadway capacity relieves congestion along the highway corridors and allows freight to pass through the region more quickly. Examples of roadway capacity enhancements are listed as follows:

- Adding lanes to existing roadways
- Upgrading the roadway facility (e.g. convert highway with traffic signals to freeway)
- Constructing bypasses around major at-grade intersections in larger cities

Rail capacity enhancements, including additional mainline tracks and sidings, connections to adjacent rail lines, expansion and relocation of rail yard facilities, and bypasses have also been analyzed for this study. However, there are not any rail capacity enhancements that warrant consideration for implementation at this time.

The benefits to the traveling public were analyzed for each grade separation and crossing closure included in the study. Anticipated public benefits of identified improvements include reduced vehicular delay times due to passing trains at roadway-rail crossings, reduced vehicle fuel consumption, improved air quality, improved public safety, improved mobility for vehicular and freight traffic, reduced noise and vibration, and increased freight movement capacity.

Next Steps

This study was conducted to establish a needs assessment report for the stakeholders in the West Texas region as part of the Texas statewide analysis of freight mobility and outlines potential infrastructure improvements with their associated order of magnitude costs. The study assists in understanding the movement of freight by rail and the inherent relationships that exist between rail and truck freight shipments.

The improvements outlined in this report are intended to provide the foundation for consideration of infrastructure and facility modifications that will benefit the quality of life in the local communities, reduce the public's exposure to freight movements, enhance economic growth and development, and improve passenger and freight mobility throughout the West Texas region.

This needs assessment ultimately will assist the Texas Transportation Commission, the State Legislature, and other stakeholders in understanding the magnitude and extent of the investment required to improve regional mobility, thus providing an overview of rail funding needs within the State.

Once funding is secured, regional agencies (such as the MPOs within West Texas), in cooperation with TxDOT and the freight railroads serving the region, and other public and private partners can work together to determine which improvements may become prioritized projects. The chosen improvements can then undergo the rigorous project development schedule that includes environmental and public involvement processes.

Meeting this region's transportation needs, for both people and goods, requires collaboration, cooperation, and an understanding that the region will continue to grow. The region requires a multi-modal solution that provides economic, efficient, and safe transportation infrastructure.

SECTION 1: PROJECT BACKGROUND

The size of Texas alone creates a huge amount of diversity, not only with its varied climates and demographics, but with a wide cross section of agricultural and industrial products. Given these characteristics, and nearly 77,000 miles of state-maintained roads, the transportation system of Texas has had, and will continue to have, a direct impact on the economic health of the state.

Beginning in 1871 when the Texas & Pacific Railway gained permission to build a southern transcontinental railroad from Marshall, Texas to San Diego, California, the construction of the railroads across Texas was a driving force that defined how and where the state developed and grew. Railroads were built in as close to a straight line as possible with diversions through the resources needed to support the railroad construction and train operations. A study of the railroad alignments across Texas provides a hint about how technology and economy worked hand in hand to transform West Texas into productive land. The growth and development of industries continues to rely on the accessibility of rail transportation today just as it did 135 years ago.

Interstate construction began in the U.S. in June, 1956 when President Eisenhower signed the Federal-Aid Highway Act. The Texas Department of Transportation (TxDOT) Odessa District has the most miles of interstate of any rural district in Texas. Interstates I-10 and I-20 have about 150-miles each within the 12 counties of the District. More than half of the highway system within Texas is comprised of Farm-to-Market (FM) roads and Ranch-to-Market (RM) roads, making up the most extensively developed rural highway system in the nation.

There is one major community in each of the three TxDOT Districts within this Study. Amarillo, located on I-40, is a major hub for the BNSF Railroad. Midland-Odessa is located at a major crossing of the BNSF and Union Pacific Railroad (UP) along I-20. Lubbock is located at a major intersection of two BNSF Subdivisions. It is strategically located on a north-south corridor that is being considered in the on-going Ports-to-Plains Trade Corridor. Lubbock is also the focus of the Seminole/Gains County Rail Service Extension Project and the home of the newly developed Reese Technology Center. It will be no surprise that the future growth in West Texas will be located around these three communities followed by the need for the majority of transportation improvements. However, remaining counties and communities are not neglected in this study. The growth of ethanol plants and the resulting industries associated with their by-products are creating opportunities and development across West Texas.

The growth and development of the transportation infrastructure throughout the TxDOT Amarillo, Lubbock, and Odessa Districts will be constantly evolving to keep pace with the population growth and transportation needs.

Public Meetings and Freight Surveys

The process of obtaining information regarding freight movements, traffic issues, and safety concerns included direct contacts with local communities in the TxDOT Amarillo, Lubbock, and Odessa Districts. In addition to public meetings, freight movement surveys were submitted to government agencies, industries, and shortline railroads.

Public meetings and presentations were conducted in Seminole, Longview, Lubbock, Amarillo, and Odessa in order to inform the local government agencies and industries of the freight study and respond to any associated questions.

Based on input from each of the Districts and from requests from the public meetings, a list of contacts was developed to receive the survey forms. Surveys submitted and received are summarized in Table 1-1.

Agency	Number Sent	Number Received
Government	81	20
Industry	15	3
Shortlines	6	3
Total:	102	26

Table 1-1: Summary of Freight Surveys Sent and Received

Freight surveys were submitted to government agencies, industries, and shortline railroads. Because the information needed from each of these groups varied so much, three survey forms were developed with questions associated with the interests of each group. In addition to the standard contact information on each of the survey forms, questions that were asked are shown in Appendix C.

Information received from the government agencies helped improve the data used to develop the Texas Statewide Analysis Model (SAM) as well as identify local traffic congestion and safety issues. The SAM uses projected growth rates to help project traffic and freight patterns.

Survey responses and telephone interviews from the shortline railroads and industries helped identify the types of freight that are important to the local areas and what kinds of options are available for shipment of freight. The number of trains and rail cars that are shipped on the shortline railroads help develop the data needed for the Rail Traffic Controller (RTC) computer model used for rail traffic projections.

SECTION 2: PURPOSE OF STUDY

The purpose of the West Texas Region Freight Study was to identify a list of improvements for TxDOT's Amarillo, Lubbock, and Odessa Districts with evaluations and recommendations for near term, mid-range, and long term improvements and/or activities that may reduce freight mobility impacts within each District.

The Study evaluated freight movements and operations within the Districts, identified opportunities to increase freight movement efficiency, determined the physical and financial viability of potential improvements, and analyzed potential alternative or additional freight corridors.

The Study was conducted in two Phases. Phase I encompassed establishing an inventory of the existing freight rail system, conducting a District-wide freight operational study, and identifying freight constraints in each of the Amarillo, Lubbock, and Odessa Districts. Phase II included identifying freight rail and rail/roadway interface safety issues, alternatives and associated feasibilities for rail system/roadway improvements within the Districts, and modeling rail system improvements to develop a cost/benefit analysis.

Scope of Work

The following is an outline of the tasks completed for the West Texas Freight Study Phase I and Phase II Work Authorizations.

Task 1 – Inventory Existing Rail System

A. Obtain and review previous freight/passenger rail corridor studies conducted within the past five years that are applicable to the Study Area (West Texas Region). Incorporate applicable and credible information as part of this study, with appropriate notation given to the source document.
B. Identify all the Shortline Railroads operating within the Study Area to determine rail line ownership, operating responsibility and line classification and nomenclature. Generate a freight rail inventory that will include information regarding each railroad's ownership, operator, class of track, method and type of dispatching, number and location of main lines, secondary lines, sidings, set-out tracks, and yards and applicable facilities.
C. Through the initial start-up meetings within the Districts, identify the Stakeholders and develop a list of contacts representing communities, industries, and shortline railroads. Develop a freight study survey form specific for communities, industries, and shortline railroads, and submit the surveys to the identified representatives.

Task 2 – Conduct District Wide Freight Operational Study

A. Current Freight Operations: Meet and coordinate with the Union Pacific Railroad and the BNSF Railroad (Carriers) regarding existing traffic volumes and operation impacts within the Study Area. The initial meeting will present the scope of the study and engage the railroads for continued input into the establishment of factual freight volumes and operational parameters. Subsequent meetings will analyze preliminary findings and allow for the incorporation of commentary offered by the Carriers. Included in this section will be a summary of traffic flow and volume on the existing rail infrastructure. The information in this section will be organized according to the following categories:

- By District (within each of the Districts in the Study Area)
- By carrier (railroad)
- By location (railroad operating division/subdivision)
- By commodity

B. The information in this section will accomplish the following tasks:

- Identify the origin and destination for the following types of freight movement:
  - Local
  - Through-freight
  - Originating outside the Study Area for local destinations
  - Originating inside the Study Area for other destinations
- Identify local industries served in the Study Area
- Identify what portions of existing freight rail operations may be re-routed to alternative alignments
- Examine the operations impact of re-routing, including crew time, train miles, fuel, transit time, and other operating parameters
- Identification of rail/truck interfaces and intermodal facilities

C. Projected Freight Operations: Utilizing the Statewide Analysis Model (SAM) the parameters shall be duplicated to incorporate freight rail volume projections to the year 2025 developing projected flows for Rail Traffic Controller (RTC) modeling beyond the Base Case, then validated with each rail carrier within the Districts.

Task 3 – Identification of Freight Constraints

A. Building upon data previously determined in Tasks 1 and 2, including results of returned freight surveys, identify locations and issues regarding operating impacts, parameters, and constraints. Concurrently, obtain engineering data required to establish a baseline layout of the track geometry for the Study Area that will graphically represent the inventory assessed in Task 1.

B. Determine infrastructure constraints inhibiting freight efficiencies resulting from:

- Congestion
- Track, Bridge, and/or Signal deficiencies
- Track alignment and profiles
- Yard utilization
- Highway/Rail grade crossing conflicts

C. Incorporating the train volume and flow data obtained in Task 2, Task 3A, and Task 3B, establish a base case operational model utilizing (RTC) software.

D. Conduct progress meetings with the freight carriers within the Districts to coordinate and validate the results of RTC modeling, allowing for the incorporation of comments offered by the Carriers.

Task 4 – Identification of Freight Rail and Rail/Roadway Interface Safety Issues

A. Utilizing information available from the Federal Railroad Administration and that provided by TxDOT from the Texas Statewide Grade Crossing Inventory study, obtain and comile data for the past 5 years showing trends for:
   - Vehicle/ train accidents
   - Vehicle/ pedestrian accidents
   - Train derailments that damaged private/ public property
   - Train accidents/ derailments involving hazardous materials

Task 5 – Develop Alternatives and Feasibilities for Rail System/Roadway Improvements

A. Building upon the results of Tasks 1 - 3, identify potential improvements, realignments, or relocations to the existing railway infrastructure that may increase the efficiency of through-freight rail operations, increase opportunities for local freight rail access and improve road user mobility and safety within the Region. This analysis, at a minimum, will include:
   - Track improvements and/or additions
     - Existing interlockings and wyes
     - Siding extensions
     - ML Track additions
     - Capital Improvements as identified by the railroads
   - Roadway/Rail re-alignments
   - Railway yard improvements/relocations
     - Evaluate all rail yards
   - New, modified, and/or relocations of rail intermodal facilities
   - Existing railway line consolidation and/or connections
   - Joint use freight corridors
   - Rail line relocation alternatives
   - New and/or modified roadways to mitigate heavy truck freight flows

B. Analyze the results of Task 5A with respect to:
   - District corridor demographics and growth patterns within a ¼ mile of the rail/roadway centerline
   - Truck congestion and delay pre and post improvements
   - Evaluate truck commodity shift to rail based on improved system performance.

C. Building upon the results of Tasks 5A and 5B establish at least one alternative alignment for SAM and/or RTC Modeling in Task 6, and order of magnitude cost estimates associated with each alternative.

D. Establish and maintain throughout the course of this work authorization a web site that outlines the results of this study.

Task 6 – Modeling of Existing System, Improvements, and Alternatives

A. Building on the RTC Base Case modeled for train operations within the Region established in prior Work Authorizations, prepare and model train operations to establish an enhanced Base Case model which incorporates the suggested track improvements and/or additions within the Region as jointly recommended by the railroads, establishing a ranking of improvements with regard to freight rail mobility improvements. RTC modeling will provide a comparison of the alternatives selected versus the Base Case and the Enhanced Base Case for existing traffic volumes including forecasted growth scenarios through 2025.

B. Prepare order of magnitude capital cost estimates for the alternatives identified and modeled including a realistic cost/benefit analysis per alternative.
C. Prepare and submit a draft summary report outlining the findings of Task 6, including safety benefits and the identification of potential funding sources.

Task 7 – Highway/Rail Grade Crossing Impact Analysis

A. Collect the following data for the grade separation/closure sites identified in Tasks 1 - 3 :
    - Research available data on railroad distribution by time of day;
    - Roadway geometry at crossing as well as closely spaced upstream and downstream intersections;
    - Average number of trains per day;
    - Average length of train;
    - Average speed of train; and,
    - Gather available traffic count data near potential grade separation/closure sites as well as closely spaced upstream and downstream intersections.
B. Set up traffic analysis model for each of the potential grade separation/closure sites using the data collected in Task 7A. For the purpose of this scope it is assumed that there would not be more than 15 potential sites to be analyzed. Scenario models will be developed with and without the grade separation/closure in order to perform a comparison analysis. Therefore traffic analysis models will be developed for up to 30 sites (15 sites with and without grade separation/closures).
C. Perform comparison analysis with and without grade separation/closure for each specified site using the traffic analysis model. Measures of effectiveness that will be used for evaluation will include:
    - Vehicle delay;
    - Queue length
    - Emissions (Fuel consumption, carbon monoxide, nitrogen oxides, volatile organic compounds)
D. Determine the impact to access on existing adjacent properties near the studied crossings for the scenarios with and without grade separation/closures. Recommend at least one conceptual alternative for each grade separation that would minimize any access changes or eliminations for adjacent properties.

Task 8 – Economic Analysis of Identified Improvements

A. Collect and review existing studies by Chambers of Commerce, Counties and Metropolitan Planning Organizations, and other available information such as economic trends and employment projections.
B. Identify development opportunities having potential for major economic impact on the Region, and document how these developments can be realized by implementing infrastructure improvements described in previous tasks.

C. Prepare order of magnitude costs for infrastructure required to integrate development opportunities in Part B and project the economic benefits of these developments based on results reported for similar developments already in operation.
D. Prepare a cost-benefit analysis of constructing grade separation structures or implementing grade crossing closures at locations identified in Task 7.

SECTION 3: FREIGHT OPERATIONAL STUDY

Introduction

It is through an understanding of the movement of truck and rail freight that each District can begin to develop ways to accommodate and capitalize on the future commodity movements. The process to begin to explore the future freight outlook requires that the best available tools are used to examine the current/base year (1998) and future year (2025) commodity flows within the West Texas Districts.

The following section describes the available tools and explains the freight modeling process and methods. Following the discussion of modeling methods, technical information is provided on truck freight flows, rail freight movements, and a comparison of truck and rail movements for the West Texas region as well as for the individual Amarillo, Lubbock, and Odessa Districts.

Freight Model Methods

The primary tool used to determine future truck and rail freight activity is the Texas Statewide Analysis Model (SAM). The SAM is a travel demand simulation modeling package developed for and used by TxDOT to study and evaluate the movement of people and freight throughout the state. The SAM is actually a large group of interrelated models that generate passenger trip estimates and freight tonnage flows for highway, aviation, and railroad networks, as well as waterway facilities along the Texas Gulf Coast. The maps and data produced by the SAM are useful in planning transportation system improvements and addressing future state transportation system needs and priorities.

The SAM was developed using base year (1998) transportation planning data to validate the adequacy of the model in estimating passenger flows by travel mode. In urban areas such as the West Texas Districts, Dallas-Fort Worth, Houston, Austin, etc. transportation data from existing urban models was extracted. In the remaining rural areas, national and state travel survey and demographics data (population, employment, and other socioeconomic factors), as well as results of Freight Study Surveys were used to prepare travel estimates, which were then compared to traffic counts. SAM freight models were used to develop estimates of freight flow (tonnage) and heavy truck traffic.

Model Calibration

Transportation and travel survey data necessary for freight modeling is less comprehensive than for passenger modeling. Therefore, SAM freight models were developed using base year and future/forecast year (2025) data made available from the following three primary sources:

- Reebie Transearch Database – This 1998 survey data includes a sample of all Texas freight movements (within, to, from, and through the state), but does not include freight movements between Texas and Mexico.

- Wharton Economic Forecasting Associates (WEFA) – Similar to the Reebie data, the WEFA data included only intra-U.S. flows and did not include freight movements between Texas and Mexico.
- Latin America Trade Transportation Study (LATTS) – This study collected data from the DRI/Mercer World Sea Trade Service (WSTS), which integrates world trade databases and economic/trade models to produce historical data and forecasts of freight movements around the world.

Additionally, Surface Transportation Board (STB) Waybill Data from 2002, 2003, and 2004 was obtained and used as another level of calibration for freight rail movements throughout the state. The STB data, along with actual rail tonnage maps provided by the freight railroads, were compared as a process check to validate current rail freight volumes, thus establishing a defendable prediction of forecasted rail freight movements throughout the state.

The freight model produces freight flow tonnage estimates based on the following nine commodity groups:

- Agriculture
- Raw materials
- Food
- Textiles
- Wood
- Chemicals/petroleum
- Building materials
- Machinery
- Secondary products

These groups represent commodities making up approximately 90 percent of the total tonnage movement within, into, and from the Districts according to the economic data. Table 3-1 shows commodity types for each commodity group analyzed for this study. The commodity types for each group were assigned to the listed groups according to information presented in the economic data.

Commodity Group	Commodity Type
Agriculture	Farm products
	Forest products
	Fresh fish and marine products
Raw Materials	Metallic ores
	Coal
	Crude petroleum and natural gas
	Nonmetallic minerals
Food	Food or kindred products
	Tobacco products
Textiles	Textile mill products
	Apparel or related products
	Rubber or misc. plastics
	Leather or leather products
Wood	Lumber or wood products
	Furniture or fixtures
	Pulp, paper or allied products
	Printed matter
Chemicals/Petroleum	Chemicals or allied products
	Petroleum or coal products
Building Materials	Clay, concrete, glass or stone
	Primary metal products
	Fabricated metal products
Machinery	Ordinance or accessories
	Machinery
	Electrical equipment
	Transportation equipment
	Instruments, photo and optical equipment
	Misc. manufactured products
Secondary Products	Secondary traffic

Table 3-1: Commodity Grouping Scheme

The commodity groups and types are based on standard codes used in the transportation industry. While an attempt has been made by economic sources to provide meaningful commodity information at various levels, certain commodities may seemingly fit into multiple commodity groups. For instance, agriculture products such as farm products or fresh fish could be confused with the commodity group of food. The agriculture group refers to items prior to being processed while typically the food commodity group refers to processed items.

Trip Generation

Trip generation is the process of converting people and jobs into trips. These trips become auto trips, truck trips, and in this case, tons of commodities. All trip generation model estimates for the freight model were developed at the county level since Reebie freight data was defined in terms of freight origins and destinations as counties. More specifically, the trip generation model applies equations relating variables for employment types and special freight handling facilities to the tonnages produced or attracted to individual counties. Freight transportation demand growth is affected by increases in both employment and worker productivity. The trip generation equations estimate freight tonnages based on employment and productivity increases. The resulting estimates were then compared to 1998 Reebie control total data and the equations were iteratively adjusted to obtain reasonably accurate freight tonnage estimates by commodity and by movement type. In short, freight movement was calculated using scientific equations; these calculations were compared to freight data from individual counties from 1998, and adjustments were made to develop accurate totals to use in the study.

Finally, average daily trip tables were obtained by dividing the annual values by the number of days in a year. The freight model-estimated overall tonnage movements at county and District level are reasonable and accurate in replicating base and future freight movement. The freight flow estimates over the various highway network routes are also reasonably accurate.

Mode Choice and Assignment

The statewide freight flow tonnage estimates (produced at the county level) are allocated to highway, rail, and waterway modes by a mode choice model. While rail and waterborne movements were assigned to their respective networks at the county level, the highway freight tonnage estimates were disaggregated to even smaller geographic areas (traffic analysis zones — TAZ) prior to being assigned to the road network. In addition, heavy truck flow estimates for the highway network were derived through factoring of the freight tonnage estimates (variables of vehicle load factor by commodity group and related trip length were applied to the freight tonnage values).

2025 Roadway Network

The SAM includes roadway improvements through the year 2025 as provided by the TxDOT Districts. These improvements represent anticipated roadway improvements based on future growth and mobility needs. The network includes projected improvements that are planned to occur between 1998 and 2025 for all three Districts. Tables and maps showing planned improvements for each District are provided in the discussion of each of the Districts.

The sections that follow provide details related to truck and rail freight flows and commodities for 1998 and 2025 for the West Texas Region and each of the three West Texas Districts (Amarillo, Lubbock, and Odessa).

Truck Traffic Analysis

Truck volumes were determined through a combination of the SAM and existing vehicle classification count volumes. Vehicular traffic was added to the truck volumes and congestion levels were calculated using a volume to capacity ratio (V/C). The V/C ratio is a measure of the volume of vehicles divided by the capacity of the roadway. The V/C defines whether or not a roadway can fulfill assigned demand and are used to broadly define problem areas on major arterials and highways while allowing decision makers to make operational decisions at intersections and on-ramps. A high V/C indicates roadway congestion.

The following descriptions are typically used for the various levels of V/C:

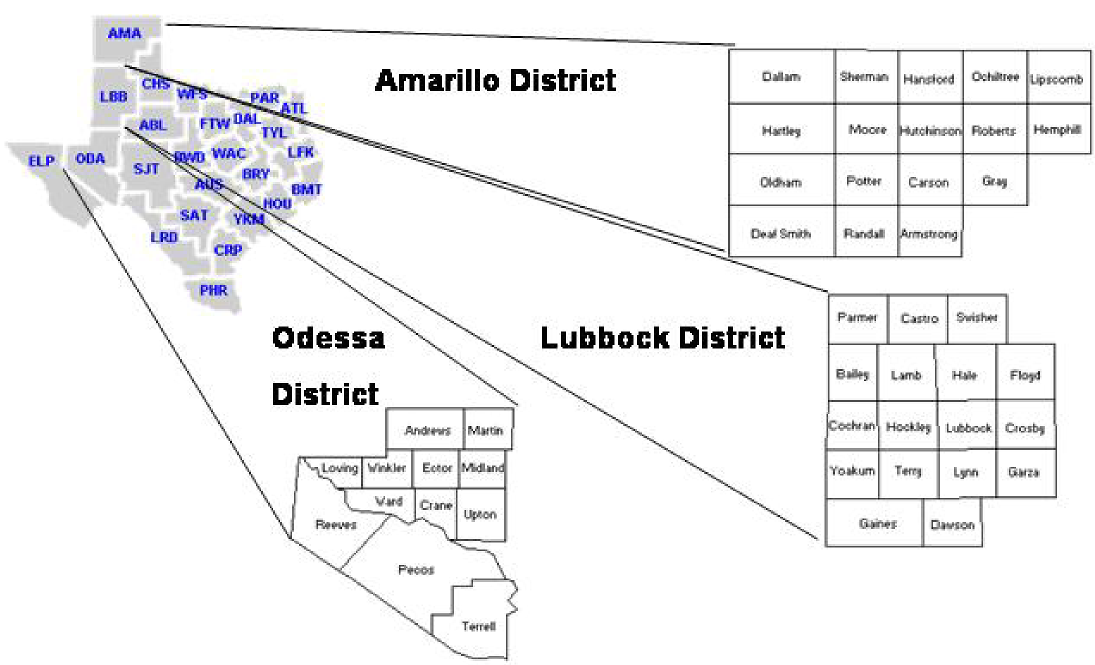
- V/C greater than 0.75 = Heavy Congestion
- V/C of .50 to .75 = Moderate Congestion
- V/C of less than .50 = Low or No Congestion

Using the model, roadway segments that resulted in a V/C of over 0.75 were considered heavily congested. As the level of detail for the SAM is not such that the V/C can be accurately determined for specific roadways, it was necessary to divide the Districts into smaller traffic analysis zones that can be used to determine an average V/C.

While it would be desirable to improve all areas that have any congestion, it is not always feasible due to economic considerations. Therefore, identifying areas of congestion with a V/C over 0.50 seemed reasonable. The primary zones of congestion were in the urban areas.

West Texas Region Overview

This Freight Study analyzed the freight flow movement in terms of truck and rail freight commodity flow for the West Texas region comprised of the TxDOT Amarillo, Lubbock, and Odessa Districts. The counties comprising the West Texas Districts are shown below.



Truck Freight Movements and Commodities

The movement of truck freight within, into, and out of the West Texas Districts will continue to be a significant method of transporting of goods and materials for the state of Texas and the country. The truck freight transported within the region, leaving the region, and coming into the region is projected to nearly double from 1998 to 2025. Analysis concluded the following percentages of growth for truck movement for the West Texas region:

- Projected growth of 56 percent in truck movement within the region;
- Projected growth of 105 percent in movement leaving the region; and,
- Projected growth of 93 percent in truck movement entering the region.

Table 3-2 describes each movement type that would either originate or end in the West Texas region. For instance, internal to internal movements occur within the region while all other movements (internal to external; external to internal) occur either between the West Texas region and other Texas counties or between the West Texas region and other regions of the U.S. and Mexico.

Table 3-2 illustrates that while the movement of truck tons within the West Texas region will increase by more than 700,000 tons, it pales in comparison to the increased movements coming out of (32.6 million tons) and into (25.8 million tons) the region.

Annual Truck Tons				
Origin	**Termination**	**1998**	**2025**	**Percent Change**
Internal to Internal				
West Texas Region	West Texas Region	1,310,883	2,039,463	56%
Internal to External				
West Texas Region	Other Texas Counties	23,676,125	49,182,300	108%
West Texas Region	Western U.S.	1,198,033	2,124,814	77%
West Texas Region	Northern U.S.	3,874,306	7,203,526	86%
West Texas Region	Eastern U.S.	801,988	1,567,761	95%
West Texas Region	Mexico	1,508,382	3,541,048	135%
External to Internal				
Other Texas Counties	West Texas Region	21,942,390	40,492,963	85%
Western U.S.	West Texas Region	998,993	2,131,819	113%
Northern U.S.	West Texas Region	3,086,599	6,750,239	119%
Eastern U.S.	West Texas Region	614,537	1,383,499	125%
Mexico	West Texas Region	1,124,405	2,839,930	153%
	Total	**60,136,641**	**119,257,361**	**98%**

*Source: Statewide Analysis Model based on 2004 Surface Transportation Board Waybill Data Forecasting Associates and Latin American Trade Transportation Study

Table 3-2: Annual Truck Tons in the West Texas Region

Truck Movements within the State

Figures 3-1 and 3-2 show the existing and projected truck tonnage movement between the West Texas region and other Texas counties for 1998 and 2025, respectively. Figure 3-1 reveals that in 1998 the largest numbers of trucks are moving between West Texas, Corpus Christi, Houston, San Antonio, the Dallas - Fort Worth metroplex, El Paso, and Austin, as well as areas along the U.S.-Mexico border. The largest origin and destination of truck freight is located in the Houston region.

Figure 3-2 shows the continued growth of truck traffic between the West Texas region and the major urban areas of Houston, San Antonio, Dallas - Fort Worth, El Paso, and Austin. These trends bring into focus the need to plan and accommodate for more trucks along the major freeway corridors both inside and outside of the major urban centers. With the increased goods movement from and to Mexico, as well as depleted available capacity on some major freeway facilities, new corridors such as the Trans-Texas, Ports to Plains, and La Entrada al Pacifico may be needed to keep auto and truck traffic moving, thereby benefiting the state and local economies.

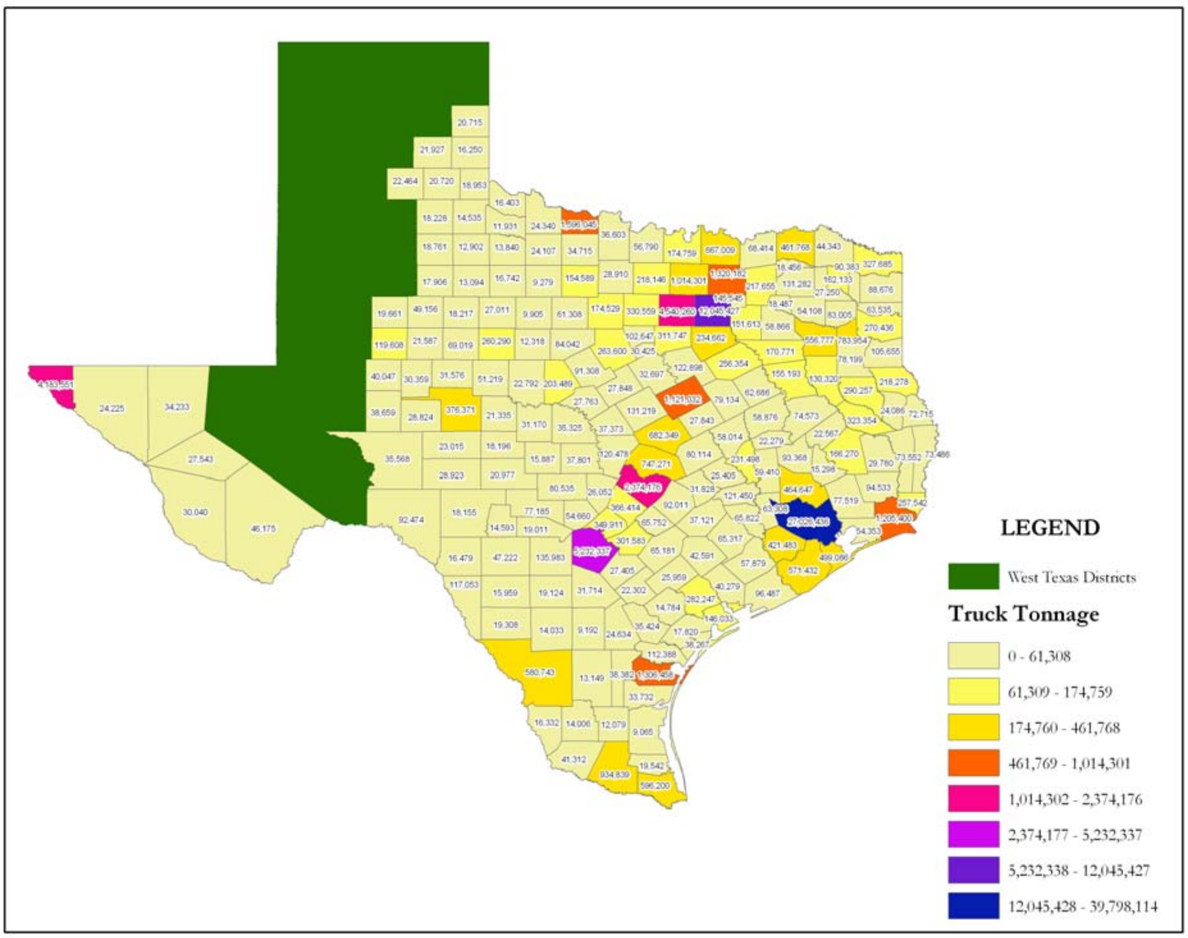


Figure 3-1: 1998 Truck Movements between West Texas and Other Texas Counties

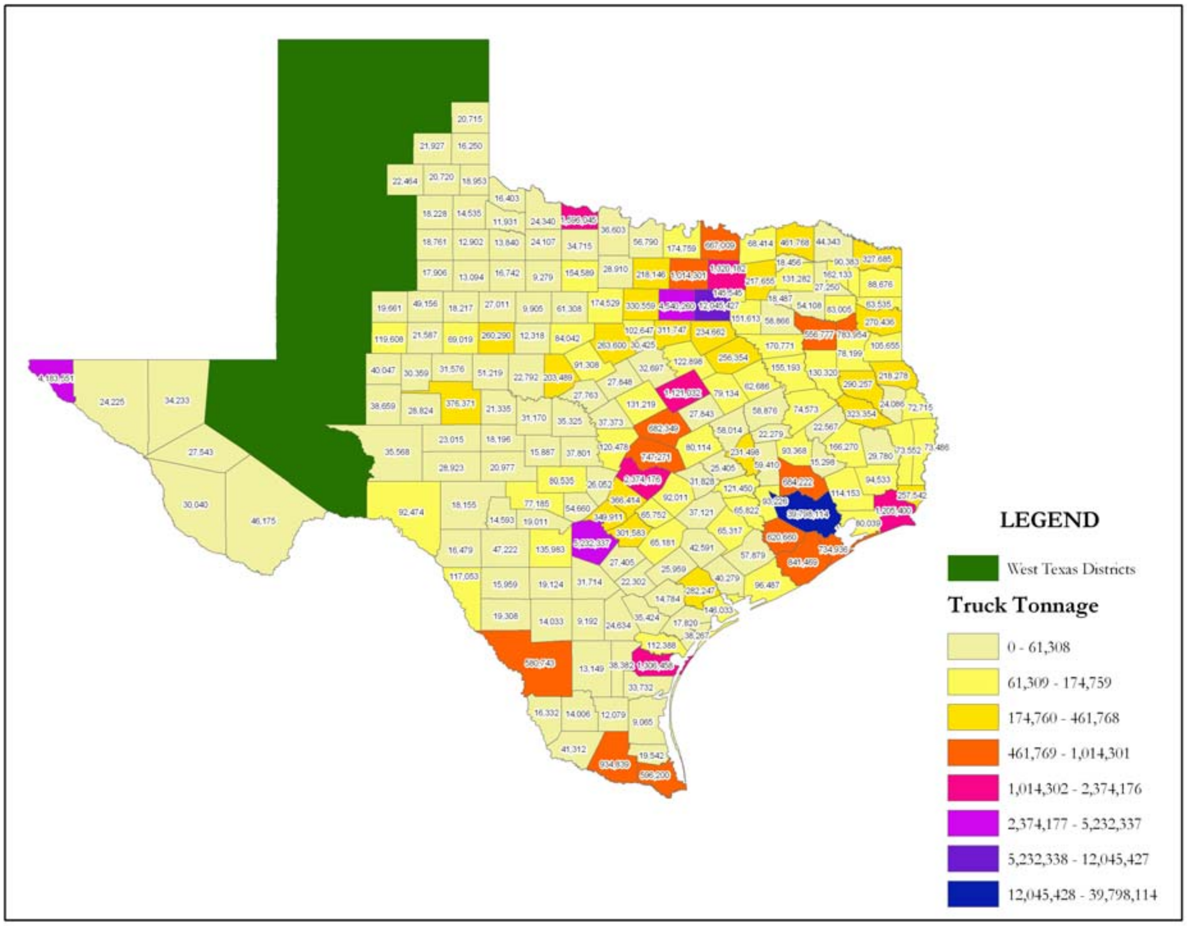


Figure 3-2: 2025 Truck Movements between West Texas and Other Texas Counties

Truck Movements Outside of the State

Large increases in truck freight activity are expected between the West Texas region and other parts of the country from 1998 to 2025. These movements represent trucks that are relegated to long-haul trips. Major movements in 1998 can be seen from Oklahoma, Arkansas, New Mexico, Louisiana, and Mexico, as shown in Figure 3-3. Figure 3-4 clearly demonstrates increased movement from Oklahoma, New Mexico, Louisiana, and Mexico to West Texas in 2025.

The movements of truck freight outside of Texas further illustrate the need for additional truck allowance on the freeway system such as the implementation of exclusive truck lanes and new freeway opportunities. Additionally, with the lack of available freeway capacity, this long haul movement may be better served by shifting truck cargo to rail cars.

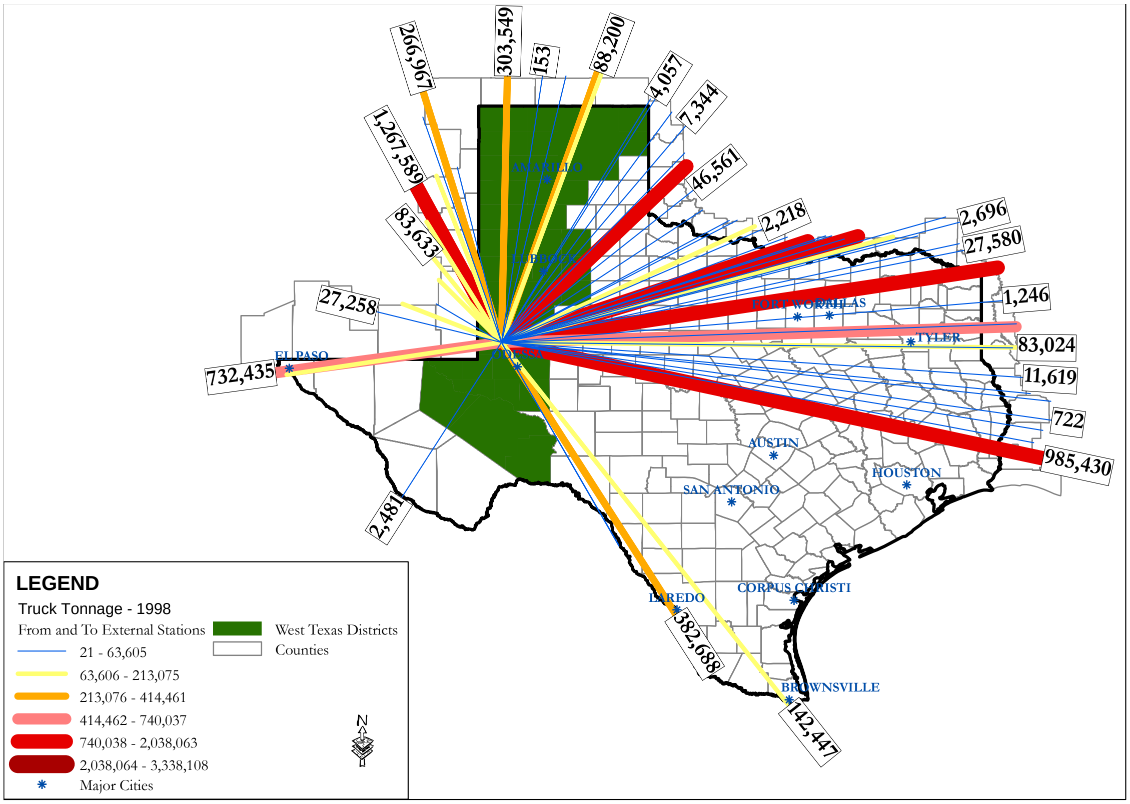


Figure 3-3: 1998 Truck Movements between West Texas and Outside of Texas

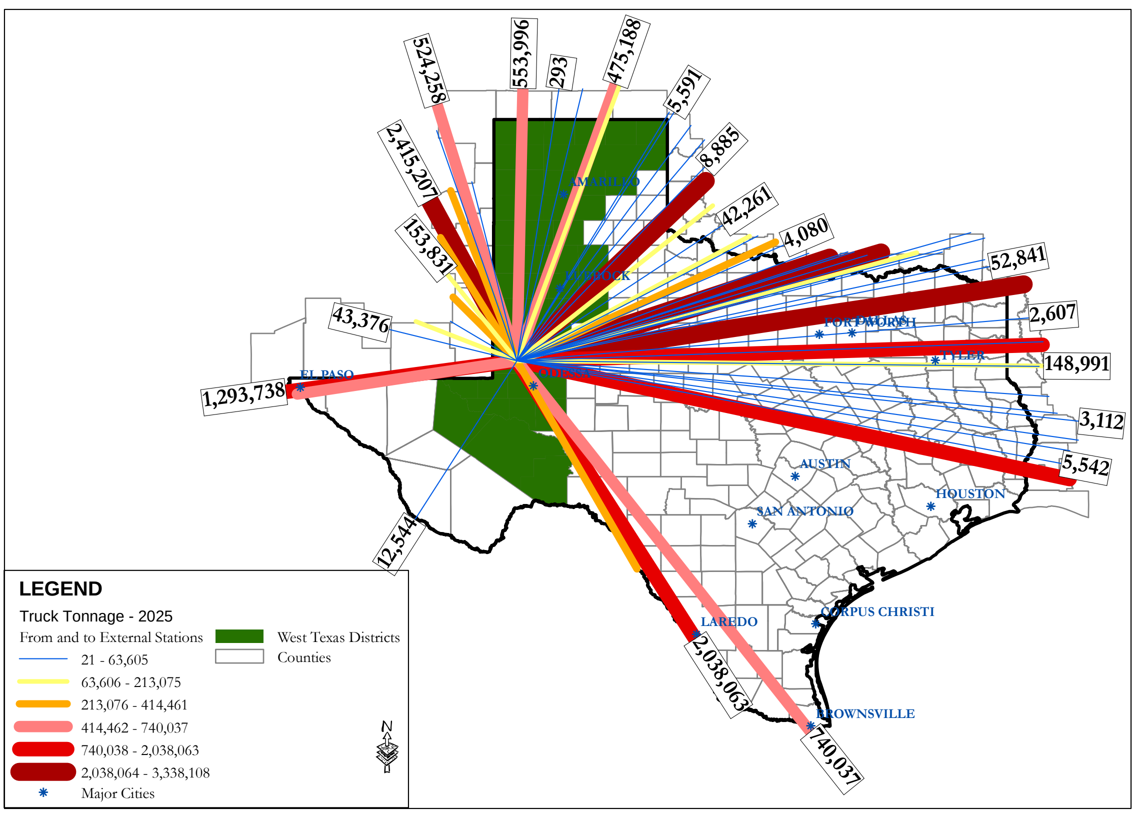


Figure 3-4: 2025 Truck Movements between West Texas and Outside of Texas

Truck Commodity Trends

The overall truck tonnage within the West Texas region is projected to nearly double by 2025. Analyzing commodities aids in further understanding the makeup of the freight tonnage. The greatest commodity volumes moving by truck are generally low value, bulk materials — consistent with traffic moving through bulk ports. The leading products moving by truck (in terms of tonnage in the District in both 1998 and 2025) are food, building materials, chemical/petroleum, and secondary products. Secondary products are an exception to the low-value tendency among the top commodities (by weight).

Table 3-3 indicates that food will be the largest growing commodity by weight and will account for approximately one-third of the total truck tonnage movement. Additionally, building materials are projected to increase by approximately 16.3 million tons between 1998 and 2025. Chemical/petroleum products are projected to result in the smallest percent increase; however, the overall tonnage is projected to be the third largest increase. While textiles and machinery are projected to produce much lower tonnages, they are expected to experience significant percent increases.

Commodity	**Truck Tons**		
	1998	**2025**	**% Increase**
Building Materials	9,800,841	26,129,443	166.60%
Wood	4,496,679	9,067,863	101.66%
Agriculture	271,101	682,568	151.78%
Textiles	415,983	1,285,115	208.93%
Chemical/Petroleum	17,408,678	21,528,760	23.67%
Food	17,487,059	38,421,537	119.71%
Machinery	785,115	2,315,546	194.93%
Raw Materials	1,006,249	1,645,221	63.50%
Secondary	8,464,938	18,181,304	114.78%
TOTAL	60,136,643	119,257,357	98.31%

Table 3-3: Truck Freight Commodity Growth

Figures 3-5, 3-6 and 3-7 further illustrate the commodity tonnage within the West Texas region for both 1998 and 2025.

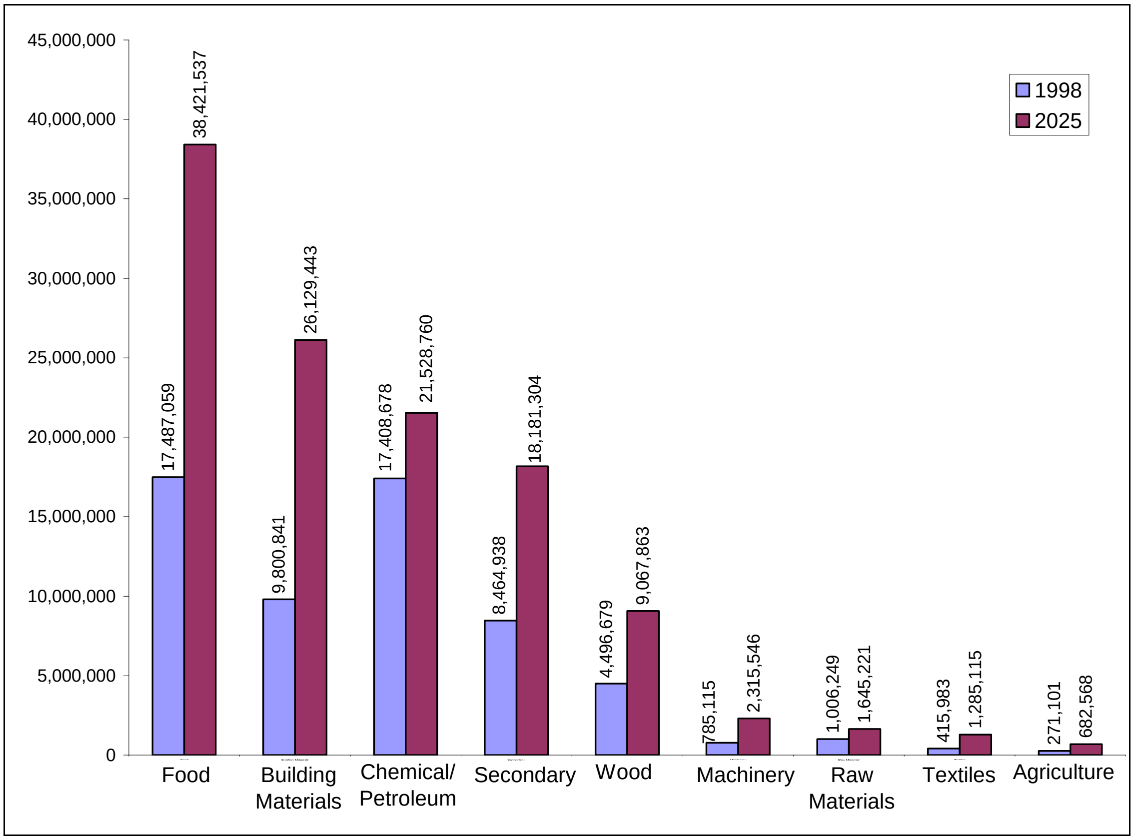


Figure 3-5: Total Truck Tons by Commodity

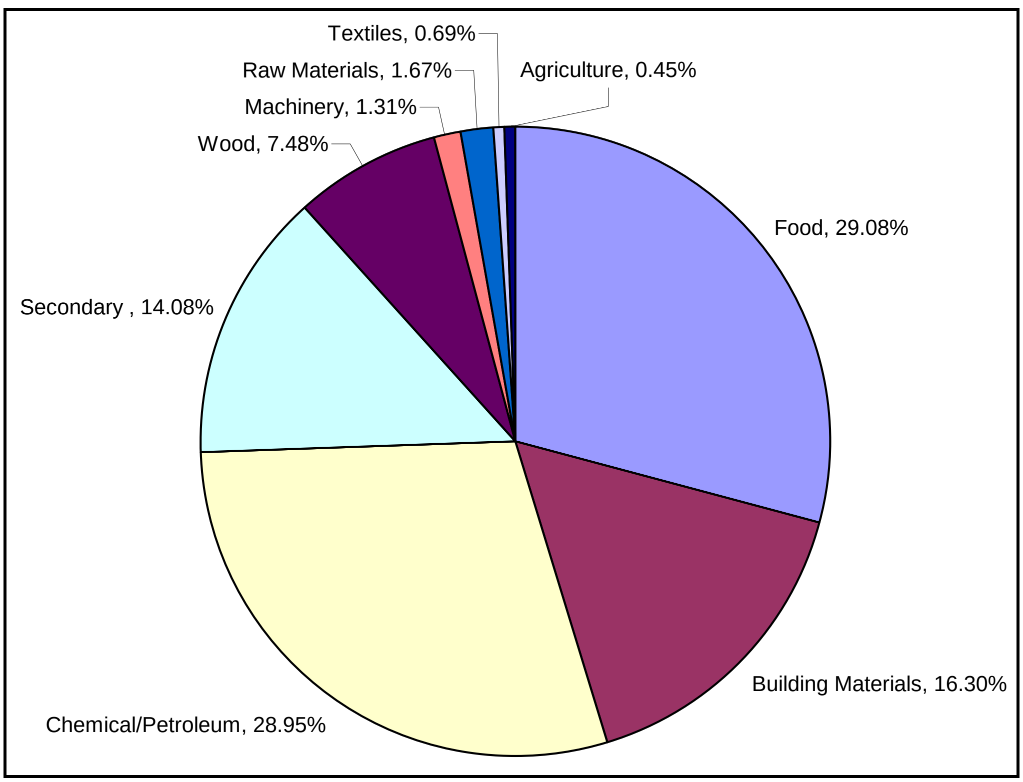


Figure 3-6: Total Truck Tons by Commodity (1998)

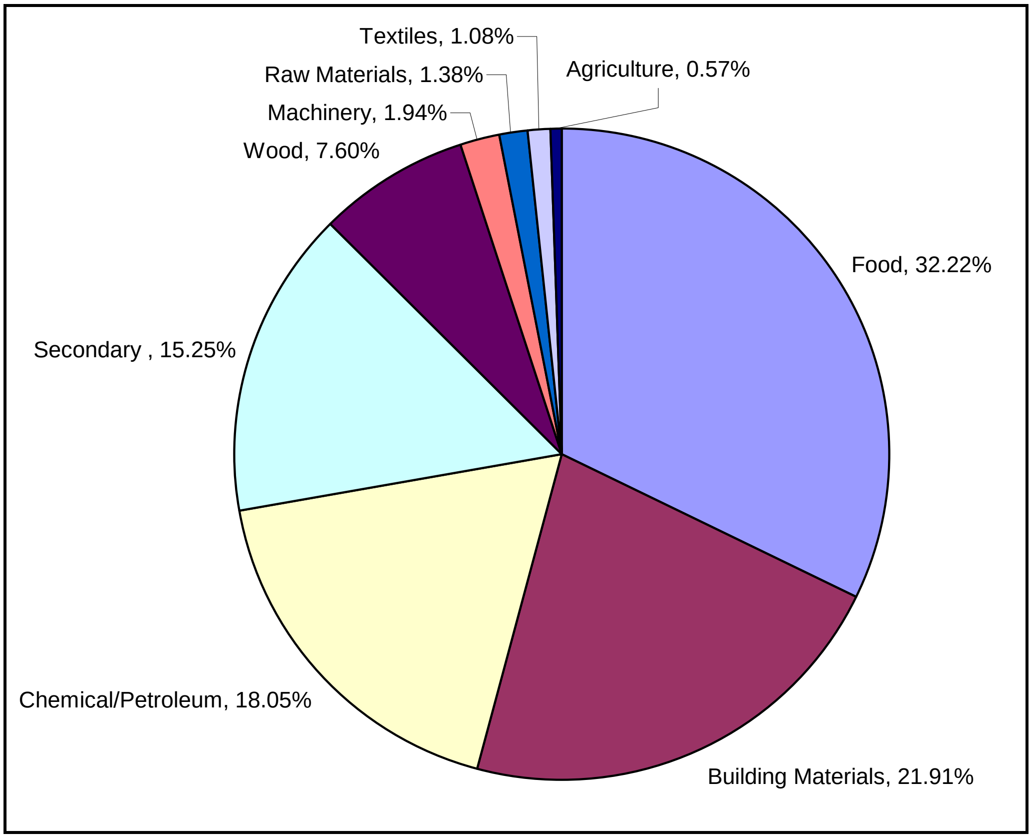


Figure 3-7: Total Truck Tons by Commodity (2025)

Since growth projections were based on 1998 information, additional data was collected through surveys, interviews, and observations in order to provide more accurate commodity projections for the future. As determined from recent interviews with economic development groups and industry professionals, agricultural commodities are expected to show significant growth in areas dealing with corn grain, ethanol plants, distilled feed supplements and dairy. Additional industries such as cotton, sorghum, grain, and food products have also grown and are expected to continue such growth. Additionally, the growth in industry leads to jobs and increased population, which will continue to increase the amount of building materials shipped by truck.

One of the major developments in the West Texas region is the Reese Technology Center, which is a transload facility with the ability to directly access rail freight; store various commodities; potentially serve as a “safe zone” for truckers, and be used as a possible truck driving training facility located west of the city of Lubbock. The Reese Technology Center is designated as a free trade zone and will be able to offer several advantages to commodity shippers that are traveling through the West Texas region. The center is projected to be a major origin and destination for truck and rail freight in the future. Due to the residential and retail development around the center, it will also be a source of additional passenger car and truck traffic west of Loop 289. Additional arterials connecting to Loop 289 through the city also showed a heightened level of congestion in the future.

Truck Freight Findings Summary

- Freight tonnages moved by truck will nearly double by 2025.
- Food products, chemical/petroleum products, building materials, and secondary products constitute a majority of the freight truck tonnage for existing and future years.

Traffic Volume Analysis

The West Texas region currently accommodates, and will accommodate in the future, a large amount of truck traffic. Areas of roadway congestion within the region were identified by utilizing information from the SAM as well as existing traffic counts. Areas of congestion were found to be concentrated in the urban areas of the cities of Amarillo, Lubbock, Midland, and Odessa, as well as along IH 27, IH 40, Loop 335, Loop 289, U.S. 62, IH 20, and SH 385.

Areas with high volumes of truck movements were identified for the purpose of revealing potential safety and congestions issues. The interaction of heavy truck traffic with local traffic can often cause bottleneck and safety issues and should be accounted for when developing potential improvement alternatives for the region. Areas of heavy truck traffic are consistent with the locations of roadway congestion listed above. Industries such as feed yards, dairy plants, peanut processing plants, ethanol plants, and an intermodal facility in Amarillo, as well as the Reese Technology Center in Lubbock are heavily dependent on truck movement and will encourage growth within the West Texas region.

It was also determined that several bottlenecks occur due to at-grade roadway-railroad crossings. Not only does congestion caused by at-grade crossings effect truck movement, it also increases the response time for emergency vehicles. Urban areas such as the cities of Amarillo, Lubbock, Midland, and Odessa are typical locations where significant delay and safety hazards may be associated with at-grade crossings.

Rail Freight Movements and Commodities

Much like the truck movements described in the previous section, rail freight movements are also growing. Table 3-4 illustrates that the West Texas region will continue to import a great deal of commodities through the year 2025. While a modest increase in rail freight movement will occur internally to the region, approximately 32.1 million additional tons were projected to be transported between the West Texas region and the rest of the U.S. and Mexico. An additional 8.2 million tons were projected to be transported between the West Texas region and other Texas counties.

Annual Rail Tons				
Origin	**Termination**	**2004**	**2025**	**Percent Change**
Internal to Internal				
West Texas Region	West Texas Region	109,518	277,157	153%
Internal to External				
West Texas Region	Other Texas Counties	3,135,702	7,854,258	150%
West Texas Region	Western U.S.	1,097,199	2,792,328	154%
West Texas Region	Northern U.S.	1,744,057	4,409,260	153%
West Texas Region	Eastern U.S.	179,051	455,314	154%
West Texas Region	Mexico	223,760	569,469	154%
External to Internal				
Other Texas Counties	West Texas Region	2,330,766	5,807,446	149%
Western U.S.	West Texas Region	6,114,749	15,498,131	153%
Northern U.S.	West Texas Region	9,643,047	24,228,151	151%
Eastern U.S.	West Texas Region	894,081	2,247,909	151%
Mexico	West Texas Region	1,181,932	2,985,868	153%
Total		**26,653,863**	**67,125,289**	**152%**

*Source: Statewide Analysis Model based on 2004 Surface Transportation Board Waybill Data

Table 3-4: Annual Rail Tons in the West Texas Region

Rail Freight Movements within the State

Unlike truck freight, rail movements are somewhat limited in their ability to deliver door to door service and are dependent upon intermodal centers, rail yards, and ports of entry as the primary locations in which rail freight can be either sent or received. Figure 3-8 illustrates the origins and destinations for freight rail movements occurring in 2004, while Figure 3-9 shows projected rail movements in 2025. Harris, Galveston, Titus, Brown, Tarrant and Dallas Counties appear to be handling the largest movements to and from the West Texas region in the future.

The major rail lines coming to and from the West Texas region are UP and BNSF. UP primarily serves the Odessa District, while BNSF provides rail lines in the Amarillo and Lubbock Districts. A significant amount of rail tonnage travels between Brown County and the West Texas region as a result of the BNSF line that travels through Brownwood. The largest rail tonnage shipments occur between Harris County and the West Texas region. Additionally, large tonnages are shipped by rail between the Amarillo and Lubbock Districts and the U.S.-Mexico border. Accommodating these and other locations with freight rail service will be critical to the future of Texas in terms of economic growth and also providing options to shift truck cargo to rail cars.

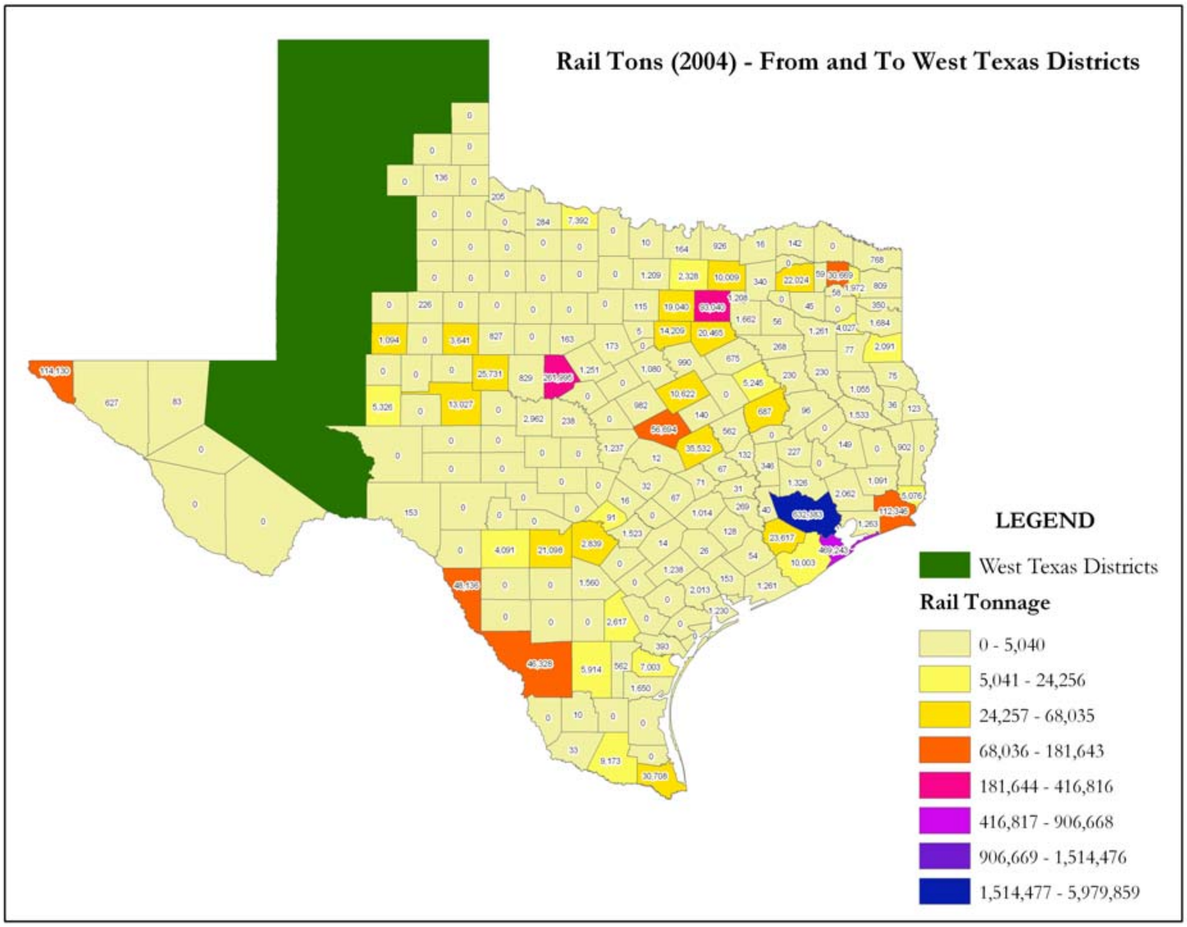


Figure 3-8: 2004 Rail Freight Movements

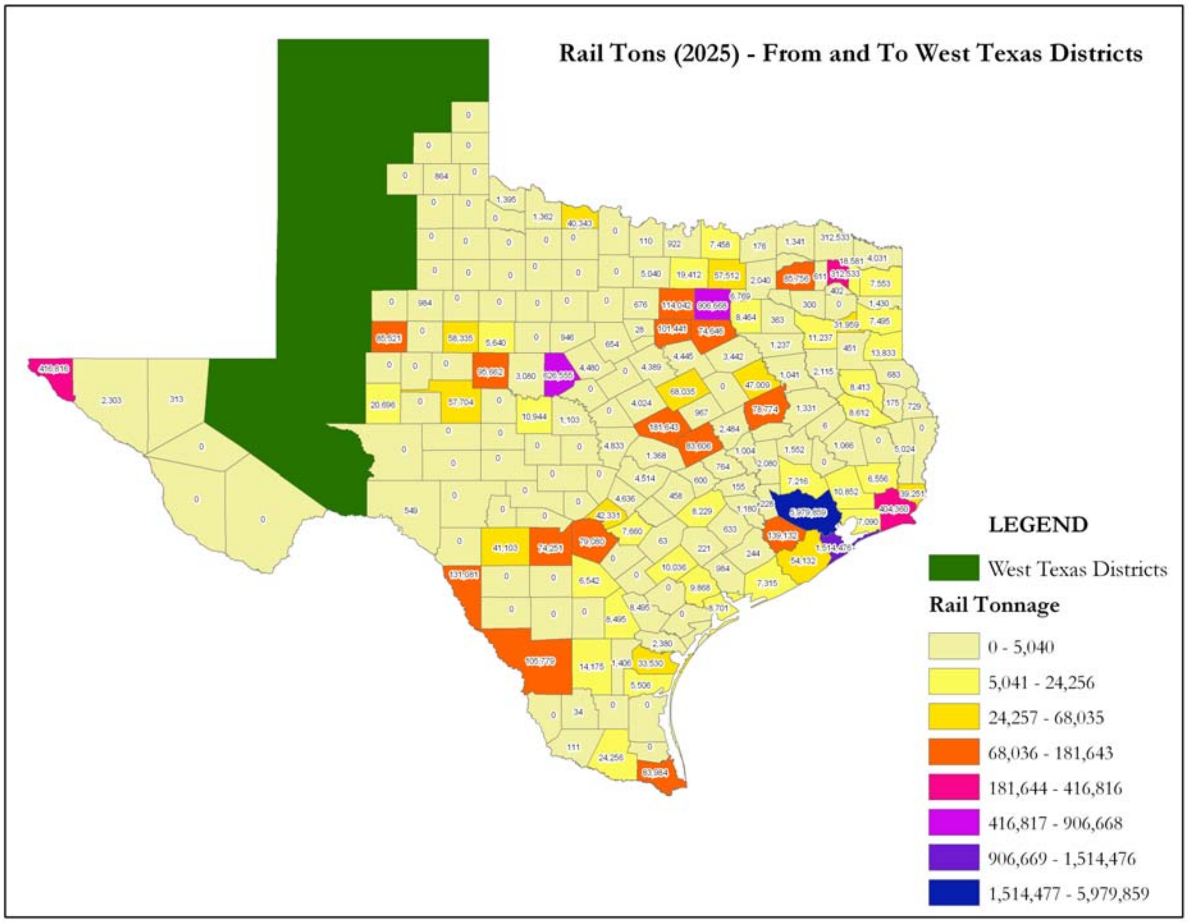


Figure 3-9: 2025 Rail Freight Movements

Rail Freight Movements Outside of the State

Rail freight is most effective when carrying long haul cargo. The cost effectiveness of utilizing rail to transport cargo over long distances has lead to the continued growth of tonnage movement between the West Texas region and locations outside of the state. Figures 3-10 and 3-11 illustrate that major rail freight movements are occurring from New Mexico, Oklahoma, Arkansas, and more moderately from Louisiana, and Mexico and are projected to continue to grow. These growth opportunities will need to be accommodated and strategic planning will need to occur to capitalize on these markets.

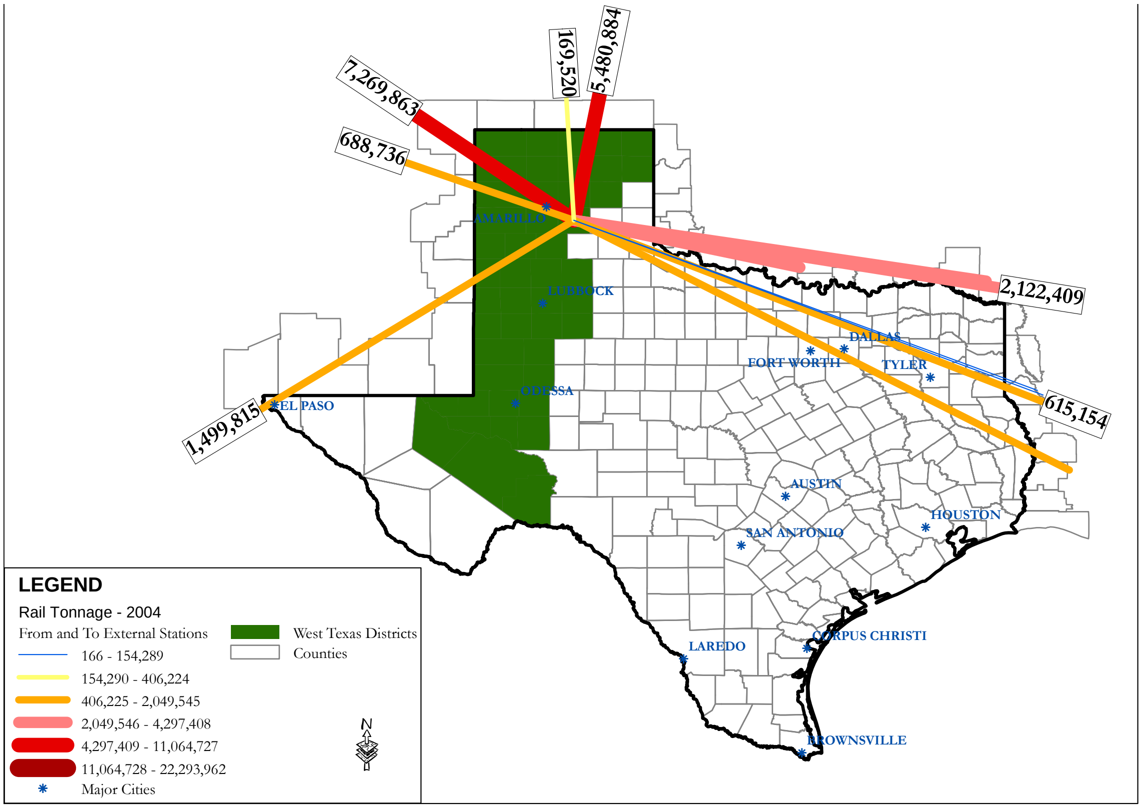


Figure 3-10: 2004 Freight Rail between West Texas and Outside of Texas

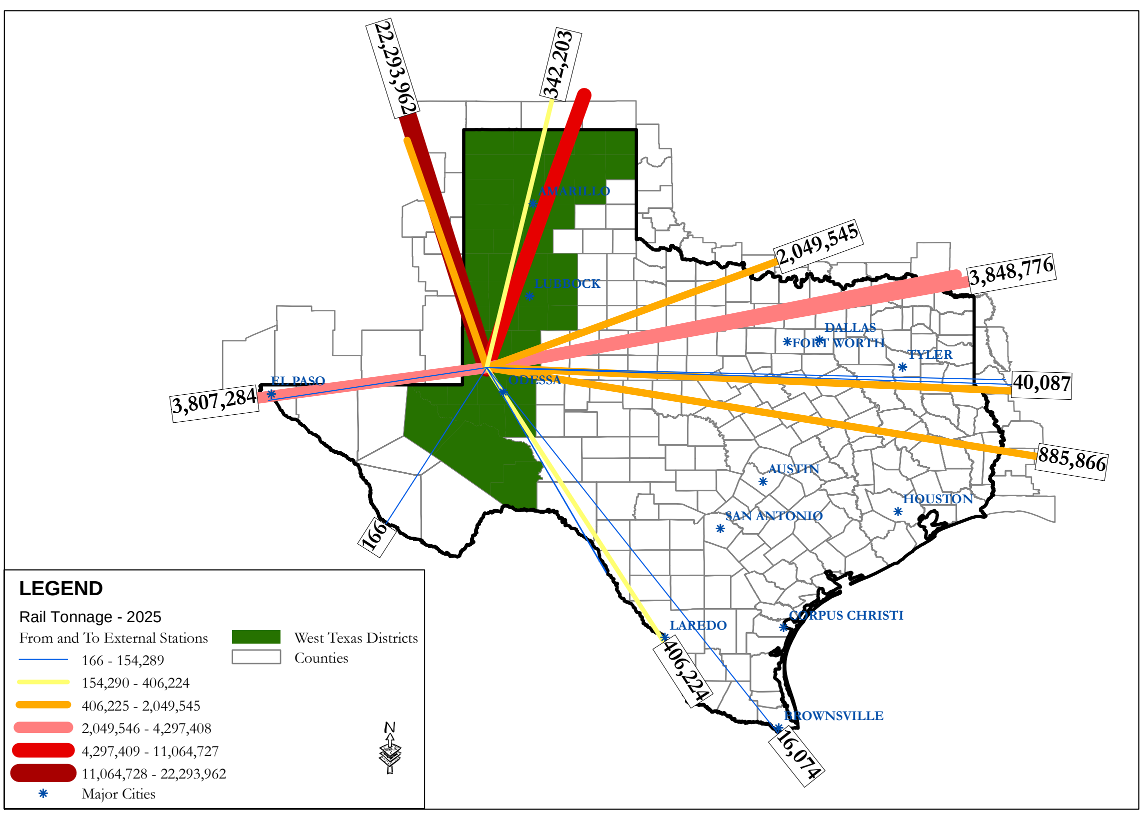


Figure 3-11: 2025 Freight Rail between West Texas and Outside of Texas

Freight Rail Commodity Trends

Unlike truck freight growth trends, rail freight growth depends largely on the type of commodity being shipped. Table 3-5 shows a comparison between 2004 and 2025 rail commodities. As previously mentioned, the overall tonnage is projected to more than double between 2004 and 2025. The commodity with the largest tonnage increase is raw materials which accounts for the coal movement through the region. The agriculture industry is projected to increase approximately 151 percent due to growth in corn grain, ethanol plants, feed supplements, dairy and cotton. Food was also projected to result in high growth rates. Raw materials, agriculture and food account for approximately 80 percent of the total rail tonnage movements. Although high percentages of growth are projected for wood, building materials, textiles, machinery, chemical/petroleum and secondary products; they result in a small portion of the overall rail movement. Secondary rail commodities include hazardous materials and products that are transferred at intermodal facilities, which include containerized or packaged products. The majority of the secondary rail commodities occur in the Amarillo District.

Commodity	Rail Tons		
	2004	2025	% Increase
Building Materials	720,898	1,852,179	156%
Wood	524,289	1,347,039	157%
Agriculture	6,073,340	15,259,303	151%
Textiles	180,224	463,045	157%
Chemical/Petroleum	1,330,312	3,468,060	161%
Food	4,397,936	11,049,840	151%
Machinery	212,993	547,235	157%
Raw Materials	10,695,692	26,596,177	149%
Secondary	2,518,180	6,542,413	160%
TOTAL	26,653,863	67,125,289	152%

Table 3-5: Rail Freight Commodity Growth

Figures 3-12 and 3-13 display the commodities being moved by rail within the West Texas region for 2004 and 2025. The relative percentages of each commodity do not significantly change from 2004, as shown in Figure 3-13, to 2025. Figure 3-14 provides a correlation of similar information, although on a national level for the year 2000.

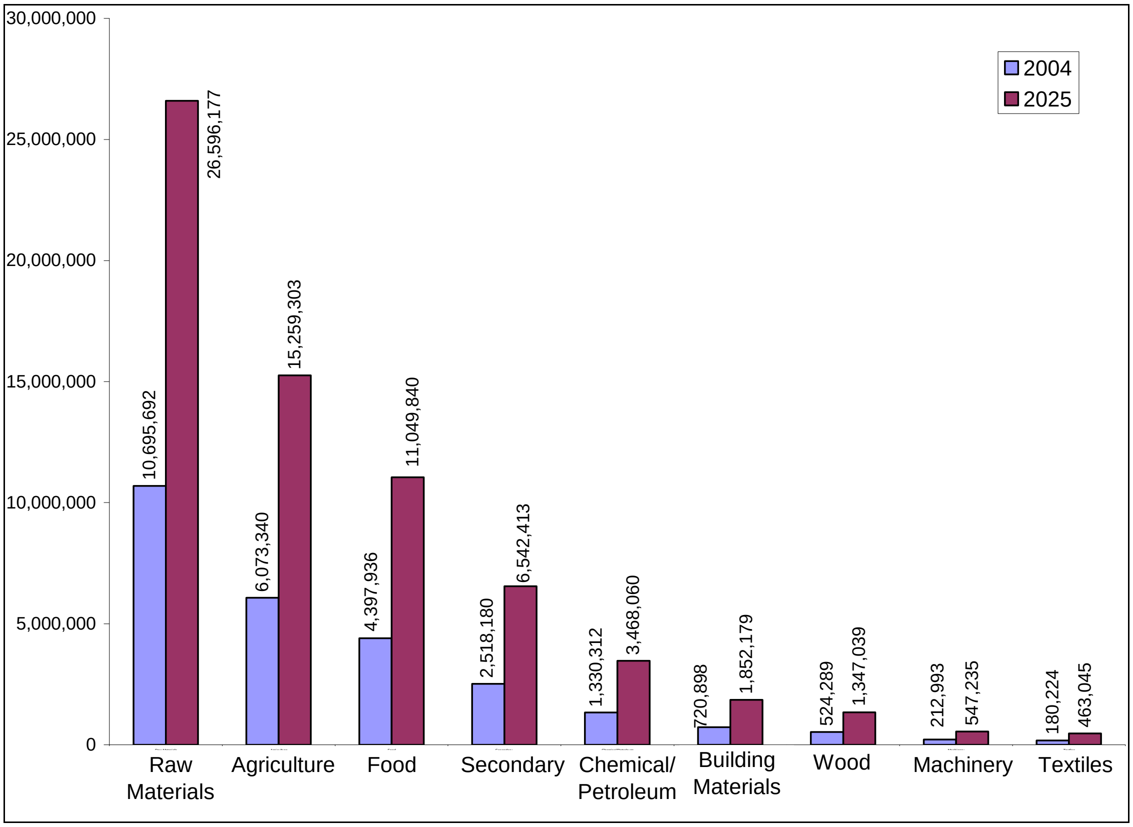


Figure 3-12: Total Freight Rail Tons by Commodity

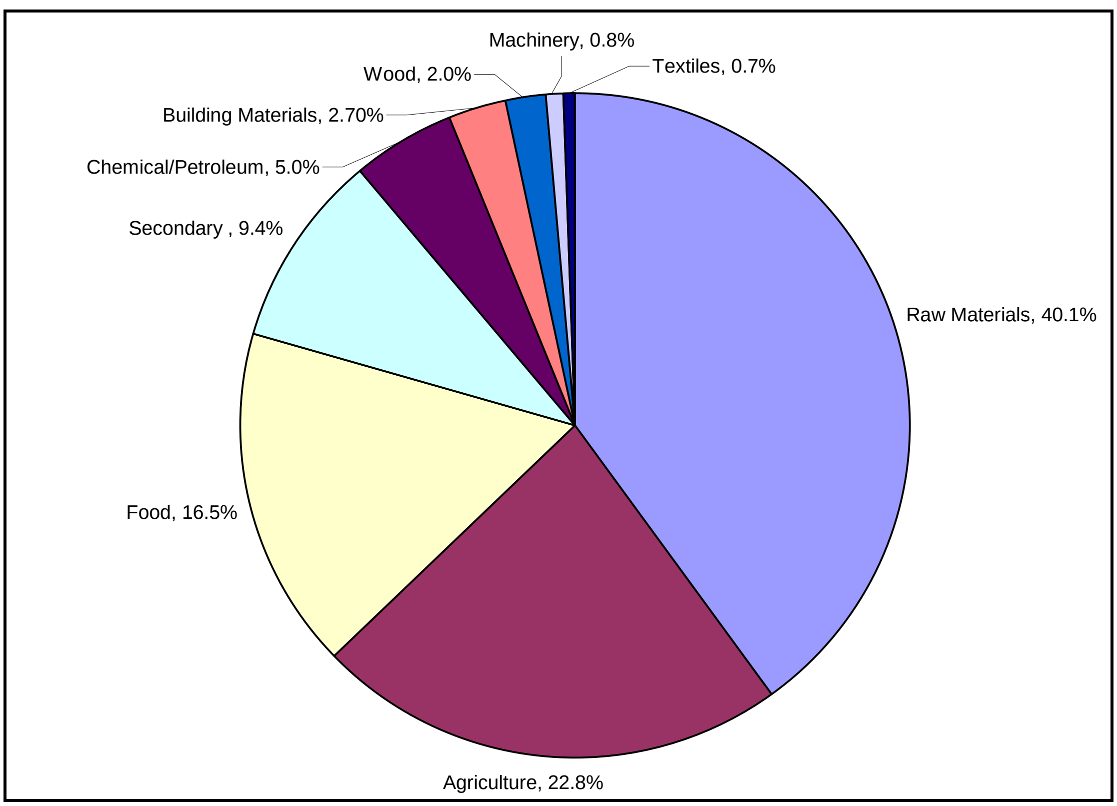


Figure 3-13: Percentage of Freight Rail Tons by Commodity (2004)

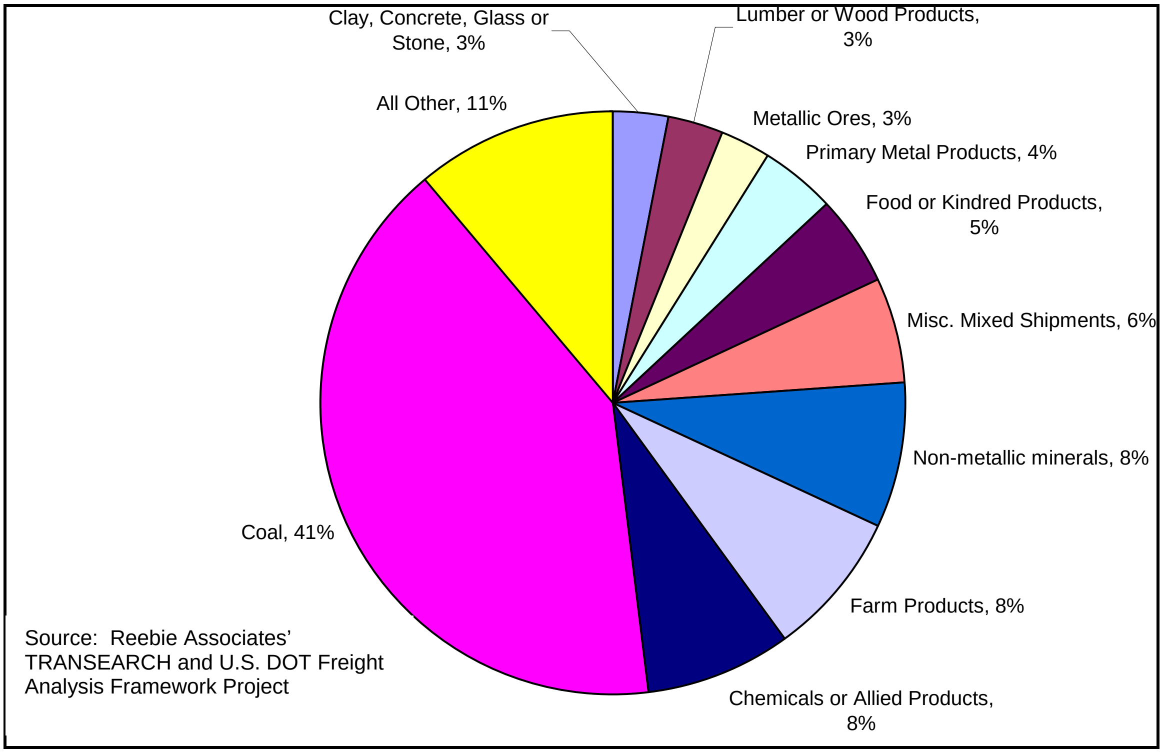


Figure 3-14: Percentage of Freight Tonnage by Commodity – National (2000)

The challenge to accommodate the forecasted growth in rail freight will be planning for new or expanded rail facilities that can capitalize on the growth markets. These new facilities must be planned in a way that allows for the ability to shift the truck cargo burden to rail cars. The percent growth is one way to analyze data; however, examining the percentage that each commodity has on the market is equally important. While growth occurs for all commodity groups analyzed, raw materials, food and agriculture remain the predominate commodities for the West Texas region.

Analyzing the trends in commodity movements aids in further understanding the trip generation and distribution of rail freight movements. In general, railways are best suited to hauling large, heavy, low-value loads that are not overly time-sensitive over distances greater than 300 to 400 miles.

Rail Freight Findings Summary

- Freight tonnages moved by rail will more than double by 2025.
- Raw materials, agriculture, and food constitute a majority of the freight rail tonnage for existing and future years.
- Rail shipments originating from other states and from Mexico are projected to constitute approximately 67 percent of total rail shipments within the West Texas region

Rail and Truck Freight Comparison

The increases of both rail and truck tons are substantial and will need to be addressed through additional infrastructure. Table 3-6 and Figure 3-15 provide the total truck and rail tons transported in West Texas. The increase between 1998 and 2025 for truck tons represents a 98 percent increase as opposed to rail tonnage increase of 152 percent. Although the rail freight percent change is higher, a larger amount of tonnage was projected to be transported via trucks in 2025. The percentages of rail freight to truck freight change from 31/69 in 2004 to 36/64 in 2025, showing an increase in the relative percentage of rail freight to truck freight in the future. The investment in highway construction has made it more convenient and quicker for trucks to carry long haul cargo. With similar investments made to rail infrastructure, more cost effective long haul trips can be realized for rail.

	Truck	Rail
1998 (Truck), 2004 (Rail)	60,136,643	26,653,863
2025	119,257,357	67,125,289
Percent Increase	98%	152%

Table 3-6: Rail and Truck Tons Comparison

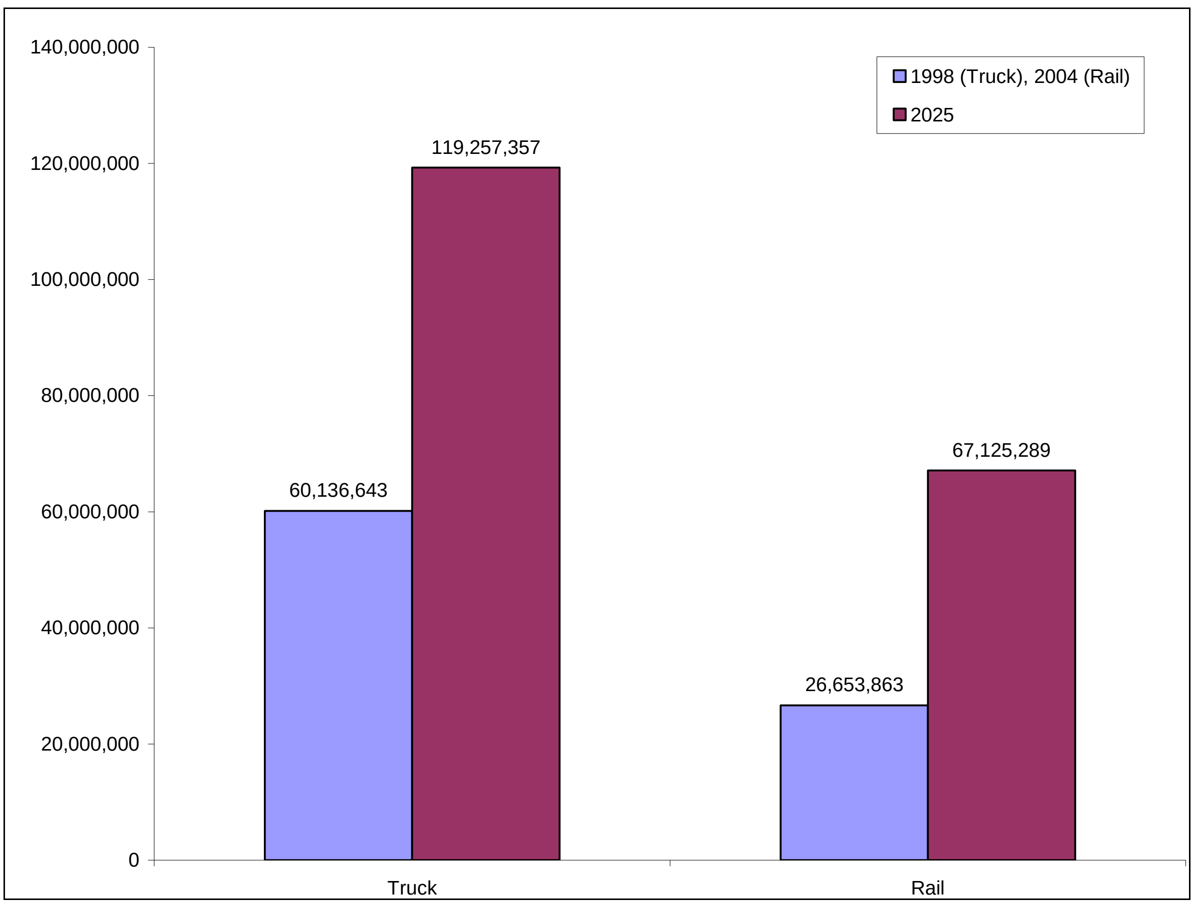


Figure 3-15: Total Rail / Truck Tons

TxDOT - Amarillo District

Truck freight flows and commodities as well as rail freight flows and commodities were analyzed for the Amarillo District in order to determine the future situation for truck and rail freight activity within the District. The analysis also identified existing and projected locations of congestion for the region. The following summary of truck and rail freight movement for the Amarillo District provides data that is specific to this District. Additional characteristics of the District that are consistent with the other West Texas Districts are included in the overview discussion of the West Texas Region.

Anticipated roadway improvements based on future growth and mobility needs, as provided by TxDOT were incorporated into the analysis. Table 3-7 and Figure 3-16 depict the anticipated roadway improvements updated in the SAM to reflect projects cited in the District's list of planned projects.

Road Name	From	To	Existing Lanes	Future Lanes
U.S. 87	FM 296	Chestnut St	2	4
U.S. 87	FM 1727	I mile north of Ranch Rd 1879	2	4
U.S. 54	Dallam/Hartley County Line	FM 0695	2	4
U.S. 54	Dallam/Sherman County Line	Ranch Rd 3213	2	4
U.S. 54	Dallam/Sherman County Line	FM 119	2	4
SS 246	SH 207	SS 119	2	4
U.S. 87	FM 2589	U.S. 287	2	4
U.S. 87	FM 3138	U.S. 385	2	4
U.S. 54	Dallam/Hartley County Line	Hartley/Quay County Line	2	4
IH 27	U.S. 60	SW 45th Ave	4	6
FM 1541	SL 335	SW 58th Ave	2	4
E 34th Ave	S Grand St	Eastern St	2	4
S Pullman Rd	SS 468	IH 40	2	4
IH 40	S Washington St	E 20th Ave	4	6
BI 40D	SL 335	N Hughes St	4	6
SW 9th Ave	SL 335	Coulter St	2	4
RM 1061	Diamond Ct	RM 2381	2	4
SL 335	FM 2176	Hester Dr	2	4
N Western St	W St. Francis Ave	FM 2176	2	4
IH 27 (Ports to Plains)	SW 45th Ave	SL 335	4	6
IH 27 (Ports to Plains)	SL 335	FM 2219	4	6

Table 3-7: Future Network Improvements

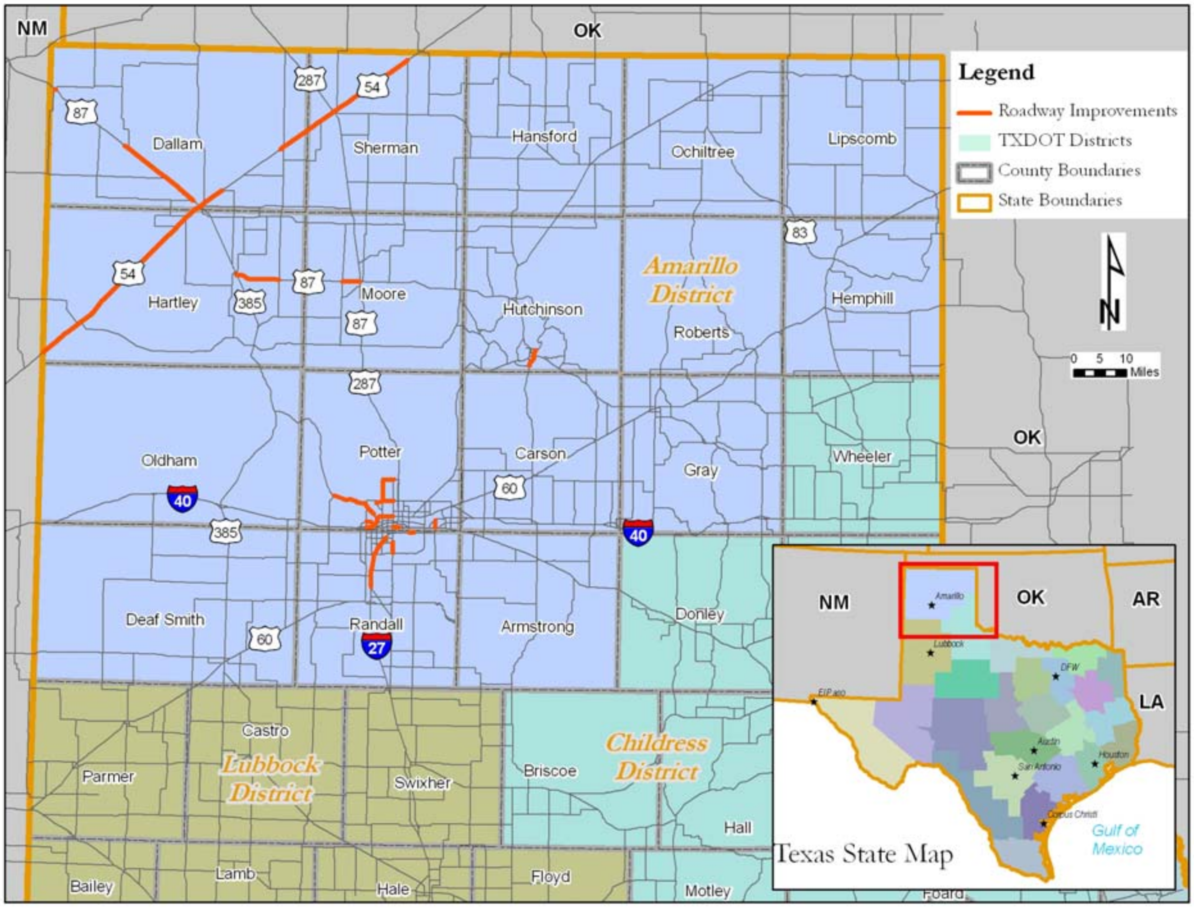


Figure 3-16: Future Roadway Improvements for Amarillo District (1998 to 2025)

Truck Freight Movements and Commodities

Table 3-8 illustrates that while the movement of truck tons within the Amarillo District will increase by nearly 300,000 tons, it pales in comparison to the increased movements coming into (10.1 million) and out of (15.1 million) the Amarillo District. The overall truck tonnage transported within, into, and out of the Amarillo District is projected to increase by 95 percent by 2025.

Annual Truck Tons				
Origin	**Termination**	**1998**	**2025**	**Percent Change**
Internal to Internal				
Amarillo District	Amarillo District	508,510	806,577	59%
Internal to External				
Amarillo District	Other Texas Counties	11,277,477	23,498,552	108%
Amarillo District	Western U.S.	794,920	1,438,181	81%
Amarillo District	Northern U.S.	1,912,657	3,460,407	81%
Amarillo District	Eastern U.S.	288,463	521,891	81%
Amarillo District	Mexico	500,729	905,926	81%
External to Internal				
Other Texas Counties	Amarillo District	8,435,620	14,950,215	77%
Western U.S.	Amarillo District	715,034	1,543,575	116%
Northern U.S.	Amarillo District	1,720,442	3,713,994	116%
Eastern U.S.	Amarillo District	259,473	560,137	116%
Mexico	Amarillo District	450,408	972,315	116%
	Total	**26,863,734**	**52,371,771**	**95%**

*Source: Statewide Analysis Model based on 1998 Reebie Transearch Data, Wharton Economic Forecasting Associates and Latin American Trade Transportation Study

Table 3-8: Truck Freight Movements for the Amarillo District

Truck Movements within the State

Figures 3-17 and 3-18 show the existing and projected truck tonnage movement between the Amarillo District and other Texas counties. Figure 3-17 illustrates that in 1998 large numbers of trucks moved between the Amarillo District and Houston, San Antonio, the Dallas - Fort Worth metroplex, El Paso, Austin, and areas along the U.S.-Mexico border. Specifically, major truck movements for trips going to and from the Amarillo District occur on the IH 35 corridor between Dallas and San Antonio. Figure 3-18 shows continued growth of truck traffic between the Amarillo District and the large urban areas of Houston, San Antonio, Dallas - Fort Worth, El Paso and Austin in the future.

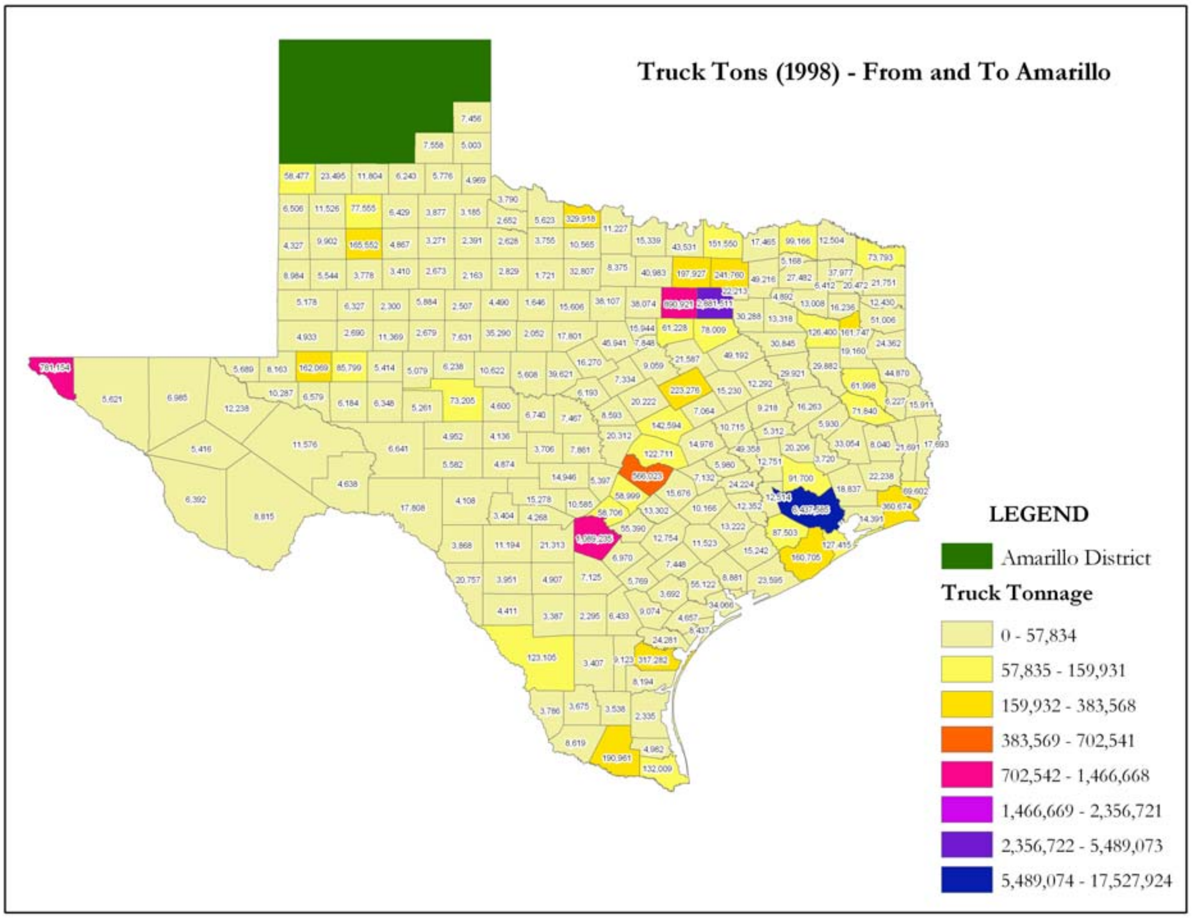


Figure 3-17: 1998 Truck Movements within Texas To and From the Amarillo District

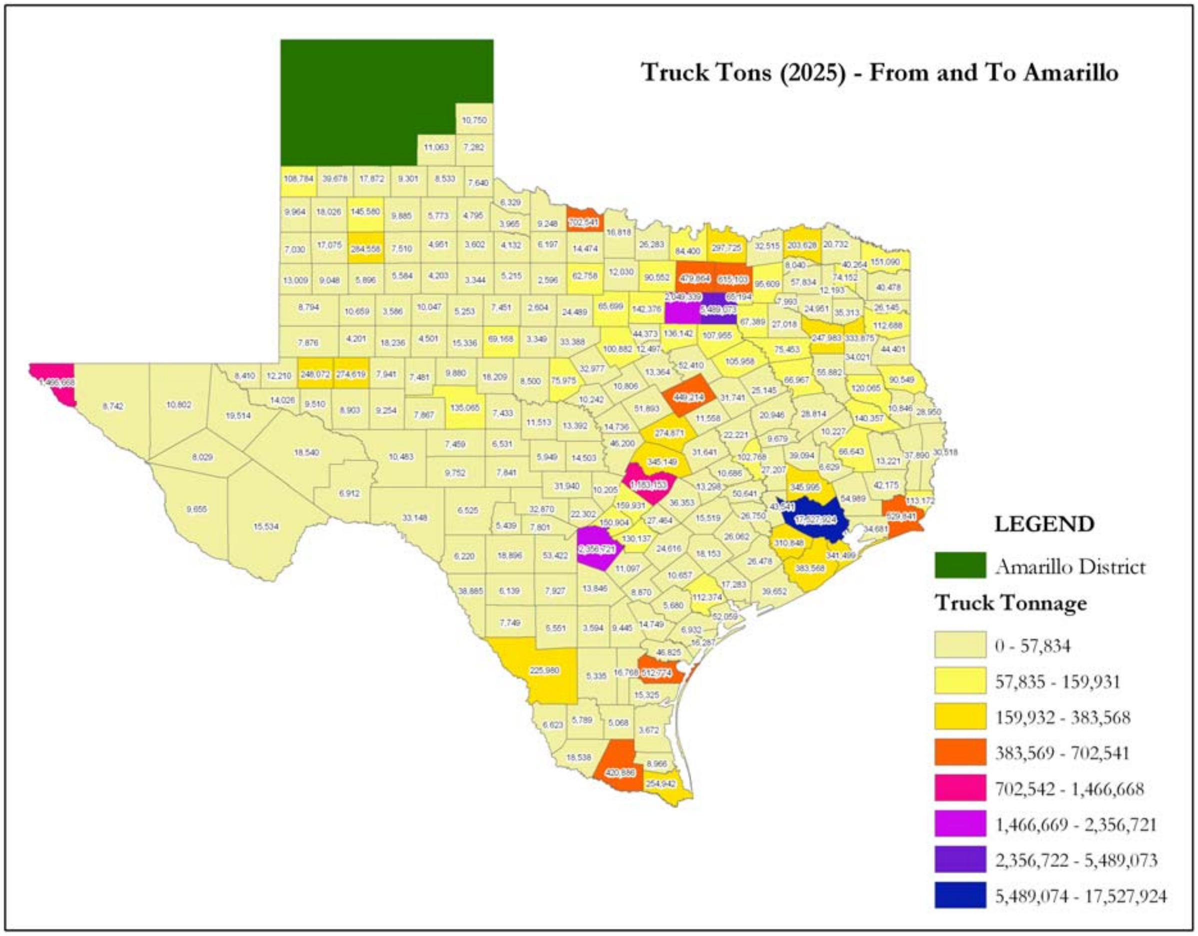


Figure 3-18: 2025 Truck Movements within Texas To and From Amarillo District

Truck Movements Outside of the State

Major movements in 1998 can be seen from/to Oklahoma, Arkansas, New Mexico, Louisiana, and Mexico as shown in Figure 3-19. Figure 3-20 clearly demonstrates increased movement from/to Oklahoma, New Mexico, Louisiana, and Mexico to the Amarillo District by the year 2025.

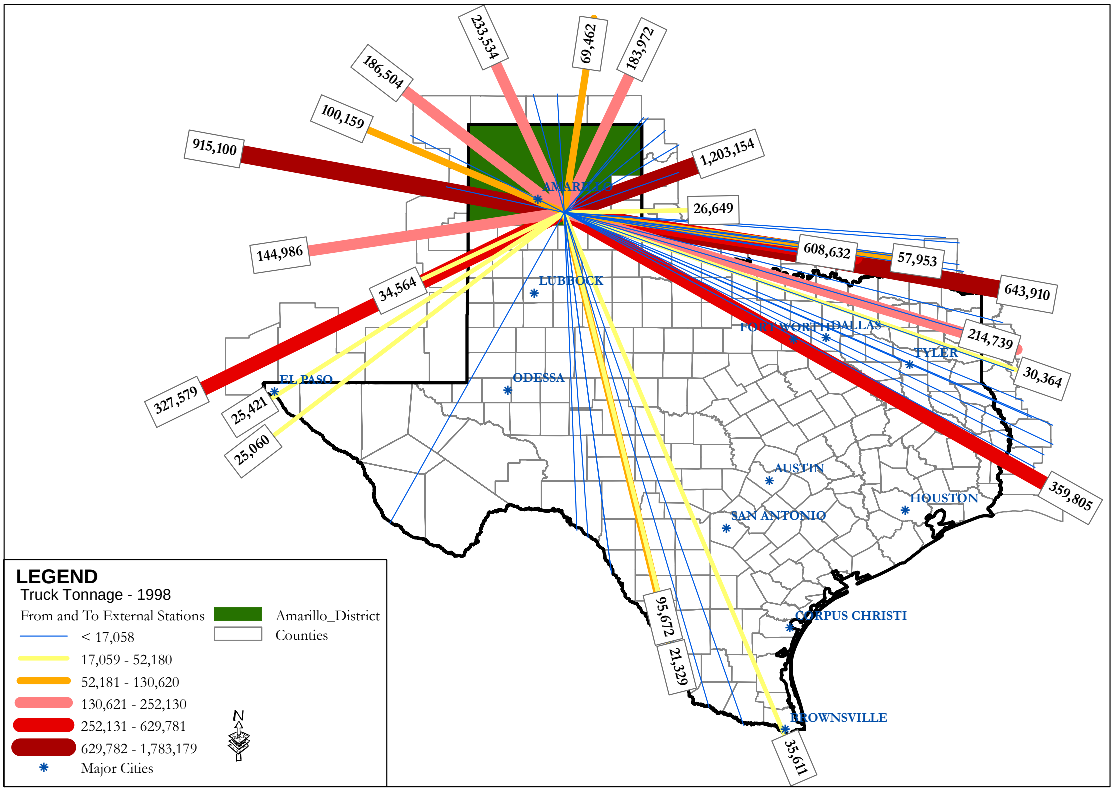


Figure 3-19: 1998 Truck Movements between the Amarillo District and Outside Texas

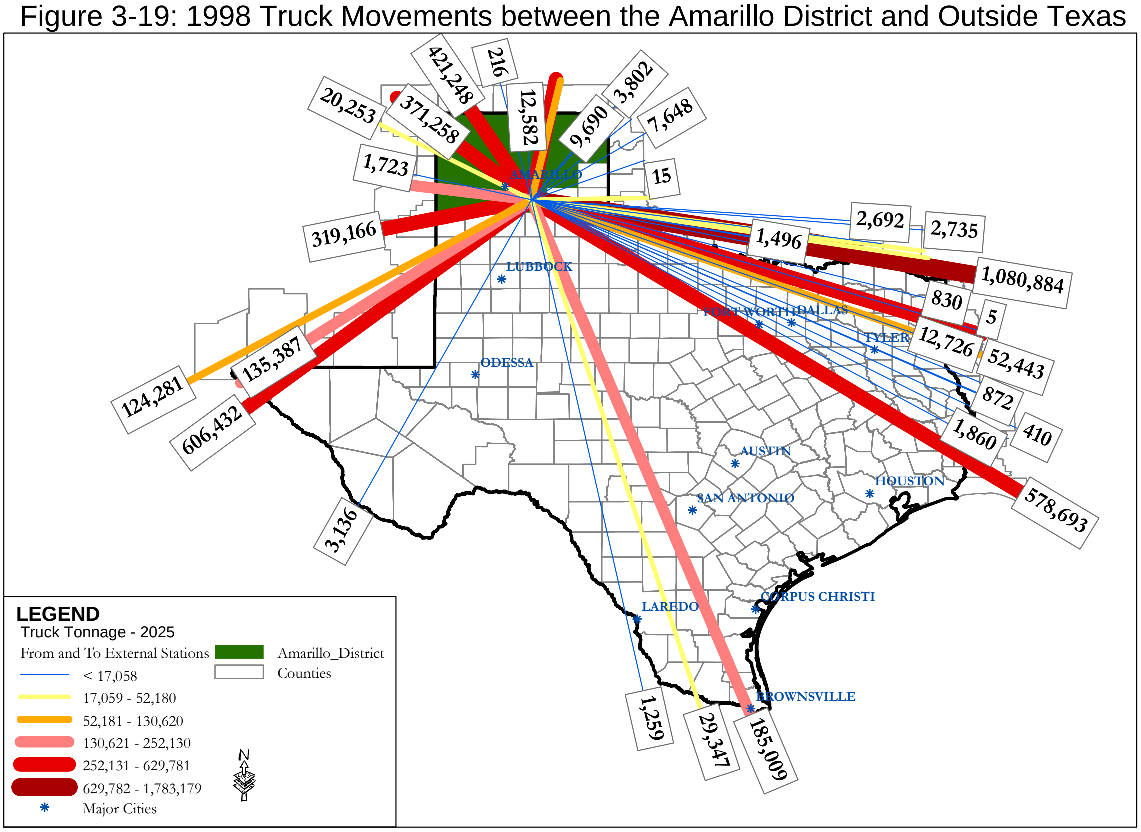


Figure 3-20: 2025 Truck Movements between the Amarillo District and Outside Texas

Truck Commodity Trends

Table 3-9 indicates that food products will be the fastest growing commodity in terms of increased tonnage from 1998 to 2025 and produce the largest total tonnage both now and in the future. While agriculture, textiles, and machinery are projected to produce much lower tonnages, they are expected to result in the highest percentages of increase.

Commodity	Truck Tons		
	1998	2025	% Increase
Building Materials	4,304,242	10,702,941	149%
Wood	2,055,275	4,122,721	101%
Agriculture	69,057	172,577	150%
Textiles	149,083	385,195	158%
Chemical/Petroleum	6,895,602	8,452,520	23%
Food	8,953,234	19,803,458	121%
Machinery	212,975	565,653	166%
Raw Materials	938,927	1,476,720	57%
Secondary	3,285,339	6,689,982	104%
TOTAL	**26,863,735**	**52,371,767**	**95%**

Table 3-9: Truck Commodity Growth

The leading products moving by truck (in terms of tonnage percentage in the District) are food, building materials, chemical/petroleum products, and secondary products. It was projected that these four commodities will make up approximately 88 percent of the commodities moved by truck within, out of, and into the Amarillo District by 2025.

As determined from recent interviews with economic development groups and industry professionals, the food and agriculture commodities are expected to show significant growth in areas dealing with corn grain, ethanol plants, distilled feed supplements, and the dairy industry. As of March 2007, one ethanol plant had been built near Stratford and two ethanol plants were planned for an area near Hereford. The city of Dalhart is another area experiencing high growth with additional new feed yards, dairy plants, and a cheese factory. These examples are just a sampling of the industry growth that is occurring in the Amarillo District.

Figures 3-21 and 3-22 display the commodities being moved by truck within the Amarillo District for both 1998 and 2025. The relative percentages of most commodities do not significantly change from 1998, as shown in Figure 3-22, to 2025. The only significant changes occur in the movement of chemical/petroleum products, which decreases from 25.7 percent in 1998 to 16.1 percent in 2025, building materials, which increases from 16 percent to 20.4 percent, and food products, which increases from 33.3 percent to 37.8 percent.

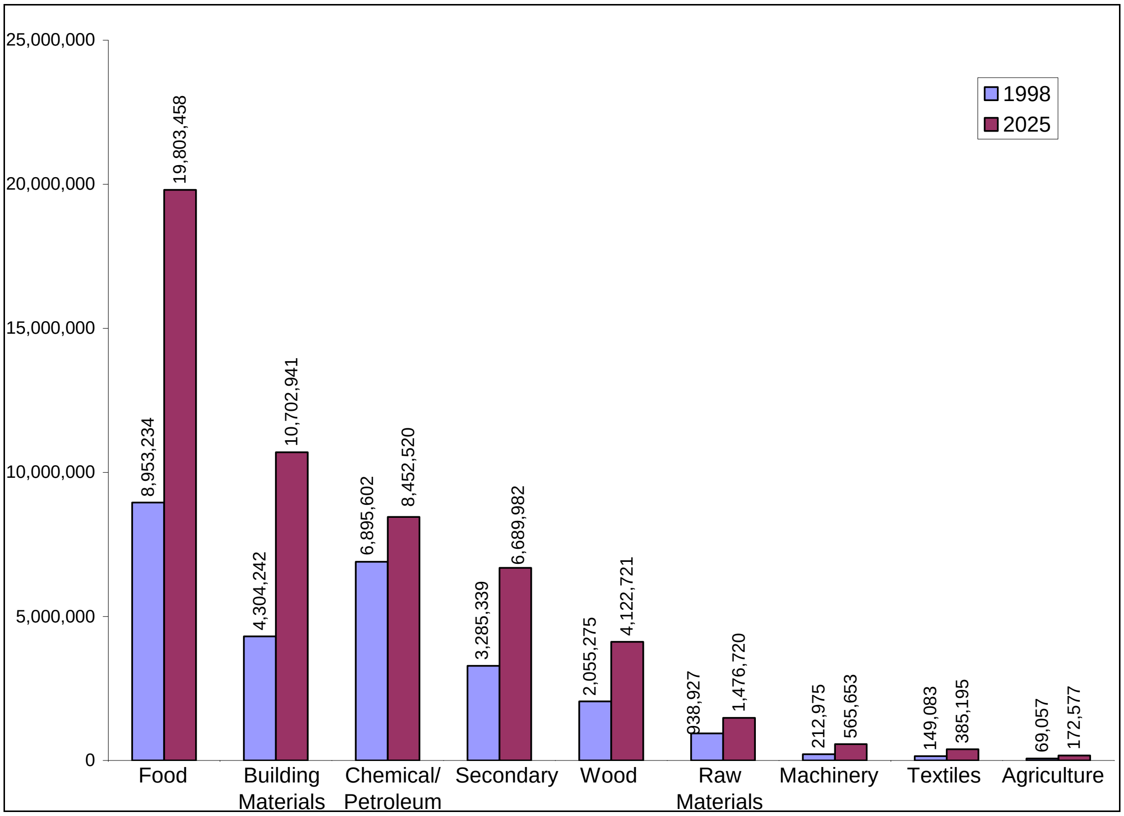


Figure 3-21: Total Truck Tons by Commodity

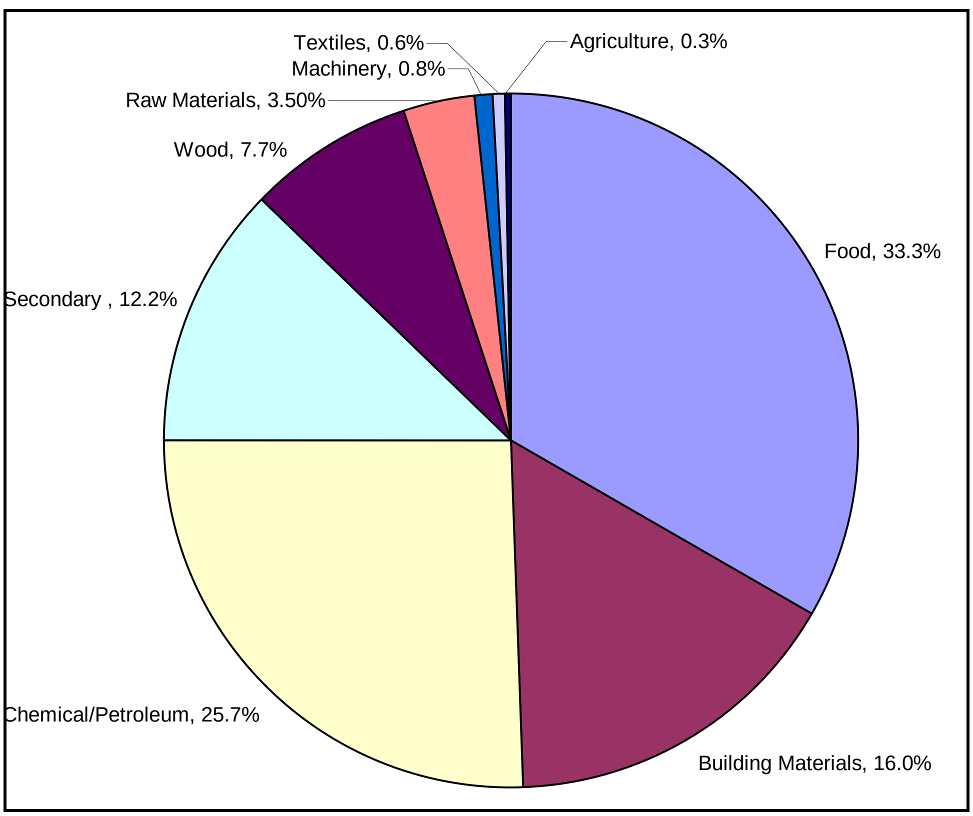


Figure 3-22: Percentage of Truck Tons by Commodity – 1998

Traffic Volume Analysis

Table 3-10 lists 2003 traffic data within the Amarillo District where permanent count stations shown in Figure 3-23 are located. Locations of the count stations are approximate and directional count stations were consolidated. The SAM was used to predict future 2025 truck volumes as shown in Table 3-11. The 2025 model includes planned improvements for the Amarillo District roadways as listed in Table 3-7 and shown in Figure 3-16.

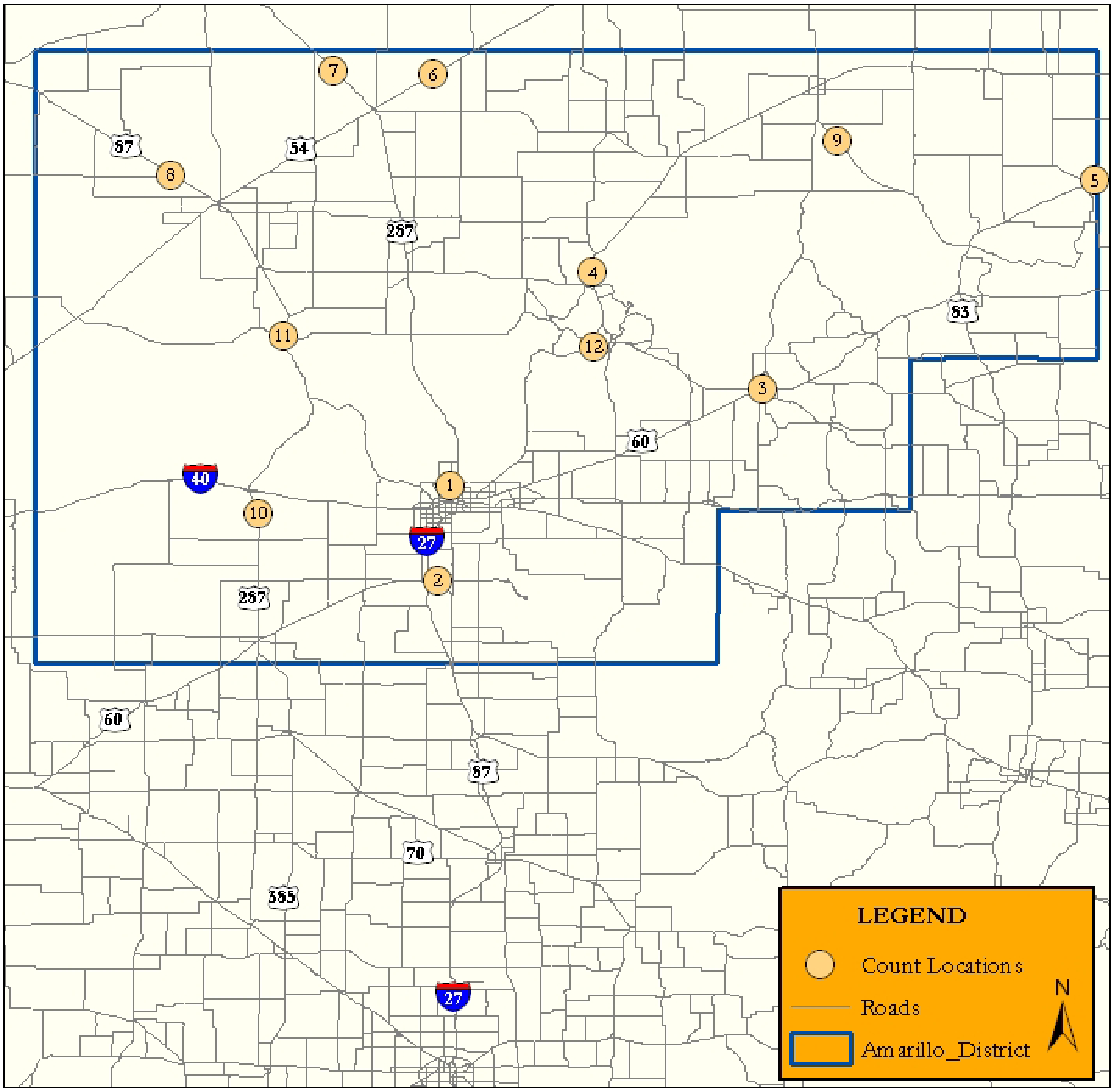


Figure 3-23: Permanent Count Locations

Location		2003				
		Total Volume	Percent Trucks	Truck Volume	Number of Lanes	V/C Ratio
1	FM 1541 S of Amarillo	7,300	6.8%	500	2	0.41
2	IH 27 E of Canyon	7,100	29.6%	2,100	4	0.09
3	U.S. 60 NE of Pampa	3,400	23.5%	800	4	0.07
4	SH 136 N of Stinnett	2,300	26.1%	600	2	0.10
5	U.S. 60 NE of Higgins	1,300	30.8%	400	2	0.05
6	U.S. 54 NE of Stratford	7,200	30.6%	2,200	2	0.30
7	U.S. 287 NW of Stratford	4,500	66.7%	3,000	4	0.09
8	U.S. 87 NW of Dalhart	10,000	21.0%	2,100	2	0.42
9	U.S. 83 S of Perryton	5,000	32.0%	1,600	4	0.10
10	U.S. 385 S of Vega	4,300	39.5%	1,700	2	0.18
11	U.S. 385 at Channing	6,100	31.1%	1,900	2	0.34
12	SH 136 W of Borger	16,400	10.4%	1,700	2	0.68

Table 3-10: 2003 Truck Traffic Volumes

Location		2025				
		Total Volume	Percent Trucks	Truck Volume	Number of Lanes	V/C Ratio
1	FM 1541 S of Amarillo	11,200	7.1%	800	2	0.70
2	IH 27 E of Canyon	11,000	29.1%	3,200	4	0.18
3	U.S. 60 NE of Pampa	5,300	22.6%	1,200	4	0.11
4	SH 136 N of Stinnett	3,500	28.6%	1,000	2	0.20
5	U.S. 60 NE of Higgins	2,000	35.0%	700	2	0.08
6	U.S. 54 NE of Stratford	11,200	30.4%	3,400	2	0.07
7	U.S. 287 NW of Stratford	6,900	66.7%	4,600	4	0.17
8	U.S. 87 NW of Dalhart	15,400	21.4%	3,300	4	0.10
9	U.S. 83 S of Perryton	7,700	32.5%	2,500	4	0.19
10	U.S. 385 S of Vega	6,600	39.4%	2,600	2	0.33
11	U.S. 385 at Channing	9,400	31.9%	3,000	2	0.67
12	SH 136 W of Borger	25,400	10.2%	2,600	2	1.06

Table 3-11: 2025 Truck Traffic Volumes

Figures 3-24 and 3-26 show the areas of congestion throughout the District, while Figures 3-25 and 3-27 highlight the areas of congestion in the city of Amarillo for years 1998 and 2025, respectively.

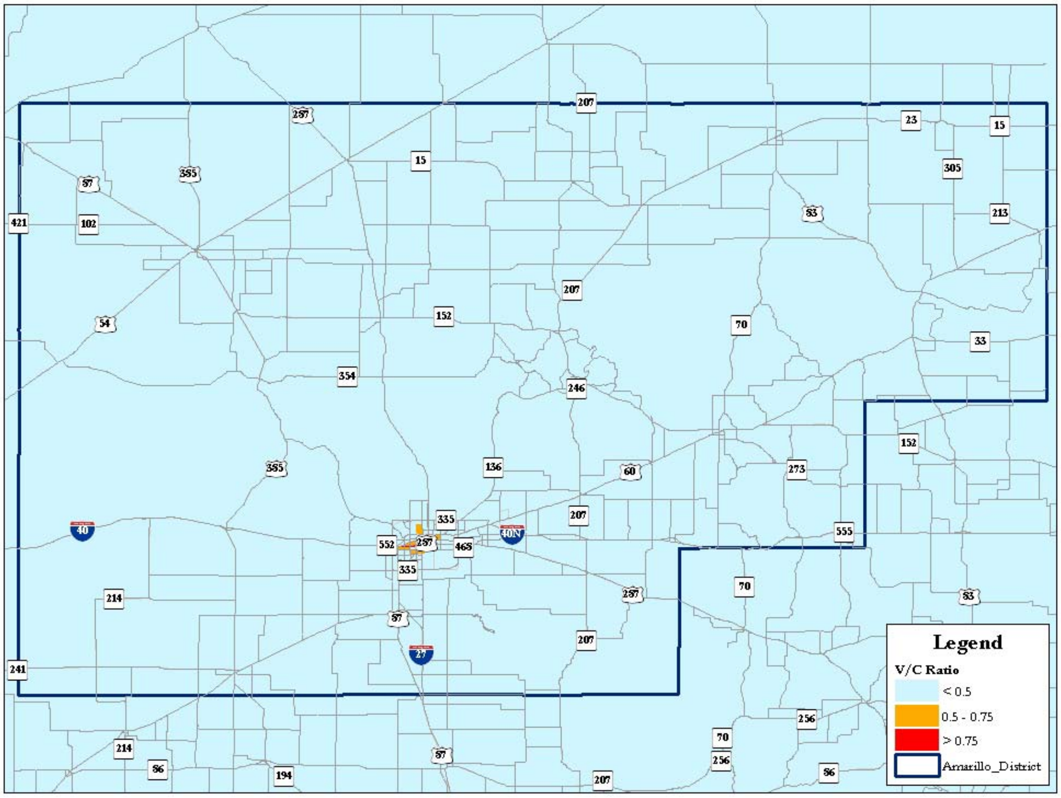


Figure 3-24: 1998 Areas of Congestion for Amarillo District (based on SAM modeling)

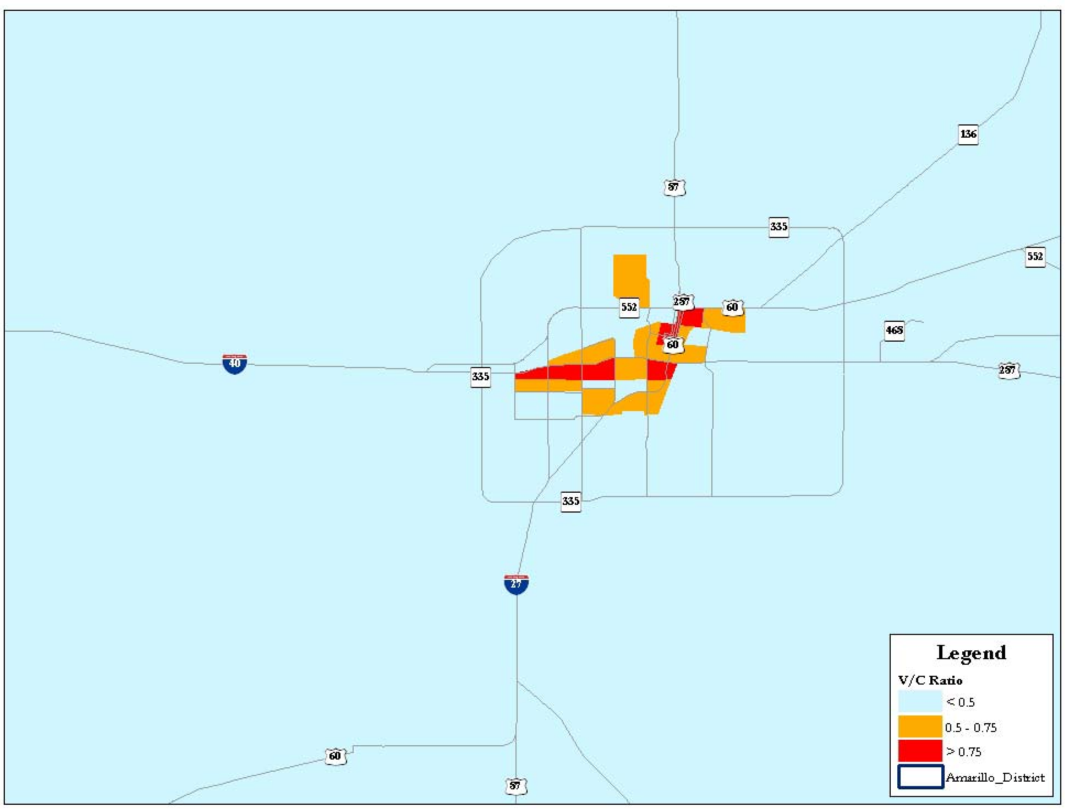


Figure 3-25: 1998 Areas of Congestion for City of Amarillo (based on SAM modeling)

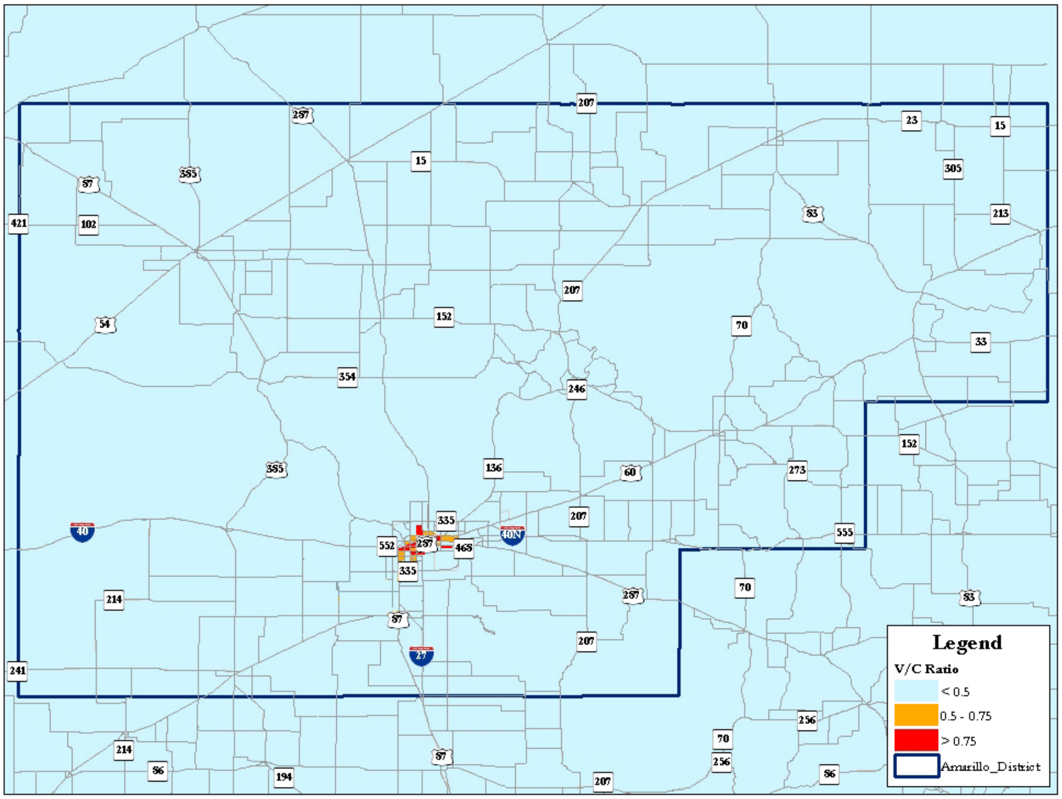


Figure 3-26: 2025 Areas of Congestion for Amarillo District (based on SAM modeling)

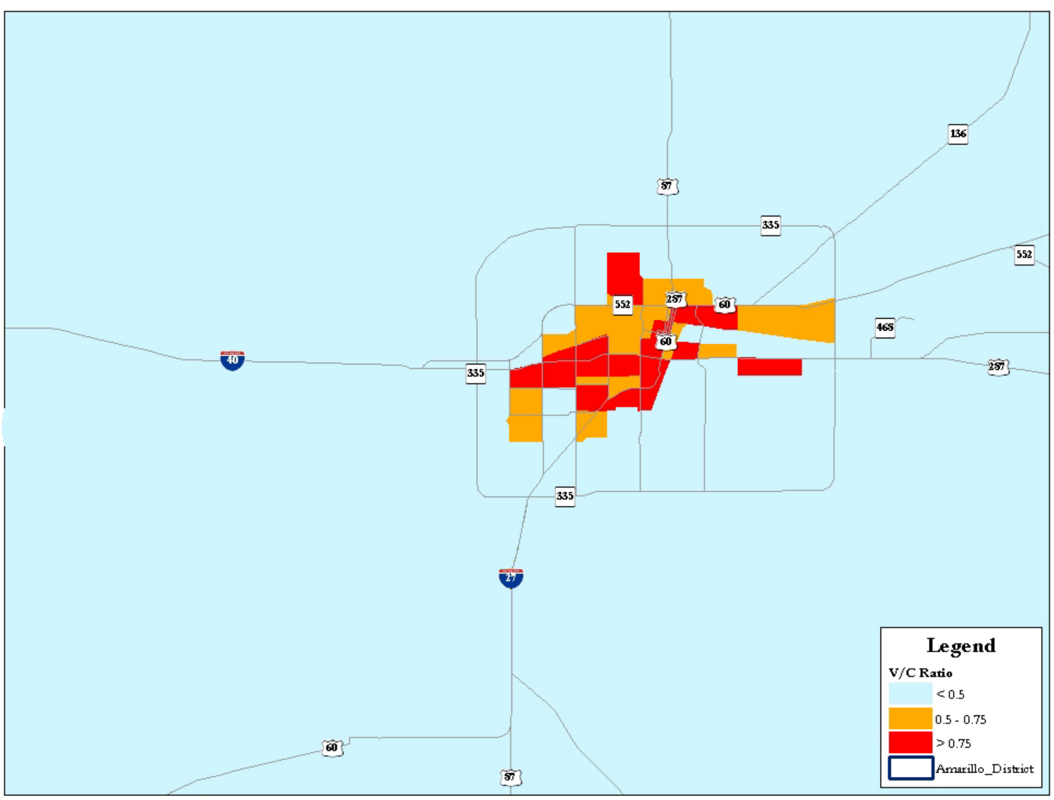


Figure 3-27: 2025 Areas of Congestion for City of Amarillo (based on SAM modeling)

The traffic analysis projected that the majority of the District would experience low congestion levels in the future; while portions of the city of Amarillo will endure more severe congestion. Traffic volumes along freeways such as IH 27 and IH 40 will continue to grow and congestion will continue to increase if capacity improvements are not implemented. No improvements were planned for IH 27 in this area as of March 2007. The analysis revealed specifically that the area along IH 40 between the east and west ends of Loop 335 would be severely congested by 2025.

Additionally, major arterials and highways connecting to the interstate freeways through the city also showed a heightened level of congestion in future years. The area of congestion along Business 40 increased west of U.S. 287 for 2025. Areas of U.S. 287 east of Amarillo showed an increase from low to moderate congestion level while the southeastern portion of Loop 335 increased from moderate to severe congestion between 1998 and 2025.

Many new businesses have relocated to the Amarillo District. For instance, new industries such as feed yards, dairy plants, and a new cheese factory were located to Dalhart. These industries are heavily dependent on truck movement, which will only encourage growth.

The count station traffic data shown in Tables 3-10 and 3-11 revealed heavy truck traffic in several areas within the District. A large percentage of the traffic on local roadways is composed of heavy trucks due to the intermodal facility located in the city of Amarillo. Additionally, approximately 30 percent of the traffic traveling along IH 27 south of Amarillo consists of trucks. The truck traffic traveling north or south typically follows U.S. 287, which goes through the Central Business District. Truck traffic composes approximately 50 percent of the traffic along U.S. 287 through Dumas, which is located north of Amarillo. Truck traffic along U.S. 385 near Hereford, which is located southwest of Amarillo, is approximately 38 percent. Along U.S. 54 northeast of the town of Stratford, the percentage of trucks ranges between 50 and 60 percent. Similar truck percentages occur along U.S. 287 northwest of Stratford. Trucks make up between 21 and 35 percent of traffic along U.S. 87 near Dalhart, located northwest of Amarillo.

Local roadways also often become congested at locations with at-grade crossings within the city of Amarillo due to slow moving coal trains. For example, delays occur in the town of Stratford where railroad lines for UP and BNSF cross near the intersection of U.S. 287 and U.S. 54.

Rail Freight Movements and Commodities

Table 3-12 illustrates that the Amarillo District will continue to import a great deal of commodities by the year 2025. Movements between the Amarillo District and the U.S. and Mexico are approaching 18 million additional tons moved between 2004 and 2025; however, relatively modest increases will occur via rail freight internal to the District. An additional 4.1 million tons are projected to be transported between the Amarillo District and other Texas counties between 2004 and 2025.

Annual Rail Tons				
Origin	**Termination**	**2004**	**2025**	**Percent Change**
Internal to Internal				
Amarillo District	Amarillo District	78,488	195,340	149%
Internal to External				
Amarillo District	Other Texas Counties	1,868,380	4,584,120	145%
Amarillo District	Western U.S.	303,954	756,477	149%
Amarillo District	Northern U.S.	1,118,566	2,783,872	149%
Amarillo District	Eastern U.S.	120,431	299,727	149%
Amarillo District	Mexico	101,706	253,124	149%
External to Internal				
Other Texas Counties	Amarillo District	879,366	2,149,214	144%
Western U.S.	Amarillo District	1,895,182	4,716,703	149%
Northern U.S.	Amarillo District	6,974,363	17,357,694	149%
Eastern U.S.	Amarillo District	750,897	1,868,822	149%
Mexico	Amarillo District	634,146	1,578,253	149%
Total		**14,725,480**	**36,543,346**	**148%**

*Source: Statewide Analysis Model based on 2004 Surface Transportation Board Waybill Data

Table 3-12: Rail Freight Movements for the Amarillo District

Rail Freight Movements within the State

Figure 3-28 illustrates the origin and destinations for freight rail movements occurring in 2004, while Figure 3-29 depicts 2025 movements. Houston, El Paso, Dallas - Forth Worth as well as Midland and Odessa appear to be handling the largest movements. Other locations in the South Texas area, specifically Webb and Maverick Counties, show moderate levels of projected growth in rail movement for the future. The San Antonio region also shows significant rail movement growth.

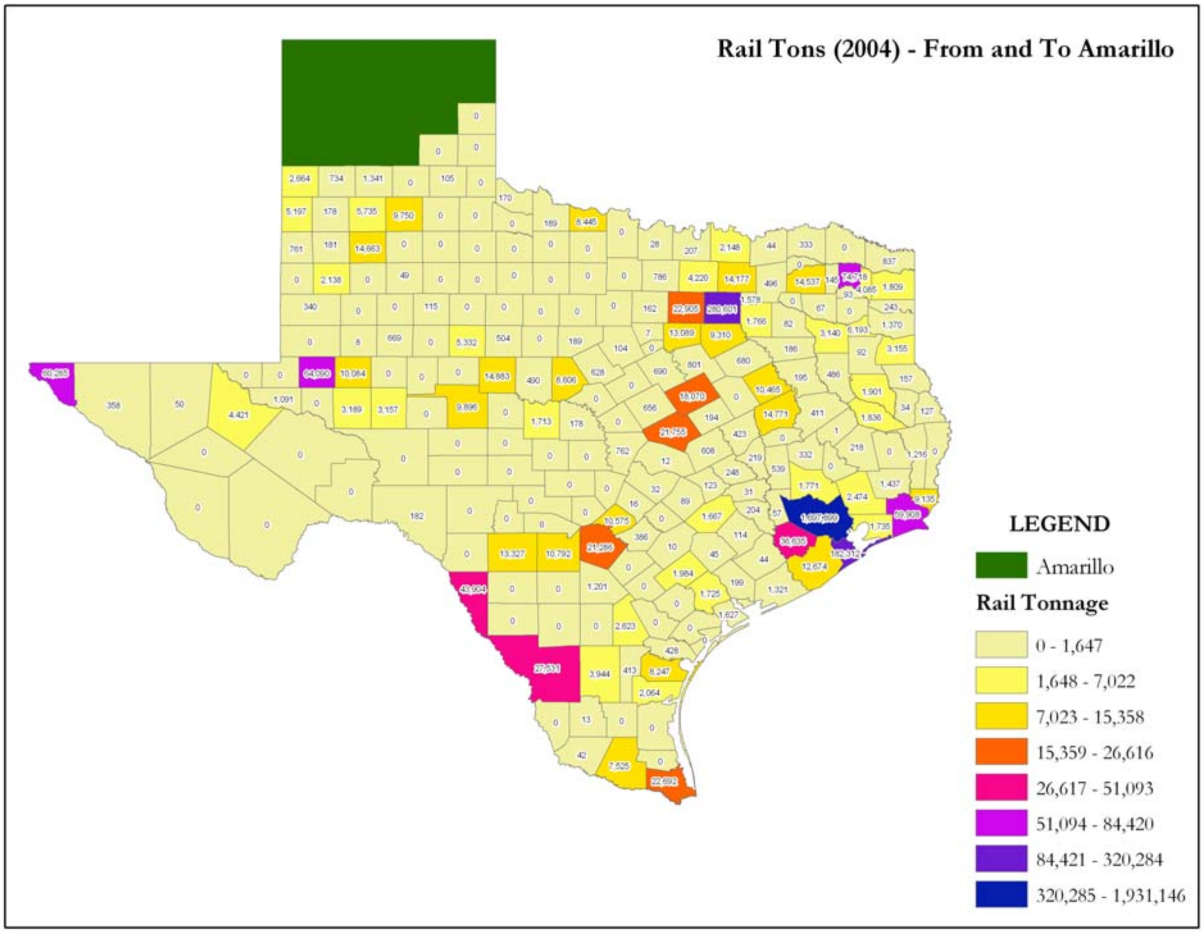


Figure 3-28: 2004 Rail Freight Movements

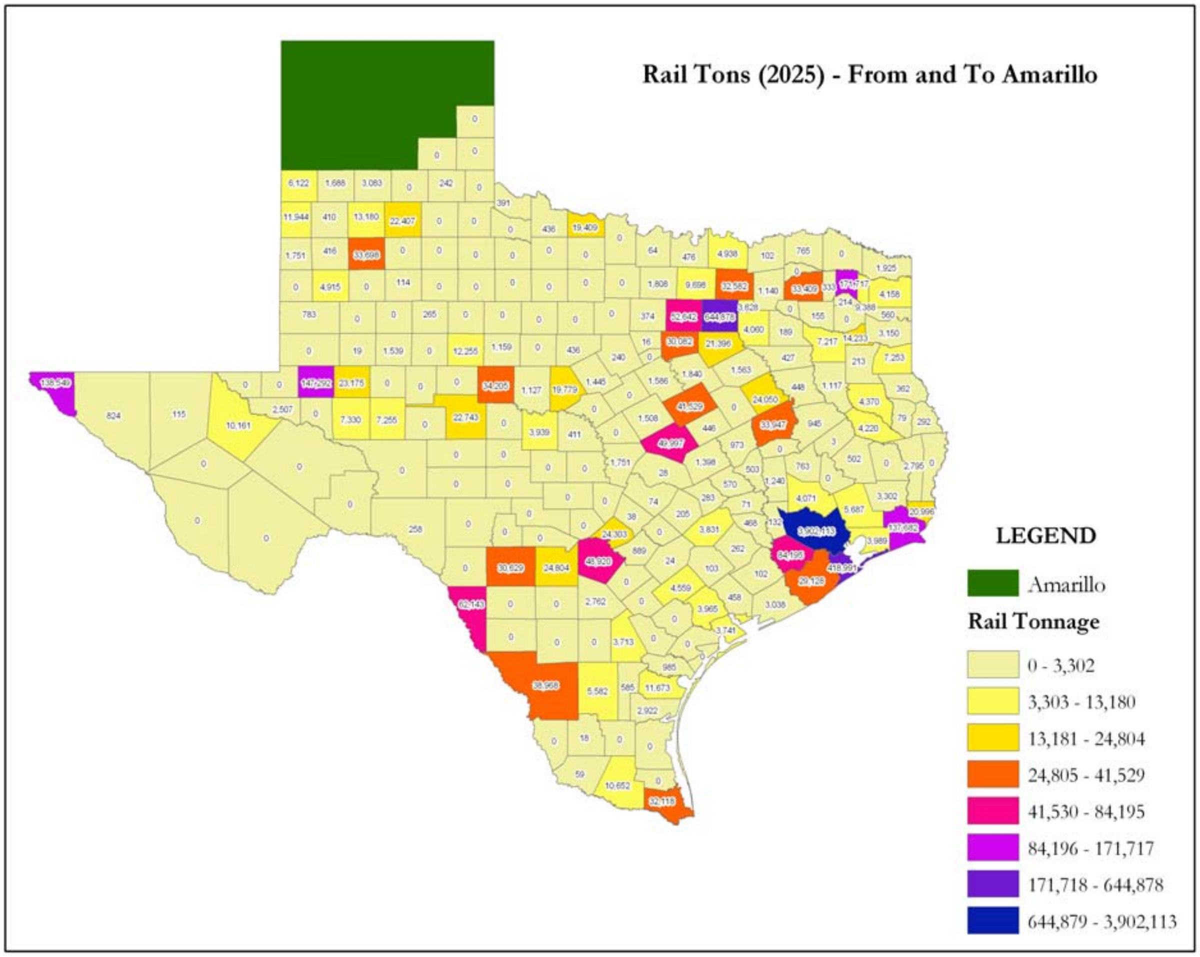


Figure 3-29: 2025 Rail Freight Movements

Rail Freight Movements Outside of the State

Figures 3-30 and 3-31 illustrate that major rail freight movements are occurring from New Mexico, Oklahoma, Arkansas, and more moderately from Louisiana, and Mexico both in 2004 and 2025.

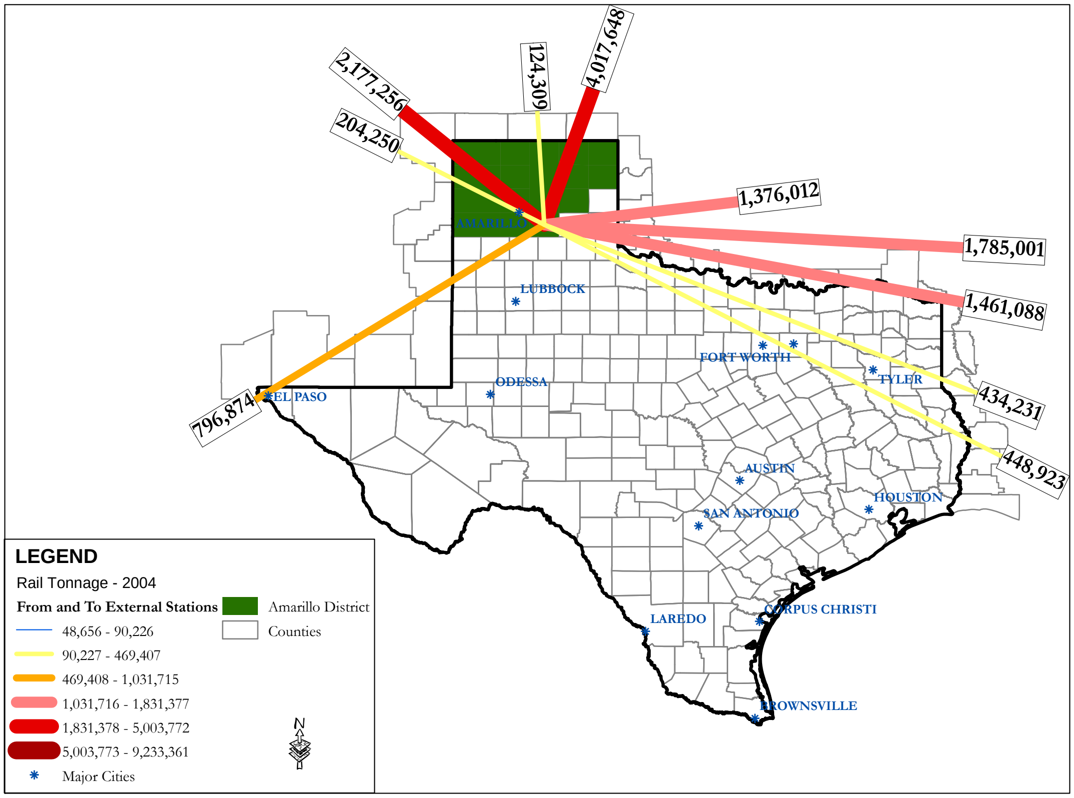


Figure 3-30: 2004 Freight Rail From/To Outside of Texas From/To Amarillo District

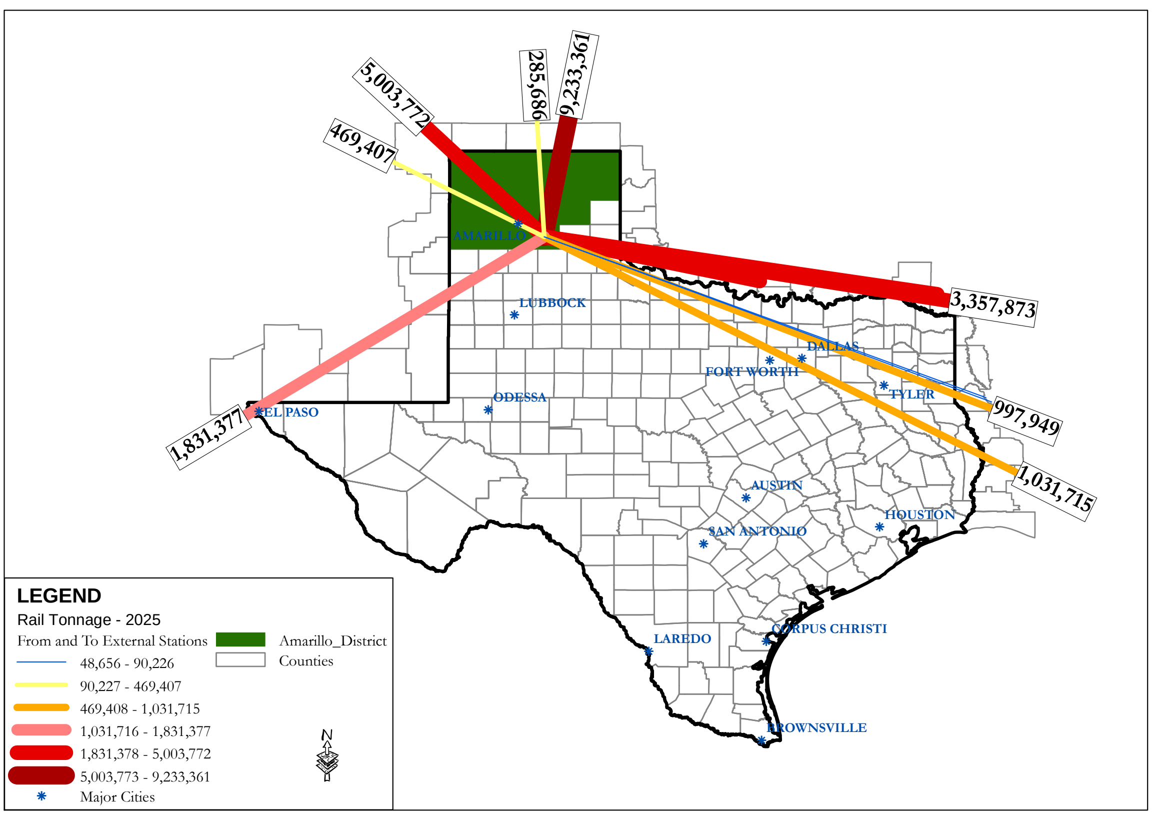


Figure 3-31: 2025 Freight Rail From/To Outside of Texas From/To Amarillo District

Freight Rail Commodity Trends

Table 3-13 shows a comparison between 2004 and 2025 rail commodity tonnage values. The commodity with the largest tonnage increase is raw materials, which accounts for the coal movement through the Amarillo District. The agriculture industry is projected to increase approximately 149 percent due to growth in corn grain, ethanol plants, feed supplements, dairy industry and cotton. Food and secondary products also are projected to result in high growth rates.

Commodity	Rail Tons		
	2004	2025	Percent Change
Building Materials	414,566	1,020,317	146%
Wood	301,503	742,048	146%
Agriculture	3,276,091	8,148,773	149%
Textiles	103,642	255,079	146%
Chemical/Petroleum	516,916	1,282,859	148%
Food	2,372,341	5,900,836	149%
Machinery	122,485	301,457	146%
Raw Materials	5,630,160	13,813,852	145%
Secondary	1,987,776	5,078,125	155%
TOTAL	**14,725,480**	**36,543,346**	**148%**

Table 3-13: Rail Freight Commodity Growth

Figures 3-32 and 3-33 display the commodities being moved by rail within the Amarillo District in 2004 and 2025. The relative percentages of each commodity do not significantly change from 2004, as shown in Figure 3-31, to 2025. Figure 3-34 provides a correlation of similar information, although on a national level for the year 2000.

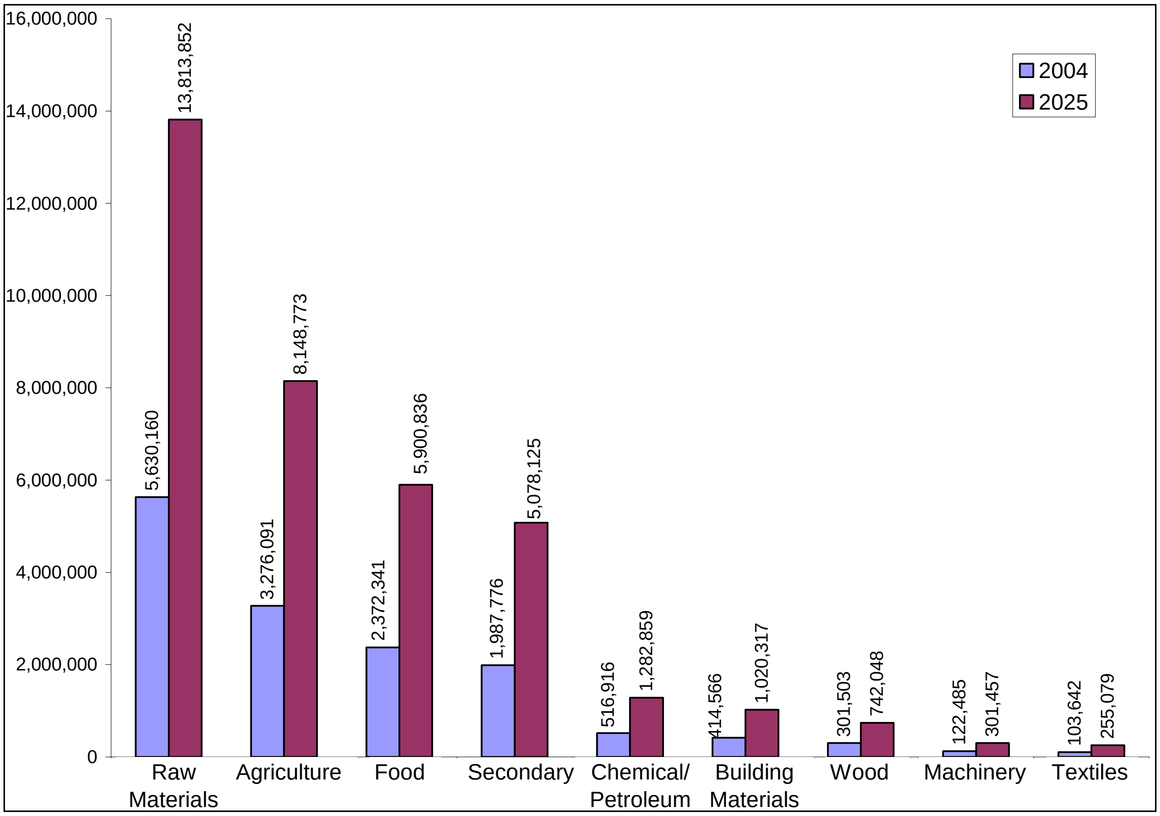


Figure 3-32: Total Freight Rail Tons by Commodity

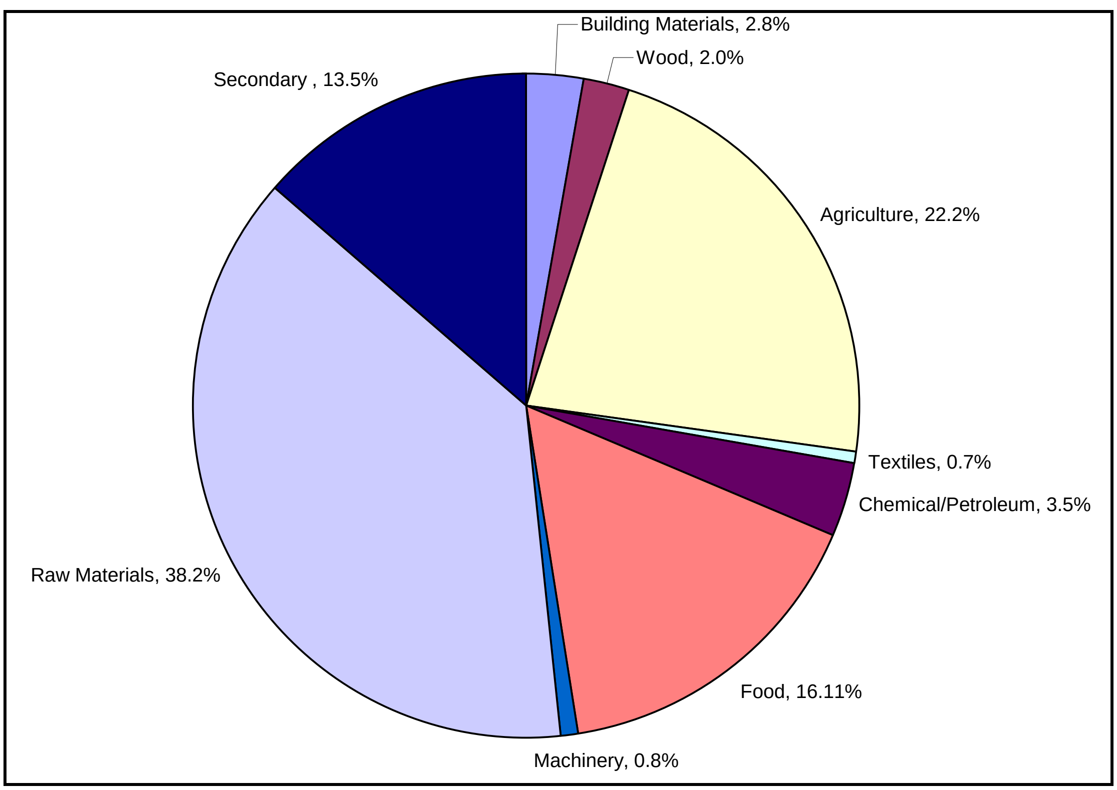


Figure 3-33: Percentage of Freight Rail Tons by Commodity (2004)

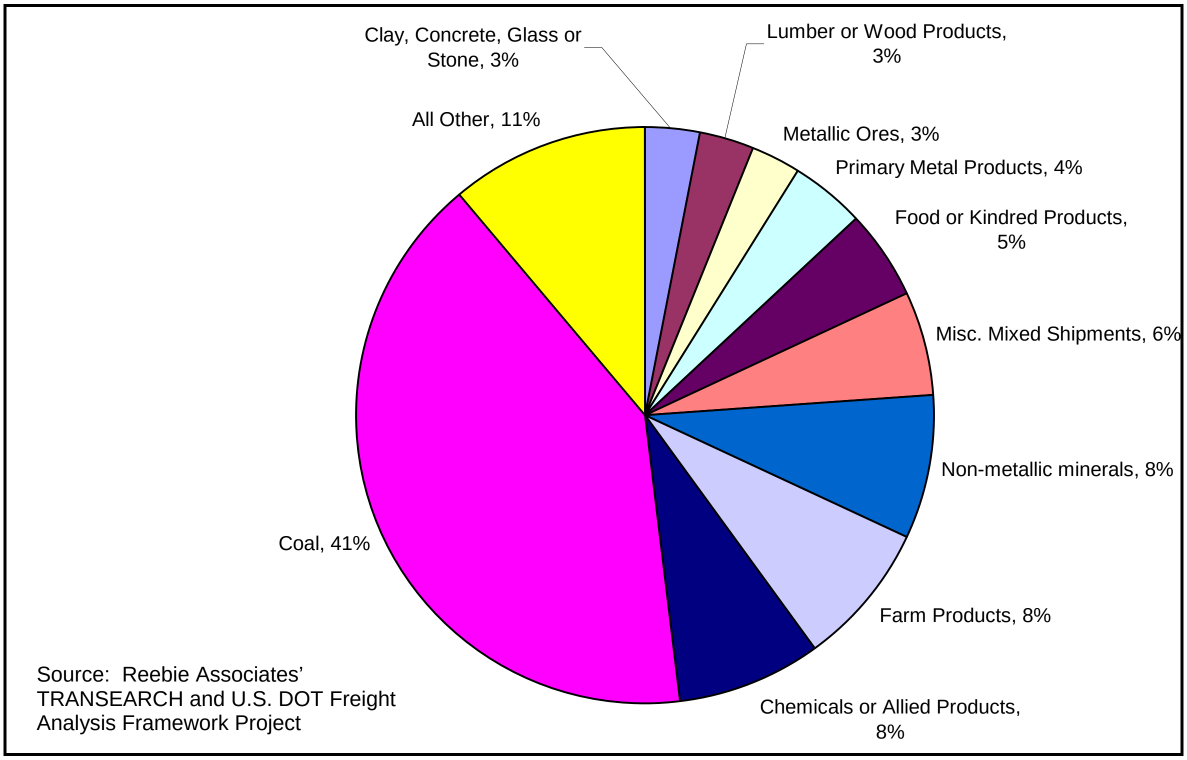


Figure 3-34: Percentage of Freight Tonnage by Commodity – (National 2000)

Rail Freight Findings Summary

- Freight tonnages moved by rail will more than double by 2025.
- Raw materials and agriculture constitute a majority of the freight rail tonnage for existing and future projections.
- Rail shipments originating from other states and from Mexico are projected to constitute approximately 70 percent of total rail shipments into and out of the Amarillo District.

Rail and Truck Freight Comparison

Table 3-14 and Figure 3-35 provide the total truck and rail tons in the District for the base year and projected to 2025. The increase between 1998 and 2025 for truck tons represents a 95 percent increase as opposed to rail tonnage increase of 148 percent from 2004 to 2025. Although the rail freight percent change is higher, a larger amount of tonnage was projected to be transported via trucks by 2025. The percentages of rail freight to truck freight change from 35/65 in 2004 to 41/59 in 2025, showing an increase in the relative percentage of rail freight to truck freight in the future.

Year	Truck	Rail
1998 (Truck), 2004 (Rail)	26,863,735	14,725,480
2025	52,371,767	36,543,346
Percent Increase	95%	148%

Table 3-14: Rail and Truck Tons Comparison

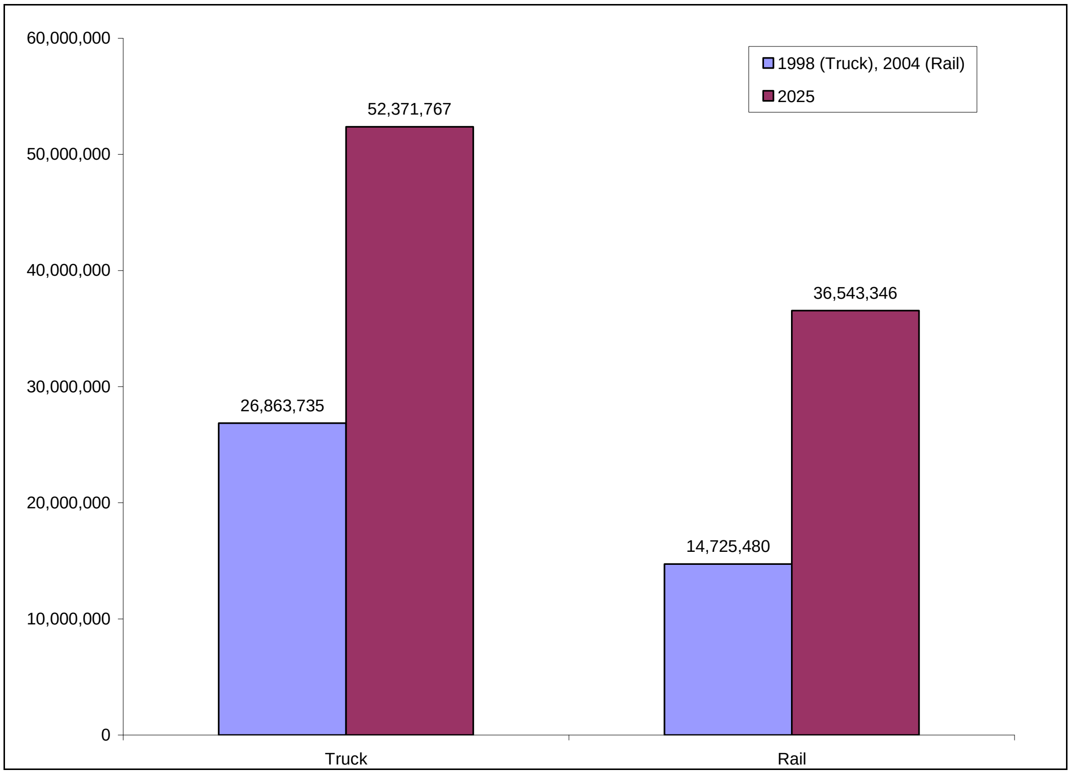


Figure 3-35: Total Rail / Truck Tons

TxDOT - Lubbock District

Truck freight flows and commodities as well as rail freight flows and commodities were analyzed for the Lubbock District in order to determine the future situation for truck and rail freight activity within the District. The analysis also identified existing and projected locations of congestion for the region. The following summary of truck and rail freight movement for the Lubbock District provides data that is specific to this District. Additional characteristics of the District that are consistent with the other West Texas Districts are included in the overview discussion of the West Texas Region.

Table 3-15 and Figure 3-34 depict the anticipated roadway improvements updated in the SAM to reflect projects cited in the District's list of planned projects.

Road Name	From	To	Existing Lanes	Future Lanes
FM 2378	FM 2681	U.S. 84	2	4
FM 1585	U.S. 87	U.S. 62	2	4
FM 1730	FM 41	SL 289	2	6
FM 179	FM 1585	U.S. 62	2	6
FM 179	FM 2641	U.S. 62	2	4
U.S. 62	SS 327	SL 193	4	6
SS 327	U.S. 62	SL 289	4	6
U.S. 82	IH 27	U.S. 62	4	6
U.S. 62	IH 27	FM 1264	4	6
FM 835	E 34th St	SS 331	2	6
SS 331	FM 835	U.S. 84	4	6
SL 289	U.S. 84	FM 1730	4	6
FM 2255	FM 2528	Quitsna Ave	2	6
FM 2528	FM 2255	U.S. 84	2	4
SH 114	Hockley/Lubbock County Line	SL 289	4	6
50th St	SL 289	Slide Rd	2	4
SH 114	Hockley/Lubbock County Line	FM 168	4	6
U.S. 87 (Ports to Plains)	U.S. 180	BU 87K South Crossing	2	4
SH 349 (Ports to Plains)	SH 137	Martin/Dawson County Line	2	4

Table 3-15: Future Network Improvements for the Lubbock District

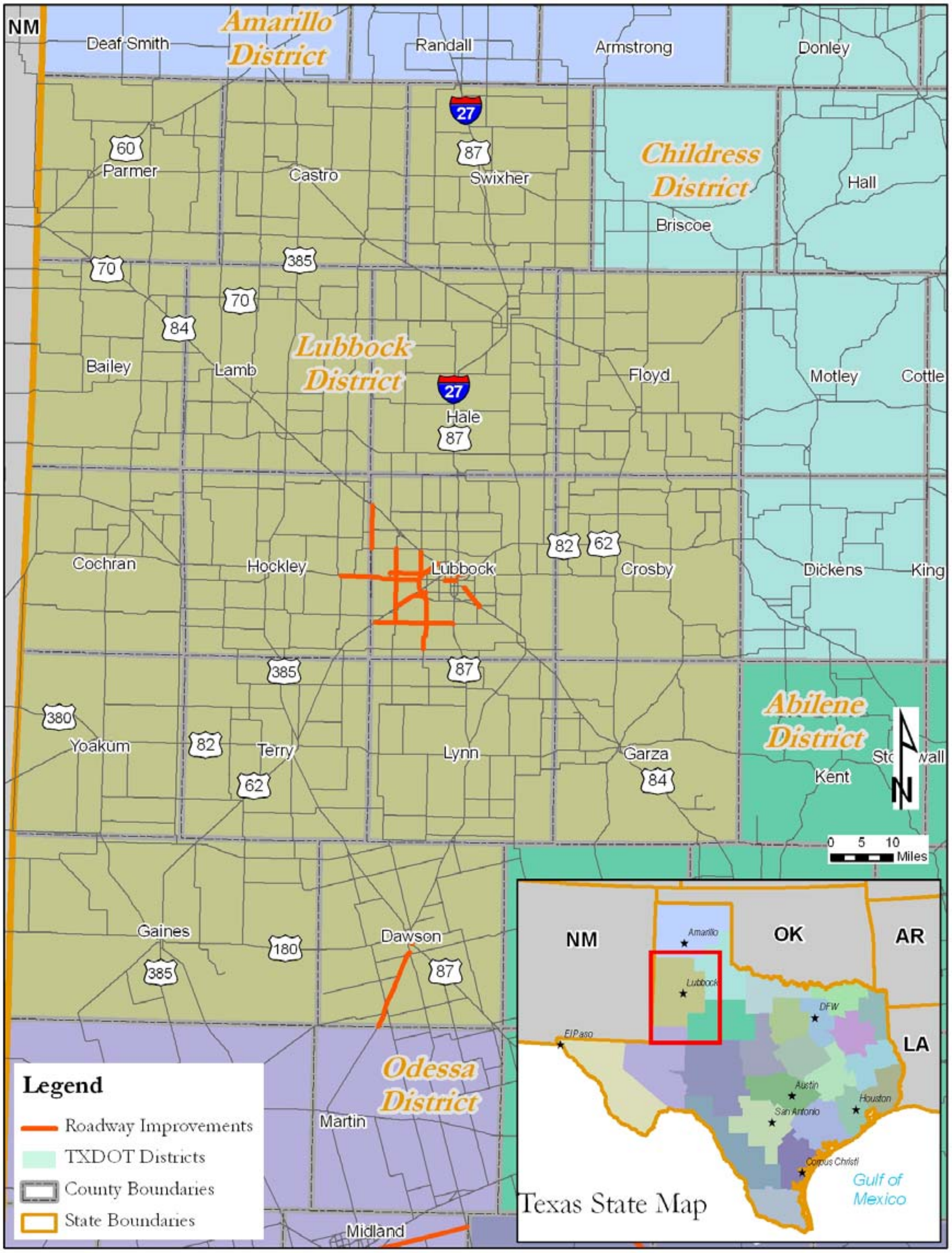


Figure 3-34: Future Roadway Network Improvements for the Lubbock District (1998 to 2025)

Truck Freight Movements and Commodities

Table 3-16 illustrates that while the movement of truck tons within the Lubbock District will increase by nearly 163,000 tons from 1998 to 2025, it pales in comparison to the increased movements coming into (8.5 million) and out of (9.8 million) the Lubbock District. The overall truck tonnage transported within, into, and out of the Lubbock District is projected to increase by 89 percent by 2025.

Annual Truck Tons				
Origin	**Termination**	**1998**	**2025**	**Percent Change**
Internal to Internal				
Lubbock District	Lubbock District	261,798	424,441	62%
Internal to External				
Lubbock District	Other Texas Counties	8,012,830	16,377,614	104%
Lubbock District	Western U.S.	368,230	588,118	60%
Lubbock District	Northern U.S.	1,464,435	2,338,921	60%
Lubbock District	Eastern U.S.	329,584	526,395	60%
Lubbock District	Mexico	171,663	274,172	60%
External to Internal				
Other Texas Counties	Lubbock District	8,366,575	15,225,338	82%
Western U.S.	Lubbock District	260,911	520,439	99%
Northern U.S.	Lubbock District	1,037,633	2,069,763	99%
Eastern U.S.	Lubbock District	233,528	465,818	99%
Mexico	Lubbock District	121,633	242,620	99%
	Total	**20,628,819**	**39,053,639**	**89%**

*Source: Statewide Analysis Model based on 1998 Reebie Transearch Data, Wharton Economic Forecasting Associates and Latin American Trade Transportation Study

Table 3-16: Annual Truck Tons

Truck Movements within the State

Figures 3-35 and 3-36 show the existing and projected truck tonnage movement between the Lubbock District and other Texas counties. Figure 3-35 illustrates that in 1998 large numbers of trucks moved between Lubbock District and Amarillo, Corpus Christi, Houston, San Antonio, the Dallas - Fort Worth metroplex, El Paso, Austin as well as areas along the U.S.-Mexico border. The largest origin and destination of truck freight was shown to be the Houston region, although the Dallas - Fort Worth metroplex also resulted in a large amount of truck traffic.

Figure 3-36 shows continued growth of truck traffic between the Lubbock District and the major urban areas of Houston, San Antonio, Dallas - Fort Worth, El Paso and Austin in the future.

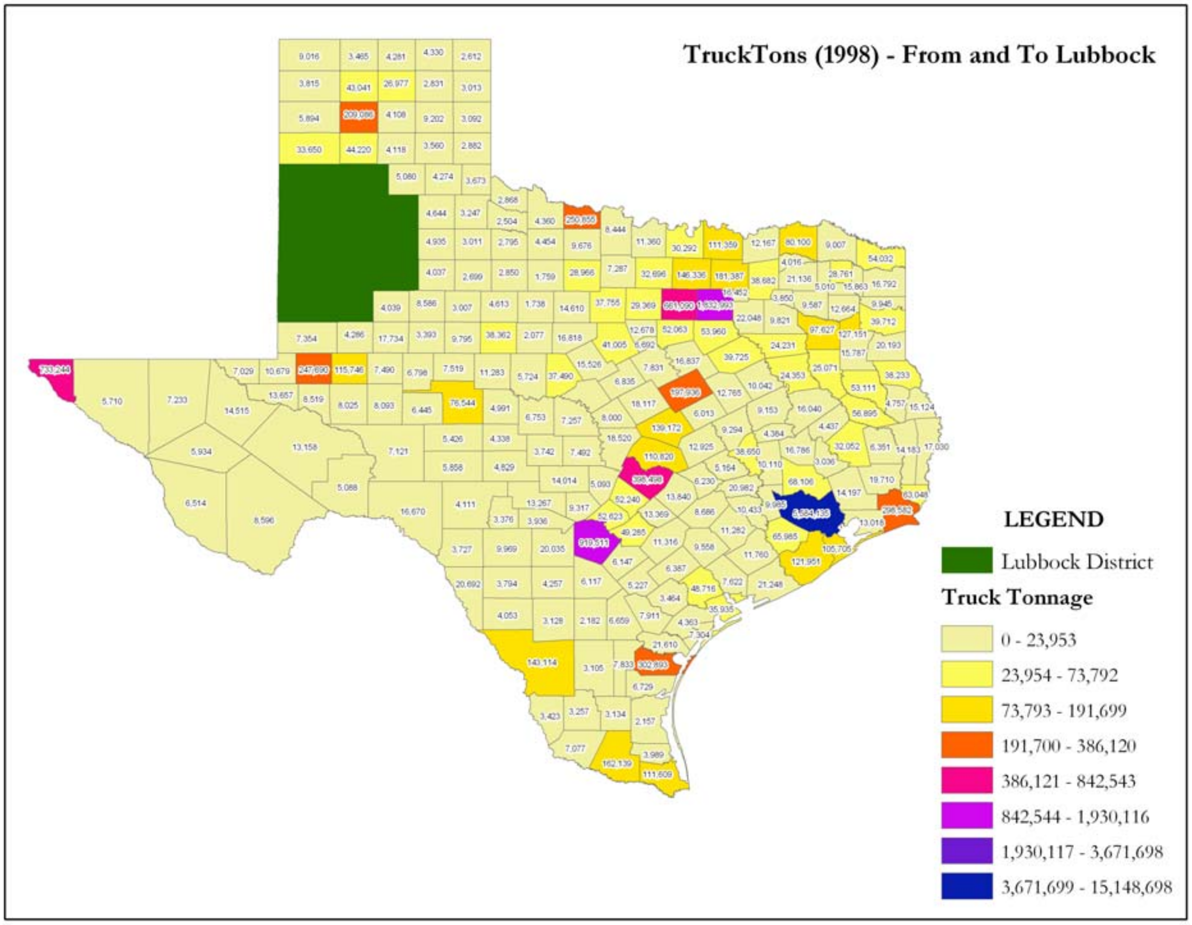


Figure 3-35: 1998 Truck Movements within Texas To and From Lubbock District

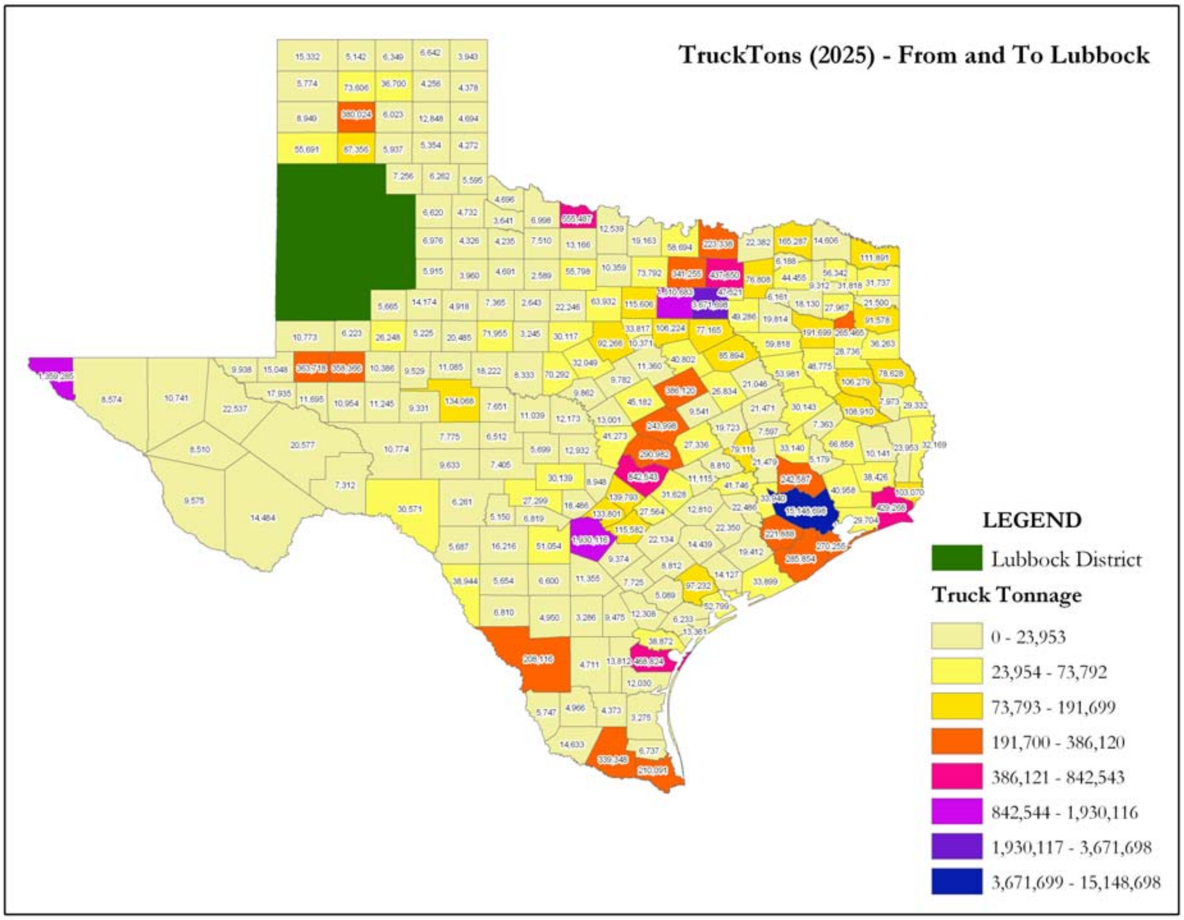


Figure 3-36: 2025 Truck Movements within Texas To and From Lubbock District

Truck Movements Outside of the State

Major movements in 1998 can be seen from Oklahoma, Arkansas, New Mexico, Louisiana, and Mexico as shown in Figure 3-37. Figure 3-38 clearly demonstrates increased movement from Oklahoma, New Mexico, Louisiana, and Mexico to the Lubbock Districts in 2025.

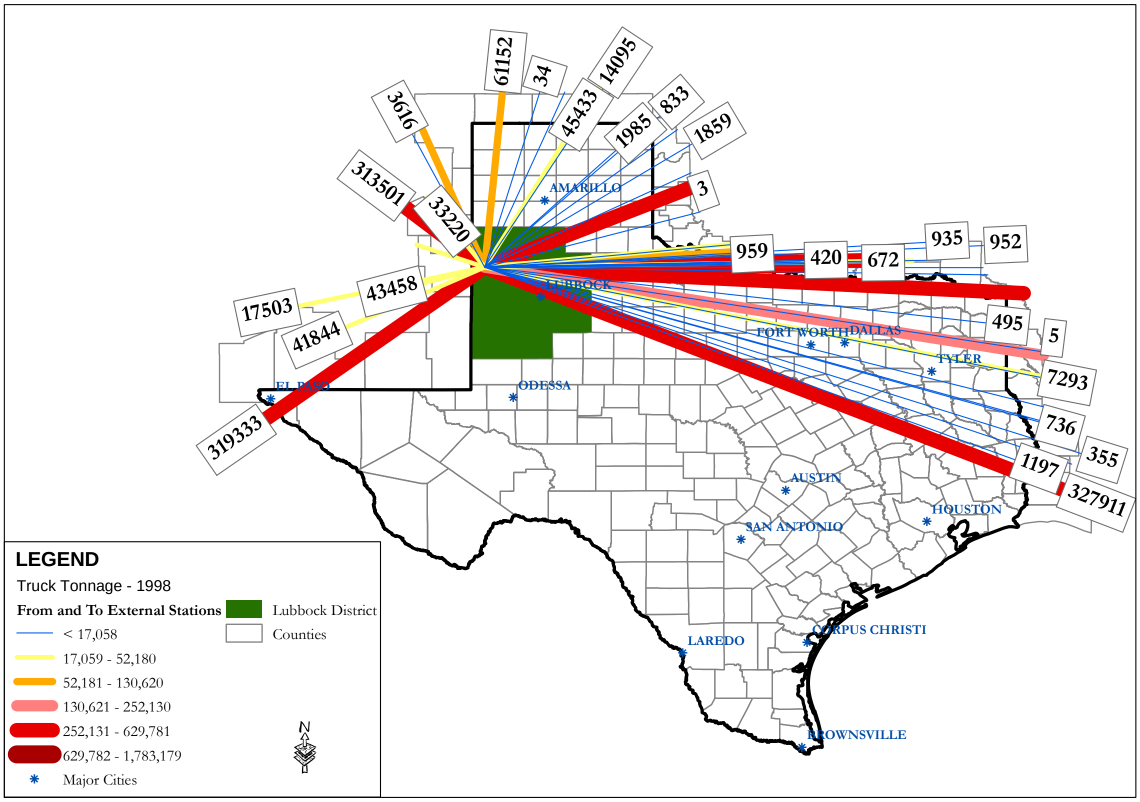


Figure 3-37: 1998 Truck Movements between the Lubbock District and Outside of Texas

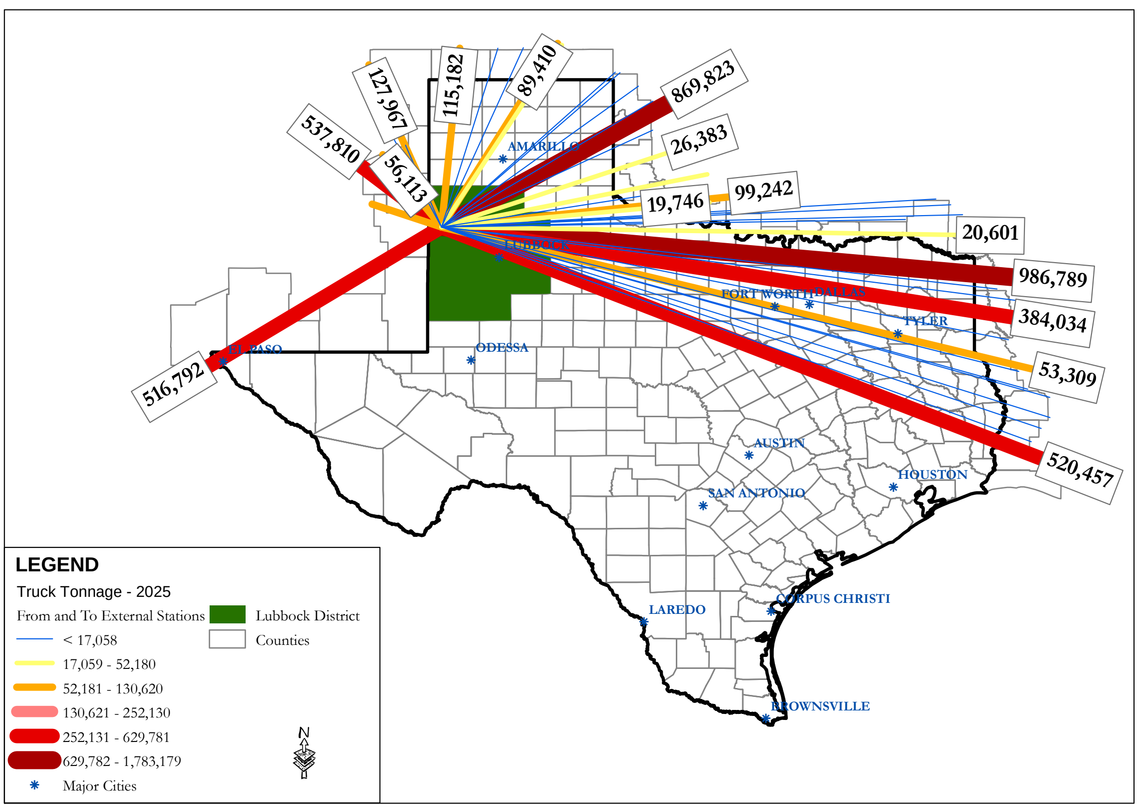


Figure 3-38: 2025 Truck Movements between the Lubbock District and Outside of Texas

Truck Commodity Trends

Table 3-17 indicates that food products will be the fastest growing commodity in terms of increased tonnage from 1998 to 2025, composing approximately 33 percent of commodities hauled by trucks in 2025. The commodity projected to produce the largest increase in percentage of total tonnage between 1998 and 2025 is building materials.

Commodity	Truck Tons		
	1998	2025	% Increase
Building Materials	3,066,676	7,775,499	154%
Wood	1,565,631	3,067,564	96%
Agriculture	67,727	105,208	55%
Textiles	131,935	252,759	92%
Chemical/Petroleum	5,159,548	6,266,804	21%
Food	6,464,954	13,257,740	105%
Machinery	301,545	607,974	102%
Raw Materials	17,091	26,492	55%
Secondary	3,853,715	7,693,598	100%
TOTAL	20,628,822	39,053,639	89%

Table 3-17: Truck Commodity Growth

The leading products moving by truck (in terms of tonnage percentage in the District) are food, building materials, chemical/petroleum products, and secondary products. As determined from recent interviews with economic development groups and industry professionals within the District, the agriculture commodity is expected to show significant growth in areas dealing with corn grain, ethanol plants, distilled feed supplements and dairy. Additionally, as shown in following sections agriculture is projected to be the second largest commodity moved by rail.

Eighteen new dairies have emerged near Friona, Muleshoe, and Plainview as well as a peanut processing plant in Plainview within the last five years. Additional industries such as cotton, sorghum, and grain are also expected to continue to grow. The development of facilities such as the Reese Technology Center will also spur on the growth of various commodities through the Lubbock District. The Reese Technology Center, which will serve the region as a transload facility for truck and rail freight, has recently opened.

Figures 3-39 and 3-40 display the commodities being moved by truck within the Lubbock District for both 1998 and projected to 2025. The relative percentages of most commodities do not significantly change from 1998, as shown in Figure 3-40, to 2025. The only significant changes occur in the movement of chemical/petroleum products, which decreases from 25.0 percent in 1998 to 16.0 percent in 2025, building materials, which increases from 14.9 percent to 19.9 percent, and food products, which increases from 31.3 percent to 33.9 percent.

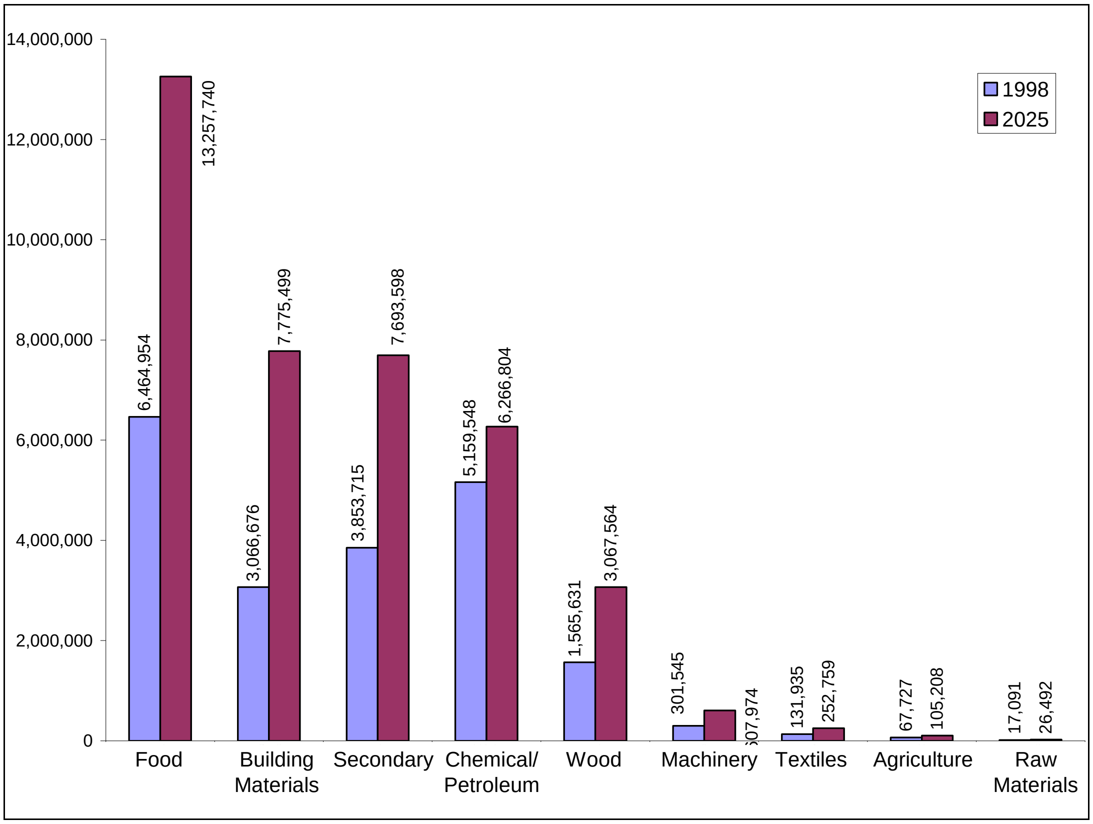


Figure 3-39: Total Truck Tons by Commodity

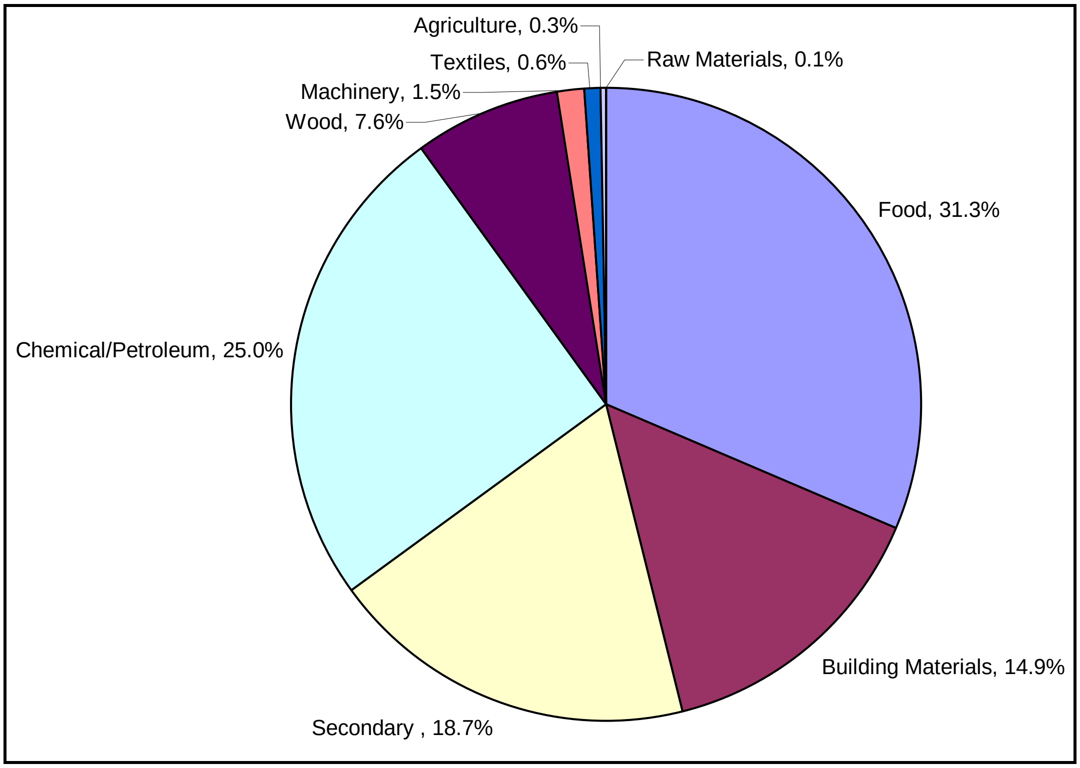


Figure 3-40: Percentage of Truck Tons by Commodity (1998)

Traffic Volume Analysis

Figure 3-41 is a graphic depiction of each location at which traffic counts were taken. Locations of the count stations are approximate and directional count stations were consolidated. Table 3-18 represents 2003 traffic data within the Lubbock District where permanent count stations were located. The SAM was used to predict future 2025 truck volumes as shown in Table 3-19. The 2025 model includes planned improvements for the Lubbock District as shown in Table 3-15 and Figure 3-34.

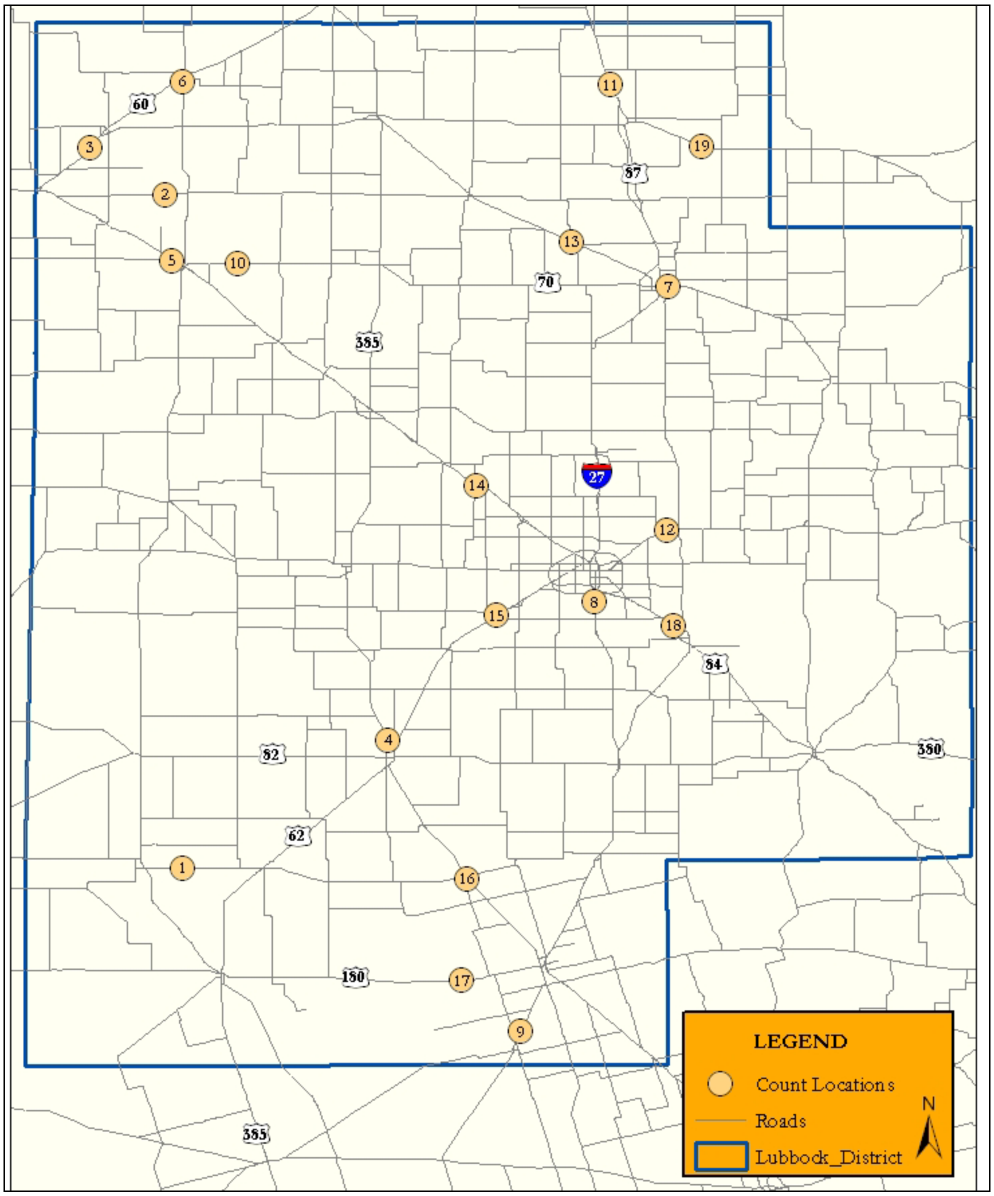


Figure 3-41: Permanent Count Locations

Location		2003				
		Total Volume	Percent Trucks	Truck Volume	Number of Lanes	V/C Ratio
1	SH 83 W of Denver City	2,100	23.8%	500	2	0.09
2	FM 145 E of Farwell	400	25.0%	100	2	0.02
3	U.S. 60 SW of Bovina	8,100	18.5%	1,500	4	0.17
4	U.S. 385 N of Brownfield	4,200	26.2%	1,100	2	0.18
5	U.S. 70 NW of Muleshoe	16,000	21.9%	3,500	4	0.33
6	SH 214 S of Friona	5,000	34.0%	1,700	2	0.21
7	U.S. 70 E of Plainview	7,800	11.5%	900	4	0.16
8	U.S. 87 S of Lubbock	14,700	14.3%	2,100	4	0.31
9	SH 349 SW of Lamesa	5,500	21.8%	1,200	2	0.31
10	U.S. 70 E of Muleshoe	2,200	22.7%	500	4	0.05
11	IH 27 N of Tulia	12,000	28.0%	3,360	4	0.15
12	U.S. 62 E of Lubbock	16,300	11.7%	1,900	4	0.34
13	SH 194 NW of Plainview	4,300	23.3%	1,000	2	0.18
14	U.S. 84 NW of Lubbock	16,700	17.4%	2,900	4	0.35
15	U.S. 62 SW of Lubbock	23,400	8.5%	2,000	4	0.49
16	SH 137 NW of Lamesa	4,600	21.7%	1,000	2	0.26
17	U.S. 180 W of FM 829	1,300	30.8%	400	2	0.07
18	U.S. 84 NW of Slaton	15,100	21.2%	3,200	4	0.31
19	SH 86 SE of U.S. 87	1,200	16.7%	200	2	0.06

Table 3-18: 2003 Truck Traffic Volumes

Location		2025				
		Total Volume	Percent Trucks	Truck Volume	Number of Lanes	V/C Ratio
1	SH 83 W of Denver City	3,200	25.0%	800	2	0.13
2	FM 145 E of Farwell	600	33.3%	200	2	0.03
3	U.S. 60 SW of Bovina	12,500	18.4%	2,300	4	0.26
4	U.S. 385 N of Brownfield	6,500	26.2%	1,700	2	0.27
5	U.S. 70 NW of Muleshoe	24,700	21.9%	5,400	4	0.51
6	SH 214 S of Friona	7,700	33.8%	2,600	2	0.32
7	U.S. 70 E of Plainview	12,100	11.6%	1,400	4	0.25
8	U.S. 87 S of Lubbock	22,700	14.1%	3,200	4	0.47
9	SH 349 SW of Lamesa	8,500	22.4%	1,900	4	0.18
10	U.S. 70 E of Muleshoe	3,400	23.5%	800	4	0.07
11	IH 27 N of Tulia	18,600	27.9%	5,194	4	0.23
12	U.S. 62 E of Lubbock	25,200	11.5%	2,900	4	0.53
13	SH 194 NW of Plainview	6,600	22.7%	1,500	2	0.28
14	U.S. 84 NW of Lubbock	25,800	17.4%	4,500	4	0.54
15	U.S. 62 SW of Lubbock	36,200	8.6%	3,100	4	0.75
16	SH 137 NW of Lamesa	7,100	21.1%	1,500	2	0.39
17	U.S. 180 W of FM 829	2,000	30.0%	600	2	0.10
18	U.S. 84 NW of Slaton	23,300	21.0%	4,900	4	0.49
19	SH 86 SE of U.S. 87	1,900	15.8%	300	2	0.10

Table 3-19: 2025 Truck Traffic Volumes

Figures 3-42 and 3-44 show the areas of congestion throughout the District, while Figures 3-43 and 3-45 highlight the areas of congestion in the city of Lubbock for years 1998 and 2025.

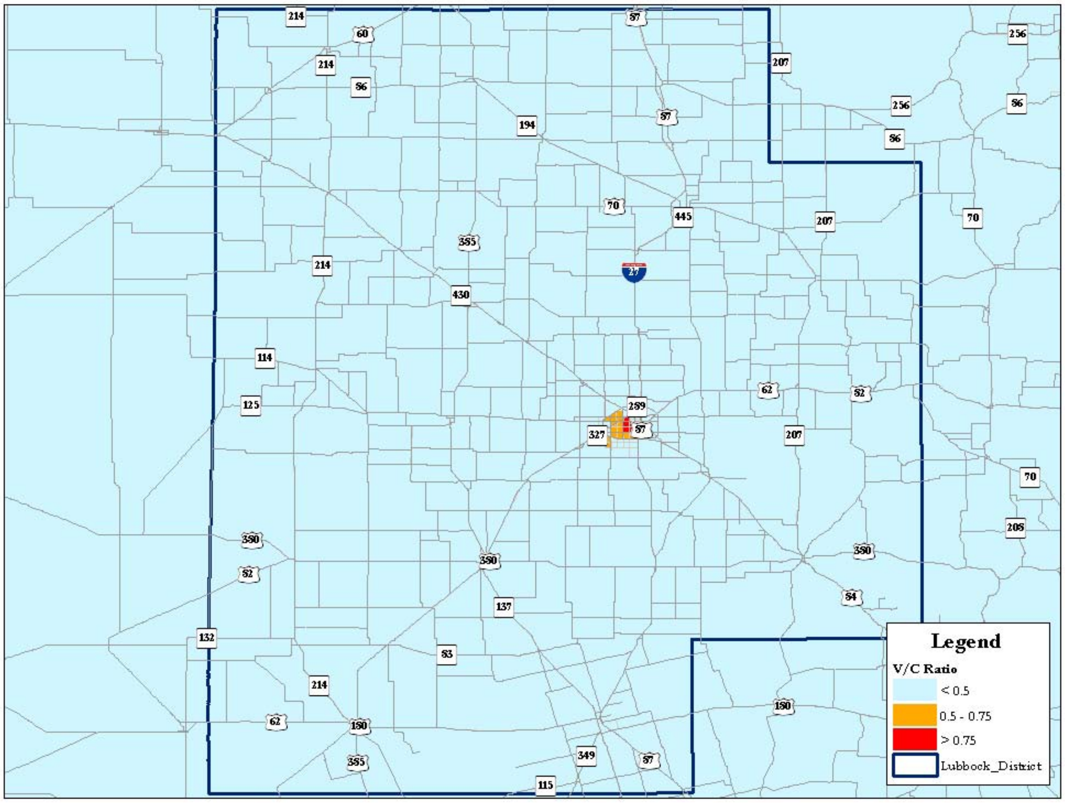


Figure 3-42: 1998 Congestion for Lubbock District (based on SAM modeling)

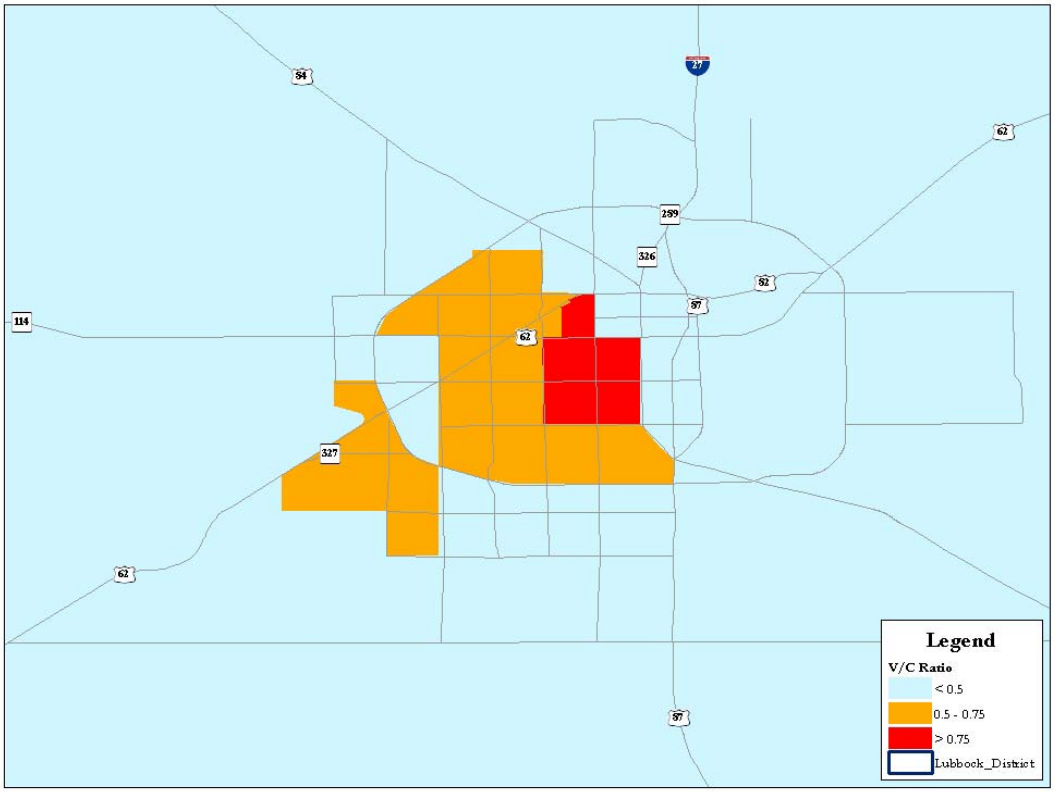


Figure 3-43: 1998 Congestion for City of Lubbock (based on SAM modeling)

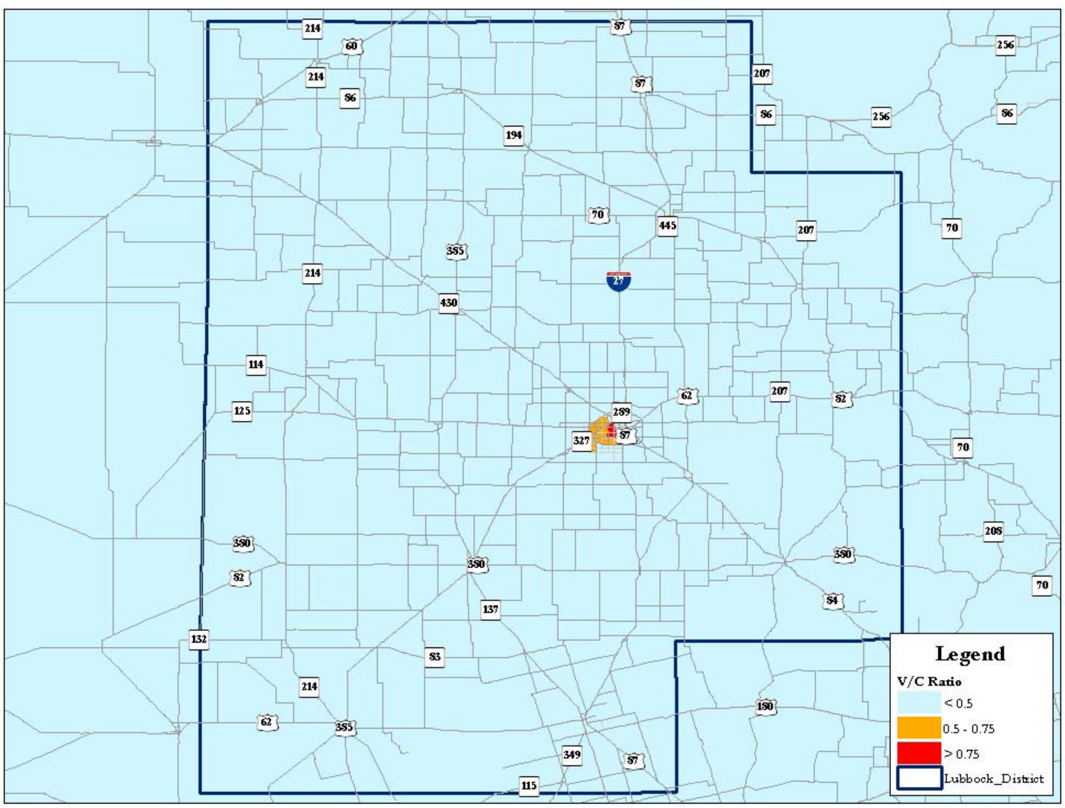


Figure 3-44: 2025 Congestion for Lubbock District (based on SAM modeling)

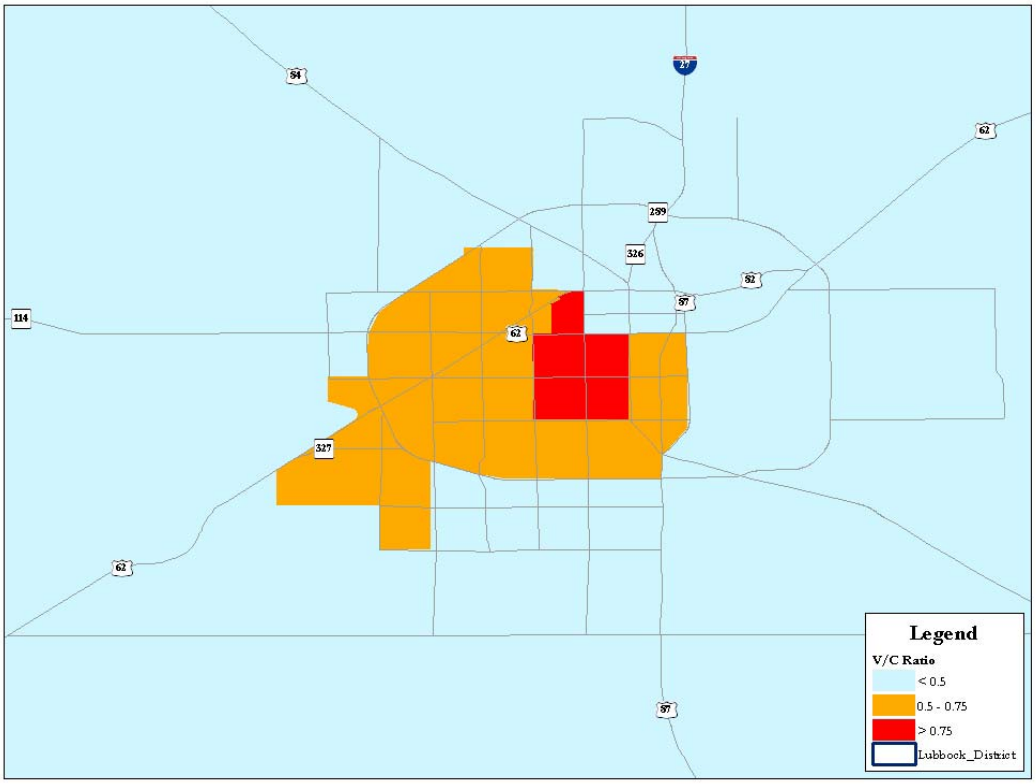


Figure 3-45: 2025 Congestion for City of Lubbock (based on SAM modeling)

While the V/C ratio analysis showed that the freeways and arterials would continue to result in increased periods of congestion between base and future years, the overall congestion level throughout the District was projected to remain relatively low in the future. Although pockets of bottlenecks are projected throughout the District, the primary areas of congestion are projected within the city of Lubbock along the major freeways and arterials.

The western and southern portions of Loop 289 were projected to experience high congestions levels for the base and future year. The 2004 traffic volume for Loop 289 between U.S. 62 and Indiana Avenue varies between 65,000 and 83,000 vehicles per day with projected 2025 volumes between 81,000 and 103,000 vehicles per day. An increase in capacity is planned for portions of this section of Loop 289; however, the future year 2025 volumes are still projected to result in a V/C greater than 0.75.

The congestion level along U.S. 84 through the city of Lubbock is also projected to increase with the V/C ratios projected to increase from 0.75 in 1998 to 0.95 in 2025. Based on 2004 traffic count information, the percentage of trucks along U.S. 84 was approximately 18 percent. According to TxDOT Lubbock District staff, no improvements have been planned for the U.S. 84 corridor as of March 2007.

The IH 27 corridor is projected to operate primarily at low to moderate congestion levels for base and future years with the exception of a portion of IH 27 between the southern end of Loop 289 and U.S. 62, which was projected to operate between moderate and heavy congestion levels. The existing four-lane freeway section currently accommodates approximately 57,000 vehicles per day, which results in a V/C between a moderate and severe congestion level. According to TxDOT Lubbock District staff, no improvements have been planned for the IH 27 corridor.

The U.S. 62/82 corridor travels from the southwest to the northeast across the city of Lubbock. The corridor between Loop 289 and SH 114 was projected to operate within the moderate congestion level for base and future years. The portion of the corridor between SH 114 and U.S. 62 (19th Street) was projected to experience a congestion level with a V/C ratio between 0.75 and 0.83 for base and future years.

The majority of the growth projected for the city of Lubbock is located in the western portion of the area. One of the major developments is the Reese Technology Center, which is projected to be a major origin and destination for truck and rail freight. Located on the corner of SH 114 and Spur 309, it will serve as a transload facility with the ability to directly access rail freight; store various commodities; potentially serve as a “safe zone” for truckers and be used as a possible truck driving training facility. As it is designated as a free trade zone, the facility will be able to offer several advantages to commodity shippers that are traveling through the West Texas region. The area surrounding the Reese Technology Center is continuing to grow with residential and retail development, which leads to additional passenger car and truck traffic projected for the area west of Loop 289. Additional arterials connecting to Loop 289 through the city also showed a heightened level of congestion in the future.

As Tables 3-18 and 3-19 show, the traffic count station data revealed heavy truck traffic in several areas within the District. Approximately 21 percent of the traffic traveling along IH 27 north consists of trucks. The truck traffic traveling north or south will typically follow U.S. 84, which goes through the Central Business District and accommodates approximately 21 percent trucks southeast of Lubbock.

Additional areas within the District also experiencing high percentages of truck traffic include Lamesa, which is located south of Lubbock, where the percentage of truck traffic currently varies between 20 and 25 percent. As with many areas in the Lubbock District, industries continue to locate in the area including feed yards, dairy plants and peanut processing plants. Seven new dairy plants have opened within or near the town of Friona, while a cotton warehouse, six new grain sites, and six new dairies have opened in Muleshoe over the past five years. The city of Plainview accommodates five new dairies and a peanut processing plant and a Wal-Mart distribution center. These are just some examples of the industrial growth that is occurring in the Lubbock District and that are heavily dependent on truck movement, which will only encourage growth.

Local roadways also often become congested at locations with at-grade crossings within the city of Lubbock.

Rail Freight Movements and Commodities

Table 3-20 illustrates that the Lubbock District will continue to import a great deal of commodities by the year 2025. Approximately 13 million additional tons will be transported between Mexico and other parts of the country and the Lubbock District (external to internal and internal to external) from 2004 to 2025; however, a relatively modest increase in rail freight movement will occur internally to the District (internal to internal). An additional 2 million tons are projected to be transported between the Lubbock District and other Texas counties between 2004 and 2025 (external to internal and internal to external).

Annual Rail Tons				
Origin	**Termination**	**2004**	**2025**	**Percent Change**
Internal to Internal				
Lubbock District	Lubbock District	20,728	52,784	155%
Internal to External				
Lubbock District	Other Texas Counties	796,559	1,949,963	145%
Lubbock District	Western U.S.	683,025	1,739,311	155%
Lubbock District	Northern U.S.	399,145	1,016,416	155%
Lubbock District	Eastern U.S.	14,768	37,607	155%
Lubbock District	Mexico	83,611	212,914	155%
External to Internal				
Other Texas Counties	Lubbock District	1,351,214	3,384,863	151%
Western U.S.	Lubbock District	4,081,493	10,393,449	155%
Northern U.S.	Lubbock District	2,385,135	6,073,705	155%
Eastern U.S.	Lubbock District	88,250	224,727	155%
Mexico	Lubbock District	499,627	1,272,291	155%
Total		**10,403,555**	**26,358,031**	**153%**

**Source: Statewide Analysis Model based on 2004 Surface Transportation Board Waybill Data

Table 3-20: Rail Freight Movements

Rail Freight Movements within the State

Figure 3-46 illustrates the origin and destinations for freight rail movements occurring in 2004, while Figure 3-47 shows projected rail movements in 2025. Harris, Galveston, Brown, El Paso, Ector, Dallas and Jefferson Counties appear to be the handling the largest movements to and from the Lubbock District. The rail tonnage in 2004 and projected for 2025 between the Dallas - Fort Worth metroplex and the Lubbock District is significantly less as compared to the traffic between Dallas - Fort Worth and the Amarillo District. However, Brown County, which is located in central Texas southwest of the Dallas - Forth Worth metroplex, exhibited significantly higher rail tonnage movement to and from the Lubbock District as compared to the Amarillo District. The reason for the significant difference of rail tonnage between the Lubbock District and Dallas - Fort Worth versus Brown County is availability of rail lines. The major rail line coming to and from the Lubbock District is provided by BNSF and travels from the northwest corner of the Lubbock District in

Parmer County southeasterly through Brown County and ends in Galveston. Therefore, significant rail tonnage travels between both Brown and Galveston Counties and the Lubbock District.

Rail tonnage traveling between El Paso and the Lubbock District is accommodated by a connection to the UP rail line near Sweetwater. A similar route is used for commodities traveling to and from Midland and Ector Counties. Other locations in the South Texas area, specifically Webb and Maverick Counties, show a moderate level of rail movement. Accommodating these and other locations with freight rail service will be critical to the future of Texas in terms of economic growth and also providing options to shift truck cargo to rail cars.

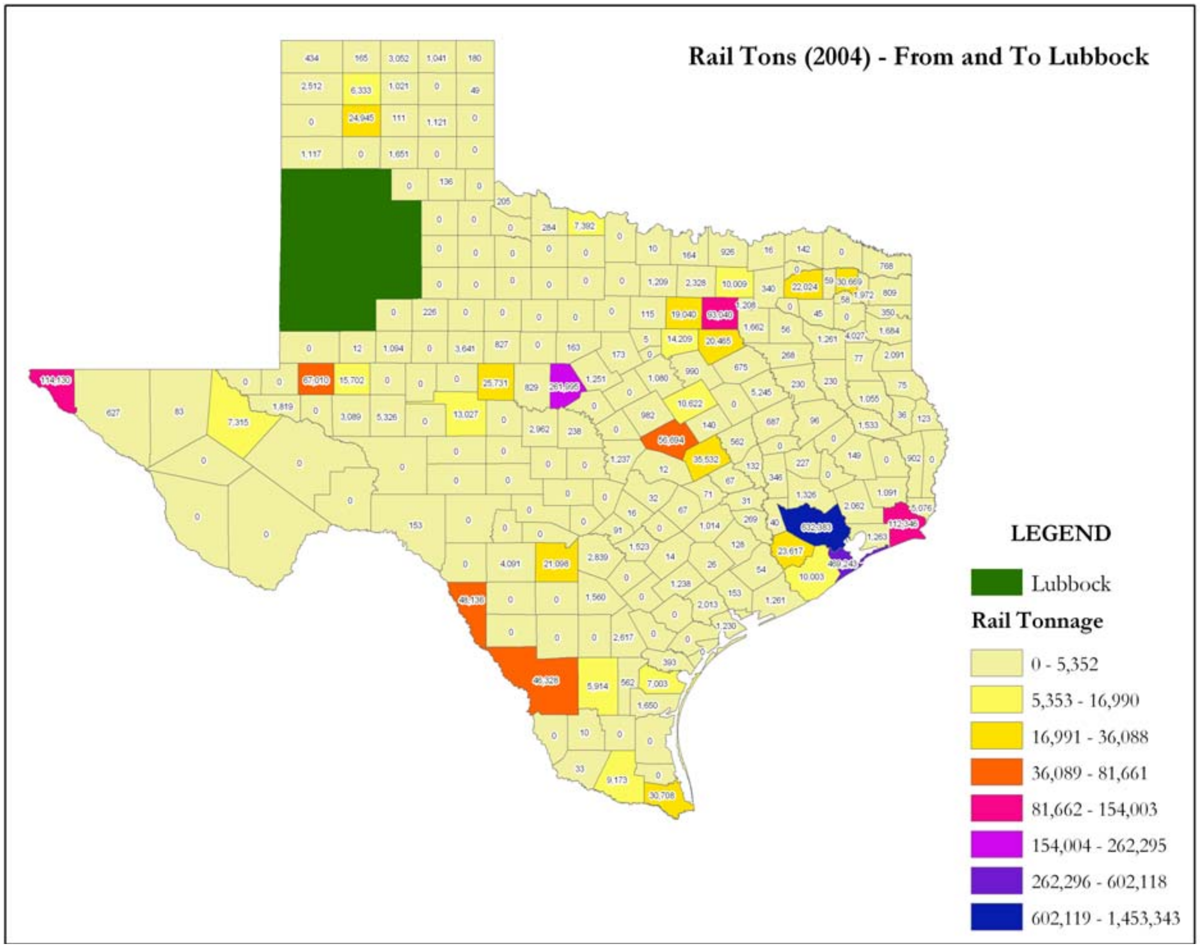


Figure 3-46: 2004 Rail Freight Movements

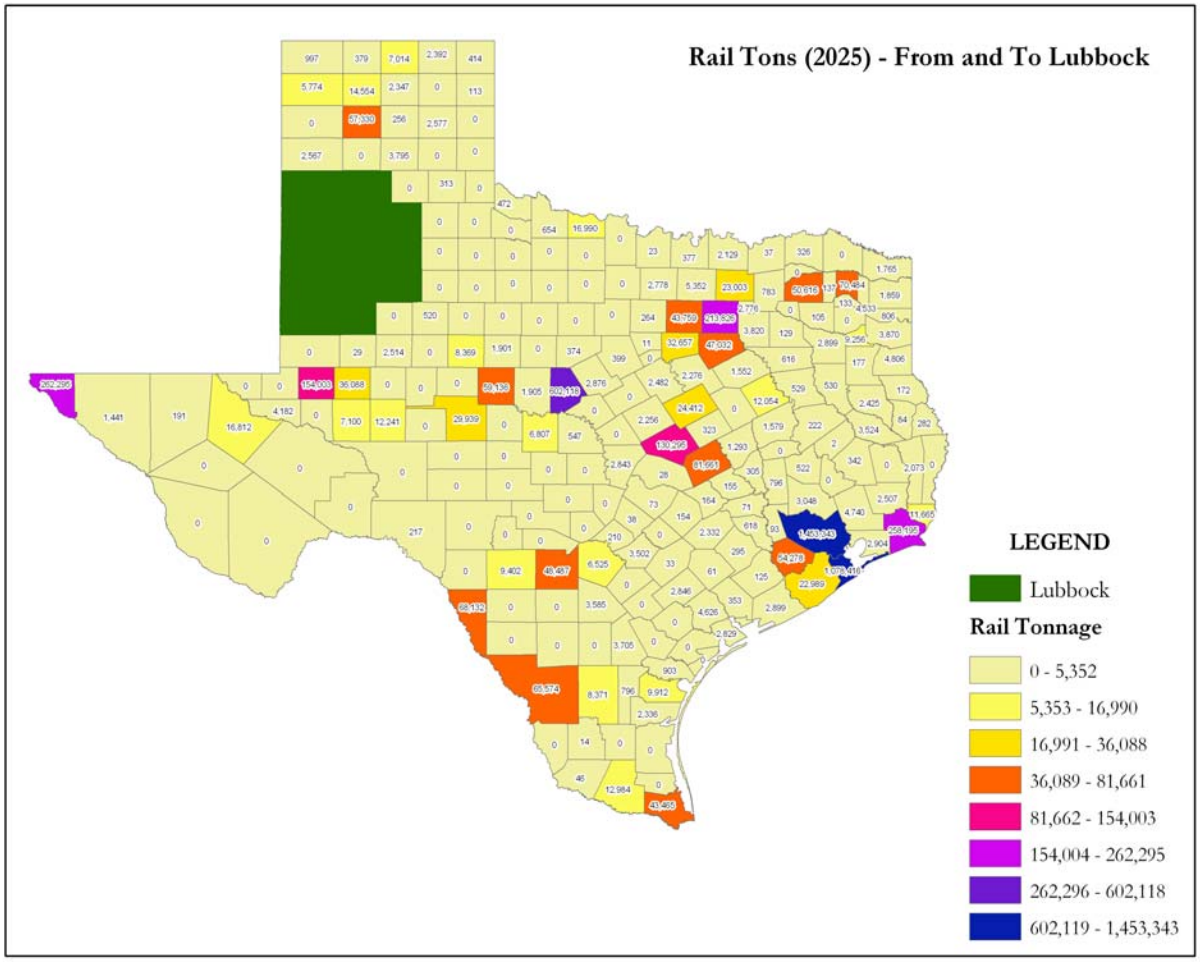


Figure 3-47: 2025 Rail Freight Movements

Rail Freight 5-48 and 5-49 illustrate that major rail freight movements are occurring from New Mexico, Oklahoma, Arkansas, and more moderately from Louisiana and Mexico, both in 2004 and 2025.

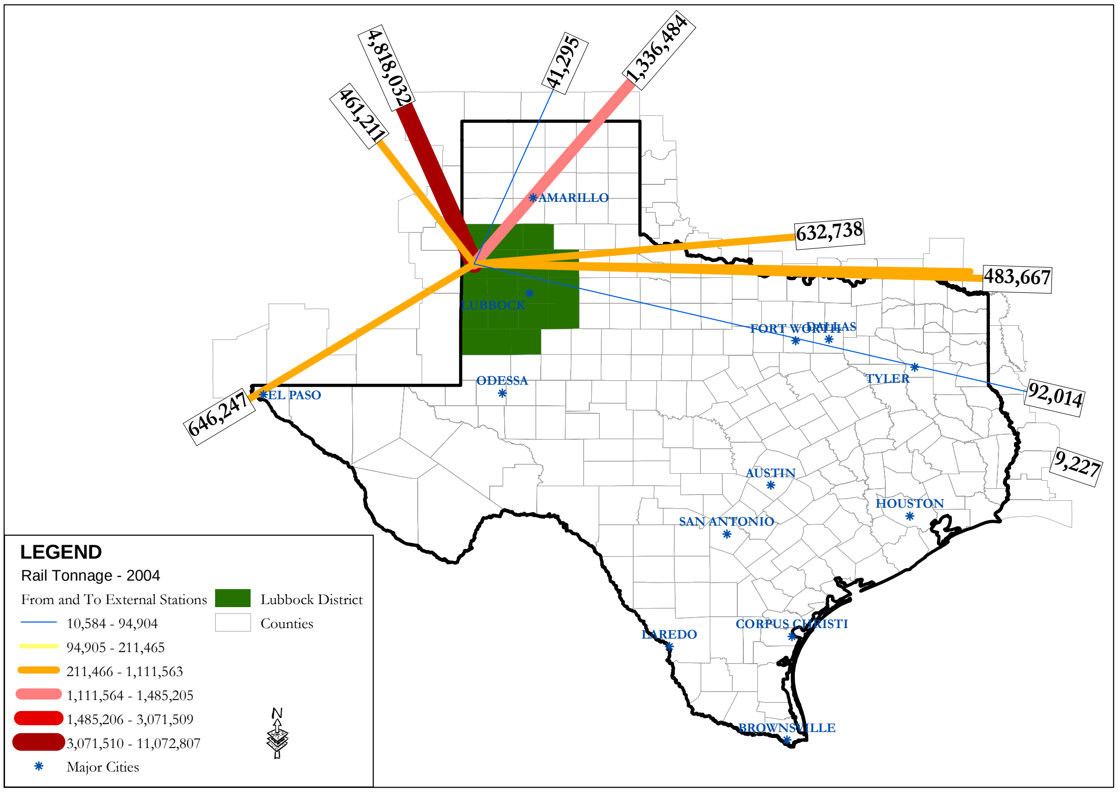


Figure 3-48: 2004 Freight Rail between the Lubbock District and Outside of Texas

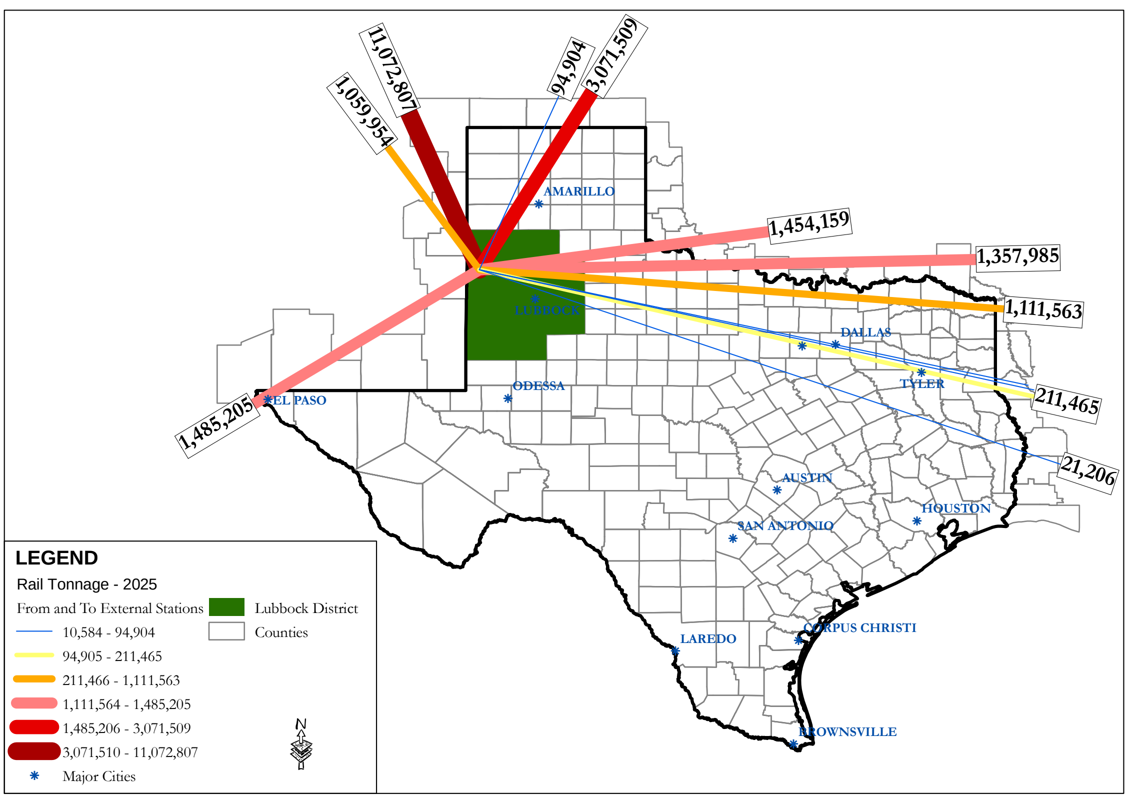


Figure 3-49: 2025 Freight Rail between the Lubbock District and Outside of Texas

Freight Rail Commodity Trends

Table 3-21 shows a comparison between 2004 and 2025 rail commodity tonnage values. The commodity with the largest tonnage increase is raw materials, which accounts for the coal movement through the Lubbock District. Raw materials accounts for more than 40 percent of the total rail tonnage movement. The movement of agriculture is projected to increase approximately 154 percent due to growth in corn grain, ethanol plants, feed supplements, dairy industry, and cotton. Secondary products also are projected to result in high growth rates. Although the highest growth commodities by percentage are building materials, wood, textiles, and machinery; they result in a small portion of the overall commodity rail movement.

Commodity	**Rail Tons**		
	2004	**2025**	**% Increase**
Building Materials	80,423	216,619	169%
Wood	58,490	157,541	169%
Agriculture	2,779,640	7,062,105	154%
Textiles	20,106	54,155	169%
Chemical/Petroleum	440,748	1,160,870	163%
Food	2,012,843	5,113,938	154%
Machinery	23,761	64,001	169%
Raw Materials	4,757,480	11,930,409	151%
Secondary	230,064	598,394	160%
TOTAL	10,403,555	26,358,031	155%

Table 3-21: Rail Freight Commodity Growth

Figures 3-50 and 3-51 display the commodities being moved by rail within the Lubbock District for both 2004 and 2025. The relative percentages of each commodity do not significantly change from 2004, as shown in Figure 3-51, to 2025. Figure 3-52 provides a correlation of similar information, although on a national level for the year 2000.

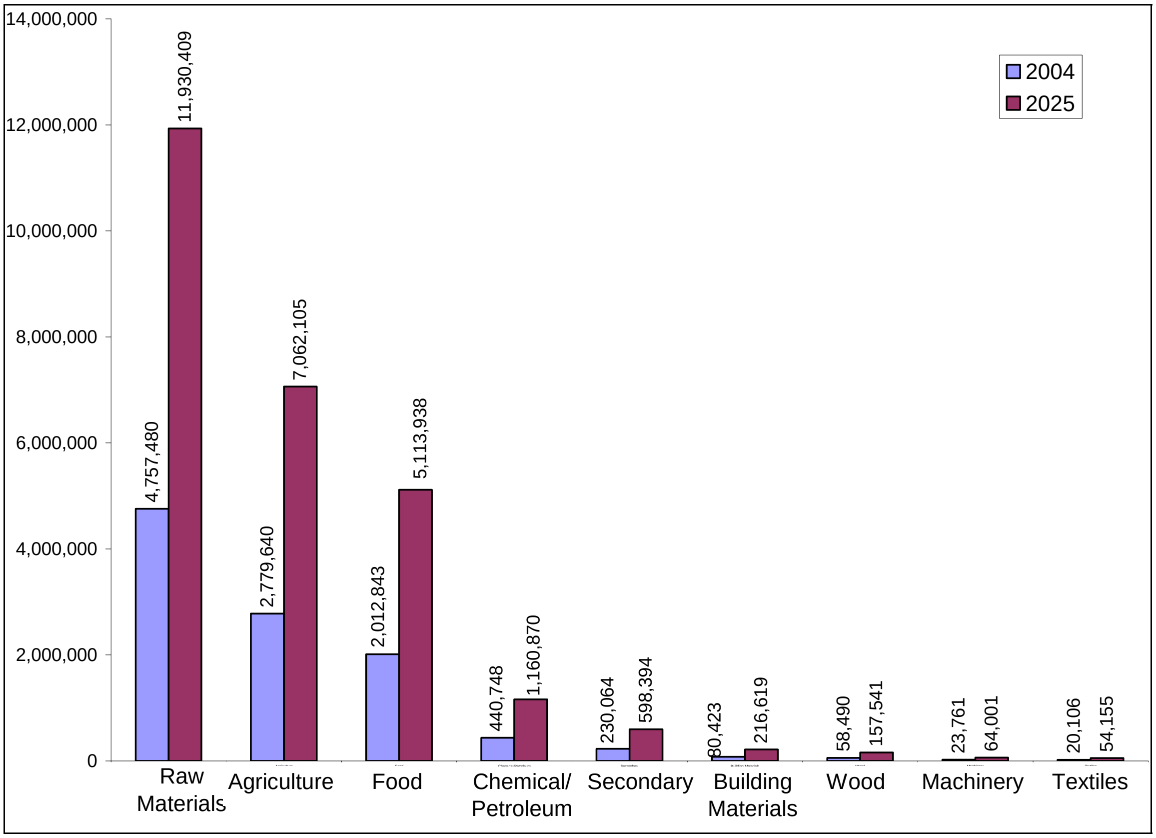


Figure 3-50: Total Freight Rail Tons by Commodity

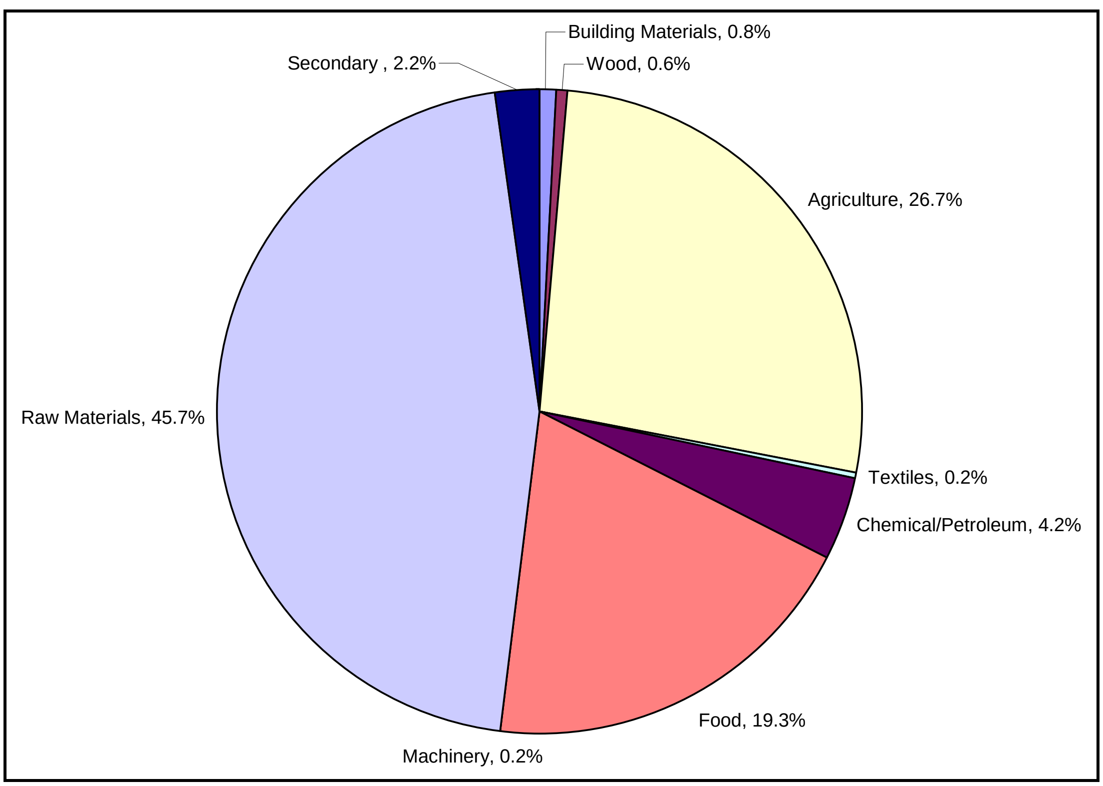


Figure 3-51: Percentage of Freight Rail Tons by Commodity (2004)

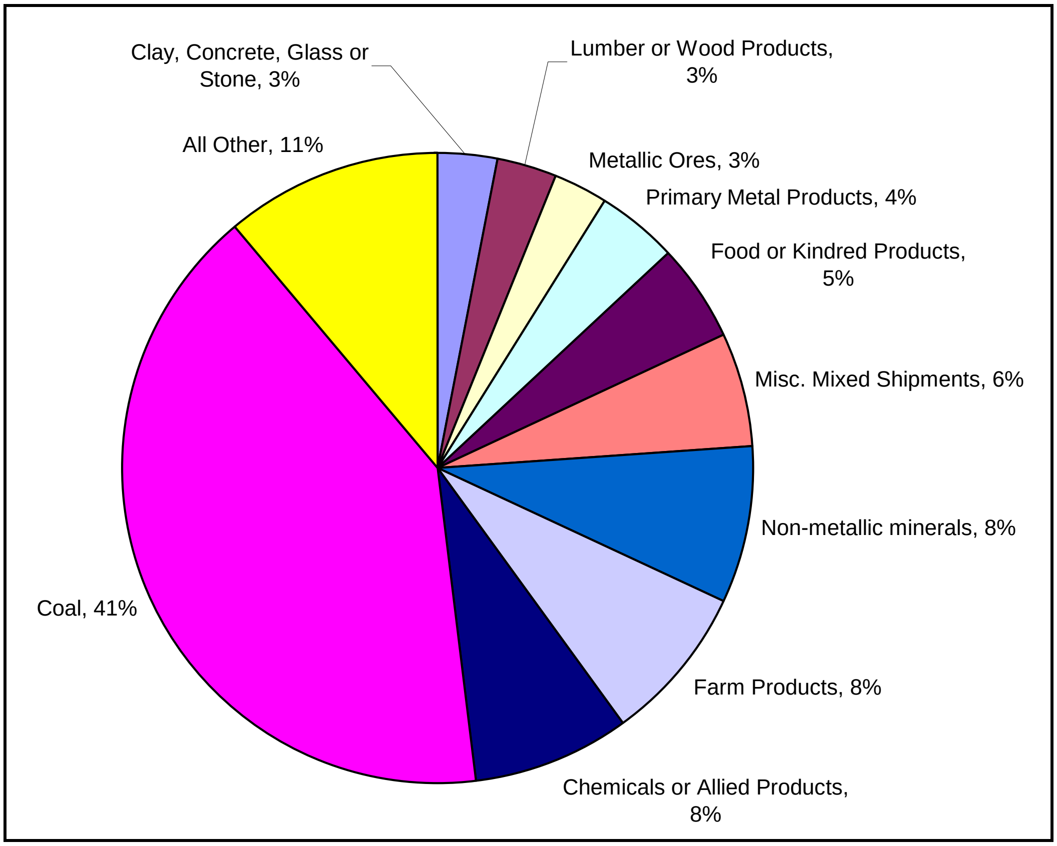


Figure 3-52: Freight tonnage by commodity – National (2000)

Rail Freight Findings Summary

- Freight tonnages moved by rail will more than double by 2025.
- Raw materials and agriculture constitute a majority of the freight rail tonnage for existing and future projections.
- Rail shipments originating from other states and from Mexico are projected to constitute approximately 70 percent of total rail shipments within the Lubbock District by 2025.

Rail and Truck Freight Comparison

Table 3-22 and Figure 3-53 provide the total truck and rail tons in the Lubbock District for the base year and projected to 2025. The increase between 1998 and 2025 for truck tons represents an 89 percent increase as opposed to rail tonnage increase of 155 percent. Although the rail freight percent change is higher, a larger amount of tonnage was projected to be transported via trucks in 2025. The percentages of rail freight to truck freight change from 34/66 in 2004 to 40/60 in 2025, showing an increase in the relative percentage of rail freight to truck freight in the future.

Year	Truck	Rail
1998 (Truck), 2004 (Rail)	20,628,822	10,403,555
2025	39,053,639	26,538,031
Percent Increase	89%	155%

Table 3-22: Rail and Truck Tons Comparison

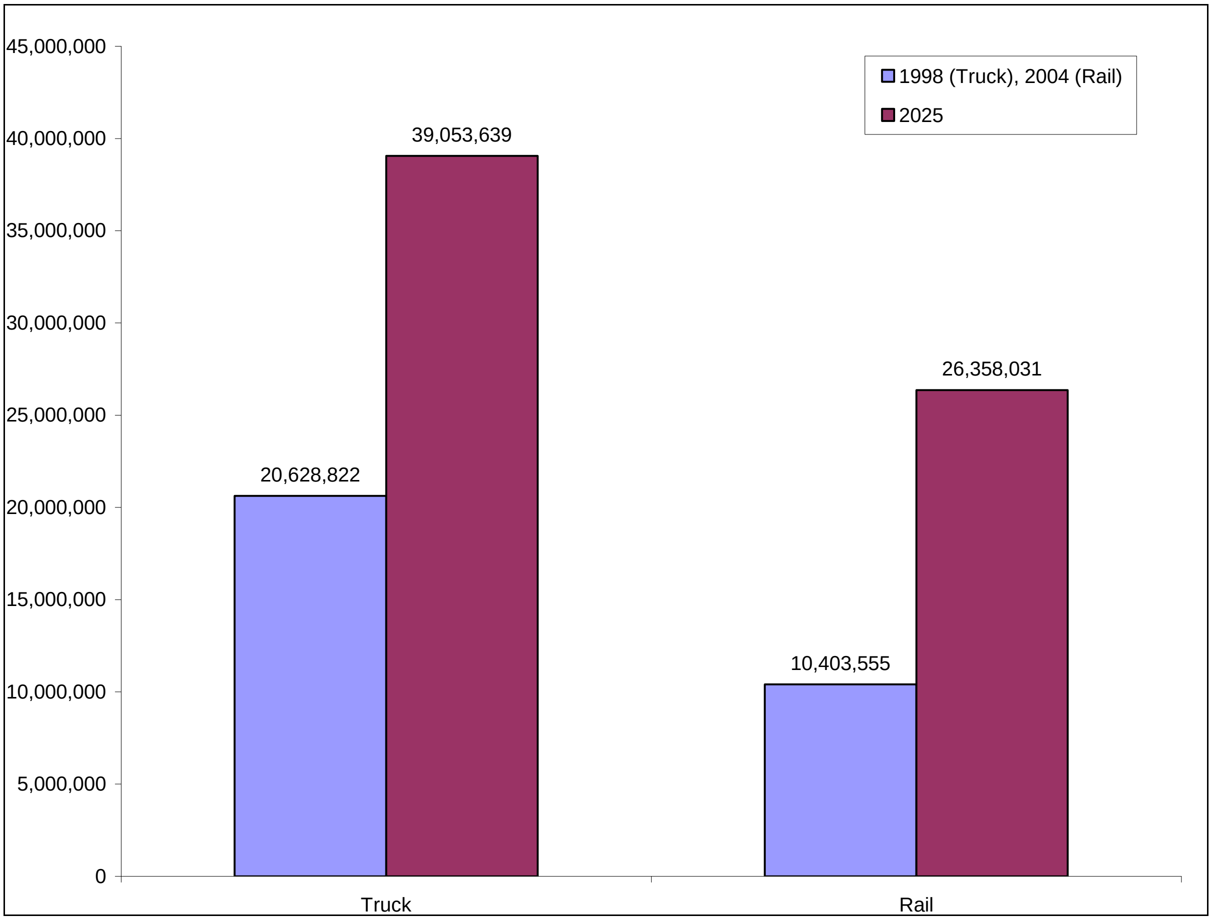


Figure 3-53: Total Rail / Truck Tons

TxDOT – Odessa District

Truck freight flows and commodities as well as rail freight flows and commodities were analyzed for the Odessa District in order to determine the future situation for truck and rail freight activity within the District. The analysis also identified existing and projected locations of congestion for the region. The following summary of truck and rail freight movement for the Odessa District provides data that is specific to this District. Additional characteristics of the District that are consistent with the other West Texas Districts are included in the overview discussion of the West Texas Region.

Table 3-23 and Figure 3-54 depict the network improvements updated in the SAM to reflect projects cited in the District's list of planned projects.

Road Name	From	To	Existing Lanes	Future Lanes
N Grandview Ave	SH 191	E Yukon Rd	2	4
FM 2020	U.S. 385	N Grandview Ave	4	6
FM 307	SH 137	Lee St	2	4
SH 158 (Ports to Plains)	IH 20	Midland/Glasscock County Line	2	4

Table 3-23: Future Network Improvements

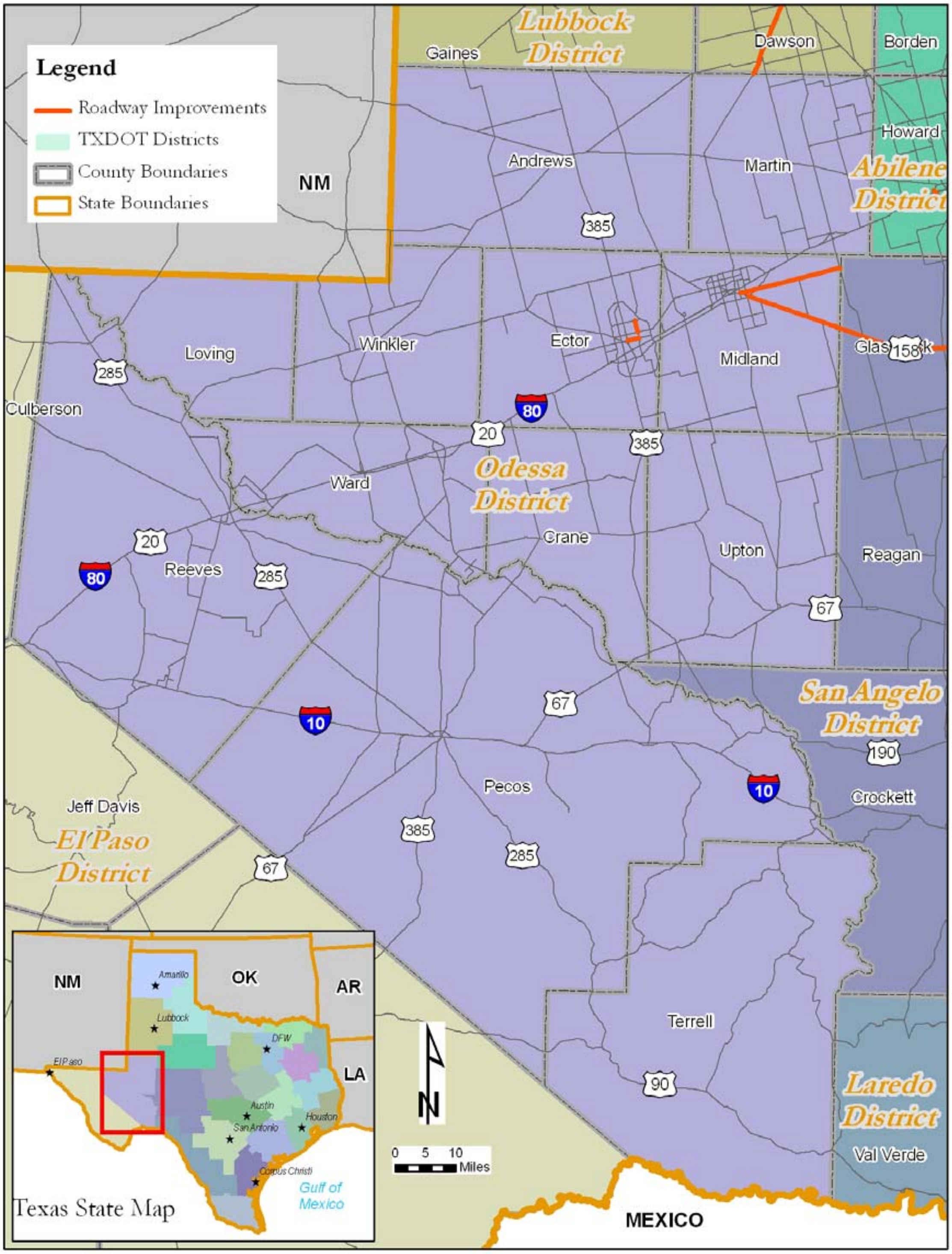


Figure 3-54: Future Roadway Improvements for Odessa District (1998 to 2025)

Truck Freight Movements and Commodities

Table 3-24 illustrates that while the movement of truck tons within the Odessa District will increase by nearly 268,000 tons between 1998 and 2025, it pales in comparison to the increased movements coming into (7.2 million) and out of (7 million) the Odessa District.

Annual Truck Tons				
Origin	**Termination**	**1998**	**2025**	**Percent Change**
Internal to Internal				
Odessa District	Odessa District	540,575	808,444	50%
Internal to External				
Odessa District	Other Texas Counties	4,385,818	9,306,134	112%
Odessa District	Western U.S.	34,883	98,514	182%
Odessa District	Northern U.S.	497,213	1,404,199	182%
Odessa District	Eastern U.S.	183,941	519,475	182%
Odessa District	Mexico	835,990	2,360,950	182%
External to Internal				
Other Texas Counties	Odessa District	5,140,196	10,317,410	101%
Western U.S.	Odessa District	23,048	67,806	194%
Northern U.S.	Odessa District	328,524	966,482	194%
Eastern U.S.	Odessa District	121,536	357,544	194%
Mexico	Odessa District	552,364	1,624,994	194%
	Total	**12,644,088**	**27,831,951**	**120%**

*Source: Statewide Analysis Model based on 1998 Reebie Transearch Data, Wharton Economic Forecasting Associates and Latin American Trade Transportation Study

Table 3-24: Annual Truck Tons

Truck Movements within the State

Figure 3-55 reveals that in 1998 large numbers of trucks are moving between the Odessa District and Amarillo, Lubbock, Corpus Christi, Houston, San Antonio, the Dallas - Fort Worth metroplex, El Paso, Austin as well as areas along the U.S.-Mexico border. The largest origins and destinations in terms of truck tonnage movement were located in the Houston region, followed by the Dallas - Fort Worth metroplex. Figure 3-56 shows the continued growth of truck traffic between the Odessa District and the major urban areas of Houston, San Antonio, Dallas - Fort Worth, El Paso and Austin.

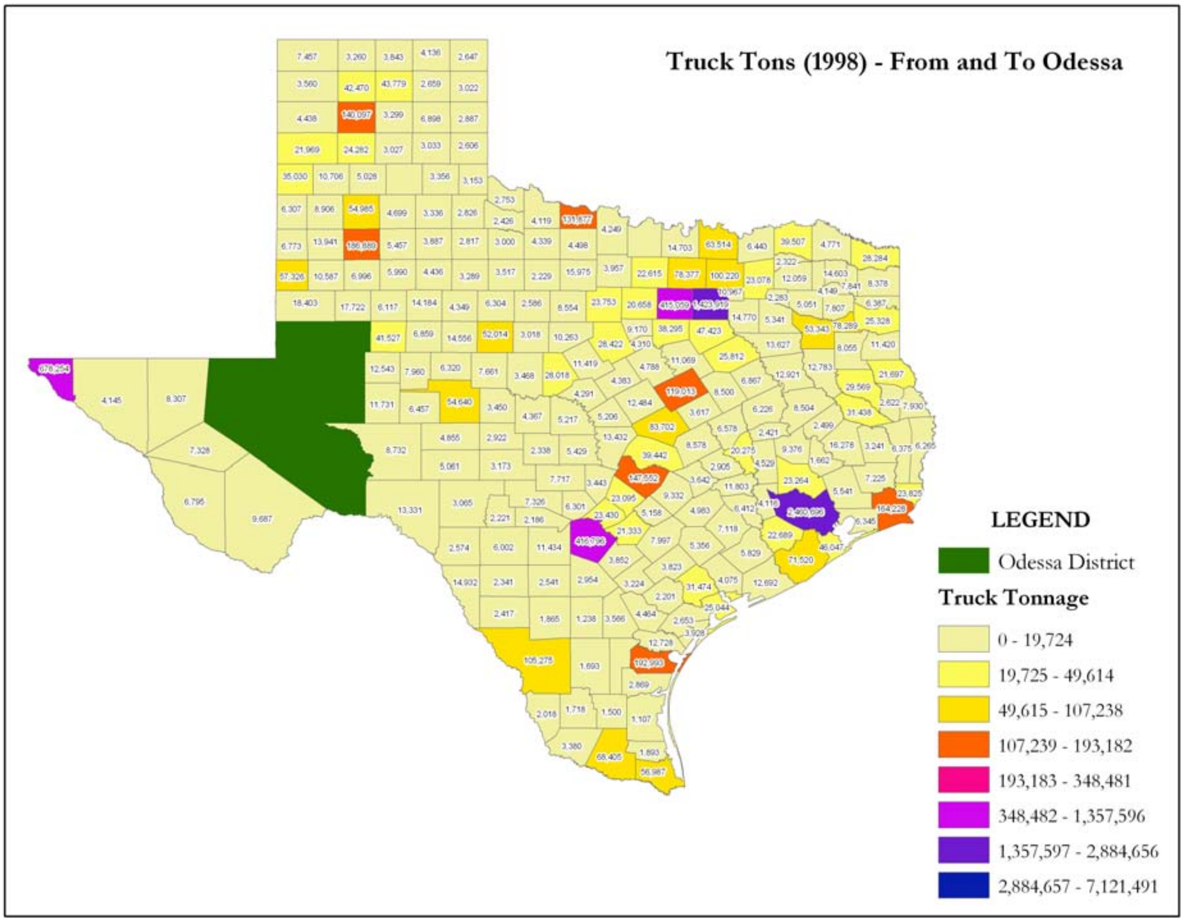


Figure 3-55: 1998 Truck Movements within Texas To and From Odessa District

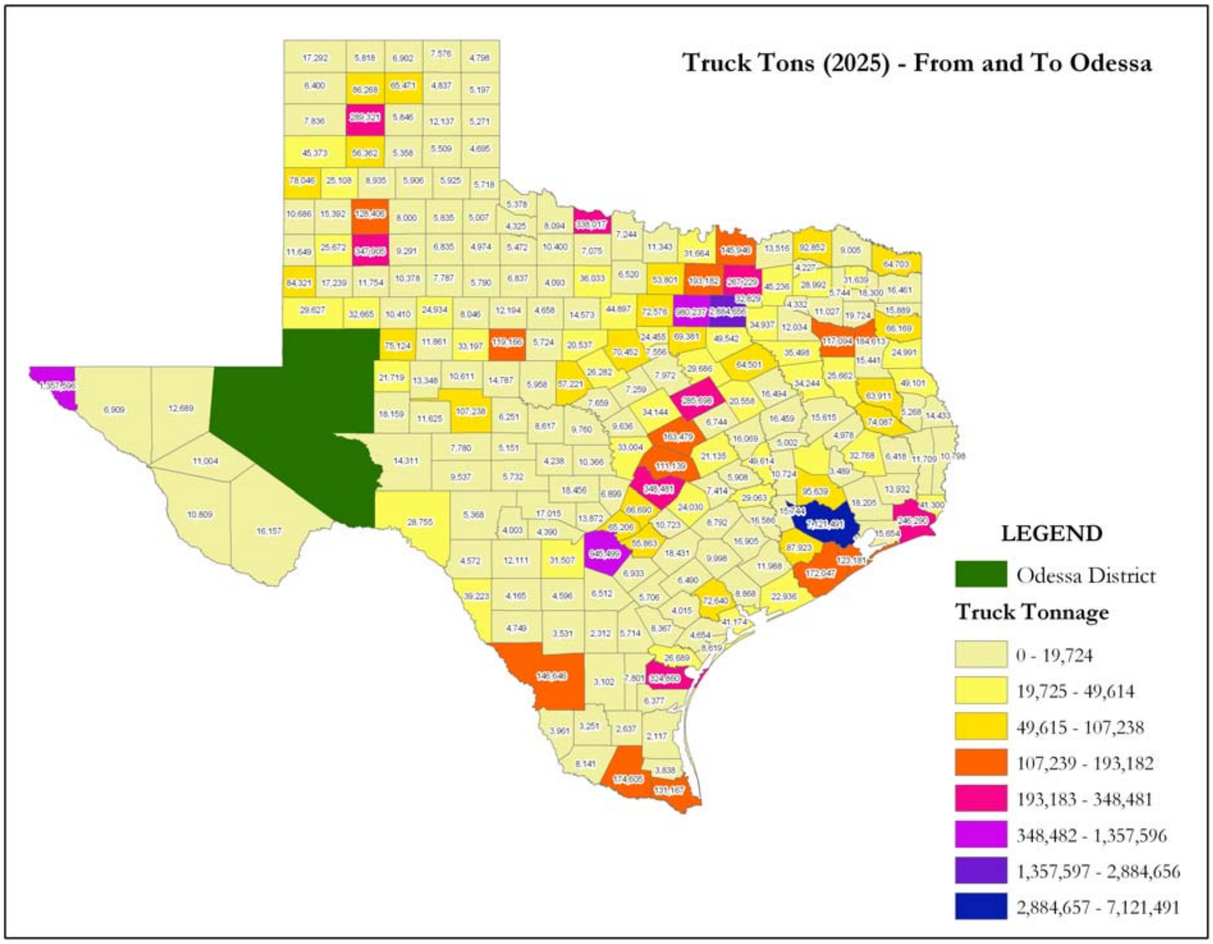


Figure 3-56: 2025 Truck Movements within Texas To and From Odessa District

Truck Movements Outside of the State

Major movements in 1998 can be seen from Oklahoma, Arkansas, New Mexico, Louisiana, and Mexico as shown in Figure 3-57. Figure 3-58 clearly demonstrates increased movement from Oklahoma, New Mexico, Louisiana, and Mexico to the Odessa District in the future.

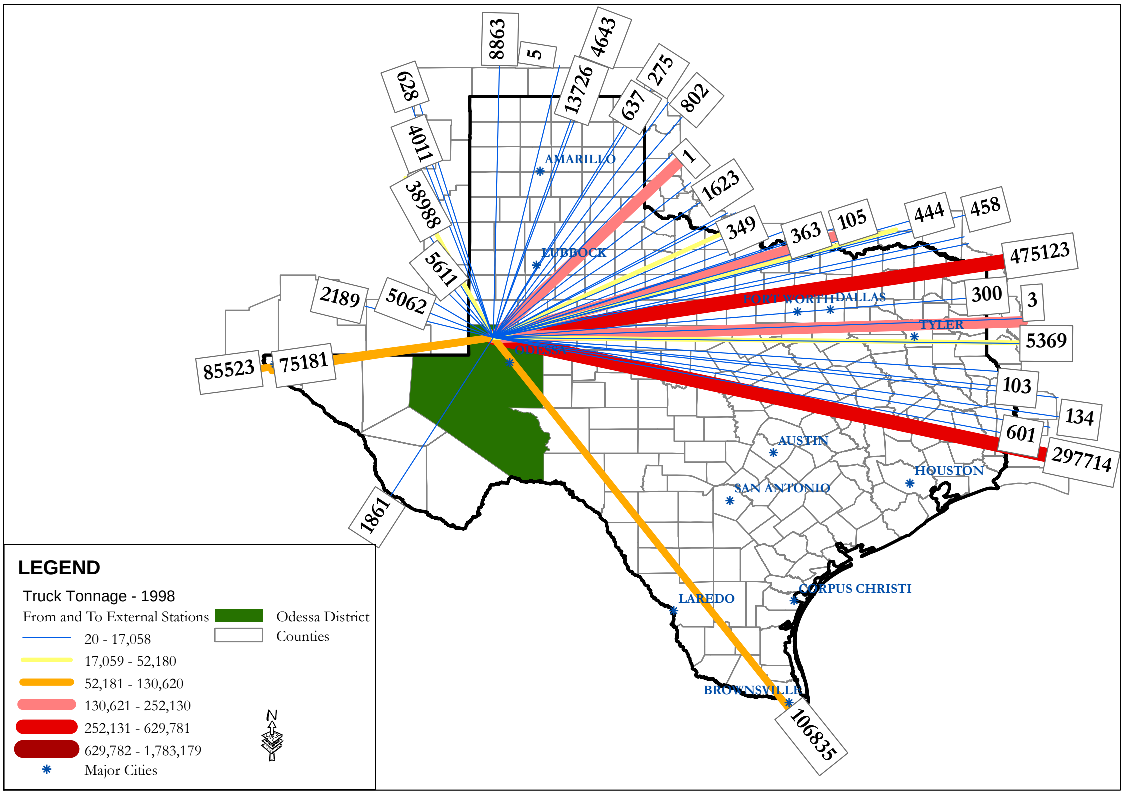


Figure 3-57: 1998 Truck Freight between the Odessa District and Outside of Texas

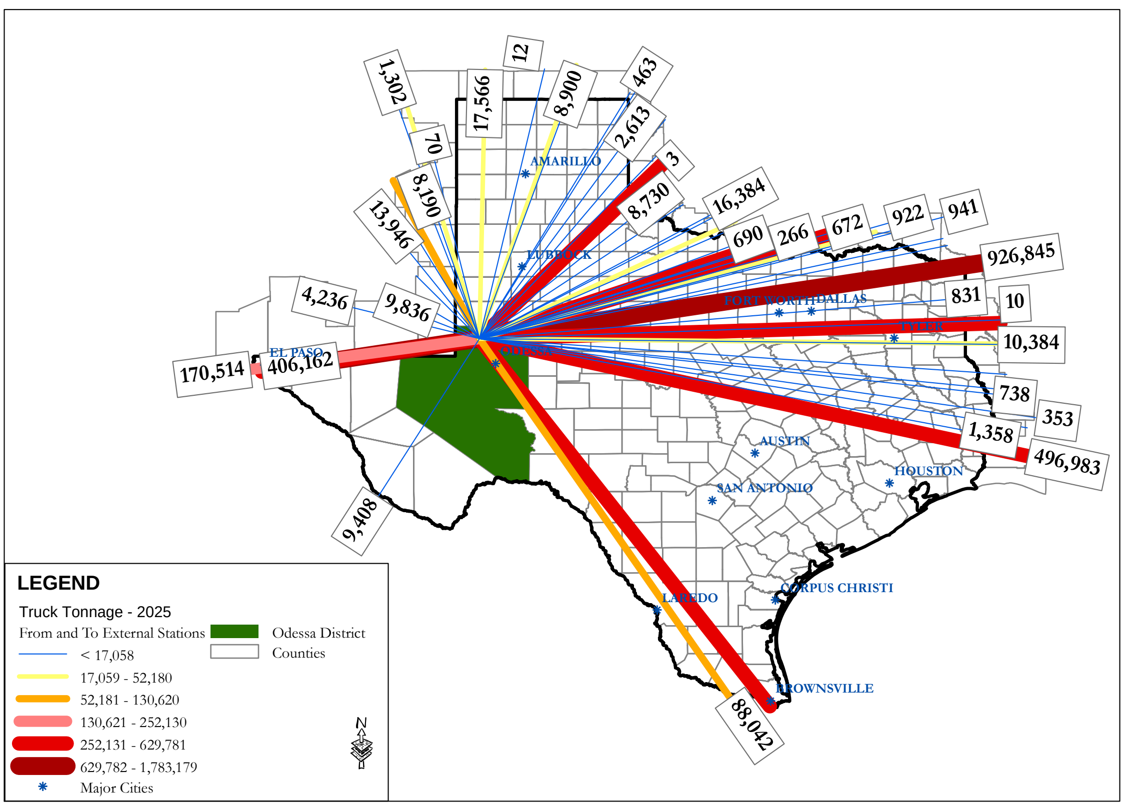


Figure 3-58: 2025 Truck Freight between the Odessa District and Outside of Texas

Truck Commodity Trends

Table 3-25 indicates that building materials will be the fastest growing commodity in terms of increased tonnage weight from 1998 to 2025. Additionally, building materials are projected to account for nearly 30 percent of the overall truck tonnage movement in 2025 into and out of the Odessa District. Chemical/petroleum products are projected to result in a large percentage of the overall tonnage movement for the Odessa District; however, the projected growth for this commodity was relatively low. Food commodities are projected to result in the third highest overall tonnage. While textiles and machinery are projected to produce much lower tonnages, they are expected to result in over 300 percent increases.

Commodity	**Truck Tons**		
	1998	**2025**	**% Increase**
Building Materials	2,429,923	7,651,003	215%
Wood	875,773	1,877,578	114%
Agriculture	134,317	404,782	201%
Textiles	134,965	647,162	380%
Chemical/Petroleum	5,353,528	6,809,436	27%
Food	2,068,870	5,360,339	159%
Machinery	270,595	1,141,919	322%
Raw Materials	50,231	142,009	183%
Secondary	1,325,884	3,797,724	186%
TOTAL	12,644,086	27,831,952	120%

Table 3-25: Truck Commodity Growth

The leading products moving by truck (in terms of tonnage in the District in both 1998 and 2025) are building materials, food, chemical/petroleum and secondary products. As determined from recent interviews with economic development groups and industry professionals, building materials are expected to show significant growth. In terms of agriculture, growth is expected in areas dealing with corn grain, ethanol plants, distilled feed supplements and dairy. According to a survey of various industries and governmental agencies within the Odessa District, twenty-five new industries have located to the Midland and Ector Counties within the last five years. Additional existing industries such as cotton, sorghum and grain have continued to grow. Figures 3-59, 3-60 and 3-61 further illustrate the commodity tonnage within the Odessa District for both 1998 and 2025.

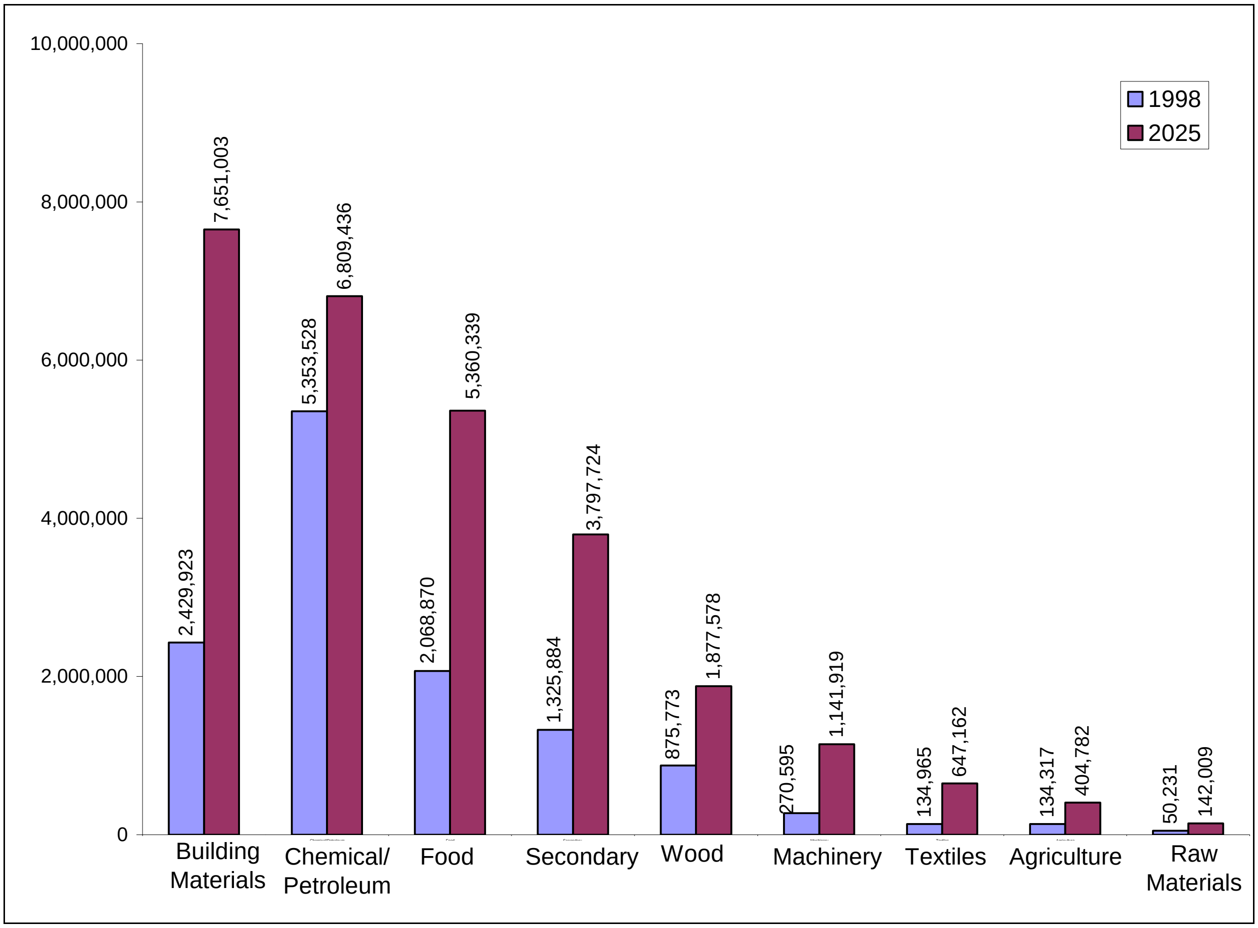


Figure 3-59: Total Truck Tons by Commodity

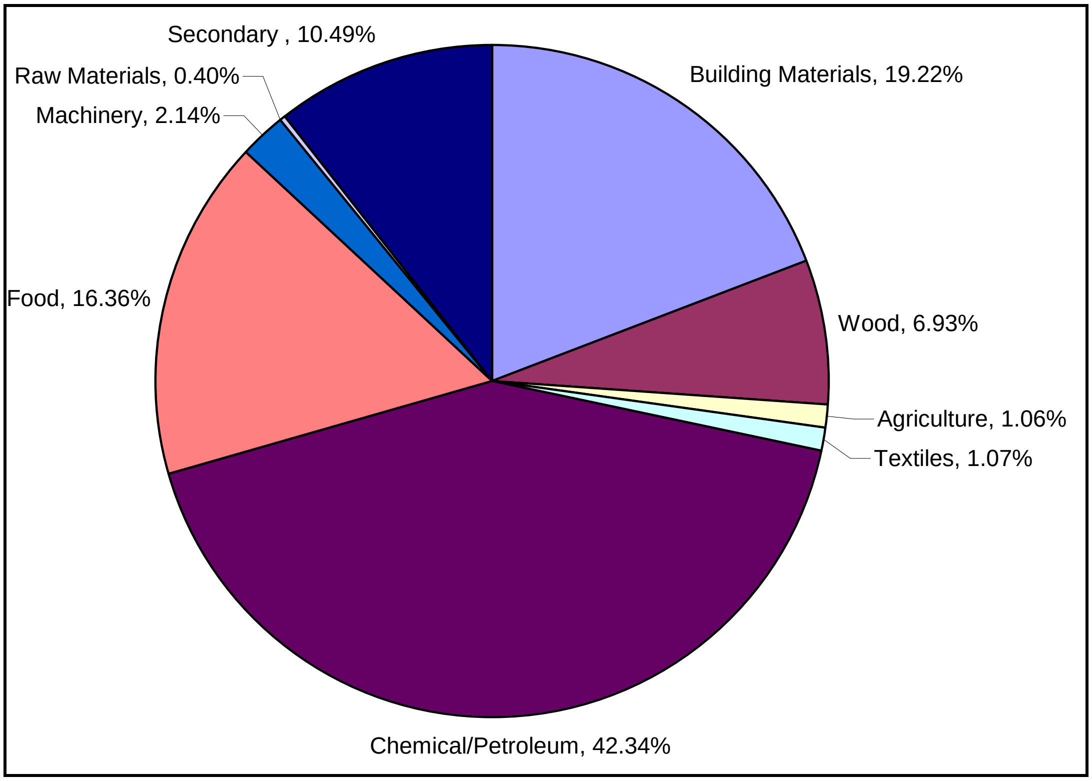


Figure 3-60: Percentage of Truck Tons by Commodity (1998)

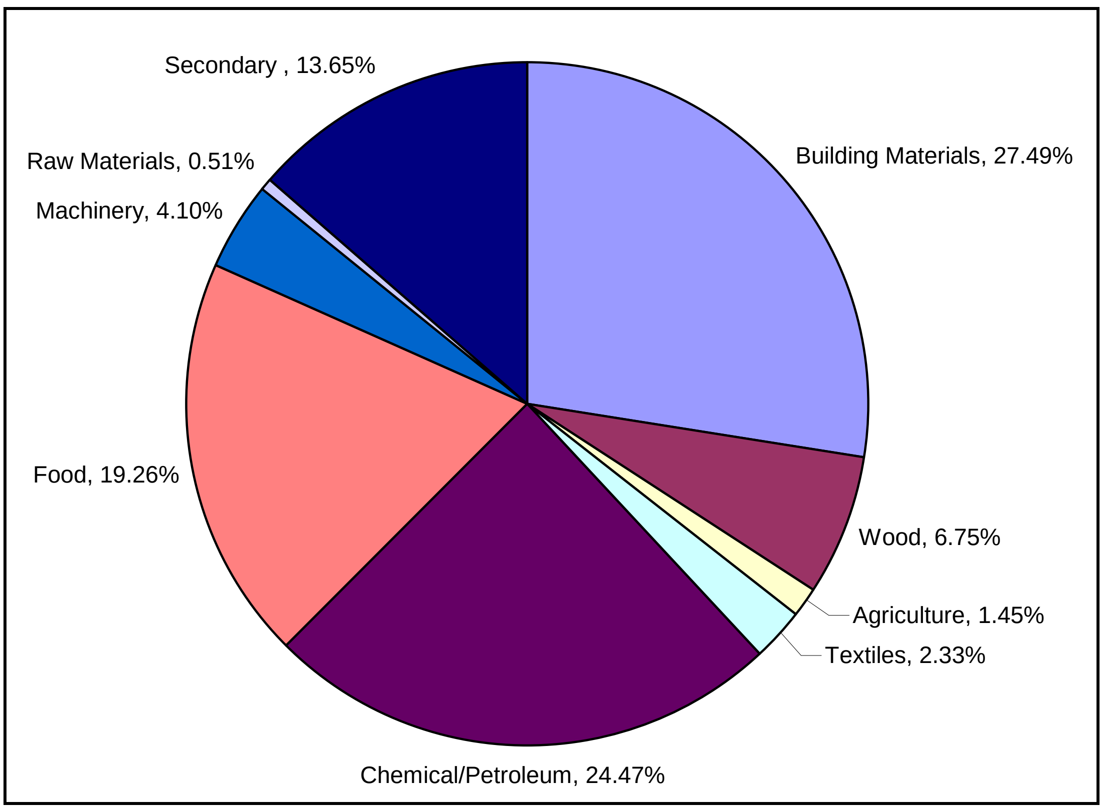


Figure 3-61: Percentage of Truck Tons by Commodity (2025)

Traffic Volume Analysis

Table 3-26 represents 2003 traffic data within the Odessa District where permanent count stations shown in Figure 3-62 are located. The SAM was used to predict future 2025 truck volumes as shown in Table 3-27. The 2025 model includes planned improvements for the Odessa District roadways as listed in Table 3-23. Figure 3-62 is a graphic depiction of each location at which traffic counts were taken. Locations of the count stations are approximate and directional count stations were consolidated.

Location		2003				
		Total Volume	**Percent Trucks**	**Truck Volume**	**Number of Lanes**	**V/C Ratio**
1	Midkiff St S of LP 250	23,000	2%	400	4	0.61
2	U.S. 385 S of Andrews	6,800	19%	1,300	4	0.17
3	SH 302 NW of Odessa	3,000	23%	700	4	0.08
4	FM 1788 W of Midland	4,000	20%	800	4	0.13
5	IH 20 E of Odessa	20,300	29%	5,900	4	0.25

Table 3-26: 2003 Truck Traffic Volumes

Location		2025				
		Total Volume	**Percent Trucks**	**Truck Volume**	**Number of Lanes**	**V/C Ratio**
1	Midkiff St S of LP 250	35,600	2%	600	4	0.94
2	U.S. 385 S of Andrews	10,400	19%	2,000	4	0.26
3	SH 302 NW of Odessa	4,600	22%	1,000	4	0.13
4	FM 1788 W of Midland	6,200	20%	2,900	4	0.52
5	IH 20 E of Odessa	31,400	29%	9,200	4	0.39

Table 3-27: 2025 Truck Traffic Volumes

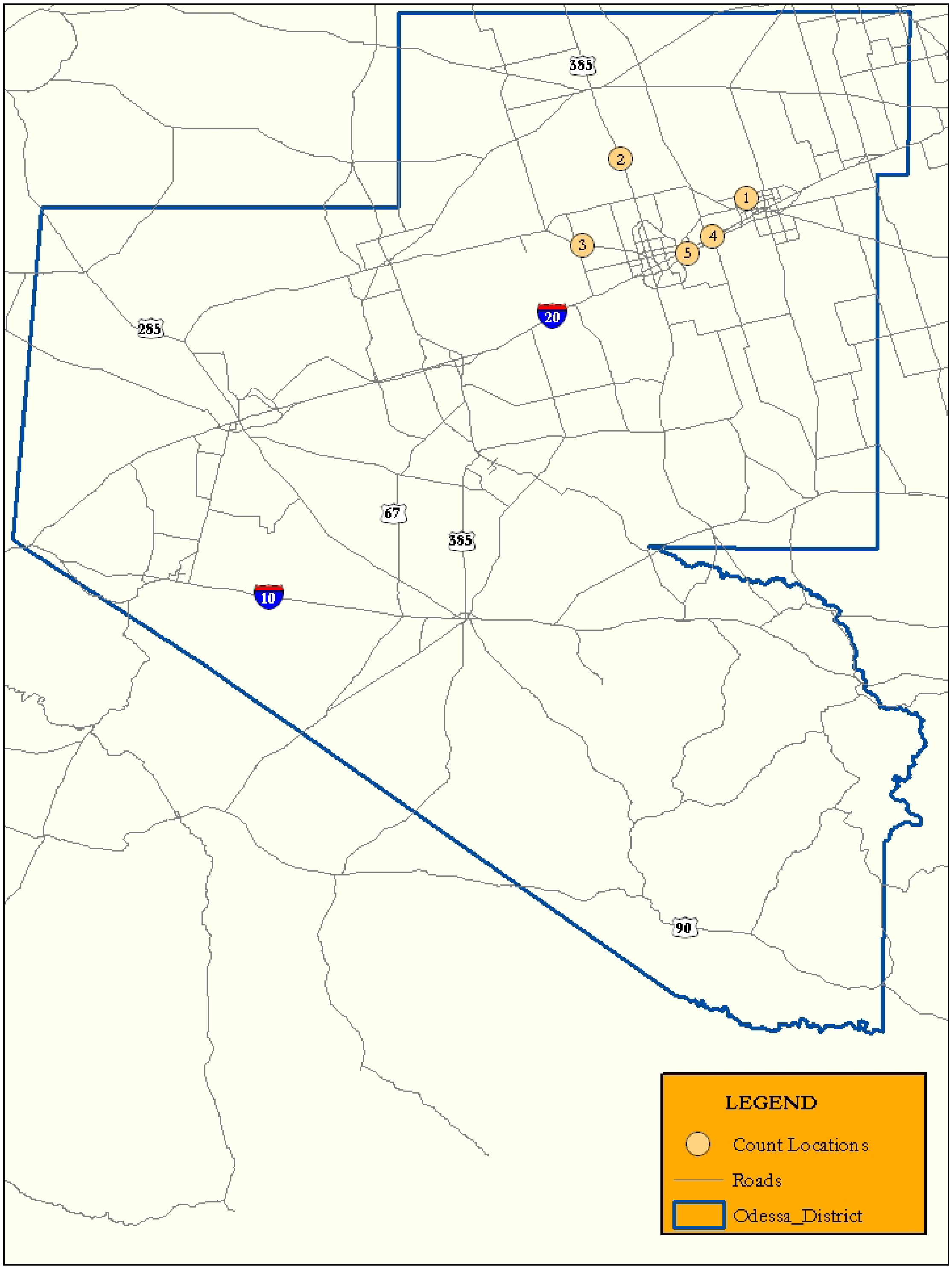


Figure 3-62: Permanent Count Locations

Figures 3-63 and 3-65 show the areas of congestion District-wide while Figures 3-64 and 3-66 highlight the areas of congestion in the cities of Midland and Odessa for years 1998 and 2025, respectively.

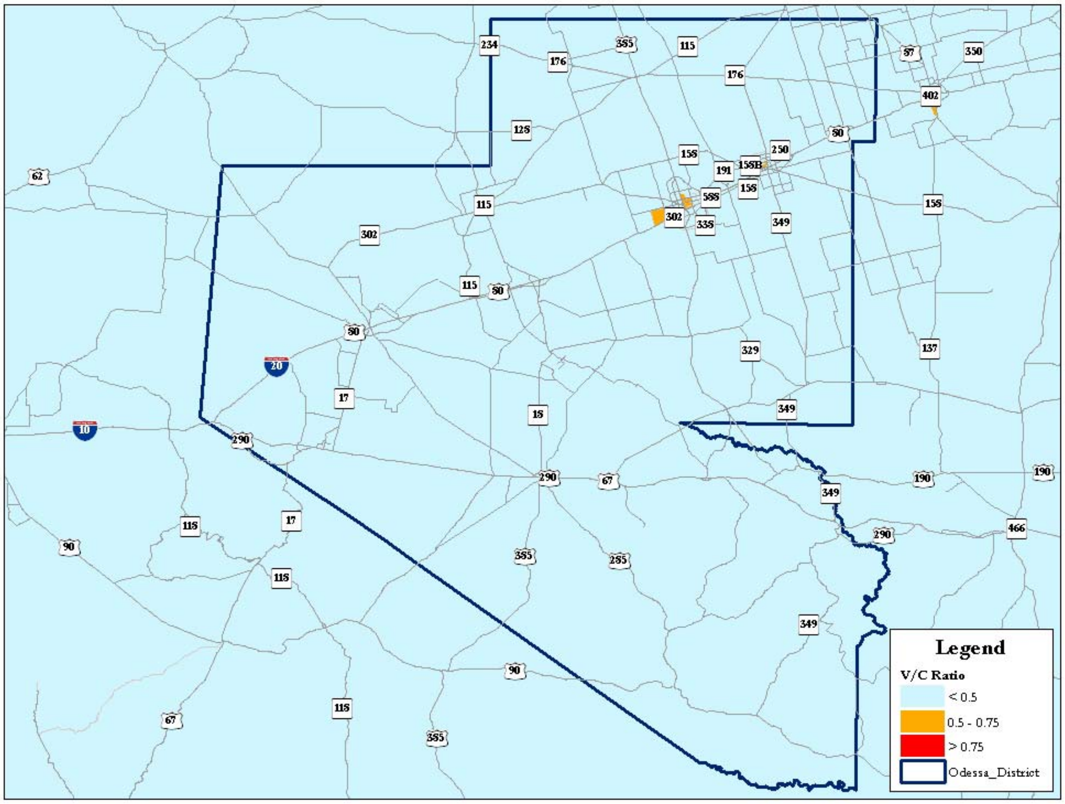


Figure 3-63: 1998 Congestion for Odessa District (based on SAM modeling)

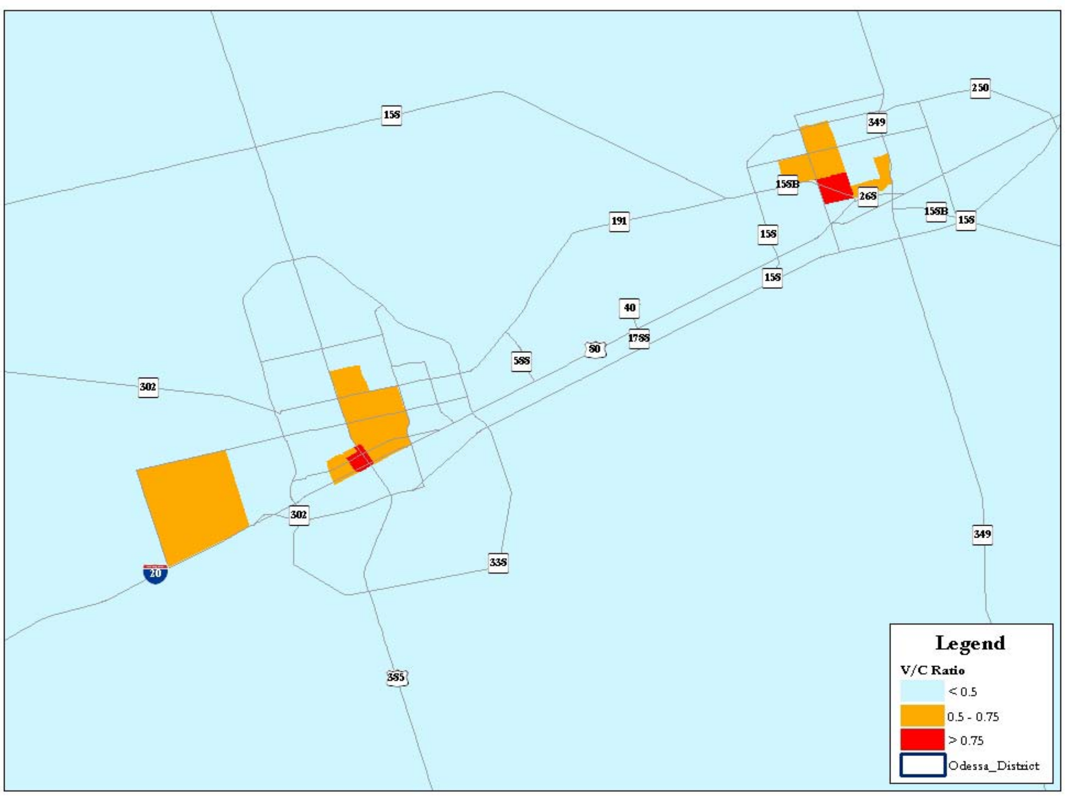


Figure 3-64: 1998 Congestion for Cities of Midland and Odessa (based on SAM modeling)

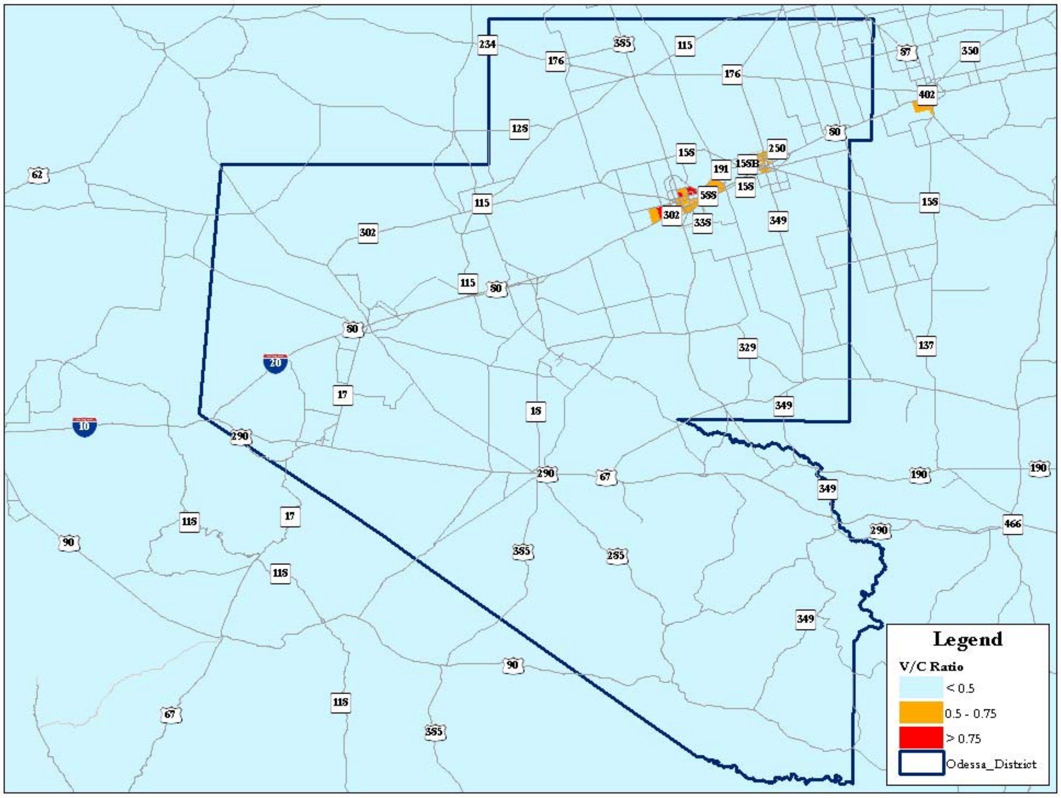


Figure 3-65: 2025 Congestion for Odessa District (based on SAM modeling)

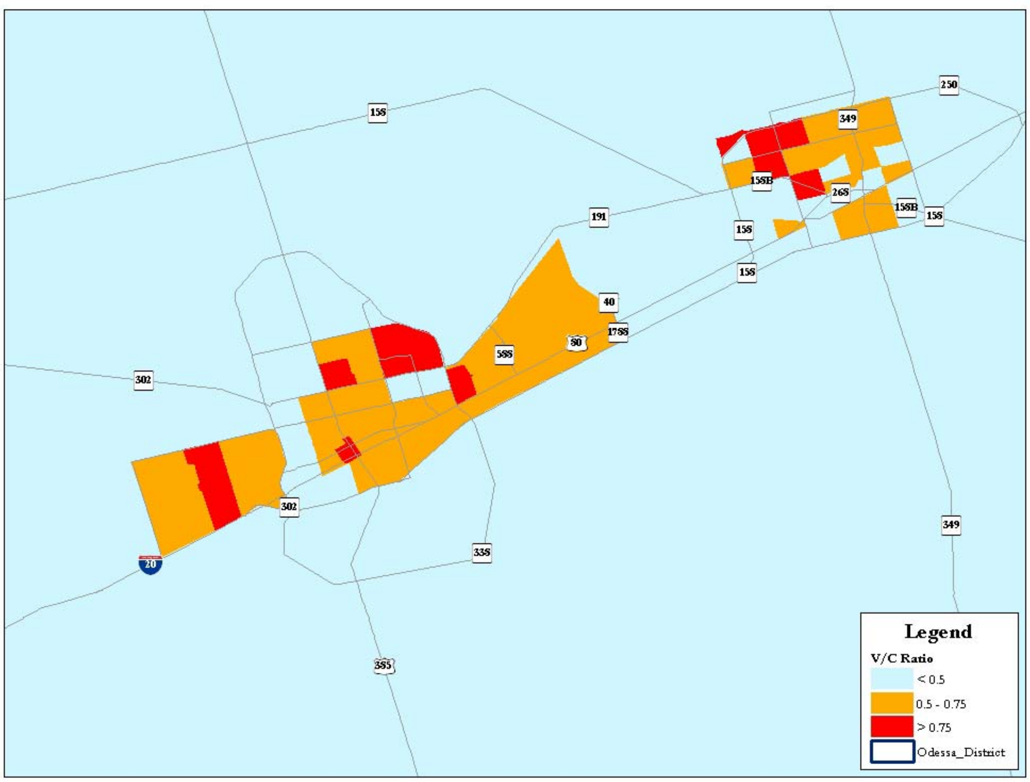


Figure 3-66: 2025 Congestion for Cities of Midland and Odessa (based on SAM modeling)

The V/C ratio analysis showed that the freeways and arterials would continue to result in increased periods of congestion between existing and future years; however, the overall congestion level throughout the District was projected to remain relatively low. Pockets of bottlenecks are projected throughout the District with the primary areas of congestion projected within the cities of Midland and Odessa. An area west of Odessa on the north side of IH 20 and an area east of SH 385 experienced an average V/C between 0.5 and 0.75 in the base year. The congestion in this area as well as an areas further east along IH 20 and on the north side of IH 20 in Midland were projected to increase for the 2025 scenario. Figures 3-64 and 3-66 show a larger area where moderate congestion levels (V/C between 0.5 and 0.75) occur, although it is projected that very few areas within the Midland/Odessa area will experience more severe levels of congestion (V/C greater than 0.75).

The count station traffic data shown in Tables 3-26 and 3-27 revealed heavy truck traffic in several areas within the District. Approximately 29 percent of the traffic traveling along IH 20 currently as well as in the future consists of trucks. The existing count information also showed that approximately 19 percent trucks travel along FM 1788, which is a major north-south route near the Midland International Airport that provides access to IH 20. SH 302 is another north-south route that provides access to IH 20 and goes through the city of Odessa. Outside of the Midland-Odessa metroplex, truck traffic is approximately 19 percent of the total traffic south of the city of Andrews along U.S. 385.

Rail Freight Movements and Commodities

Table 3-28 illustrates that the Odessa District will continue to import a great deal of commodities by the year 2025. While a modest increase in rail freight movement will occur internally to the District, approximately 1.6 million additional tons will be transported between the Odessa District and U.S. and Mexico. An additional 1 million tons will be transported between the Odessa District and other Texas counties from 2004 and 2025.

Annual Rail Tons				
Origin	**Termination**	**2004**	**2025**	**Percent Change**
Internal to Internal				
Odessa District	Odessa District	10,302	29,032	182%
Internal to External				
Odessa District	Other Texas Counties	470,763	1,320,175	180%
Odessa District	Western U.S.	110,220	296,540	169%
Odessa District	Northern U.S.	226,346	608,972	169%
Odessa District	Eastern U.S.	43,852	117,980	169%
Odessa District	Mexico	38,444	103,430	169%
External to Internal				
Other Texas Counties	Odessa District	100,186	273,368	173%
Western U.S.	Odessa District	138,074	387,979	181%
Northern U.S.	Odessa District	283,548	796,752	181%
Eastern U.S.	Odessa District	54,934	154,360	181%
Mexico	Odessa District	48,159	135,324	181%
Total		**1,524,828**	**4,223,912**	**177%**

*Source: Statewide Analysis Model based on 2004 Surface Transportation Board Waybill Data

Table 3-28: Rail Freight Movements for the Odessa District

Rail Freight Movements within the State

Figure 3-67 illustrates the origin and destinations for freight rail movements occurring in 2004, while Figure 3-68 shows projected rail movements in 2025. Potter, Howard, Bailey, Lubbock, Harris, Galveston, Titus, Tarrant and Dallas Counties appear to be the handling the largest movements to and from the Odessa District. The amount of rail tonnage shown in 2004 and projected for 2025 for the Dallas - Fort Worth metroplex is significantly less to/from the Odessa District as compared to the Amarillo District.

The major rail line coming to and from the Odessa District is provided by UP and travels from El Paso, across Reeves, Ward, Ector, Midland and Martin Counties and travels towards Tarrant and Dallas Counties. Therefore, significant rail tonnage travels between both Howard and Nolan Counties, which are located east of the Odessa District. A crossing with BNSF near Sweetwater provides access for rail traffic to the Lubbock and Amarillo Districts. The largest rail tonnage shipments travel between Harris County and the Odessa District. Unlike the Lubbock and Amarillo Districts, the amount of tonnage traveling toward the U.S.-Mexico border counties was significantly less than the tonnage to the other Texas counties previously mentioned. Accommodating these and other locations with freight rail service will be critical to the future of Texas in terms of economic growth and also providing options to shift truck cargo to rail cars.

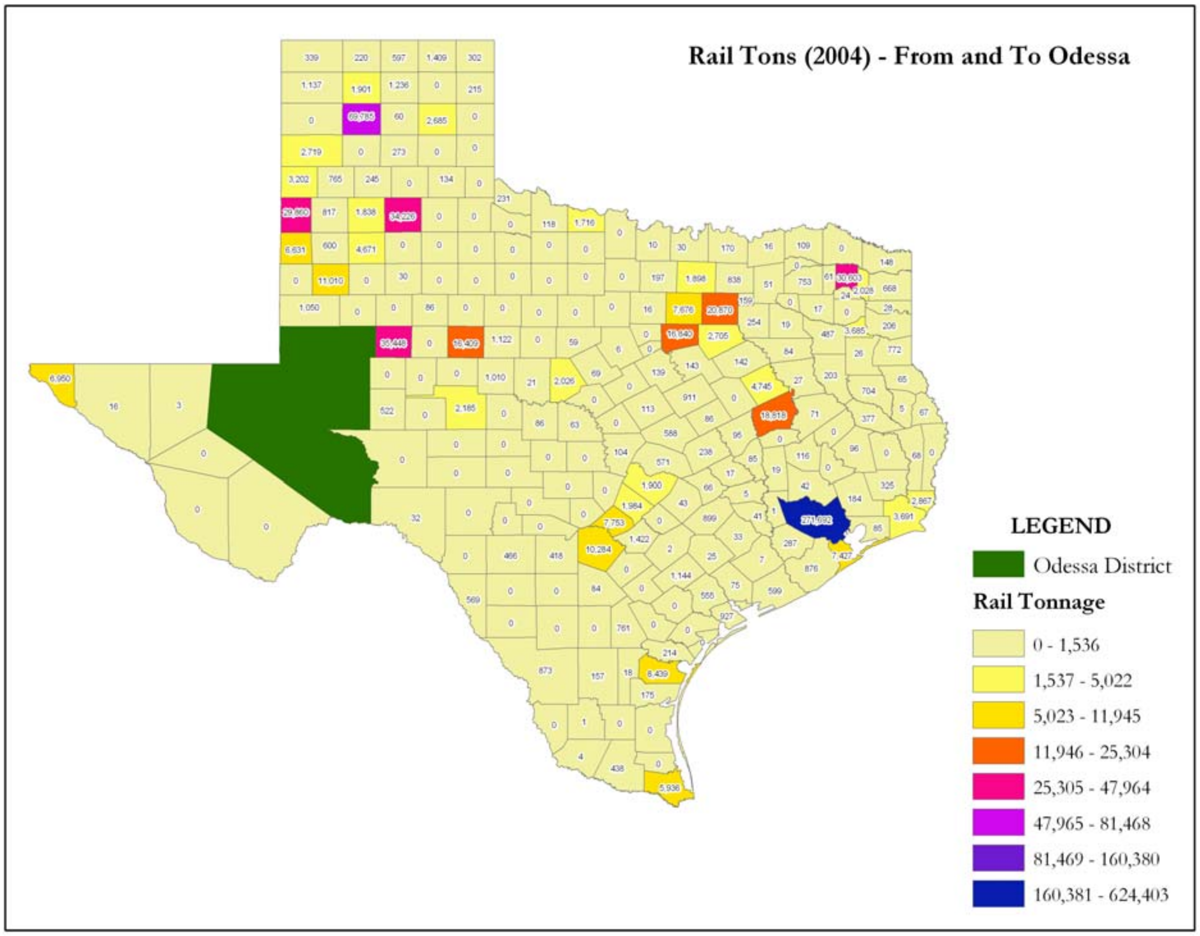


Figure 3-67: 2004 Rail Freight Movements

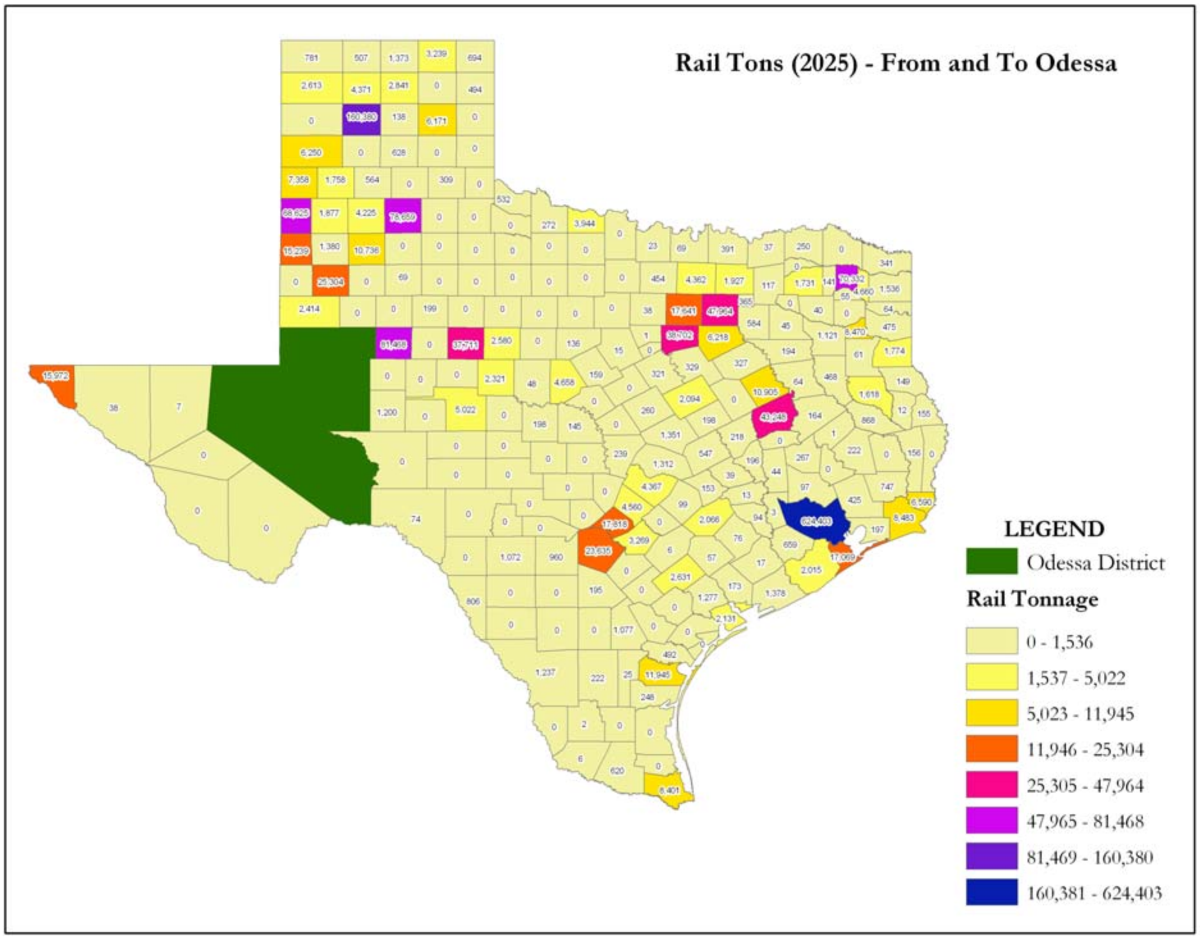


Figure 3-68: 2025 Rail Freight Movements

Rail Freight Movements Outside of the State

Figures 3-69 and 3-70 illustrate that major rail freight movements are occurring from New Mexico, Oklahoma, Arkansas, and more moderately from Louisiana and Mexico. Major movement from Mexico will continue to grow in the future. These new growth opportunities will need to be accommodated and strategic planning will need to occur to capitalize on these growing markets.

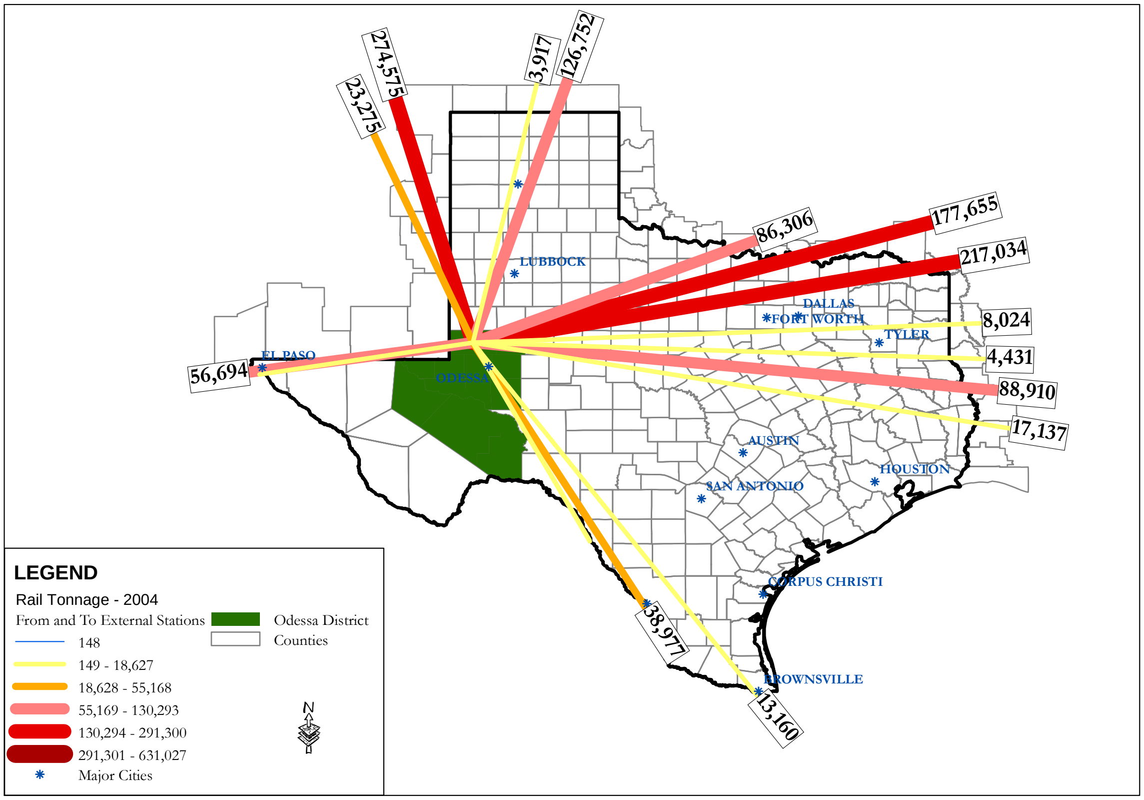


Figure 3-69: 2004 Freight Rail From/To Outside of Texas From/To Odessa District

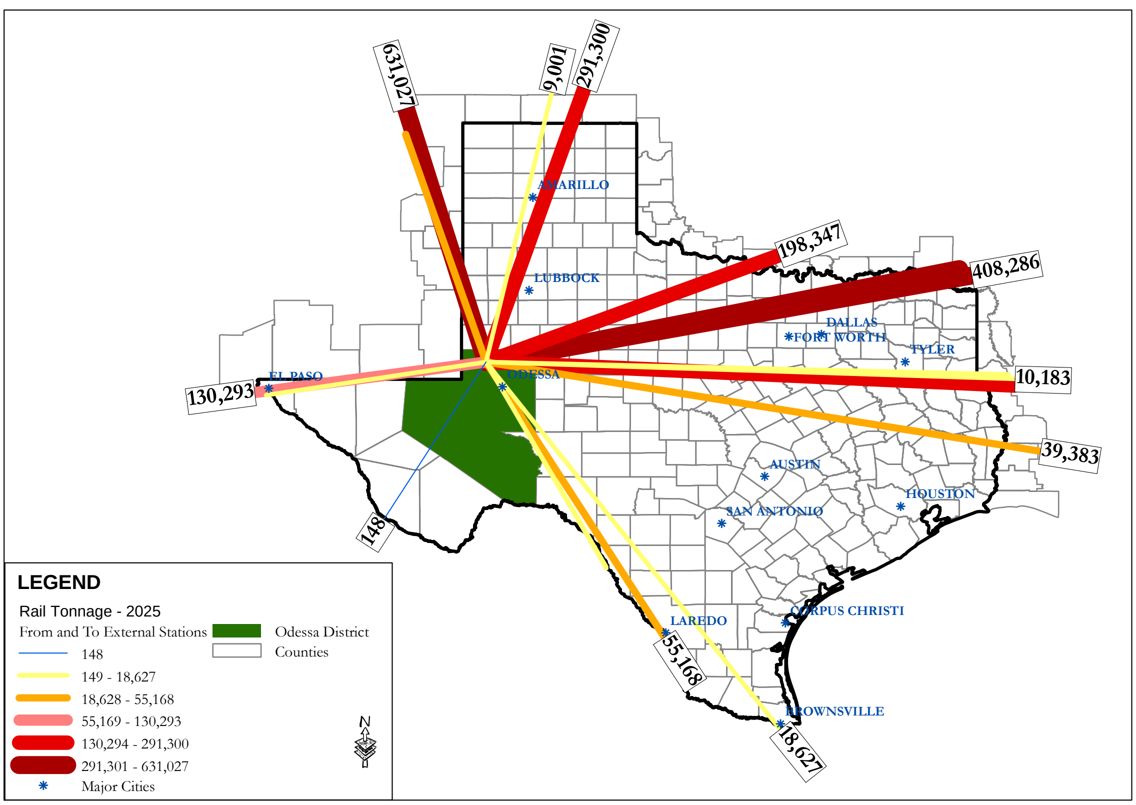


Figure 3-70: 2025 Freight Rail From/To Outside of Texas From/To Odessa District

Freight Rail Commodity Trends

Unlike truck freight growth trends, rail freight growth depends largely on the type of commodity being shipped. Table 3-29 shows a comparison between 2004 and 2025 rail commodities. Secondary products result in the largest percent increase with raw materials resulting in the second largest percent increase. Building materials, chemical/petroleum, raw materials, and secondary products account for approximately 80 percent of the total tonnage movement into and out of the Odessa District. Coal is the primary raw material rail movement through the District. Chemical/petroleum products account for nearly 25 percent of the total rail tonnage movement. The movement of agriculture is projected to increase approximately 175 percent; however, this is shown to be a small percentage of the overall tonnage movement. Although the high percentage growth are projected for wood, textiles, food and machinery; they result in a small portion of the overall commodity rail movement.

Commodity	Rail Tons		
	2004	2025	% Increase
Building Materials	225,908	615,243	172%
Wood	164,297	447,450	172%
Agriculture	17,609	48,425	175%
Textiles	56,477	153,811	172%
Chemical/Petroleum	372,648	1,024,331	175%
Food	12,751	35,066	175%
Machinery	66,746	181,776	172%
Raw Materials	308,052	851,917	177%
Secondary	300,340	865,894	188%
TOTAL	1,524,828	4,223,912	177%

Table 3-29: Rail Freight Commodity Growth

Figures 3-71 and 3-72 display the commodities being moved by rail within the Odessa District in 2004 and 2025. The relative percentages of each commodity do not significantly change from 2004, as shown in Figure 3-71, to 2025. Figure 3-73 provides a correlation of similar information, although on a national level for the year 2000.

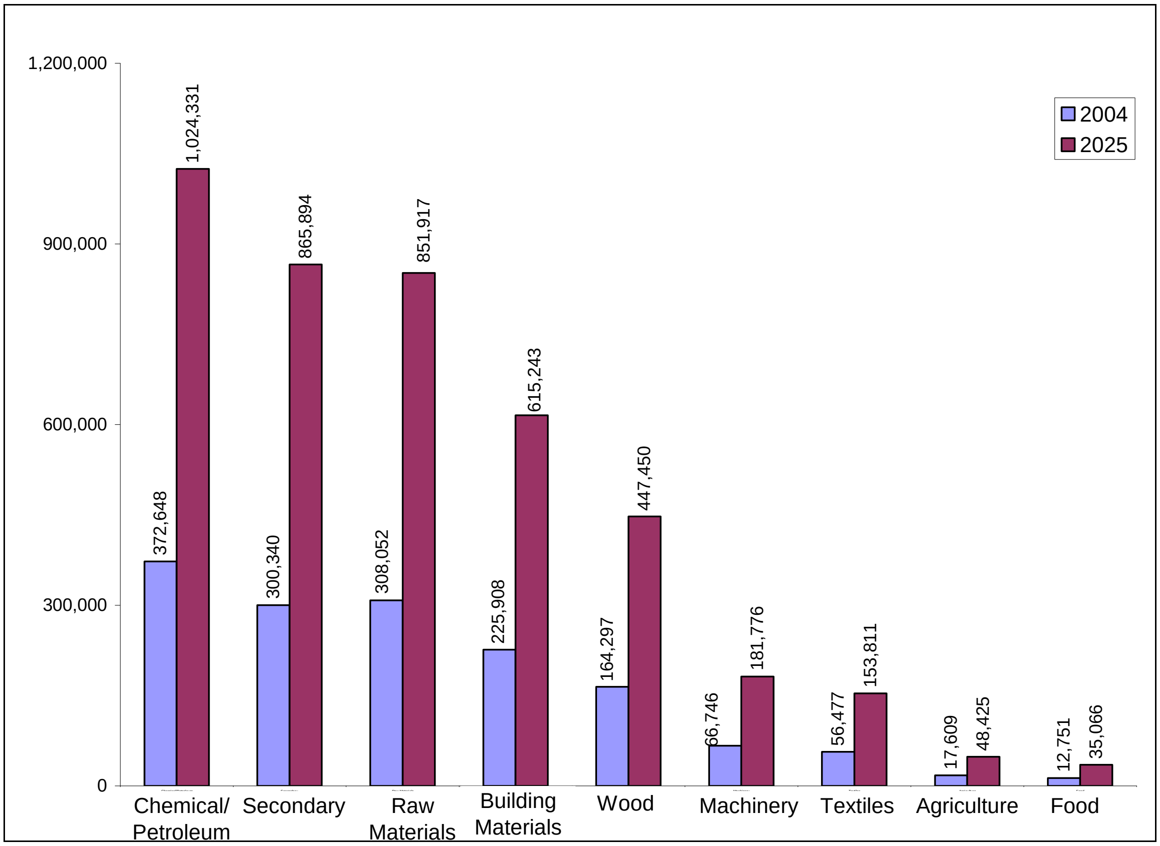


Figure 3-71: Total 2004 Freight Rail Tons by Commodity

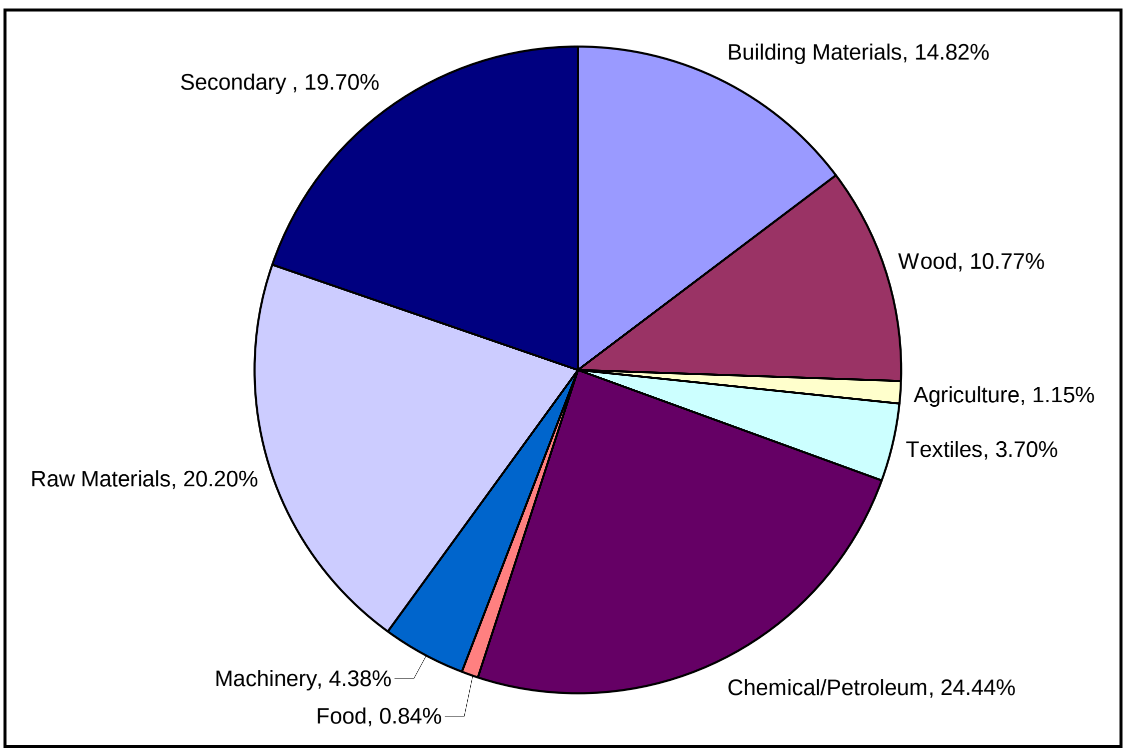
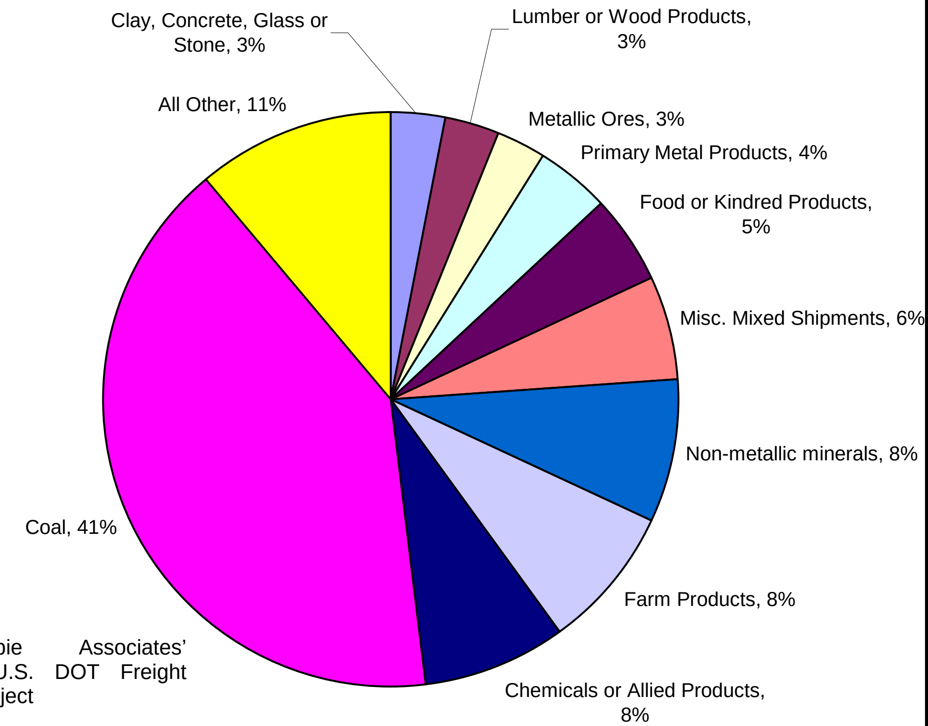


Figure 3-72: Percentage of Freight Rail Tons by Commodity (2004)



Source: Reebie Associates' TRANSEARCH and U.S. DOT Freight Analysis Framework Project

Figure 3-73: Percentage of Freight Tonnage by Commodity – National (2000)

Rail Freight Findings Summary

- Freight tonnages moved by rail will more than double by 2025.
- Chemical/petroleum, raw materials, and secondary products constitute a majority of the freight rail tonnage for existing and future years.
- Rail shipments originating from other states and from Mexico are projected to constitute approximately 36 percent of total rail shipments within the Odessa District by 2025.

Rail and Truck Freight Comparison

Table 3-30 and Figure 3-74 provide the total truck and rail tons in the Odessa District for the base year and projected to 2025. The increase between 1998 and 2025 for truck tons represents a 120 percent increase as opposed to rail tonnage increase of 177 percent.

Although the rail freight percent change is higher, a larger amount of tonnage was projected to be transported via trucks in 2025. The percentages of rail freight to truck freight change from 11/89 in 2004 to 13/87 in 2025, showing a slight increase in the relative percentage of rail freight to truck freight in the future, although the percentage of freight transported by trucks remains significantly larger than that transported by rail.

Year	Truck	Rail
1998 (Truck), 2004 (Rail)	12,644,086	1,524,828
2025	27,831,952	4,223,912
Percent Increase	120%	177%

Table 3-30: Rail and Truck Tons Comparison

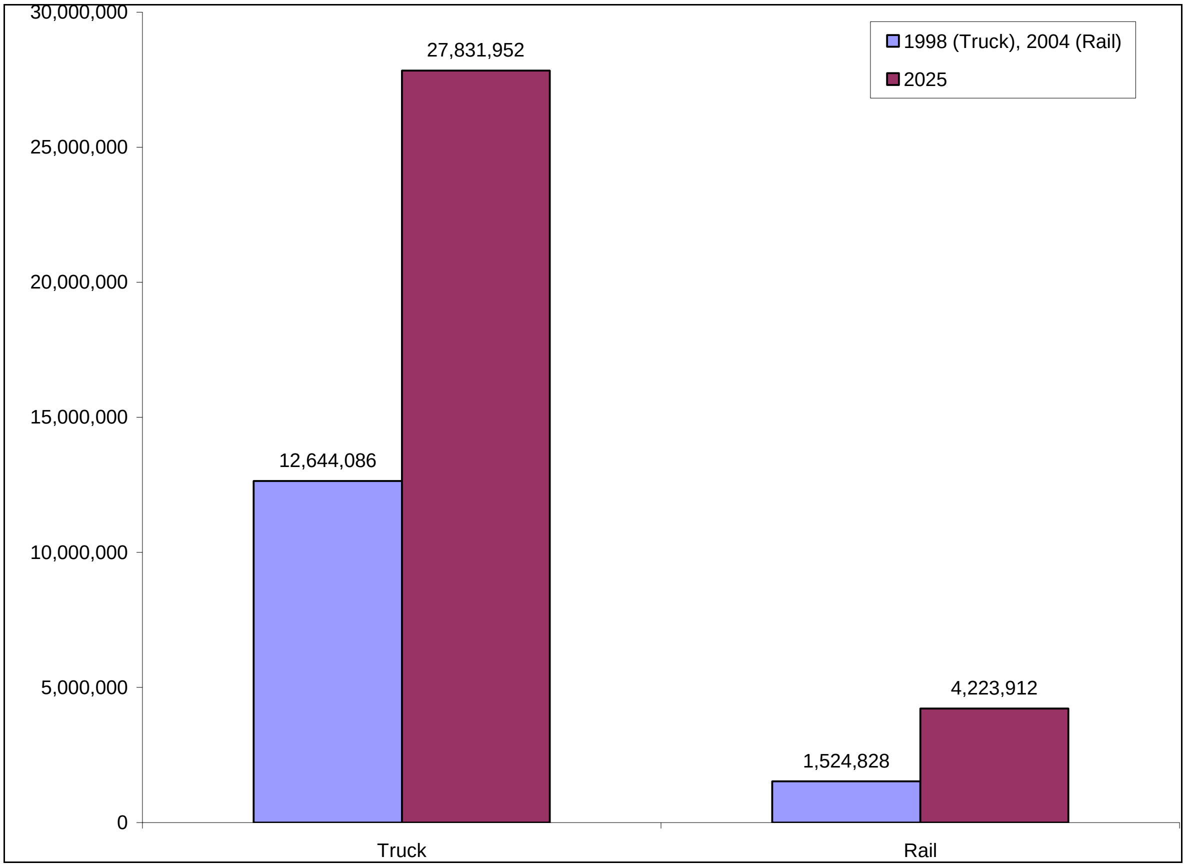


Figure 3-74: Total Rail / Truck Tons

Summary and Conclusions

Given the projected growth in commodities moved by both rail and trucks, the economic outlook for West Texas is extremely positive. The analysis projected that commodities moved by trucks in 1998 would nearly double by 2025, while commodities moved by rail would more than double between 2004 and 2025. The majority of tonnage moved by truck is composed of the following commodities:

- Food
- Building materials
- Chemical/Petroleum
- Secondary materials

Food composes nearly one-third of the total commodities moved by truck while building materials constitutes approximately 22 percent.

The majority of tonnage moved by rail into, out of and through West Texas is composed of the following commodities:

- Raw materials
- Agriculture
- Food

Raw materials are projected to account for nearly 40 percent of total tonnage movement by rail, while agriculture results in approximately 23 percent and food constitutes approximately 17 percent of tonnage movement by rail. As these commodities continue to grow at a rapid pace, the infrastructure will need to be evaluated to accommodate the growth in commodity movements. The purpose of this report is to provide an outlook at the existing and projected conditions for truck and rail infrastructure.

The number of congested areas along major routes within the West Texas region is somewhat minimal. The report identified existing and current congestion levels for each District and all of them occurred in the major urban areas. Heavy truck movements were identified along areas of congestion for each District. With fairly consistent commodity percentages between 1998 and 2025 it can be concluded that consistent use of trucks will be utilized, unless a benefit can be found to shifting truck cargo to rail cars.

A number of alternatives could be included in a list of recommended capacity improvements that include but are not limited to the following concepts:

- Roadway capacity upgrades;
- Dedicated truck lanes; and,
- Shift more cargo from trucks to freight rail.

Heavy trucks will continue to serve a much needed purpose for both local and regional service. A number of intermodal facilities located within the District use trucks to ship goods to local businesses and warehouses as well as regional locations. Facilities such as the Reese Technology Center, located west of Lubbock, will encourage freight movement growth into, out of, and through West Texas. Therefore, it is important to attempt to make local roadway capacity improvements so that these trucks can move more efficiently. In recent years timely and efficient movement of goods has become vital to private industry and can be observed through the increase in logistical analysis.

One way to encourage the timely and efficient flow of trucks is through dedicated truck lanes. The interaction of trucks and passenger cars can often decrease the capacity of a roadway. By separating truck traffic from passenger cars, the roadways could operate more efficiently and result in safer driving conditions. Specifically, the Trans-Texas Corridor (TTC) plan is an all-Texas transportation network of corridors up to 1,200 feet wide. The corridor will include separate tollways for passenger vehicles and trucks as well as for high-speed passenger rail, high-speed freight, commuter rail and a dedicated utility zone. Roadways that provide separate truck lanes would benefit both truck traffic and passenger car traffic movement.

Another strategy that could be implemented to improve truck flow in the West Texas region is to reduce the number of trucks needed on the roadway by relying more on freight rail to move cargo. The challenge for the future of goods movement is dependent on two major factors: First, the movement of truck freight to rail cars. Second, planning and building the rail infrastructure to compete against the roadway infrastructure used by trucks. The SAM has the ability to apply a policy shift module which allows for a shift of truck tonnage to rail tonnage, as analyzed by comparing truck travel times and costs versus rail freight times and costs. As new freight movement infrastructure is added, the time and cost of the delivery of goods and materials will be affected accordingly. This time and cost will be evaluated by commodity group and applied to a percentage shift.

As evidenced by existing and projected freight flows, the economic outlook is very positive for the West Texas region. However, it is important to plan for future roadway and rail infrastructure that would accommodate the explosive commodity growth of the region.

SECTION 4: EXISTING RAIL NETWORK

The Amarillo, Lubbock, and Odessa TxDOT Districts have 1,720-miles of mainline railroad tracks in the study area including the UP, BNSF, and nine shortline railroads. Detailed inventories of these railroads can be found in Appendix B of this report, while a summary of the information is shown in Table 4-1.

	TxDOT Districts			W. Texas
	Amarillo	Lubbock	Odessa	Study Area
UP Mainline Track	92	0	230	322
BNSF Mainline Track	602	364	0	966
Shortline Track	146	116	170	432
Total Mainline Track Miles	840	480	400	1720
Number of Sidings	140	101	35	276
Siding Lengths (miles)	126	74	41	241
Industrial Sidings	171	159	71	401
Number of Bridges	185	140	107	432
Length of Bridges (Miles)	3.53	2.3	2.16	7.99
Public Grade Crossings	347	467	184	998

Table 4-1: Railroad Inventory Summary

Figure 4-1 shows the counties included in the Amarillo, Lubbock, and Odessa Districts which make up the study area.

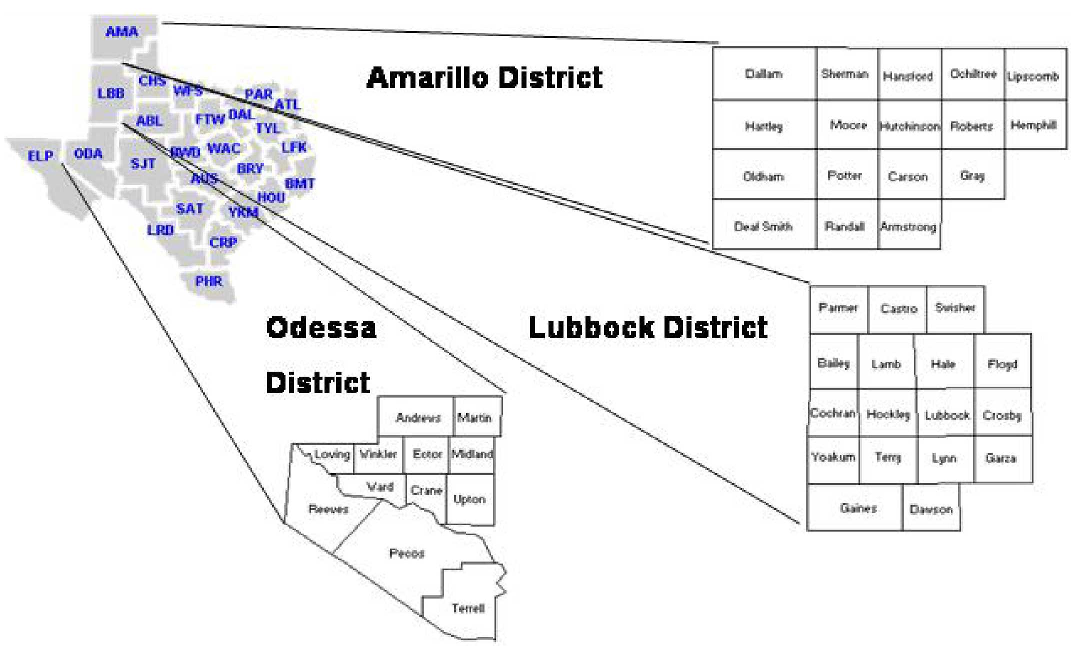


Figure 4-1: West Texas Study Area

Table 4-2 shows the number of public at-grade roadway-rail crossings by county and district, including the type of crossing protection.

County	Total	Type of Highway Warning								
		None	Other	Cross bucks	Stop signs	Special warning	HWTS, WW, Bells	Flashing lights	Gates	Whistle Ban
ARMSTRONG	19	.	.	12	.	.	.	1	6	.
CARSON	26	.	.	9	.	.	.	1	16	.
DALLAM	26	1	.	7	.	.	.	2	16	.
DEAF SMITH	18	.	.	4	.	.	.	.	14	.
GRAY	15	.	.	4	.	.	.	2	9	.
HANSFORD	6	.	.	5	.	.	.	1	.	.
HARTLEY	17	.	.	10	.	.	1	.	6	.
HEMPHILL	5	.	.	1	.	.	.	.	4	.
HUTCHINSON	17	.	.	7	1	.	.	5	4	.
LIPSCOMB	26	.	.	25	.	.	.	.	1	.
MOORE	33	1	.	25	.	.	.	2	5	.
POTTER	48	.	.	18	.	.	.	8	21	.
OCHILTREE	28	.	.	27	.	.	.	.	1	.
OLDHAM	1	.	.	1	.	.	.	.	.	.
RANDALL	32	.	.	14	.	.	1	.	17	.
ROBERTS	1	.	.	.	.	.	.	.	1	.
SHERMAN	29	.	.	22	.	.	.	2	5	.
Amarillo Dist. Total	**347**	**2**	**0**	**191**	**1**	**0**	**2**	**24**	**126**	**0**
BAILEY	16	.	.	4	.	.	.	1	11	.
CASTRO	26	.	.	22	.	.	.	2	2	.
COCHRAN	4	.	.	4	.	.	.	.	.	.
GAINES	3	.	.	1	.	.	.	2	.	.
GARZA	10	.	.	6	.	.	.	.	4	.
HALE	98	.	.	74	.	.	1	9	14	.
HOCKLEY	44	.	.	34	.	.	.	4	6	.
LAMB	25	.	.	15	.	.	.	1	9	.
LUBBOCK	148	.	.	101	.	.	.	15	32	.
PARMER	25	.	.	4	.	.	.	2	19	.
SWISHER	30	.	.	18	.	.	.	1	11	.
TERRY	38	.	.	34	.	.	.	4	.	.
Lubbock Dist. Total	**467**	**0**	**0**	**317**	**0**	**0**	**1**	**41**	**108**	**0**
ECTOR	30	2	.	17	.	.	.	.	11	.
MARTIN	8	.	.	4	.	.	.	1	3	.
MIDLAND	32	5	.	9	.	.	2	2	14	.
PARMER	25	.	.	4	.	.	.	2	19	.
PECOS	17	.	.	13	.	.	.	3	1	.
REEVES	45	1	.	35	.	.	.	5	4	.
TERRELL	2	.	.	.	1	.	.	.	1	.
UPTON	11	.	.	9	.	.	.	2	.	.
WARD	14	.	.	5	.	.	.	4	5	.
Odessa Dist. Total	**184**	**8**	**0**	**96**	**1**	**0**	**2**	**19**	**58**	**0**
West Texas Total	**998**	**10**	**0**	**604**	**2**	**0**	**5**	**84**	**292**	**0**

Table 4-2: West Texas Grade Crossings by District and County

The BNSF and the UP are the only Class I Railroads located within the West Texas Study Area. As of 2005, a Class I railroad, as defined by the Association of American Railroads (AAR), has an operating revenue exceeding $319-million. Class II and Class III designations are rarely used anymore as the AAR currently splits non-Class I railroads into the following three categories:

- Regional railroads - operate at least 350-miles, or make at least $40-million per year up to the Class I criteria;
- Local railroads - non-regional railroads that engage in line-haul service; and
- Switching and Terminal railroads - mainly switch cars between other railroads, or provide service from other lines to a common terminal.

The Surface Transportation Board (STB) continues to use Class II and Class III designations since labor regulations are different for the two classes. The term “Shortline Railroad(s)” has been used throughout this Study to describe the non-Class I railroads. The railroads and the respective nomenclature of their rail lines, located throughout the study area are listed as follows and discussed in further detail in the following section.

Class I Railroads

- BNSF Railroad
  - Boise City Subdivision
  - Dalhart Subdivision
  - Hereford Subdivision
  - Panhandle Subdivision
  - Plainview Subdivision
  - Red River Subdivision
  - Slaton Subdivision
  - South Plains Subdivision
  - South Plains Subdivision
- UP
  - Pratt Subdivision
  - Tucumcari Subdivisions
  - Sanderson Subdivision
  - Toyah Subdivision

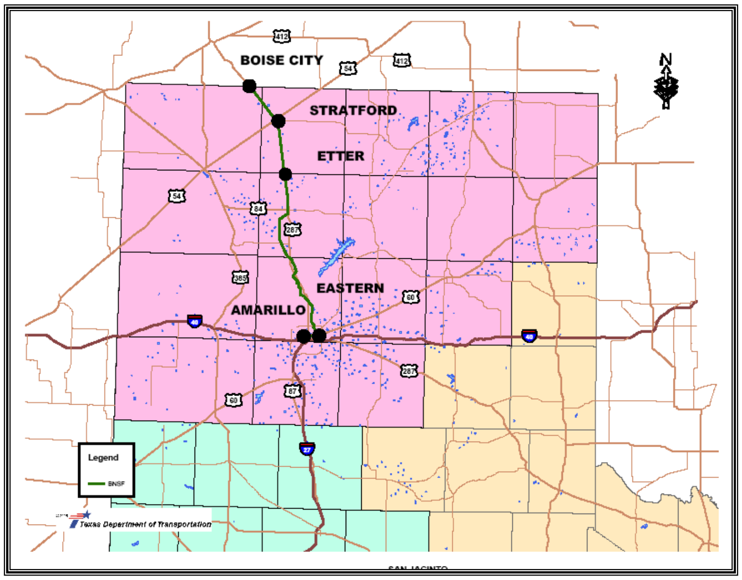
Shortline Railroads

- Regional Railroads
  - Texas Pacifico Railroad (TXPF)
- Local Railroads
  - Panhandle Northern Railroad
  - Pecos Valley Southern Railroad
  - Southwestern Railroad
  - Texas-New Mexico Railroad
  - Texas North Western Railroad
  - West Texas & Lubbock Railroad
- Switching and Terminal Railroads
  - Plainview Terminal
  - South Plains Lamesa

Class I Railroads

BNSF Boise City Subdivision

The BNSF Boise City Subdivision operates between Amarillo, Texas and Las Animas Junction (near La Junta, Colorado). It begins at Dumas Junction in downtown Amarillo with mileposts increasing northward to Colorado. The Boise City Subdivision operates on a single track mainline across four counties within the TxDOT Amarillo District following U.S. 287 highway to the Texas - Oklahoma border. The maximum freight speed across this subdivision is 49 miles per hour without any scheduled passenger train operations.



The Boise City Subdivision begins in Amarillo with an east and west wye track connection to the BNSF Hereford Subdivision near the BNSF East Tower. The east leg of the subdivision wye track ties into the Hereford Subdivision's mainline track number 1. The west leg of the subdivision wye track ties into a siding track at the Hereford Subdivision East Tower. Amarillo, Texas is the hub of five separate BNSF subdivisions coming together at a major BNSF Yard located in the downtown region just north of Interstate I-40 and east of U.S. 287.

The Boise City Subdivision heads north out of Amarillo passing through Potter, Moore, Sherman, and Dallam Counties before crossing into Oklahoma. The following mileages are located in these Texas Counties:

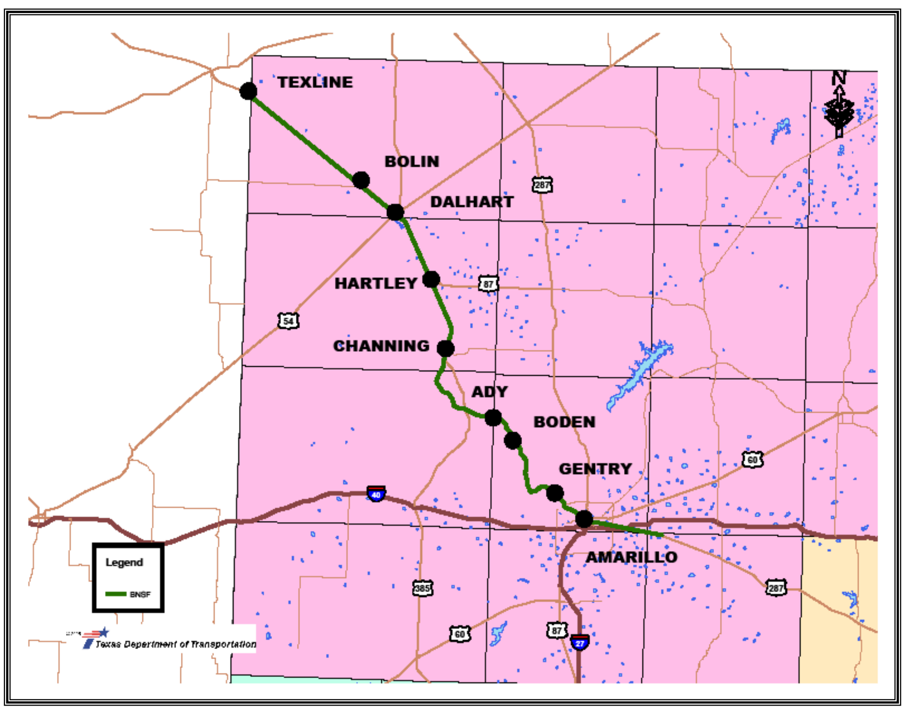
County	Mileage
Dallam	7.35
Moore	31.96
Potter	33.74
Sherman	24.75
Total Texas Miles:	100.50

Key locations across the Boise City Subdivision with associated milepost locations include the following:

Landmark Description	Milepost
Dumas Junction, Amarillo	0
Canadian River	19.27
Marsh	27.2
Moore County – Potter County	33.75
Bautista	41.3
Dumas	52.1
Machovec	58.3
Texas Northwestern Railroad connection	63.37
Etter	64
Potter County – Sherman County	65.72
UP Pratt Subdivision Crossing	85.48
Stratford	85.7
Sherman County – Dallam County	93.15
Texas – Oklahoma Border	100.5
End of Subdivision (Colorado)	235.51

BNSF Dalhart Subdivision

The BNSF Dalhart Subdivision operates from Amarillo, Texas to the northwest corner of Texas at Texline, Texas. The BNSF Twin Peaks Subdivision operates on 1.23 miles of track in Dallam County from Texline, Texas to the Texas – Colorado state line.



The Dalhart Subdivision operates on 117.20 miles of single track mainline across four counties within the TxDOT Amarillo District. The maximum freight speed across this subdivision is 60 miles per hour without any scheduled passenger train operations. Train operations are controlled by Track Warrant Control (TWC) and Automatic Block Signals (ABS).

At the beginning of the Dalhart Subdivision, a second mainline track of the BNSF Red River Valley Subdivision ends for a distance of 0.31 miles inside the limits of the Dalhart Subdivision. The BNSF Dalhart Subdivision operates across the following mileage in these Texas Counties:

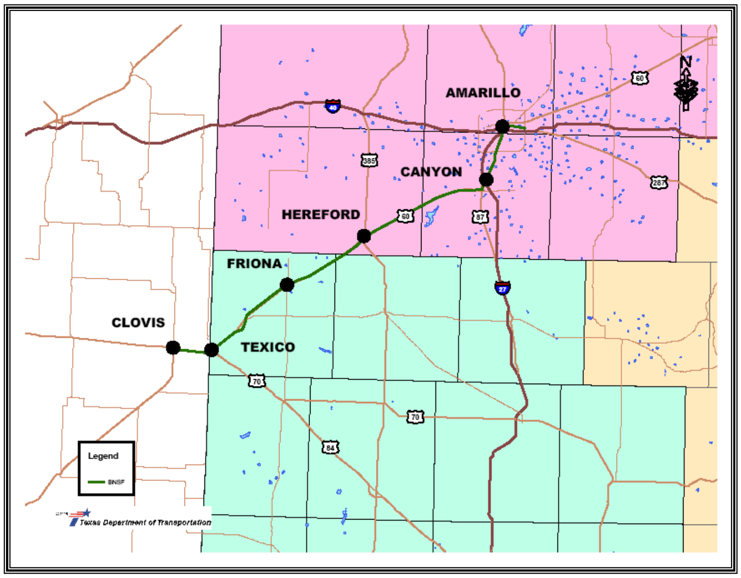
County	Mainline (miles)	Second Mainline (miles)	Total Miles
Potter County	31.3	0.31	31.61
Oldham County	16.84	0	16.84
Hartley County	32.48	0	32.48
Dallam County	36.58	0	36.58
Total Texas Miles:	117.2	0.31	117.51

Key locations across the Dalhart Subdivision with associated milepost locations include the following:

Landmark Description	Milepost
Begin Dalhart Subdivision, end Red River Subdivision	335.7
Gentry	334.3
Boden	359.2
Potter County – Oldham County	367
Canadian River	375.2
Canadian River	383.84
Channing	388.1
Hartley	403.7
Hartley County – Dallam County	416.32
Dalhart	417.59
UP Pratt Subdivision Crossing	417.6
Texline	452.9
End Dalhart Subdivision, begin Twin Peaks Subdivision	452.9
Texas – Colorado Border	454.13

BNSF Hereford Subdivision

The BNSF Hereford Subdivision operates between Amarillo, Texas and East Clovis, New Mexico. It begins at railroad station Eastern located 0.31 miles west of Eastern Avenue (Milepost 550.19) in downtown Amarillo, Texas. Hereford Subdivision mileposts increase as the alignment proceeds southwest toward Clovis, New Mexico after crossing the New Mexico – Texas border.



The Hereford Subdivision operates on a double track mainline across three counties within the TxDOT Amarillo District and two counties within the TxDOT Lubbock District. The maximum freight speed across this double track mainline subdivision is 70 miles per hour without any scheduled passenger train operations. Train operations are dispatched using Centralized Train Control (CTC).

The BNSF Hereford Subdivision operates across the following mileage in these Texas Counties:

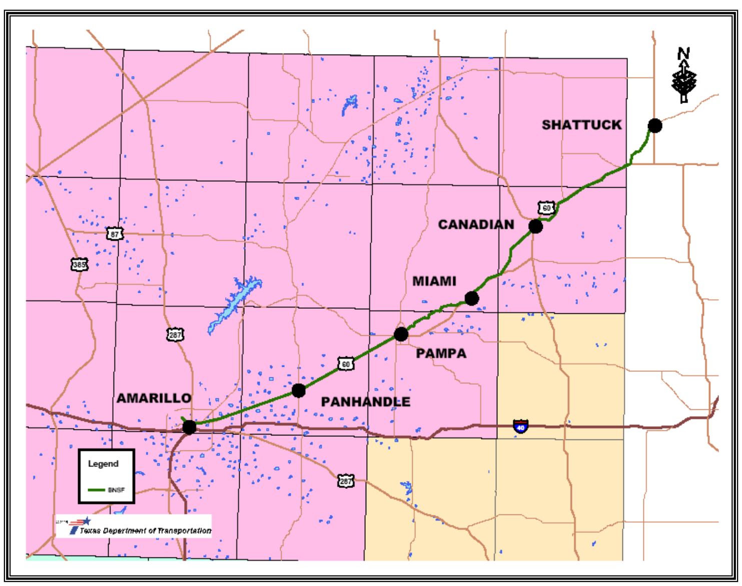
Amarillo District			
County	**Mainline 1**	**Mainline 2**	**Total**
Potter County	4.4	4.4	8.8
Randall County	29.7	29.7	59.4
Deaf Smith County	21.99	21.99	43.98
Subtotal:	56.09	56.09	112.18
Lubbock District			
Castro County	2.54	2.54	5.08
Parmer County	38.14	38.14	76.28
Subtotal:	40.68	40.68	81.36
Total Texas Miles – Hereford Subdivision			
	96.77	96.77	193.54

Key locations across the Hereford Subdivision with associated milepost locations include the following:

Landmark Description	Milepost
Amarillo	554
Begin Hereford Subdivision = Eastern Station	550.5
Potter County – Randall County	554.9
Canyon	569.5
Lubbock Junction = BNSF Plainview Subdivision	570.9
Randall County – Deaf Smith County	584.6
Hereford	600.4
Deaf Smith County – Castro County	600.4
Summerfield	607.8
Castro County – Parmer County	609.13
Friona	621.8
Bovina	633.8
Texico	646
BNSF Slayton Subdivision	646
BNSF Operation Limit: Amarillo Div. to New Mexico Div.	646
Texas – New Mexico Border	647.27
End Hereford Subdivision, Clovis, New Mexico	655.70

BNSF Panhandle Subdivision

The BNSF Panhandle Subdivision operates from Wellington, Kansas to Amarillo, Texas at Eastern Station. The Panhandle Subdivision mileposts increase as the alignment proceeds southwest toward Amarillo. The Subdivision crosses the Oklahoma – Texas border and operates across six counties within the TxDOT Amarillo District.



The Panhandle Subdivision operates on a double track mainline through Texas with the exception of a 45 mile single track mainline between Coburn, Texas, and Codman, Texas. The maximum freight speed across this subdivision is 70 miles per hour without any scheduled passenger train operations. Train operations are dispatched using CTC.

The BNSF Panhandle Subdivision operates across the following mileage in these TxDOT Amarillo District counties:

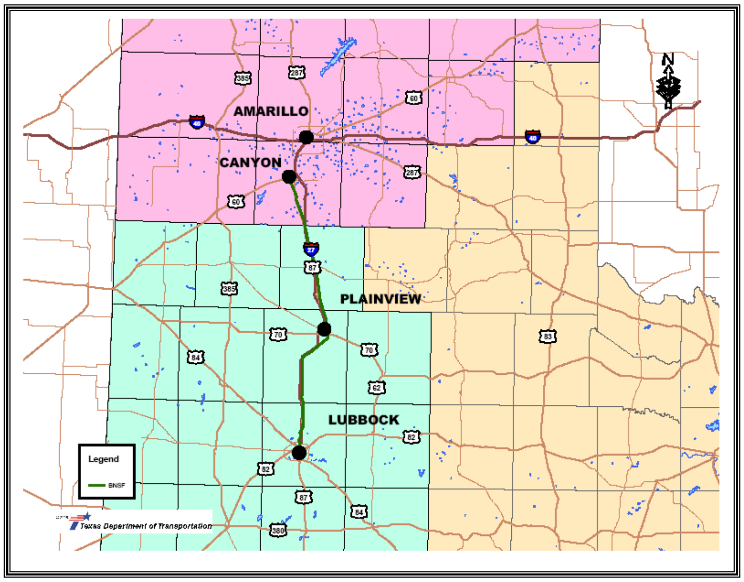
County	Mainline 1	Mainline 2	Total
Lipscomb	11.2	11.05	22.25
Hemphill	31.74	0	31.74
Roberts	17.66	4.15	21.81
Gray	19.3	19.3	38.6
Carson	33.8	33.8	67.6
Potter	9.6	9.6	19.2
Total Texas Miles:	123.3	77.9	201.2

Key locations across the Panhandle Subdivision, including their milepost location include the following:

Landmark Description	Milepost
Begin Panhandle Subdivision, Wellington, Kansas	238
Oklahoma – Texas Border, enter Libscomb County	427.2
Higgins	428.66
Libscomb County – Hemphill County	438.4
Clear Creek	449.4
Canadian River	453.53
Canadian River	455.1
Hemphill County – Roberts County	470.14
Lora	471.2
Miami	476.9
Codman	483.3
Roberts County – Gray County	487.8
Hoover	491.19
Pampa	498.8
Kingsmill	505.9
Gray County – Carson County	507.1
White Deer	512.8
Culver	519
Panhandle	526
Panhandle Northern Railroad	527.33
Pantex Ordnance Spur Track	539.15
Carson County – Potter County	540.9
End Panhandle Subdivision = Start Hereford Subdivision, Eastern Station, Amarillo	550.5

BNSF Plainview Subdivision

The BNSF Plainview Subdivision operates between Lubbock, Texas and Canyon, Texas, approximately 17 miles south of Amarillo. It begins at a railroad station called Lubbock Junction (near Canyon, Texas) located on the BNSF Hereford Subdivision. The Plainview Subdivision mileposts increase as the alignment proceeds south toward Lubbock with its ending at railroad station Canyon Junction on the BNSF Slaton Subdivision.



The Plainview Subdivision operates on a single track mainline across one county within the TxDOT Amarillo District and three counties within the TxDOT Lubbock District. The maximum freight speed across this subdivision is 49 miles per hour without any scheduled passenger train operations. Train operations are dispatched using TWC.

The BNSF Plainview Subdivision operates across the following mileage in these Texas Counties:

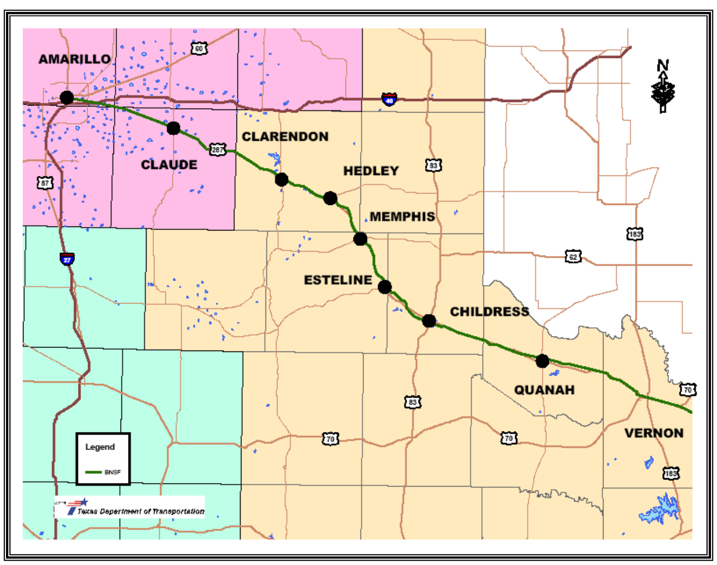
Amarillo District	
County	**Miles**
Randall	17.29
Subtotal:	17.29
Lubbock District	
Swisher	31
Hale	38.19
Lubbock	16.22
Subtotal:	85.41
Total Texas Miles	
	102.7

Key locations across the Plainview Subdivision with associated milepost locations include the following:

Landmark Description	Milepost
Begin Plainview Sub at Lubbock Junction (Canyon, TX)	570.8
Celta	575.3
Happy	588
Randall County – Swisher County	588.09
Kaffir	596.4
Tulia	603.3
Kress	615.3
Swisher County – Hale County	619.09
Finley	621.8
Plainview	627.6
Floydada Junction	628.2
BNSF South Plains Subdivision Crossing	628.38
Hale Center	640.9
Underwood	646.5
Abernathy	657
Hale County – Lubbock County	657.28
New Deal	663.3
End Plainview Subdivision to Start Slaton Subdivision	673.42

BNSF Red River Valley Subdivision

The BNSF Red River Valley Subdivision operates between Valley Junction, near Wichita Falls, Texas, and Amarillo, Texas. With the limits of this report limited to the TxDOT Districts of Amarillo, Lubbock, and Odessa, the Red River Valley Subdivision enters the Amarillo District at the Donley County to Armstrong County border. The subdivision mileposts increase as the alignment proceeds northwest toward Amarillo ending where the Red River Valley Subdivision becomes the Dalhart Subdivision.



Within the limits of the Amarillo District, the Red River Valley Subdivision operates on a single track mainline across three counties. The maximum freight speed across these counties is 49 miles per hour without any scheduled passenger train operations.

Train operations are dispatched using TWC. The BNSF Red River Valley Subdivision operates across the following mileage in the TxDOT Amarillo District:

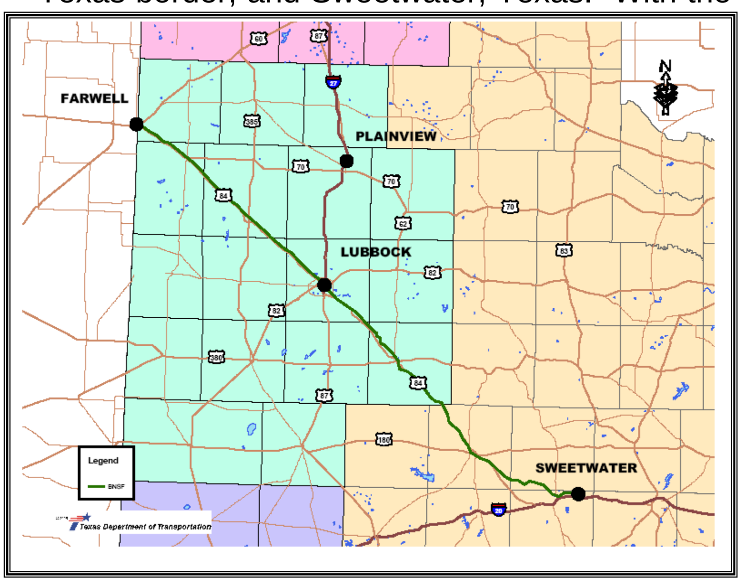
County	Mainline 1	Mainline 2	Total
Armstrong	11.96	0	11.96
Carson	0.66	0	0.66
Potter	32.58	6.31	38.89
Total Texas Miles:	45.2	6.31	51.51

Key locations across the Red River Valley Subdivision with associated milepost locations include the following:

Landmark Description	Milepost
Donley County – Armstrong County	290.5
Claude	307.9
Washburn	320.5
Armstrong County – Carson County	323.08
Carson County – Potter County	323.74
End Red River Valley Subdivision, Start Dalhart Sub.	335.7

BNSF Slaton Subdivision

The BNSF Slaton Subdivision operates between Texico, Texas, at the New Mexico – Texas border, and Sweetwater, Texas. With the scope of this report limited to the TxDOT Districts of Amarillo, Lubbock, and Odessa, the Slaton Subdivision inventory ends at the Garza County to Scurry County border which is the end of the Lubbock District. The Slaton Subdivision mileposts increase as the alignment proceeds southeast toward Sweetwater, Texas. The Texas – New Mexico border also identifies the end of the BNSF Amarillo Division and New Mexico Division and the beginning of the BNSF Slaton Subdivision in Parmer County, Texas. Both legs of the Slaton Subdivision wye tracks are tied into the BNSF Hereford Subdivision at this location. The Slaton Subdivision operates on a single track mainline across seven counties within the TxDOT Lubbock District. The maximum freight speed across the mainline track is 55 miles per hour without any scheduled passenger train operations. Train operations are dispatched using CTC.



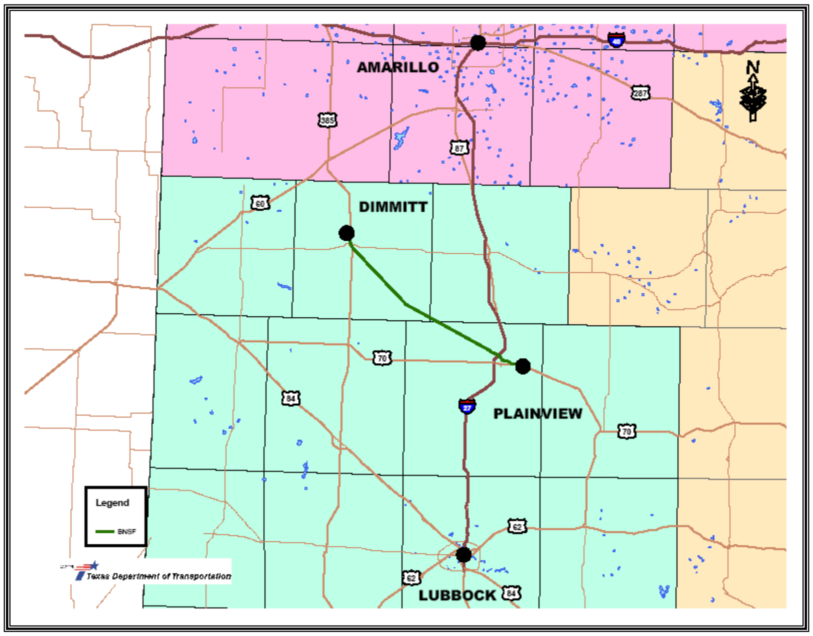
The BNSF Slaton Subdivision operates across the following mileage in these Texas counties in the TxDOT Lubbock District:

County	Miles
Parmer	10.81
Bailey	19.68
Lamb	32.81
Hockley	7.72
Lubbock	38.47
Lynn	2.13
Garza	40.99
Total Texas Miles:	152.61

Key locations across the Slaton Subdivision with associated milepost locations include the following:

Landmark Description	Milepost
Begin Slaton Subdivision	0.37
Parmer County – Bailey County	11.12
Muleshoe	22.2
Bailey County – Lamb County	30.8
Sudan	38.1
Amherst	45.5
Littlefield	53
Lamb County – Hockley County	63.8
Anton	65.6
Hockley County – Lubbock County	71.33
Shallowater	78.1
Broadview	83.6
Canyon Junction	88.6
BNSF Plainview Subdivision connection	88.6
West Texas & Lubbock Railroad connection	88.6
Milepost Equation: 88.65 = 673.49	88.65
Milepost Equation: 673.49 = 88.65	673.49
Lubbock	674.6
Slaton	690
Lubbock County – Lynn County	694.65
Lynn County – Garza County	696.78
Southland	697.32
Post	713.8
Augustus	720.3
Justiceburg	729.9
Garza County-Scurry County	737.77

BNSF South Plains Subdivision



The BNSF South Plains Subdivision operates from Plainview, Texas with increasing mileposts to Dimmitt, Texas. The South Plains Subdivision operates across three counties within the TxDOT Lubbock District.

The BNSF South Plains Subdivision operates across the following mileage in these Texas counties in the TxDOT Lubbock District:

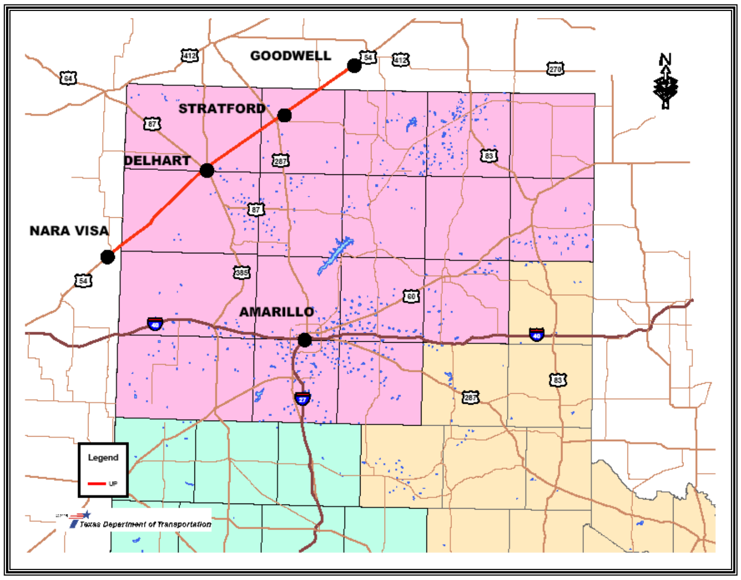
County	Miles
Hale	18.8
Swisher	1.95
Castro	23.95
Total Texas Miles:	44.7

Key locations across the South Plains Subdivision with associated milepost locations include the following:

Landmark Description	Milepost
Begin South Plains Subdivision, Plainview	322.95
Edmonson	337.5
Hale County- Swisher County	341.7
Swisher County – Castro County	343.65
Hilburn	349.6
Hart	354.6
Dimmitt	367.6
End South Plains Subdivision	368.38

UP Pratt and Tucumcari Subdivisions

The Pratt and Tucumcari Subdivisions are in the UP Wichita Service Unit and operate between Pratt, Kansas and Vaughn, New Mexico. These subdivisions cross the northwest corner of Texas making the transition from the Pratt Subdivision to the Tucumcari Subdivision near Dalhart, Texas. The subdivision mileposts increase from Kansas to New Mexico. Within the limits of this report, the inventory information for these subdivisions will be limited to the three counties that the subdivisions cross within the TxDOT Amarillo District between Oklahoma and New Mexico borders.



The Pratt Subdivision crosses the Oklahoma – Texas border at Texhoma, Texas, and the Tucumcari Subdivision crosses the Texas – New Mexico border approximately two miles north of the Hartley County - Oldham County border. The subdivision's alignment follows along the north side of Highway U.S. 54 across northwest Texas.

The Pratt and Tucumcari Subdivisions operate on a single track mainline with a maximum freight speed of 70 miles per hour. Train operations are dispatched using ABS from the Oklahoma border to Stratford, Texas and CTC from Stratford to the New Mexico border.

The Pratt Subdivision crosses the BNSF Boise City Subdivision at Stratford, Texas. In Dalhart, Texas the Pratt Subdivision ends and the Tucumcari Subdivision begins. There are two wye tracks on the east side of the BNSF crossing providing train access to the BNSF Dalhart Subdivision and the ability to store and switch cars in the UP Dalhart Yard.

The UP Pratt and Tucumcari Subdivisions operate across the following mileage in these Texas counties in the TxDOT Amarillo District:

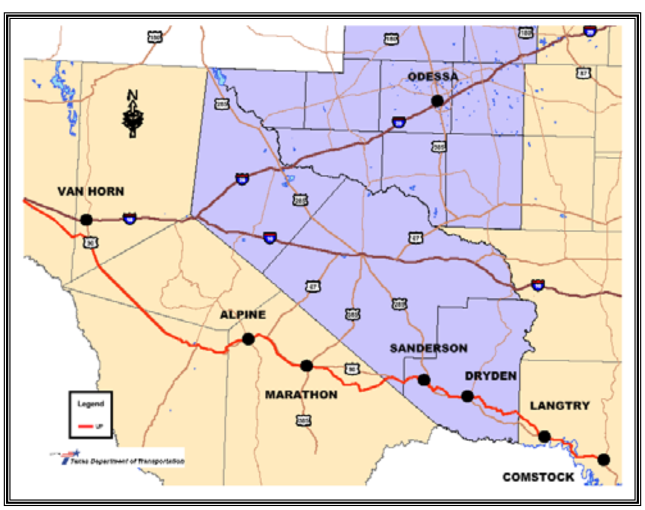
County	Miles
Pratt Subdivision	
Sherman	25.35
Dallam	25.15
Total Texas Miles:	50.5
Tucumcari Subdivision	
Dallam	1.49
Hartley	39.63
Total Texas Miles:	41.12

Key locations across the Pratt and Tucumcari Subdivisions with associated milepost locatiosn include the following:

Landmark Description	Milepost
Oklahoma – Texas Border at Texhoma	494.9
BNSF Boise City Subdivision crossing	514.66
Stratford	514.7
Sherman County – Dallam County	520.25
Chamberlain	536.1
Dalhart	545.4
End Pratt Subdivision, Begin Tucumcari Subdivision	545.46
BNSF Dalhart Subdivision crossing	545.58
Dallam County – Hartley County	546.89
King	560.5
Romero	577.1
Texas – New Mexico Border	586.52

UP Sanderson Subdivision

The UP Sanderson Subdivision operates between Alpine, Texas and Del Rio, Texas within the UP San Antonio Service Unit. Within the limits of this Study, the Sanderson Subdivision enters the Odessa District at the Val Verde County to Terrell County border. The subdivision mileposts increase as the alignment proceeds west toward Alpine and crosses the Pecos County to Brewster County border and exits the Odessa District. Within the limits of the Odessa District, the Sanderson Subdivision operates on a single track mainline across two counties. The maximum train speed is 70 miles per



hour for freight trains and 79 miles per hour for passenger trains. Train operations are dispatched using CTC.

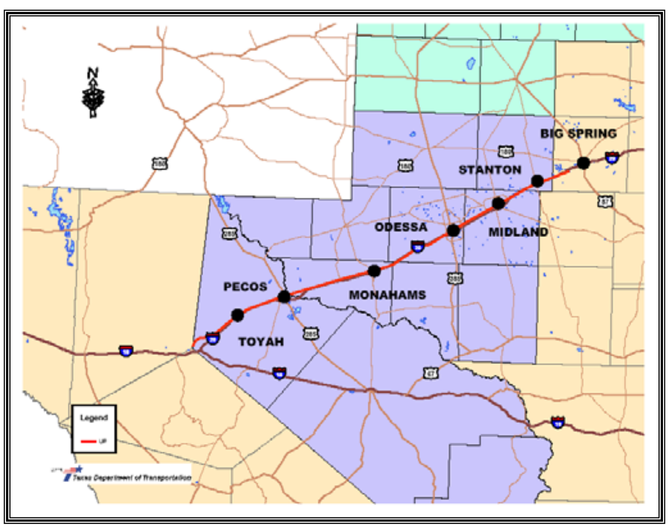
The UP Sanderson Subdivision operates across the following mileage in these Texas counties in the TxDOT Odessa District:

County	Miles
Terrell	59.53
Pecos	9.32
Total Texas Miles:	68.85

Key locations across the Sanderson Subdivision with associated milepost locations include the following:

Landmark Description	Milepost
Val Verde County – Terrell County	493.03
Meyers Canyon Bridge (1,077')	466.8
Dryden	482.06
Mofeta	491
Sanderson	506.19
Milepost Equation: 507.00 = 515.92	507
Milepost Equation: 515.92 = 507.00	515.92
Emerson	524.01
Terrell County – Pecos County	527.48
Pecos County – Brewster County	536.8

UP Toyah Subdivision



The UP Toyah Subdivision operates between Sierra Blanca, Texas and Sweetwater, Texas. The UP Tucson Service Unit controls operations between Sierra Blanca and Pecos, Texas while the Fort Worth Service Unit controls operations between Pecos and Sweetwater. Within the limits of this Study, the Toyah Subdivision enters the Odessa District at the Howard County to Martin County border. The subdivision proceeds in a southwest direction toward Sierra Blanca crossing the Reeves County to Culberson County border where the Toyah Subdivision departs the Odessa District. The subdivision mileposts increase as the alignment proceeds from Sweetwater to Sierra Blanca. Within the limits of the Odessa District, the Toyah Subdivision operates on a single track mainline across six counties. The maximum freight speed across these counties is 60 miles per hour without any scheduled passenger train operations. Train operations are dispatched using ABS. The UP Toyah Subdivision operates across the following mileage in these Texas counties in the TxDOT Odessa District:

County	Miles
Reeves	43.7
Ward	43.65
Crane	1.5
Ector	31.9
Midland	26.8
Martin	13
Total Texas Miles:	160.55

Key locations across the Toyah Subdivision with associated milepost locations include the following:

Landmark Description	Milepost
Howard County – Martin County	528.1
Slaton	533.3
Martin County – Midland County	541.15
Midland	555.6
Midland County – Ector County	567.95
Rubber Industry Lead (General Tire Warehouse)	570
Odessa	570.3
Industrial Lead Tracks (Cemex Cement Plant)	585.65
Ector County – Crane County	599.85
Crane County – Ward County	601.35
Monahans	609.4
Texas & New Mexico Railroad (connects in Yard area)	610.5
Wickett	615.6
Pyote	623.87
Barstow	640
Ward County – Reeves County	645
Pecos	646.6
Pecos Southern Railroad Connection	647.57
Operation changeover: Ft. Worth Service Unit to Tucson Service Unit	653.52
Toyah	666.1
San Martine	685.9
Reeves County – Culberson County	688.7

Shortline Railroads

Texas Pacifico Transportation:

Texas Pacifico Transportation, LTD (TXPF) is the operating railroad company for the rail line owned by TxDOT known as the South Orient Railroad (SORR). TXPF operates between San Angelo Junction, Texas (located on U.S. 84 about half way between Coleman, Texas and Santa Anna, Texas), and Presidio, Texas (located on the U.S. and Mexico border). The SORR mileposts increase as the alignment proceeds to the Mexico border. Within the limits of this Study, the SORR enters the Odessa District at the Upton County and Regan County. For a very short distance of 0.53 miles, the SORR departs the Odessa District as it cuts across the corner of Crocket County then exits the Odessa District at the Pecos County and Brewster County border.

Within the limits of the Odessa District, TXPF operates on a SORR single track mainline across three counties. The horizontal and vertical track geometry is consistent with the Federal Railroad Administration (FRA) requirements for 25 mile per hour track speeds. Train operations are dispatched using TWC.

The SORR alignment follows U.S. 67 between San Angelo Junction, Texas and Fort Stockton, Texas before proceeding to the southwest across open country to the Mexico border. TXPF transfers from their Fort Stockton Subdivision (San Angelo to Fort Stockton) to the Alpine Subdivision (Fort Stockton to Presidio) at Fort Stockton.

TXPF operates across the following SORR mileage in these Texas counties in the TxDOT Odessa District:

County	Miles
Upton	33.91
Crane	3.69
Pecos	69.24
Total Miles:	106.84

Key locations across the TXPF/SORR with associated milepost locations include the following:

Landmark Description	Milepost
Reagan County – Upton County	809.7
Rankin	819.9
Mc Camey	838.6
Upton County – Crane County	843.61
Crane County – Crockett County	847.3
Crockett County – Pecos County (Pecos River)	847.83
Givin	849.6
Baldridge	863.8
Sulphur Junction	867
Fort Stockton	881.7
Operation Change: Fort Stockton Subdivision to Alpine Subdivision	881.7
Belding	892.9
Chancellor	904.3
Pecos County – Brewster County	917.07

Panhandle Northern Railroad:

The Panhandle Northern Railroad (PNR) is owned and operated by the Omnitrax Corporation and operates across 31 miles of railroad track between Panhandle, Texas and Borger, Texas. The PNR was formally owned by the Atchison, Topeka and Santa Fe Railroad (ATSF) and provides service to the nations largest petro-chemical plant located in Burger, Texas. The PNR operates through the following counties in the TxDOT Amarillo District:

County	Miles
Carson	24.8
Hutchinson	6.2
Total Miles:	31

Pecos Valley Southern Railway:

The Pecos Valley Southern Railway operates south of Pecos, Texas following Texas State Road 17 to Saragosa, Texas. This shortline railroad serves the UP Toyah mainline track in Pecos. The Pecos Valley Southern operates in the following county within the TxDOT Odessa District:

County	Miles
Reeves	29.3
Total Miles:	29.3

Southwestern Railway:

The Southwestern Railway operates across 75 miles of track in northern Texas between Shattuck, Oklahoma and Spearman, Texas. This shortline railroad has access to the BNSF Panhandle Subdivision mainline at Shattuck, Oklahoma. The Southwestern operations center is in Perryton, Texas (about 7 miles south of the Oklahoma border on U.S. 83) and serves 45 customers. The Southwestern Railway purchased the railroad from the Santa Fe Railroad prior to the merger with the BNSF Railway in June, 1990. This shortline railroad operates through the following counties in the TxDOT Amarillo District:

County	Miles
Lipscomb	33.27
Hansford	8.6
Ochiltree	33.5
Total Miles:	75.37

Texas-New Mexico Railroad:

The Texas-New Mexico Railroad (TNMR) is owned by the Permian Basin Railways Company and runs between Monahans, Texas north to Lovington, New Mexico. At Monahan, Texas, the TNMR provides service to the UP two to three times per week while operating one train per day with an average of 18 cars.

The TNMR has five customers within Texas that receive freight, but do not ship any freight by rail. Top commodities shipped across this railroad include rock in open hoppers, chemicals in tank cars, and transload containers.

The alignment follows Texas State Road 18 and serves customers shipping oil field equipment. This railroad is under consideration for a new easterly connection from Hobbs, New Mexico to Seminole, Texas then north to Seagraves, Texas to connect to the West Texas and Lubbock Railway. The TNMR operates through the following counties within the TxDOT Odessa District:

County	Miles
Ward	6.86
Winkler	27.1
Total Miles:	33.96

Texas North Western Railway:

The Texas North Western Railway (TXNW) operates across 40 miles of track between Bryden, Texas and Pringle, Texas running just north of FM 281. The TXNW has access to the BNSF Boise City Subdivision mainline at Bryden. The subdivision is a former Rock Island Railroad property with the TXNW starting operations in 1982. This shortline railroad operates through the following counties in the TxDOT Amarillo District:

County	Miles
Moore	21.5
Hutchinson	18.5
Total Miles:	40

West Texas & Lubbock:

The West Texas & Lubbock Railroad (WTLC) operates on two alignments going west and southwest out of Lubbock, Texas for a total of 107 miles of trackage. One alignment goes from Lubbock to Seagraves, Texas and the other line goes from Lubbock to Whiteface, Texas. The line to Whiteface provides service to the Reese Facility which is currently under construction and expansion for additional rail service for the Lubbock and West Texas area. The WTLC line to Seagraves is being considered for extending south to Seminole, Texas then west to Hobbs, New Mexico connecting to the Texas New Mexico Railroad. This extension would provide the Lubbock and West Texas area with rail access to the UP mainline through El Paso, Texas, Arizona, and California. At this time, the WTLC serves both the UP and the BNSF three days per week at the BNSF rail yards in Lubbock, Texas.

The West Texas & Lubbock Railroad is part of the Permian Basin Railways that also owns the Texas New Mexico Railroad. The primary products that are hauled include sodium sulfate in covered hoppers, fertilizers in tank cars, and peanuts in both covered hoppers and box cars. About 59% of the freight is received and 41% of the freight is shipped by its 35 local customers. The WTLC operates one train per day with an average of 23 cars.

The WTLC operates through the following counties in the TxDOT Lubbock District:

County	Miles
Cochran	1.1
Gains	5.9
Hockley	30.1
Lubbock	32.54
Terry	37
Total Miles:	106.64

Plainview Terminal Company:

The Plainview Terminal Company is a switching company that provides service to the BNSF Plainview Subdivision mainline track at the Plainview, Texas railroad yard tracks. As a former Atchison Topeka and Santa Fe Railroad, the switching company has been in operation since December 1995. The Plainview Terminal Company operates in the following county within the TxDOT Lubbock District:

County	Miles
Hale	4.6
Total Miles:	4.6

South Plains Lamesa, LTD:

The South Plains Lamesa Railroad represents a switching company that provides about five-miles of trackage in Slaton, Texas that is used for storing and unloading cars for the BNSF on its Slaton Subdivision. The South Plains Lamesa was previously a 54 mile railroad going to O'Donnell. Freight cars that are stored in their yard are primarily tank cars, flat cars, and fertilizer cars. The fertilizer is delivered by rail, unloaded, stored in tanks, then hauled to final destinations by truck. This switching company transfers cars at Slaton, Texas on the BNSF Wye Tracks. The railroad tacks operate through the following counties in the TxDOT Lubbock District:

County	Miles
Lubbock	3.2
Lynn	1.8
Total Miles:	5

SECTION 5: ESTABLISHMENT OF A FREIGHT RAIL BASE CASE OPERATIONS MODEL

The railroad industry has gone through many changes over the past 35 years that have impacted their internal organization, methods of operation, and relationships with the trucking industry, customers, and even other railroads. The Staggers Rail and Motor Acts of 1980, which deregulated the railroads, can be considered as having one of the most significant impacts to the railroad freight industry. Once the railroad industry was deregulated and could begin setting its own freight rates and controlling their own expenditures, competition and the "American Way" took over.

Each railroad began to focus on how they could gain a larger market share of shippers. The overall answer seemed to be longer and faster trains. Priorities were given to the mainline, high density rail traffic lines with personnel, and services reduced on secondary lines. Then the mergers began and the number of Class I railroads dropped from 41 in 1978, to today's seven Class I railroads throughout the continental United States.

The railroads merged to either increase profits or to avoid bankruptcy. The larger railroads' sale of less profitable secondary lines resulted in the growth of America's Shortline Railroad Industry. Today, the Class I railroads continue to focus on increasing the "velocity" of their trains by increasing their infrastructure capacity to operate more trains at faster speeds. To accomplish this objective, freight rail transfers are made at major intermodal or transload hubs strategically located across the country thus providing optimum train speeds across longer distances. Unit trains, which consist of over 100 cars of the same product or container type typically having the same destination, are made up within these hubs. The products that make up unit trains can be containers from an intermodal facility or other items such as coal cars or automobile-transporting cars. Because these unit trains do not have to stop along the route to perform switching operations, they can essentially go non-stop from origin to destination, making them a time sensitive movement.

Because so many unit trains that are loaded with containers are seen passing by on every major railroad, the term "intermodal" has become the accepted term used when discussing truck-to-train transportation systems. Although the nation's intermodal system plays a major role in the railroad and trucking industries, the transload industry is often misunderstood and should not be overlooked when evaluating methods of freight movements. Intermodal facilities focus on 20' and 40' containers that can be loaded directly on or off of ships, trucks, and trains. Transload facilities offer locations for a variety of shipments to be transferred from and to trucks and trains. The cargo shipped via transload facilities could be anything shipped in trucks including gas, oil, sand, gravel, cotton, peanuts, and even the containers from intermodal locations.

This very generic overview of the rail industry can explain why many local communities, industries, and even shortline railroads, can become frustrated when making arrangements to ship their products long distances by rail. The process of providing a “local” train to make multiple stops across a high density rail line to pick-up or drop-off small numbers of freight cars is no longer economically feasible. For this reason, shippers are required to truck their products up to 500 miles to a major rail yard or facility to be transferred to a rail car and then switched onto a long distance train. This process is then reversed when a shipment is received at a major rail yard or terminal. This type of frustration was apparent during several of the stakeholder meetings conducted in West Texas for this Study. Shippers complained about having to ship their cotton, peanuts, and other cargo east to Fort Worth by truck then watch it go by on a westbound train a few weeks later.

Rail Operations Modeling

As a part of this Study, train operating simulations of the rail lines throughout the West Texas Region Freight Study area were performed. The simulations were performed using Rail Traffic Controller (RTC), which is a software package that is used by all the major railroads for capacity analysis and evaluation of service alternatives. The primary purpose of the simulations was to determine the capacity of each rail line to accommodate existing and future traffic levels and to identify areas where improvements might be made to increase rail capacity or to provide operating flexibility.

The RTC model requires input data that reflect the characteristics of the rail network that determine train operations, such as length of track segments, elevations, allowable operating speeds, track classifications, and other data. The input data must also include information that will define the trains operating over the network in terms of length, tonnage, horsepower, starting and ending locations, priority, and stops enroute. The software then dispatches these trains using algorithms that mimic the logic decisions made by railroad dispatchers who control actual train operations on a daily basis. The program produces statistical measures of the results that permit comparison of performance between routes or between optional operating patterns or cases.

The West Texas rail network was coded using railroad track charts and operating timetable data and was supplemented by other rail maps where necessary. Train data were entered into the simulation based on descriptions of rail operations in recent publications[1] and descriptions provided by field observers in Texas. While the resulting train schedules that were input into the simulation do not precisely reflect actual train data, they do represent current train volumes and movement patterns and are considered valid for the purposes of this set of simulations. Trains were coded to provide variation in their operating times similar to the actual variations experienced by the railroads, with starting times each day determined on a random basis within typical parameters. This process yields a better measure of the ability of a rail line to accommodate rail traffic over time.

[1] Trains Magazine, October 2004, detailing BNSF Transcon route operations; and Train Magazine, August 2002, describing UP train operations between Fort Worth and El Paso.

A base case simulation was performed along with two additional cases using a different random number generator that results in trains being dispatched at slightly varying times in each simulation. The statistical results of the additional cases were comparable to the base case, affirming that the base case is a reasonable representation of current daily train operations. Subsequent simulations will be compared or measured against the results of the original base case.

Comparison of Simulations with Differing Random Number Generators

	Base Case	Variation A	Variation B
Trains Operated	2,433	2,416	2,432
Train Miles	631,071	626,969	630,708
Average Speed	29.613	29.938	29.781
Total Operating Hours	21,311	20,942	21,178
Total Delay Hours	3,354	3,167	3,232
Delay Minutes/100 TM	31.90	30.31	30.75

Table 5-1: RTC Statistical Results Comparison

The simulation was performed for a 14-day period. The mainline rail network was coded into several distinct lines that serve different areas and have different track and train characteristics. These generally follow railroad operating subdivisions:

- BNSF Boise City Line: This line corresponds to the BNSF Boise City Subdivision from Boise City south through Stratford to Amarillo.
- BNSF Colorado Line: This line comprises the BNSF Dalhart Subdivision from Texline south through Dalhart to Amarillo and continuing southeast along the Red River Valley Subdivision from Amarillo, through Quannah, to Valley Junction.
- BNSF Transcon Line: The Transcon line includes the Panhandle Subdivision from Waynoka, OK southwest through Pampa to Amarillo and the Hereford Subdivision continuing west from Amarillo to Clovis, New Mexico.
- BNSF Lubbock Line: This line incorporates the Slaton Subdivision from Texico (east of Clovis) southeasterly through Lubbock to Sweetwater.
- BNSF Plainview Line: This line is equivalent to the Plainview Subdivision between Lubbock Junction (southwest of Amarillo) south to Lubbock.
- UP Tucumcari Line: This route incorporates parts of the Pratt and Tucumcari Subdivisions, reaching from Goodwell southwesterly to Dalhart and Tucumcari, New Mexico.
- UP Toyah Line: This line extends from Sweetwater west to Sierra Blanca, incorporating a small segment of the Baird Subdivision in the Sweetwater area, and all of the Toyah Subdivision west through Odessa to Sierra Blanca.
- UP Sunset Line: This line includes the Sanderson Subdivision from Del Rio to Sanderson, the Alpine Subdivision to Alpine, and the Valentine Subdivision west to Sierra Blanca.

- SO Mexico Line: This route includes the state-owned South Orient trackage from San Angelo west to Alpine and Presidio.

Short line railroad trackage connecting to these lines was also included in the simulation, but since the short lines generally operate only one train per day over relatively low-speed trackage and do not conflict with main line operations, their performance characteristics are not essential to an understanding of route capacities or constraints. As a result, they are not included in the statistical results summarized in this paper.

Figure 5-1 shows a "screen shot" of the rail network included in the West Texas simulations. The network is not portrayed with geographic accuracy, but does show the relative locations of the routes and the interconnections between them.

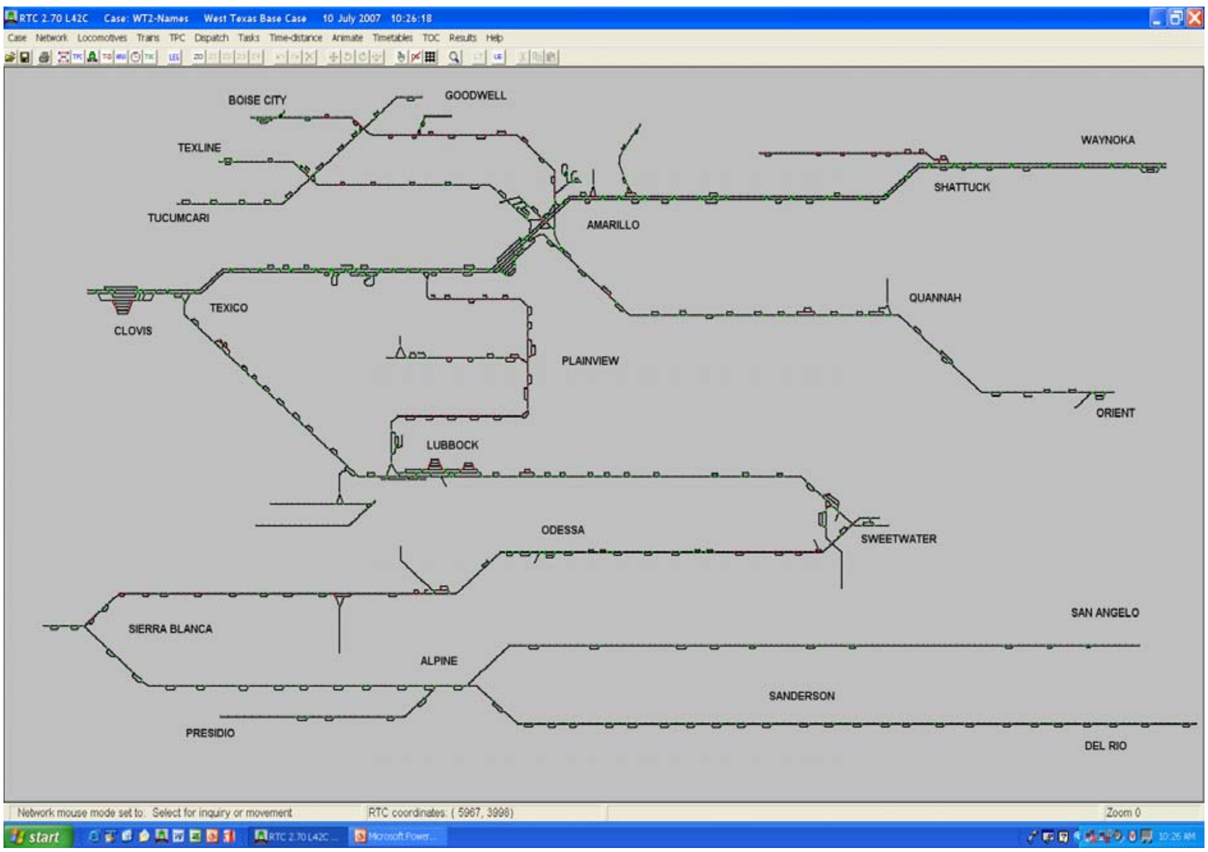


Figure 5-1: RTC West Texas Rail Network

Table 5-2 provides the base case summary data for the entire network and for each of the separate lines identified for analysis. Train volumes and operating results vary widely between the lines because of the different operating characteristics of each line.

West Texas 1 Base Case										
14-Day Simulation	**Summary Results**									
	Total Network	BNSF Boise City	BNSF Colorado	BNSF Transcon	BNSF Plainview	BNSF Lubbock	UP Tucumcari	UP Toyah	UP Sunset	TXPF
Trains Operated	2,431	514	1,240	1,343	76	216	622	412	474	20
Train Miles	630,420	16,384	76,239	268,332	6,405	31,571	57,160	56,939	103,191	8,850
Run Time (hours per day)	758.9	44.5	163.5	250.8	32.9	127.6	148.1	164.9	270.7	32.1
Delay Time (hours per day)	118.3	3.0	11.9	7.6	3.6	17.1	18.1	27.1	31.2	2.0
Delay Percent	15.6%	6.7%	7.3%	3.0%	10.8%	13.4%	12.2%	16.4%	11.5%	6.1%
Delay/100 TM (min)	31.53	15.18	13.12	4.75	46.59	45.44	26.6	39.98	25.38	18.72
Average Speed	29.668	26.285	33.307	38.212	13.909	17.674	27.572	24.666	27.227	19.669

Table 5-2: RTC Base Case Results

Table 5-3 shows the number of trains per day in each direction at selected locations on the network.

West Texas 1 BASE CASE			
Train Counts at Selected Locations Average Number of Trains per Day		Average Trains	Total Trains
Direction	Location	Per Day	14 Days
Northbound	BNSF Boise City, north of Stratford	0.0	0
Southbound	BNSF Boise City, north of Stratford	8.9	124
Northbound	BNSF Boise City, north of Amarillo	0.0	0
Southbound	BNSF Boise City, north of Amarillo	8.9	124
Northbound	BNSF Colorado, north of Dalhart	7.7	108
Southbound	BNSF Colorado, north of Dalhart	0.0	0
Northbound	BNSF Colorado, north of Amarillo	8.7	122
Southbound	BNSF Colorado, north of Amarillo	1.0	14
Northbound	BNSF Colorado, south of Amarillo	8.9	124
Southbound	BNSF Colorado, south of Amarillo	10.8	151
Northbound	BNSF Colorado, north of Valley Jct	8.9	124
Southbound	BNSF Colorado, north of Valley Jct	10.8	151
Westbound	BNSF Transcon Track 1, east of Shattuck	28.7	402
Eastbound	BNSF Transcon Track 1, east of Shattuck	0.4	5
Westbound	BNSF Transcon Track 2, east of Shattuck	0.9	12

Eastbound	BNSF Transcon Track 2, east of Shattuck	27.0	378
Westbound	BNSF Transcon Track 1, east of Eastern	27.3	382
Eastbound	BNSF Transcon Track 1, east of Eastern	3.9	55
Westbound	BNSF Transcon Track 2, east of Eastern	2.3	32
Eastbound	BNSF Transcon Track 2, east of Eastern	23.4	328
Westbound	BNSF Transcon Track 1, west of Amarillo	25.1	351
Eastbound	BNSF Transcon Track 1, west of Amarillo	8.1	113
Westbound	BNSF Transcon Track 2, west of Amarillo	10.2	143
Eastbound	BNSF Transcon Track 2, west of Amarillo	26.4	369
Westbound	BNSF Transcon Track 1, west of Lubbock Jct	24.9	349
Eastbound	BNSF Transcon Track 1, west of Lubbock Jct	7.4	104
Westbound	BNSF Transcon Track 2, west of Lubbock Jct	8.8	123
Eastbound	BNSF Transcon Track 2, west of Lubbock Jct	25.0	350
Westbound	BNSF Transcon Track 1, east of Texico	32.4	454
Eastbound	BNSF Transcon Track 1, east of Texico	2.6	36
Westbound	BNSF Transcon Track 2, east of Texico	0.6	8
Eastbound	BNSF Transcon Track 2, east of Texico	29.1	408
Westbound	BNSF Lubbock Line, east of Texico	5.2	73
Eastbound	BNSF Lubbock Line, east of Texico	3.6	51
Westbound	BNSF Lubbock Line, east of Lubbock	7.1	99
Eastbound	BNSF Lubbock Line, east of Lubbock	5.1	71
Westbound	BNSF Lubbock Line, west of Sweetwater	6.4	89
Eastbound	BNSF Lubbock Line, west of Sweetwater	4.4	61
Southbound	BNSF Plainview Line, north of Lubbock	2.6	36
Northbound	BNSF Plainview Line, north of Lubbock	3.0	42
Westbound	UP Toyah Line, west of Sweetwater	6.4	90
Eastbound	UP Toyah Line, west of Sweetwater	7.0	98
Westbound	UP Toyah Line, east of Sierra Blanca	5.6	78
Eastbound	UP Toyah Line, east of Sierra Blanca	5.9	82
Westbound	UP Sunset Line, east of Sierra Blanca	9.5	133
Eastbound	UP Sunset Line, east of Sierra Blanca	9.2	129
Westbound	UP Sunset Line, west of Alpine	11.0	154
Eastbound	UP Sunset Line, west of Alpine	10.6	148
Westbound	UP Sunset Line, east of Alpine	10.3	144
Eastbound	UP Sunset Line, east of Alpine	9.9	138
Westbound	TXPF, east of Alpine	0.7	10
Eastbound	TXPF, east of Alpine	0.7	10

Table 5-3: Average Number of Trains per Day

SECTION 6: FREIGHT RAIL AND RAIL/ROADWAY INTERFACE SAFETY ISSUES

Safety Policies, Practices, and Legislation

The State of Texas has traditionally taken the lead regarding safety issues centering on the freight rail/roadway interface. The first toll-free call-in program for the public to notify of highway-rail crossing incidents was established by Texas in 1983 with the calls directed to the State's Emergency Management Center (EMC). Enacted by the Texas State Legislature in 1983, the Railroad Crossing Safety Information Act became part of the Texas Transportation Code in 1995, and established a State-wide toll-free telephone network intended to report malfunctions of the safety devices at highway-rail grade crossings. Telephone numbers were mounted onto the sides of the railroads grade crossing equipment cabinets near the at-grade crossing that contained the name of the roadway, the railroad subdivision name, and the approximate milepost of the crossing. Upon receipt of a call, the EMC operator would relay the information provided by the caller to the respective railroad. Even though only at-grade crossings with active warning devices contain the contact information, the Texas system handles over 1,200 calls monthly with information provided at public and private at-grade crossings.[1]

In 2001, after many system upgrades, the Texas call center operations were transferred to the Texas Department of Public Safety. This program, based on the success experienced in Texas, has been adopted by most Class I freight railroad companies and other states throughout the United States.

The Federal Railroad Administration (FRA) administers a safety program that oversees the movement of hazardous materials across the rail network in the United States. The current FRA hazardous materials safety regulatory program includes the following items:[2]

- Hazardous Materials Incident Reduction Program
- Tank Car Facility Conformity Assessment Program
- Tank Car Owner Maintenance Program Evaluations
- Spent Nuclear Fuel and High-Level Nuclear Waste Program
- Railroad Industrial Hygiene Program
- Rulemaking, Approvals, and Exemptions
- Partnerships in Domestic and International Standards-Related Organizations (e.g., American Association of Railroads - AAR)
- Education, Safety Assurance, Compliance, and Accident Investigation

As part of the safety program, the FRA periodically conducts a National Hazardous Material Audit (the results of which are public) in order to determine the level of

[1] Federal Railroad Administration – *Pilot Program for Emergency Notification Systems at Highway-Rail Grade Crossings,* May, 2006
[2] http://www.fra.dot.gov/us/content/337

compliance of Class I railroads with the federal requirements pertaining to the movement of hazardous materials.

The federal rules and regulations for the transport of hazardous materials are contained in Title 49 of the Code of Federal Regulations (49 CFR). The 49 CFR provides regulations as to what materials are considered to pose risk to humans, what materials may be transported, and by what means the materials should be transported and labeled. The CFR lists and classifies those materials which are designated as hazardous materials for purposes of transportation and prescribes the requirements for shipping papers, package marking, labeling, and transport vehicle placarding applicable to the shipment and transportation of those hazardous materials.

The Emergency Response Guidebook (ERG), published by the U.S. Department of Transportation, specifies proper procedure by first responders at the scene of a transportation incident involving hazardous materials. The ERG aids in quickly identifying the classification of material involved in the incident as well as protecting the public in response of the incident.

The partnerships developed between the State of Texas, the Texas Department of Transportation, and the 46 counties comprising the West Texas region, along with the two Class I freight railroads are working for the collective good of the freight industry and the traveling public to continue striving for no incidents, no derailments, no accidents, and ultimately no fatalities.

Safety Statistics for Rail Transportation

Various data pertaining to train accidents/incidents including collisions, derailments, and other events causing reportable damage, injuries, or fatalities are reported to the FRA by the operating railroads across the country. Incidents, including those resulting in damage to rail cars transporting hazardous material or causing the release of the hazardous material, must be reported to the FRA if there is reportable damage resulting from the incident above a specified threshold ($6,700 in 2005) or if there are any injuries or evacuations ordered in response to the incident.[3]

Additionally, incidents must be immediately reported to the National Response Center for both rail and truck transport that result in any fatalities, personal injuries, public evacuations, closure of a major transportation artery, and fire, breakage, or spillage of radioactive or infectious materials.[4]

During the timeframe from January 2002 through December 2006, the 46-county region experienced 123 highway-rail at-grade crossing accidents, in which there were 17 fatalities and 45 injuries.

[3] Code of Federal Regulations, Title 49, Part 225: Railroad Accidents/Incidents: Reports, Classification, and Investigations

[4] Code of Federal Regulations, Title 49, Part 171.15: Railroad Accidents/Incidents: Immediate Notice of Certain Hazardous Materials Incidents.

In comparison, during this same period of time, the entire State of Texas experienced 1,565 highway-rail incidents in which there were 166 fatalities and 636 reported injuries.[5] Statistically, the West Texas region accounts for approximately 7.9 percent of all the highway-rail accidents, 10.2 percent of all the fatalities, and 7.1 percent of all the injuries that occurred at highway-rail crossings within the State. As would be expected, over 80 percent of the reported grade crossing incidents and nearly 80 percent of the fatalities occurred at public at-grade crossings.

Table 6-1 depicts the number of public at-grade crossings, sorted by type of warning device, for the United States, Texas, and the West Texas region.

Number of Public At-Grade Crossings by Warning Device					
United States		**Texas**		**West Texas Region (1)**	
2003		2003		2005	
Crossbucks (passive)	68,834	Crossbucks (passive)	5,244	Crossbucks (passive)	**469**
Lights only (active)	25,656	Lights only (active)	1,362	Lights only (active)	**40**
Gates (active)	36,410	Gates (active)	3,728	Gates (active)	**302**
Stop Signs	9,905	Stop Signs	270	Stop Signs	**14**
Special Warning	3,209	Special Warning	93	Special Warning	**0**
Hwy. Traffic Signal	1,269	Hwy. Traffic Signal	74	Hwy. Traffic Signal	**11**
Other (passive & active)	618	Other (passive & active)	7	Other (passive & active)	**19**
Unknown	4,843	Unknown	458	Unknown	**0**
Source: Federal Railroad Administration				*Source: TxDOT*	
(1) Mainline tracks only					

Table 6-1: Number of Public At-Grade Crossings

Figure 6-1 illustrates the number of highway-rail incidents, including injuries and fatalities, in the state of Texas, by county, from 2002 to 2006. Highway-rail incidents include accidents associated with traffic at highway-rail interfaces, and do not include accidents due to trespassing on railroad property.

[5] Federal Railroad Administration, 2002 – 2006 highway-rail at-grade crossing safety statistics.

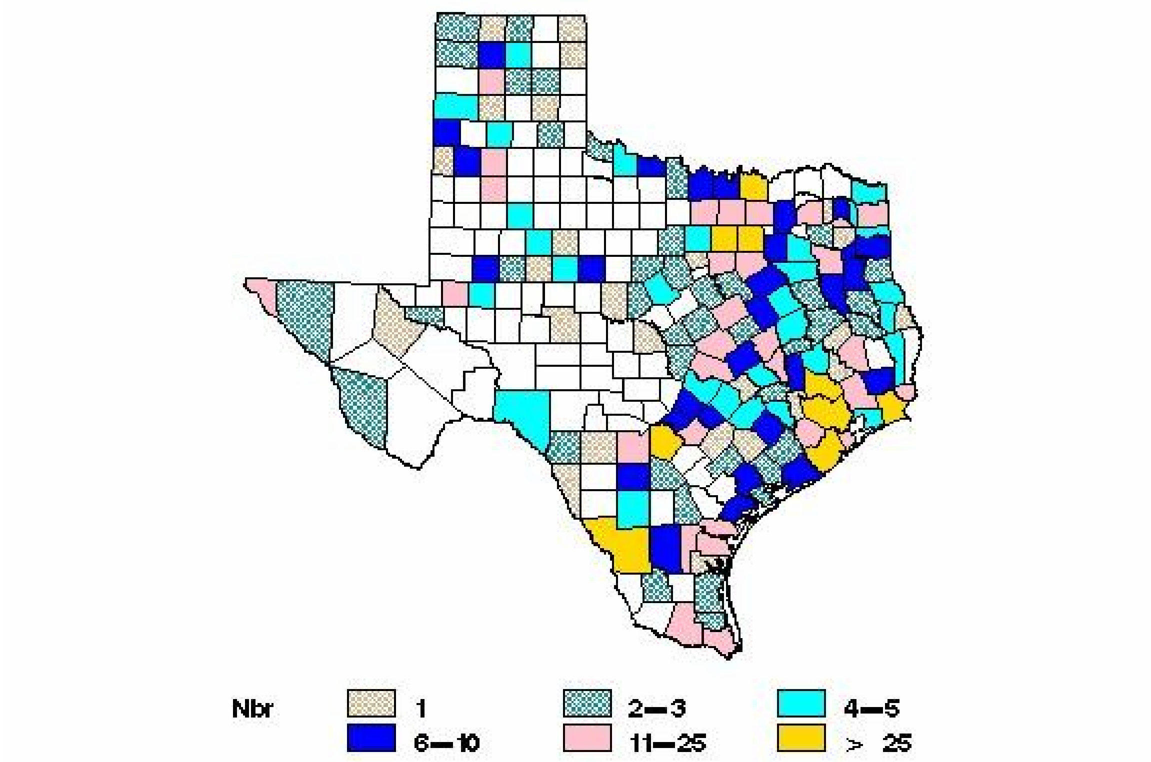


Figure 6-1: Highway-rail incidents in Texas, 2002-2006

In reviewing the investigation logs reported to the FRA for highway-rail incidents within the West Texas region, the average train speeds were approximately 40 mph while the average vehicle speeds were approximately 10 mph. The average vehicle damage per incident is approximately $11,000.

Tables 6-2 and 6-3 depict, by county within the West Texas region, the number of highway-rail incidents annually from 2002 to 2006. The ‘Cnt’ value displays the number of accidents, while the ‘Kld’ and ‘Inj’ values display the number of people killed and injured in those accidents, respectively.

County	Totals			At Public Crossing						At Private Crossing					
				Motor Vehicle			Other			Motor Vehicle			Other		
	Cnt	Kld	Inj	Cnt	Kld	Inj	Cnt	Kld	Inj	Cnt	Kld	Inj	Cnt	Kld	Inj
BAILEY	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-
CARSON	3	-	2	2	-	2	-	-	-	1	-	-	-	-	-
DALLAM	2	-	1	1	-	1	-	-	-	1	-	-	-	-	-
DEAF SMITH	4	-	-	3	-	-	-	-	-	1	-	-	-	-	-
ECTOR	14	3	5	11	2	5	1	-	-	2	1	-	-	-	-
GARZA	4	-	2	4	-	2	-	-	-	-	-	-	-	-	-
GRAY	3	-	-	2	-	-	1	-	-	-	-	-	-	-	-
HALE	16	4	10	12	4	7	-	-	-	4	-	3	-	-	-
HANSFORD	2	-	-	2	-	-	-	-	-	-	-	-	-	-	-
HARTLEY	2	-	1	2	-	1	-	-	-	-	-	-	-	-	-
HEMPHILL	1	-	1	-	-	-	-	-	-	1	-	1	-	-	-
HUTCHINSON	4	-	2	2	-	1	-	-	-	2	-	1	-	-	-
LAMB	8	1	4	6	1	3	1	-	1	1	-	-	-	-	-
LIPSCOMB	1	-	-	-	-	-	-	-	-	1	-	-	-	-	-
LUBBOCK	11	-	4	8	-	4	-	-	-	3	-	-	-	-	-
MARTIN	9	4	1	9	4	1	-	-	-	-	-	-	-	-	-
MIDLAND	5	-	1	5	-	1	-	-	-	-	-	-	-	-	-
MOORE	6	1	1	4	1	1	-	-	-	2	-	-	-	-	-
PARMER	6	2	2	3	-	-	-	-	-	3	2	2	-	-	-
POTTER	11	1	6	11	1	6	-	-	-	-	-	-	-	-	-
RANDALL	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-
REEVES	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-
SHERMAN	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-
SWISHER	4	1	1	4	1	1	-	-	-	-	-	-	-	-	-
WARD	3	-	1	1	-	1	-	-	-	2	-	-	-	-	-
Totals	**123**	**17**	**45**	**96**	**14**	**37**	**3**	**0**	**1**	**24**	**3**	**7**	**0**	**0**	**0**

Table 6-2: Highway-Rail Accidents in the West Texas Region, 2002-2006
(Source: FRA)

County	2002 Totals			2003 Totals			2004 Totals			2005 Totals			2006 Totals		
	Cnt	Kld	Inj	Cnt	Kld	Inj	Cnt	Kld	Inj	Cnt	Kld	Inj	Cnt	Kld	Inj
BAILEY	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CARSON	-	-	-	1	-	2	-	-	-	-	-	-	-	-	-
DALLAM	-	-	-	1	-	1	-	-	-	-	-	-	1	-	-
DEAF SMITH	2	-	-	-	-	-	1	-	-	1	-	-	-	-	-
ECTOR	1	-	-	3	1	1	4	2	2	4	-	1	2	-	1
GARZA	1	-	-	-	-	-	1	-	-	1	-	1	1	-	1
GRAY	1	-	-	2	-	-	-	-	-	-	-	-	-	-	-
HALE	-	-	-	2	4	3	6	-	2	6	-	4	2	-	1
HANSFORD	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-
HARTLEY	-	-	-	-	-	-	-	-	-	1	-	1	1	-	-
HEMPHILL	-	-	-	1	-	1	-	-	-	-	-	-	-	-	-
HUTCHINSON	1	-	-	-	-	-	1	-	1	1	-	1	1	-	-
LAMB	1	-	-	2	1	-	1	-	1	1	-	-	3	-	3
LIPSCOMB	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
LUBBOCK	3	-	2	3	-	-	1	-	-	2	-	1	2	-	1
MARTIN	1	-	-	1	-	-	1	-	1	1	1	-	5	3	-
MIDLAND	-	-	-	-	-	-	2	-	-	1	-	-	2	-	1
MOORE	1	-	-	-	-	-	1	-	-	2	-	-	2	1	1
PARMER	1	-	1	3	-	-	-	-	-	2	2	1	-	-	-
POTTER	6	1	1	1	-	-	2	-	2	1	-	1	1	-	2
RANDALL	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
REEVES	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
SHERMAN	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
SWISHER	1	1	-	-	-	-	1	-	-	-	-	-	2	-	1
WARD	-	-	-	-	-	-	1	-	-	-	-	-	2	-	1
Totals	21	2	4	22	6	8	23	2	9	26	3	11	29	4	13

Table 6-3: Highway-Rail Accidents in the West Texas Region, 2002-2006
(Source: FRA)

Additionally, there were more than 80 derailments within the West Texas region from 2002 through 2006[6]. Data provided by the railroads to the FRA shows the accumulative cost of equipment and infrastructure damage was more than $8 million dollars. Table 6-4 provides a yearly summary of the derailment damage statistics for the region, while Table 6-5 provides a breakdown of those incidents by type of track on which the accident occurred.

[6] Federal Railroad Administration safety statistics

Year	Instances	Total Equipment & Track Damage	Average per Occurrence	Ave Train Speed (mph)	Total Locomotives Derailed	Total Cars Derailed	Total Killed	Total Injured
2006	24	$1,890,569	$78,774	6	9	73	0	0
2005	14	$930,142	$66,439	15	1	61	0	0
2004	15	$1,953,839	$130,256	11	2	75	0	0
2003	18	$1,649,263	$91,626	9	0	101	0	0
2002	18	$1,927,686	$107,094	7	3	84	0	1
Total	**89**	**$8,351,499**	**$474,188**	**10**	**15**	**394**	**0**	**1**

Table 6-4 – Derailment Incidents in the West Texas Region (source: FRA)
(FRA data does not distinguish between railroad and non-railroad damages)

Year	Type of Track				
	Main	**Industry**	**Siding**	**Yard**	**Total**
2006	6	5	2	11	24
2005	6	2	0	6	14
2004	3	1	0	11	15
2003	6	1	1	10	18
2002	3	4	2	9	18
Total	24	13	5	47	89

Table 6-5 – Derailment Incidents by Type of Track (source: FRA)

There were no pedestrian related incidents at grade crossings within the West Texas region between 2002 and 2006. Pedestrian incidents consist of deaths and injuries caused by pedestrians walking on running on to railroad property at grade crossings, and do not include accidents associated with traffic at highway-rail interfaces or worker related accidents.

According to the FRA data, the West Texas region experienced no pedestrian incidents and 62 highway-rail incidents (from Table 6-2) in a five year period that resulted in deaths or injuries.

The statistics shown in the previous tables, however, only show a moderate reduction in most categories between 2002 through 2006. A combination of population increases, the number of people traveling on the roadway network, and an increase in the number of freight trains traveling through densely populated areas, increases the exposure rate of the highway/rail interface.

Rail incidents involving hazardous materials between 2002 and 2006 are listed in Table 6-6. The ‘acc’ value displays the number of accidents involving hazardous materials and the ‘rel’ value shows those accidents where those materials were released from the rail cars.

County	Derailments Involving Hazardous Materials									
	2002		2003		2004		2005		2006	
	Acc	Rel	Acc	Rel	Acc	Rel	Acc	Rel	Acc	Rel
CARSON	-	-	-	-	1	-	-	-	-	-
DALLAM	-	-	1	-	-	-	-	-	-	-
DEAF SMITH	1	-	1	-	1	-	2	-	-	-
ECTOR	1	1	-	-	-	-	1	-	-	-
GARZA	-	-	-	-	1	-	1	-	-	-
GRAY	-	-	-	-	-	-	-	-	1	-
HEMPHILL	-	-	1	-	-	-	-	-	-	-
HUTCHINSON	-	-	1	-	-	-	-	-	1	-
LAMB	-	-	-	-	-	-	1	-	1	-
LUBBOCK	3	-	3	1	-	-	2	-	2	-
MOORE	-	-	-	-	-	-	3	-	3	-
PARMER	2	-	1	-	-	-	1	-	-	-
POTTER	3	-	6	-	10	-	3	-	11	1
RANDALL	-	-	1	-	1	-	-	-	-	-
REEVES	1	-	-	-	-	-	1	-	-	-
Totals	11	1	15	1	14	0	15	0	19	1

Table 6-6: Accidents and Release Involving Hazardous Materials by County, 2002-2006 (Source: FRA)

The table shows a general increase in the number of annual accidents over the five-year span, accumulating to 74 accidents, three of which released hazardous materials. Nearly one-half of these incidents occurred in Potter County.

Hazardous materials are shipped throughout the U.S. via highways, rail, pipeline, water, and air. The trucking industry continues to remain the dominant mode of freight transport. Approximately 70 percent of the nation's freight tonnage is carried by trucks, far more than by any other mode. In 1998, trucks were reported to account for nearly 43 percent of all hazardous material tonnage shipped in the U.S., while rail accounted for approximately 4 percent of hazardous material tonnage shipments. Pipelines, water, and air transport accounted for the remaining 52 percent of hazardous material tonnage.[7]

The annual reported number of incidents and property damage resulting from incidents involving hazardous materials is consistently larger for trucks as opposed to rail. The number of reported personal injuries and fatalities resulting from incidents involving hazardous materials is also typically larger for trucks than rail. Table 6-7 summarizes the 2002 through 2006 highway and rail incidents involving hazardous material transported by truck and rail.

[7] Hazardous Material Shipments, The Office of Hazardous Materials Safety, Research and Special Programs Administration, U.S. Department of Transportation, Washington, DC, October 1998.

	2002 Totals	2003 Totals	2004 Totals	2005 Totals	2006 Totals
Trucks					
Number of Truck Incidents in the U.S. involving hazmat	13,506	13,601	12,977	13,456	17,149
Injuries	118	105	156	175	192
Fatalities	8	15	10	24	6
Property Damage	$33,972,178	$39,114,403	$29,235,870	$40,039,279	$58,966,210
Number of Truck Incidents in Texas involving hazmat	1,035	1,097	1,124	1,267	1,382
Injuries	6	9	11	8	31
Fatalities	1	0	0	2	0
Property Damage	$3,510,363	$3,904,839	$3,458,029	$4,306,795	$5,888,350
Rail					
Number of Rail Incidents in the U.S. involving hazmat	870	802	753	745	704
Injuries	14	13	121	692	24
Fatalities	1	0	3	10	0
Property Damage	$9,745,140	$4,126,165	$11,635,633	$15,454,556	$10,739,810
Number of Rail Incidents in Texas involving hazmat	126	93	87	83	100
Injuries	1	2	92	7	2
Fatalities	0	0	3	0	0
Property Damage	$1,256,315	$1,262,120	$5,942,712	$424,500	$646,837

Table 6-7: 2002-2006 Truck and Rail Hazardous Material Incident Data
Source: U.S. Department of Transportation Office of Hazardous Materials Safety: Hazardous Materials Incident Data

SECTION 7: ALTERNATIVES ANALYSIS

This report is the beginning of an analysis of the West Texas region's freight network (roads and railroads) and the process of developing ways to accommodate and capitalize on future freight movements. It identifies improvements that may provide relief to residents and the traveling public adversely affected by delays, interruptions, and noise attributed to the movement of freight within the region.

This report recognizes that improvements made to the region's transportation infrastructure must describe both public and private benefits so that costs of the improvements are apportioned in a fair and balanced manner to all parties involved.

It is intended that the West Texas region, through a cooperative effort of local governments, will study this report and add, subtract, modify, or use this information to develop a regional freight plan. The plan can then be incorporated into the region's long-range transportation plan developed by each local area's designated metropolitan planning organization (MPO).

The West Texas Region Freight Study identifies existing truck and freight rail transportation operations, bottlenecks, and constraints with the goal of establishing a slate of potential improvements. The identified improvements are geared toward providing solutions that may resolve the problems associated with rising congestion levels and the expected growth of commodity movements in the West Texas region.

The improvements selected to be analyzed were compiled from information and or recommendations from freight surveys distributed, meetings and independent discussions with the UP and the BNSF, and the results from the regional freight rail operations modeling (RTC) and the Statewide Analysis Model (SAM).

Improvements identified for the West Texas region, comprised of the TxDOT Amarillo, Lubbock, and Odessa Districts, are categorized as:

- Grade Separations (bridges to separate the railroad from streets)
- Grade Crossing Closures (closing and rerouting the street at the intersection with the railroad)
- Improvements to Existing Roadway and Rail Infrastructure (improving capacity and connectivity on existing roadways and railways)
- Truck Bypass Routes (new roadway lanes to bypass congested areas)

The improvements determined from the aforementioned sources have been analyzed to determine the effects on efficiency, mobility, and safety for both rail operations as well as vehicular traffic in the West Texas region. This analysis began with the identification of the existing conditions and included estimates of the implementation cost, implementation timeframe, and public and private benefits for the identified improvements.

The identification of existing conditions at locations of potential improvements incorporated a review of property land uses and estimated values based on county appraisal information, environmental constraints, traffic flow volumes for both vehicular and rail traffic, and traffic accident statistics.

The estimated costs for each improvement are order of magnitude costs that were determined based on preliminary planning. The costs included in this study represent an estimate of probable costs prepared in good faith and with reasonable care. The study team has no control over the costs of construction labor, materials, or equipment, nor over competitive bidding or negotiating methods and does not make any commitment or assume any duty to assure that bids or negotiated prices will not vary from these estimates. The costs are subject to inflation, and in some cases are calculated using county appraisal district values for right-of-way acquisition, which may vary from the actual cost of property acquisition.

The estimated implementation timeframe for each improvement was determined based on the additional analysis, engineering design, environmental mitigation, and funding required prior to the implementation of an improvement.

All identified grade crossing closures and separations were determined to be near-term or mid-range improvements, depending on the level of complexity and available funding for each location. The grade crossing improvements may be prioritized by their associated benefit/cost ratios. Roadway capacity improvements (i.e. roadway widening) and identified potential truck and rail bypasses were determined to be long-range improvements.

Anticipated public benefits of the potential improvements include reduced vehicular delay times due to passing trains at existing at-grade crossings, reduced vehicle fuel consumption, improved air quality, improved public safety, improved mobility for vehicular and freight traffic, reduced noise and vibration, and increased freight movement capacity.

The estimated public benefits of the potential improvements were determined using a grade crossing “impedance” or delay model, which takes into account the volume and frequency of vehicular and train traffic at roadway-rail crossings to estimate the amount of time motorists are delayed by rail traffic.

The model measures the anticipated public costs associated with traffic delays and calculates the extra emissions and fuel usage experienced while delayed by a train at each of the approximately 850 rail crossings within the region. The cost of collisions is added to time delay costs, emissions, and fuel usage to provide an annualized estimate of total public costs at each grade crossing in the study. Forecasting for growth in both rail and vehicular traffic provides an annualized estimate of public costs through the year 2017 for 10-year benefit calculations and through the year 2027 for 20-year benefit calculations.

The net present value (NPV) shown as the public benefit is the cumulative projected cost-burden over a 10-year or 20-year period. The NPV is a standard method for financial evaluation of long-term projects and is the value of the improvements projected 10 or 20 years into the future in terms of today's dollars. This can be assessed as the savings associated with a grade separation or crossing closure. An explanation of the public benefit calculations can be found in Appendix F.

The grade separations and crossing closures primarily provide benefit to the public in the form of reduced delays and improved safety, but also may provide a limited benefit to the railroads at certain locations. Every grade crossing in the region has not been evaluated; rather the analysis of grade crossings and rail line capacity enhancements was limited to those locations contained in this report or deemed necessary for analysis from traffic data analysis.

Grade Separations

Grade separations consist of overpass or underpass structures (bridges) that separate the vehicular traffic and the train traffic at roadway-rail interfaces. In general, the grade separations allow the train to travel under or over the roadway traffic. This separation of traffic improves safety by eliminating the conflict point between trains and cars.

Locations for grade separations were based on the following:

- Freight surveys conducted during Phase 1 of this study
- Areas where EMS response may be slowed by high train movements
- Areas of high vehicular traffic volumes (AADT) with high train movements

The locations of EMS conflicts were identified from surveys sent out to mid-size and larger cities during Phase 1 of the Study. Additional specific at-grade roadway areas within these cities were determined by locating hospitals and fire department buildings and determining logical EMS response paths through each city where a grade separation between roadway and rail would be most efficient. Additionally, AADT volumes and percentages of trucks were used to verify a reasonable amount of vehicular and truck traffic to justify the grade separation.

Locations with reported AADT volumes of at least 5,000 vehicles per day and at least 10 trains per day were analyzed for potential grade separation. A list of roadways identified as potential grade separations is provided in Table 7-1 along with the estimated costs, 10- and 20-year public benefits, and AADT volumes associated with each roadway. Table 7-1 lists the potential grade separations in descending order of the 20-year public benefit to cost ratio.

Grade Separations									
Street Name	TxDOT District	County	Railroad Subdivision	AADT	Estimated Cost	Estimated 10-year Public Benefit	Ratio: Benefit/ Cost	Estimated 20-year Public Benefit	Ratio: Benefit/ Cost
Midkiff Rd	Odessa	Midland	UP Toyah	26520	$ 4,760,000	$ 2,341,000	0.49	$ 6,844,000	1.44
U.S. 70	Lubbock	Parmer	BNSF Hereford	9280	$ 6,230,000	$ 1,427,000	0.23	$ 3,980,000	0.64
Grand St	Amarillo	Potter	BNSF Red River	13200	$ 5,390,000	$ 968,000	0.18	$ 2,612,000	0.48
Eastern Ave	Amarillo	Potter	BNSF Panhandle	5050	$ 6,260,000	$ 979,000	0.16	$ 2,535,000	0.40
U.S. 87	Amarillo	Moore	BNSF Boise City	9610	$ 3,900,000	$ 449,000	0.12	$ 1,273,000	0.33
15th St	Amarillo	Randall	BNSF Hereford	5060	$ 9,620,000	$ 1,057,000	0.11	$ 2,805,000	0.29
U.S. 70	Lubbock	Bailey	BNSF Slaton	7840	$ 10,400,000	$ 580,000	0.06	$ 1,580,000	0.15
University Ave	Lubbock	Lubbock	BNSF Slaton	13260	$ 15,550,000	$ 946,000	0.06	$ 2,589,000	0.17
U.S. 287/U.S. 54	Amarillo	Sherman	UP Pratt / BNSF Boise City	9820	$ 11,440,000	$ 399,000	0.03	$ 1,088,000	0.10
FM 2943	Amarillo	Deaf Smith	BNSF Hereford	2150	$ 9,870,000	$ 341,000	0.03	$ 907,000	0.09

Table 7-1: Potential Grade Separations

The difference in values between the estimated 10-year and 20-year public benefits is due to the forecasted growth of both vehicular and train traffic volumes in the future. The public cost burden associated with the at-grade roadway-railroad crossings, which is equivalent to the estimated public benefit of grade-separating the crossings, is projected to significantly increase after 10 years due to the compounding growth of traffic.

Grade Crossing Closures

Crossing closures consist of the closure of a roadway at the point where the roadway crosses the railroad, requiring an alternate route for vehicular traffic. These safety improvements minimize conflict points between trains and cars by closing crossings and encouraging motorists to use grade-separated roadways or alternate streets which have better safety systems in place.

Potential crossing closures for the purposes of this study only include those that would re-route traffic over a grade-separated roadway. Other criteria used in determining potential crossing closures include a maximum rerouting distance of 1-1/2 miles and evaluation of traffic volumes at the roadway-rail interfaces. The cost estimated to implement a crossing closure was estimated to be $50,000, which only includes the placement of traffic barriers, minor street signage, and removal of the existing crossing material.

A list of crossings identified for potential closure is provided in Table 7-2 along with associated costs, benefits, and AADT volumes. Table 7-2 lists these crossing closures in descending order of the benefit-to-cost ratio. The potential reroutes of the crossing closures are discussed in further detail in Section 8.

Street Name	TxDOT District	County	Railroad Subdivision	AADT	Estimated Cost	Estimated 10-year Public Benefit	Ratio: Benefit/ Cost	Estimated 20-year Public Benefit	Ratio: Benefit/ Cost
Elsie Ave	Amarillo	Carson	BNSF Panhandle	1,940	$ 50,000	$ 239,000	4.78	$ 649,000	12.98
Avenue P	Lubbock	Lubbock	BNSF Slaton	2,500	$ 50,000	$ 186,000	3.72	$ 518,000	10.36
Ave M	Lubbock	Lubbock	BNSF Slaton	1,420	$ 50,000	$ 115,000	2.30	$ 316,000	6.32
E 6th St	Lubbock	Hale	BNSF Plainview	1,720	$ 50,000	$ 112,000	2.24	$ 303,000	6.06
Wall St	Amarillo	Sherman	UP Pratt	2,550	$ 50,000	$ 75,000	1.50	$ 205,000	4.10
W 5th St	Lubbock	Bailey	BNSF Slaton	1,090	$ 50,000	$ 71,000	1.42	$ 190,000	3.80
E 4th St	Lubbock	Hale	BNSF Plainview	550	$ 50,000	$ 58,000	1.16	$ 141,000	2.82
4th St	Amarillo	Sherman	BNSF Boise City	360	$ 50,000	$ 35,000	0.70	$ 80,000	1.60
Main St	Amarillo	Sherman	UP Pratt	600	$ 50,000	$ 27,000	0.54	$ 63,000	1.26
E 3rd St	Lubbock	Hale	BNSF Plainview	70	$ 50,000	$ 7,000	0.14	$ 16,000	0.32
E 7th St	Lubbock	Hale	BNSF Plainview	60	$ 50,000	$ 7,000	0.14	$ 15,000	0.30

Table 7-2: Potential Crossing Closures

Improvements to Existing Roadway and Rail Infrastructure

Roadway and rail capacity enhancements foster the economic growth of the region by improving the efficiency of operations as well as minimizing disturbance to residents of the region. Providing additional roadway and rail capacity relieves congestion along the highway and rail corridors and allows freight to pass through the region more quickly. Examples of roadway capacity enhancements are listed as follows:

- Adding lanes to existing roadways
- Upgrading the roadway facility (e.g. convert highway with traffic signals to freeway)
- Constructing bypasses around major at-grade intersections in larger cities

The list of roadway capacity enhancements was determined based on the following criteria:

- Volume-to-capacity (V/C) ratio of 0.75 or greater for year 2025
- Truck volumes of 15% of the overall traffic volume
- Connectivity to and from other truck routes

The improvements identified for the above-listed locations of constraints are projected to lower the V/C ratios in 2025 at locations to less than 0.75 where practicable.

A list of potential roadway and rail capacity enhancements is provided in Table 7-3 along with the estimated costs of the improvements and average annual daily traffic, while the improvements are described in further detail in Section 8.

Roadway/Rail Capacity Enhancements				
Facility Name/Limits	TxDOT District	County	AADT	Estimated Cost
Interstate 40 (within Loop 335)	Amarillo	Potter	154000	$ 132,750,000
Dalhart Bypass (within U.S. 54)	Amarillo	Dallam	N/A	$ 130,970,000
Dumas Bypass (within U.S. 287)	Amarillo	Moore	N/A	$ 34,180,000
U.S. 84 Direct Connectors at Loop 289	Lubbock	Lubbock	48900	$ 84,680,000
Interstate 27 (south Loop 289 to U.S. 62)	Lubbock	Lubbock	117700	$ 21,260,000
U.S. 385 (Interstate 20 to Andrews)	Odessa	Ector/Andrews	31100	$ 108,690,000

Table 7-3: Potential Roadway and Rail Capacity Enhancements

SECTION 8: IDENTIFIED IMPROVEMENTS

The potential improvements analyzed in this study have been organized by TxDOT District and are described in the following section. The potential improvements are listed in Tables 8-1 through 8-3 with estimated costs and public benefits. Moreover, a detailed discussion of each identified improvement follows the list of potential improvements in each District.

Amarillo District

The TxDOT Amarillo District is located in the Panhandle region of the state and contains the counties of Armstrong, Carson, Dallam, Deaf Smith, Gray, Hansford, Hartley, Hemphill, Hutchinson, Lipscomb, Moore, Ochiltree, Oldham, Potter, Randall, Roberts, and Sherman. Major roadways that traverse the District include Interstates 27 and 40, U.S. 287, and many other U.S. highways. Many of the major roadways in the District carry large volumes of truck traffic, generally over 15 percent of the total traffic volume.

The Amarillo District is served by two Class 1 railroads, the UP and BNSF, and three shortline railroads. The shortline railroads consist of the Panhandle Northern Railroad (PNR), the Southwestern Railway, and the Texas Northwestern Railway (TXNW). Amarillo is a major hub of BNSF for movements for freight within the state.

A list of planned future network improvements has been provided by TxDOT for use in identifying areas of planned reconstruction or widening of major roadways. Some of these areas in the Amarillo District include Interstate 40 near Interstate 27 in Amarillo as well as multiple segments of Interstate 27, U.S. 54, and U.S. 87. Other portions of Interstate 27 are also slated for widening for the Ports to Plains Corridor. The planned improvements by TxDOT are not included as proposed improvements in this study unless additional widening of the roadway was deemed necessary for analysis. The complete list of planned future improvements by TxDOT in the Amarillo District can be viewed in Table 3-7 and Figure 3-16 of this report.

Potential improvements within the Amarillo District consist of six grade separations, four crossing closures, and three roadway capacity enhancements as listed in Table 8-1 with their associated costs and estimated public benefits.

Amarillo District						
Grade Separations	County	Estimated Cost	Estimated 10-year Public Benefit	Ratio: Benefit/ Cost	Estimated 20-year Public Benefit	Ratio: Benefit/ Cost
U.S. 87	Moore	$ 3,900,000	$ 449,000	0.12	$ 1,273,000	0.33
Grand St	Potter	$ 5,390,000	$ 968,000	0.18	$ 2,612,000	0.48
Eastern Ave	Potter	$ 6,260,000	$ 979,000	0.16	$ 2,535,000	0.40
15th St	Randall	$ 9,620,000	$ 1,057,000	0.11	$ 2,805,000	0.29
FM 2943	Deaf Smith	$ 9,870,000	$ 341,000	0.03	$ 907,000	0.09
U.S. 287/U.S. 54	Sherman	$ 11,440,000	$ 399,000	0.03	$ 1,088,000	0.10
Crossing Closures	County	Estimated Cost	Estimated 10-year Public Benefit	Ratio: Benefit/ Cost	Estimated 20-year Public Benefit	Ratio: Benefit/ Cost
Main St	Sherman	$ 50,000	$ 27,000	0.54	$ 63,000	1.26
Wall St	Sherman	$ 50,000	$ 75,000	1.50	$ 205,000	4.10
4th St	Sherman	$ 50,000	$ 35,000	0.70	$ 80,000	1.60
Elsie Ave	Carson	$ 50,000	$ 239,000	4.78	$ 649,000	12.98
Roadway/Rail Capacity Enhancements	County	Estimated Cost	Estimated 10-year Public Benefit	Ratio: Benefit/ Cost	Estimated 20-year Public Benefit	Ratio: Benefit/ Cost
Interstate 40 (within Loop 335)	Potter	$ 132,750,000	N/A	N/A	N/A	N/A
Dalhart Bypass (within U.S. 54)	Dallam	$ 130,970,000	N/A	N/A	N/A	N/A
Dumas Bypass (within U.S. 287)	Moore	$ 34,180,000	N/A	N/A	N/A	N/A

Table 8-1: Amarillo District Potential Improvements

Grade Separations

Grade Separation of U.S. 87 on the BNSF Boise City Subdivision

U.S. 87, also known as West 1st Street, is currently a two-lane roadway west of the tracks and four-lane roadway east of the tracks that crosses the BNSF Boise City Subdivision in Moore County within the city of Dumas. This roadway, with approximately 9,610 vehicles crossing the railroad tracks daily, has been identified as a potential candidate for grade separation. The potential two- to four-lane roadway overpass would separate vehicular traffic from the Boise City Subdivision.

A preliminary layout of the overpass is included in the figures in Appendix E. The land use in the vicinity of U.S. 87 consists of a mix of commercial and residential properties, with the residential tracts mainly east of the tracks.

Access to adjacent properties would not be available along the identified U.S. 87 overpass for a length of over ¼ mile. However, some of these adjacent properties would still have access via the local Dumas street network; those properties that do not have access were included in the estimated cost of right-of-way acquisition. Also, Miller Avenue and 2nd Street would be converted to cul-de-sacs where connections to U.S. 87 are not viable. Wilson Avenue and Twichell Avenue, although U.S. 87 would no longer connect to them, would have connections to properties on the north side of the overpass.

The grade separation of U.S. 87 is estimated to cost $3.9 million, with an estimated public benefit of $1.3 million, which is 33 percent of the estimated cost of the grade separation.

Grade Separation of Grand Street on the BNSF Red River Subdivision

Grand Street is currently a four-lane roadway that crosses the BNSF Red River Subdivision in Potter County within the city of Amarillo. This roadway, with approximately 13,200 vehicles crossing the railroad tracks daily, has been identified as a potential candidate for grade separation. The potential four-lane roadway overpass would separate vehicular traffic from the Red River Subdivision.

A preliminary layout of the overpass is included in the figures in Appendix E. The land use in the vicinity of Grand Street consists of commercial properties to the west of the roadway and vacant land to the east.

Access to adjacent properties would not be available along the identified Grand Street overpass for a length of ¼ mile. However, the adjacent commercial properties will still have access due to the large size of the tracts and multiple entrance points. Third Avenue would not intersect Grand Street; rather, a ramp connection would provide access between Third Avenue and Grand Street. Due to the large commercial properties and lack of developed land, there would not be any closures of cross streets due to the grade separation.

The grade separation of Grand Street is estimated to cost $5.4 million, with an estimated public benefit of $2.6 million, which is nearly 50 percent of the estimated cost of the grade separation.

Grade Separation of Eastern Street on the BNSF Panhandle Subdivision

Eastern Street is currently a four-lane roadway that crosses the BNSF Panhandle Subdivision in Potter County within the city of Amarillo. This roadway, with approximately 5,050 vehicles crossing the railroad tracks daily, has been identified as a potential candidate for grade separation. The potential four-lane roadway overpass would separate vehicular traffic from the Panhandle Subdivision.

A preliminary layout of the overpass is included in the figures in Appendix E. The land use in the vicinity of Eastern Street consists of commercial properties north of the railroad and vacant land south of the tracks.

Access to adjacent properties would not be available along the identified Eastern Street overpass for a length of over ¼ mile. However, these adjacent properties would still have access via Sanborn Street and under the overpass bridge. Also, Sanborn Street would not intersect Eastern Street; rather, a ramp connection would provide access between Sanborn Street and Eastern Street. Due to the spread-out commercial properties and lack of developed land, there would not be any closures of cross streets because of the grade separation.

The grade separation of Eastern Street is estimated to cost $6.3 million, with an estimated public benefit of $2.5 million, which is 40 percent of the estimated cost of the grade separation.

Grade Separation of 15th Street on the BNSF Hereford Subdivision

15th Street is currently a two-lane roadway that crosses the BNSF Hereford Subdivision in Randall County within the city of Canyon. This roadway, with approximately 5,060 vehicles crossing the railroad tracks daily, has been identified as a potential candidate for grade separation. The potential two-lane roadway underpass would separate vehicular traffic from the Hereford Subdivision.

A preliminary layout of the underpass is included in the figures in Appendix E. The land use in the vicinity of 15th Street consists of a mix of commercial and residential properties along the underpass route.

Access to adjacent properties would not be available along the identified 15th Street underpass for a length of less than ¼ mile. However, some of these adjacent properties would still have access via the local Canyon street network; those properties that do not have access were included in the estimated cost of right-of-way acquisition. Additionally, First Avenue, Second Avenue, and the street between First Avenue and U.S. 60 would be converted to cul-de-sacs where connection to 15^{th} Street is not viable.

The grade separation of 15th Street is estimated to cost $9.6 million, with an estimated public benefit of $2.8 million, which is 29 percent of the estimated cost of the grade separation.

Grade Separation of FM 2943 on the BNSF Hereford Subdivision

FM 2943 is currently a two-lane roadway that crosses the BNSF Hereford Subdivision in Deaf Smith County within the city of Hereford. This roadway, with approximately 2,150 vehicles crossing the railroad tracks daily, has been identified as a potential candidate for grade separation. The potential two-lane roadway overpass, including an overpass connection to U.S. 60, would separate vehicular traffic from the Hereford Subdivision.

A preliminary layout of the overpass is included in the figures in Appendix E. The land use in the vicinity of FM 2943 and U.S. 60 consists of mainly commercial properties with some residential properties along the overpass route, with a large commercial tract on the southeast side of the grade separation.

Access to adjacent properties would not be available along the identified FM 2943 and U.S. 60 overpasses for a length over ¼ mile each. However, some of these adjacent properties would still have access via the local Hereford street network;

those properties that do not have access were included in the estimated cost of right-of-way acquisition. A connection eastbound from 15th Street to U.S. 60 may be added; however, all other movements to 15th Street would use County Road G for access. Also, access to the large commercial tract east of FM 2943 would be maintained on the southern driveway.

The grade separation of FM 2943 is estimated to cost $9.9 million, with an estimated public benefit of $907 thousand, which is nine percent of the estimated cost of the grade separation.

Grade Separation of U.S. 287/U.S. 54 on the UP Pratt/BNSF Boise City Subdivision

U.S. 287 is currently a two-lane roadway that crosses the UP Pratt Subdivision and U.S. 54 is a four-lane roadway that crosses the BNSF Boise City Subdivision in Sherman County within the city of Stratford. These roadways, with approximately 6,410 vehicles on U.S. 287 and 3,410 vehicles on U.S. 54 crossing the railroad tracks daily, have been identified as potential candidates for grade separation. The potential roadway overpasses would separate vehicular traffic from the Pratt and Boise City Subdivisions.

A preliminary layout of the overpasses is included in the figures in Appendix E. The land use in the vicinity of U.S. 287 and U.S. 54 consists mainly of residential properties with some commercial tracts along the overpass route.

Access to adjacent properties would not be available along the U.S. 287 and U.S. 54 overpasses for a length of over ¼ mile along each structure. However, some of these adjacent properties would still have access via the local Stratford street network; those properties that do not have access were included in the estimated cost of right-of-way acquisition. Additionally, North 2nd Street and South 1st Street along U.S. 287, as well as South Maple Street and South Cedar Street along U.S. 54, would be converted to cul-de-sacs where connection to these roadways is not viable. North 1st Street would not have a connection to U.S. 287, although it would continue as a through-street; just as South Pine Street would connect to properties on the north side of U.S. 54.

The combined grade separations of U.S. 287 and U.S. 54 are estimated to cost $11.4 million, with an estimated public benefit of $1.1 million, which is ten percent of the estimated cost of the grade separations.

Crossing Closures

Crossing Closures of Main Street and Wall Street on the UP Pratt Subdivision

Main Street is currently a four-lane roadway and Wall Street is a two-lane roadway, both of which cross the UP Pratt Subdivision north of U.S. 54 and east of U.S. 287 in Stratford. Accommodating approximately 2,550 and 600 daily vehicles, respectively, Main Street and Wall Street provide access to and from residential and commercial areas on either side of the Pratt Subdivision. The location of the potential crossing closures as well as alternative traffic routing and associated distances are included in the figures in Appendix E.

Closing the crossings would increase the travel distance to access the residences and businesses from Main Street by about ¾ mile and from Wall Street by about 1-1/4 miles. The vehicular traffic along Main Street and Wall Street could be rerouted to cross the railroad over the proposed U.S. 287 overpass.

The crossing closures are estimated to cost $50,000 per crossing. The estimated public benefit calculated for the closure of Main Street is $63,000, which is 26 percent greater than the estimated cost to implement the crossing closure. The estimated public benefit calculated for the closure of Wall Street is $205,000, which is more than four times the estimated cost to implement the crossing closure.

Crossing Closure of 4th Street on the BNSF Boise City Subdivision

4th Street is currently a two-lane roadway that crosses the BNSF Boise City Subdivision south of U.S. 54 and west of U.S. 287 in Stratford. Accommodating approximately 360 daily vehicles, 4th Street provides access to and from residential and commercial areas on the eastern side of the Boise City Subdivision. The location of the potential crossing closure as well as alternative traffic routing and an associated distance are included in the figures in Appendix E.

Closing the crossing would increase the travel distance to access the residences and businesses from 4th Street by about 1 ¼ miles. The vehicular traffic along 4th Street could be rerouted to cross the railroad over the proposed U.S. 54 overpass, which is included as a potential improvement in this study.

The crossing closure is estimated to cost $50,000 with an estimated public benefit of $80,000, which is one-and-a-half times the estimated cost to implement the crossing closure.

Crossing Closure of Elsie Avenue on the BNSF Panhandle Subdivision

Elsie Avenue is currently a two-lane roadway that crosses the BNSF Panhandle Subdivision north of U.S. 60 and east of SH 207 in Panhandle. Accommodating approximately 1,940 daily vehicles, Elsie Avenue provides access to and from residential and commercial areas on the either side of the Panhandle Subdivision. The location of the potential crossing closure as well as alternative traffic routing and an associated distance are included in the figures in Appendix E.

Closing the crossing would increase the travel distance to access these residences and businesses from Elsie Avenue by over one mile. The vehicular traffic along Elsie Avenue could be rerouted to cross the railroad over the existing SH 207 underpass.

The crossing closure is estimated to cost $50,000. The estimated public benefit calculated for the closure of Elsie Avenue is $649,000, which is 13 times the estimated cost to implement the crossing closure.

Roadway/Rail Capacity Enhancements

Widening of Interstate 40 Within Loop 335 (from six to eight lanes)

Interstate 40 is currently a six-lane roadway between the west and east sides of Loop 335 within the city of Amarillo. In 2003, a volume of 80,000 to 100,000 vehicles per day traveled along this section of Interstate 40, which is expected to increase to 125,000 to 155,000 vehicles by the year 2025. Generally, over 15 percent of the daily traffic along this section of Interstate 40 is composed of trucks.

The interstate is a limited-access facility, which allows vehicles access to the facility in particular locations and incurs faster travel times than U.S. and state highways. As a result, Interstate 40 sustains a higher capacity threshold than a U.S. or state highway section and is assumed to have a capacity of approximately 20,000 vehicles per lane per day. Thus, the volume-to-capacity (V/C) ratio accounting for TxDOT's proposed widening is projected to be between 1.04 and 1.28 for 2025. A V/C ratio of over 0.75 is typically an indicator of an area of heavy congestion.

Widening Interstate 40 between the west and east sides of Loop 335 from six to eight lanes is projected to decrease the V/C ratio to between 0.78 and 0.96, indicating reduced congestion in 2025. Adding the proposed lanes would increase the capacity and allow vehicles to travel at higher speeds throughout the day.

The estimated cost of the widening of Interstate 40 from six to eight lanes between the west and east sides of Loop 335 is $133 million.

Dalhart Bypass (southwest U.S. 54 east to northeast U.S. 54)

U.S. 54, U.S. 87, and U.S. 385 are located within the limits of the city of Dalhart. These roadways contain high volumes of truck traffic, generally over 30 percent of the total traffic volume. Furthermore, complicated turning movements by trucks accessing the other highways slow other vehicles within Dalhart.

A potential Dalhart bypass is identified as a 16 mile long, four-lane corridor that connects at each end to U.S. 54 and is located on the east side of Dalhart. Entrance and exit ramps would connect the Dalhart bypass to U.S. 87 on the southeast side of the city. An overpass is proposed over U.S. 87 and over Rita Blanca Creek west of U.S. 87. Signalized at-grade crossings are planned for RR 297 and RR 281 as well as the connection points to U.S. 54. Many of the county roads in the areas would be split by the bypass route.

The estimated cost of the 16-mile, four-lane Dalhart bypass connecting on both ends to U.S. 54 along the east side of town is $131 million.

Dumas Bypass (north U.S. 287 west to south U.S. 287)
U.S. 87, U.S. 287, and SH 152 are located within the limits of the city of Dumas and contain high volumes of truck traffic, generally over 20 percent of the total traffic volume. Additionally, many trucks turning left from northbound U.S. 287 to westbound U.S. 87 slow other vehicles within Dumas.

A potential Dumas bypass is identified as a five mile long, four-lane corridor that connects at each end to U.S. 287 and is located on the west side of Dumas. The bypass travels between the Dumas airport and the city of Dumas. Signalized at-grade crossings are planned for U.S. 87 and FM 722 as well as the connection points to U.S. 287, and many of the county roads in the areas would be split by the bypass route.

The estimated cost of the five-mile, four-lane Dumas bypass connecting on both ends to U.S. 287 along the west side of town is $34 million.

Lubbock District

The TxDOT Lubbock District is located south of the Amarillo District and contains the counties of Bailey, Castro, Cochran, Crosby, Dawson, Floyd, Gaines, Garza, Hale, Hockley, Lamb, Lubbock, Lynn, Parmer, Swisher, Terry, and Yoakum. Major roadways that traverse the District consist of Interstate 27, U.S. 62, U.S. 82, and U.S. 84. Many of the major roadways in the District, except for segments of U.S. 62 carry large volumes of truck traffic, generally over 15 percent of the total traffic volume.

The Lubbock District is served by the BNSF, the West Texas & Lubbock Railroad (WTLC), and two switching companies: the Plainview Terminal Company and the South Plains Lamesa Railroad.

A list of planned future network improvements has been provided by TxDOT for use in identifying areas of planned reconstruction or widening of major roadways. Such improvements located in the Lubbock District include two segments of U.S. 62 and portions of U.S. 87 and SH 349 for the Ports to Plains Corridor. The planned improvements by TxDOT are not included as proposed improvements in this study unless additional widening of the roadway was deemed necessary for analysis. The complete list of planned future improvements by TxDOT in the Lubbock District are shown in Table 3-15 and Figure 3-34 of this report.

Potential improvements within the Lubbock District consist of three potential grade separations, seven potential crossing closures, and two roadway capacity enhancements as listed in Table 8-2 with their associated costs and estimated public benefits.

Lubbock District						
Grade Separations	County	Estimated Cost	Estimated 10-year Public Benefit	Ratio: Benefit/ Cost	Estimated 20-year Public Benefit	Ratio: Benefit/ Cost
U.S. 70	Bailey	$ 10,400,000	$ 580,000	0.06	$ 1,580,000	0.15
University Ave	Lubbock	$ 15,550,000	$ 946,000	0.06	$ 2,589,000	0.17
U.S. 70	Parmer	$ 6,230,000	$ 1,427,000	0.23	$ 3,980,000	0.64
Crossing Closures	County	Estimated Cost	Estimated 10-year Public Benefit	Ratio: Benefit/ Cost	Estimated 20-year Public Benefit	Ratio: Benefit/ Cost
W 5th St	Bailey	$ 50,000	$ 71,000	1.42	$ 190,000	3.80
E 3rd St	Hale	$ 50,000	$ 7,000	0.14	$ 16,000	0.32
E 4th St	Hale	$ 50,000	$ 58,000	1.16	$ 141,000	2.82
E 6th St	Hale	$ 50,000	$ 112,000	2.24	$ 303,000	6.06
E 7th St	Hale	$ 50,000	$ 7,000	0.14	$ 15,000	0.30
Avenue P	Lubbock	$ 50,000	$ 186,000	3.72	$ 518,000	10.36
Ave M	Lubbock	$ 50,000	$ 115,000	2.30	$ 316,000	6.32
Roadway/Rail Capacity Enhancements	County	Estimated Cost	Estimated 10-year Public Benefit	Ratio: Benefit/ Cost	Estimated 20-year Public Benefit	Ratio: Benefit/ Cost
U.S. 84 Direct Connectors at Loop 289	Lubbock	$ 84,680,000	N/A	N/A	N/A	N/A
Interstate 27 (south Loop 289 to U.S. 62)	Lubbock	$ 21,260,000	N/A	N/A	N/A	N/A

Table 8-2: Lubbock District Potential Improvements

Grade Separations

Grade Separation of U.S. 70 on the BNSF Slaton Subdivision

U.S. 70 is currently a four-lane roadway that crosses the BNSF Slaton Subdivision in Bailey County within the city of Muleshoe. This roadway, with approximately 7,640 vehicles crossing the railroad tracks daily, has been identified as a potential candidate for grade separation. The potential four-lane roadway overpass would separate vehicular traffic from the Slaton Subdivision.

A preliminary layout of the overpass is included in the figures in Appendix E. The land use in the vicinity of U.S. 70 consists of residential properties north of the tracks and commercial properties south of the tracks.

Access to adjacent properties would not be available along the identified U.S. 70 overpass for a length of over ¼ mile and the corresponding U.S. 84 overpass for a length of less than ¼ mile. However, some of these adjacent properties would still have access via the local Muleshoe street network. Those properties that do not have access were included in the estimated cost of right-of-way acquisition. Additionally, Ash Avenue and Avenue B along U.S. 70, as well as Main Street and West 2nd Street along U.S. 84, would be converted to cul-de-sacs where connection to these roadways is not viable.

The grade separation of U.S. 70 is estimated to cost $10.4 million, with an estimated public benefit of $1.6 million, which is 15 percent of the estimated cost of the grade separation.

Grade Separation of University Avenue on the BNSF Slaton Subdivision

University Avenue is currently a four-lane roadway that crosses the BNSF Slaton Subdivision in Lubbock County within the city of Lubbock. This roadway, with approximately 13,260 vehicles crossing the railroad tracks daily, has been identified as a potential candidate for grade separation. The potential four-lane roadway underpass would separate vehicular traffic from the Slaton Subdivision.

A preliminary layout of the underpass is included in the figures in Appendix E. The land use in the vicinity of University Avenue consists mainly of commercial properties with some school properties on the west side of the identified underpass route.

Access to adjacent properties would not be available along the University Avenue and the corresponding U.S. 84 underpass for a length of less than ¼ mile along each structure. However, some of these adjacent properties would still have access via the local Lubbock street network. Those properties that do not have access were included in the estimated cost of right-of-way acquisition. Additionally, connections to local side streets would remain intact by lowering profiles where necessary to meet the underpasses.

The grade separation of University Avenue is estimated to cost $15.6 million, with an estimated public benefit of $2.6 million, which is 17 percent of the estimated cost of the grade separation.

Grade Separation of U.S. 70 on the BNSF Hereford Subdivision

U.S. 70 is currently a four-lane roadway that crosses the BNSF Hereford Subdivision in Parmer County within the city of Farwell. This roadway, with approximately 9,280 vehicles crossing the railroad tracks daily, has been identified as a potential candidate for grade separation. The potential four-lane roadway overpass would separate vehicular traffic from the Hereford Subdivision.

A preliminary layout of the overpass is included in the figures in Appendix E. The land use in the vicinity of U.S. 70 consists of a mix of residential and commercial properties.

Access to adjacent properties would not be available along the U.S. 70 overpass for a length of over ¼ mile and the corresponding U.S. 60 overpass for a length of less 700 feet. However, some of these adjacent properties would still have access via the local Farwell street network. Those properties that do not have access would need to be acquired. Also, Second Street and Turner Street along U.S. 70 would be converted to cul-de-sacs where connection to these roadways is not viable.

Moreover, First Street would connect to properties north of U.S. 70 and east of the tracks and Slate Street would no longer have a connection to U.S. 60.

The grade separation of U.S. 70 is estimated to cost $6.2 million, with an estimated public benefit of $4.0 million, which is 64 percent of the estimated cost of the grade separation.

Crossing Closures

Crossing Closure of 5th Street on the BNSF Slaton Subdivision

5th Street is currently a two-lane roadway that crosses the BNSF Slaton Subdivision north of U.S. 84 and west of SH 214 in Muleshoe. Accommodating approximately 1,090 daily vehicles, 5th Street provides access to and from residential and commercial areas on the either side of the railroad. The location of the potential crossing closure as well as alternative traffic routing and an associated distance are included in the figures in Appendix E.

Closing the crossing would increase the travel distance to access the residences and businesses from 5th Street by less than one mile. The vehicular traffic along 5th Street could be rerouted to cross the railroad over the proposed U.S. 70 overpass.

The crossing closure is estimated to cost $50,000. The estimated public benefit calculated for the closure of 5th Street is $190,000, which is nearly four times the estimated cost to implement the crossing closure.

Crossing Closure of 3rd, 4th, 6th, and 7th Streets on the BNSF Plainview Subdivision

3rd, 4th, 6th, and 7th Streets are currently two-lane roadways that cross the BNSF Plainview Subdivision near U.S. 70 and east of FM 400 in Plainview. Accommodating between 60 and 1,720 daily vehicles each, these streets provides access to and from residential and industrial areas on the either side of the railroad. The location of the potential crossing closures as well as alternative traffic routing and associated distances are included in the figures in Appendix E.

Closing the crossings would increase the travel distance to access these residences and businesses from 3rd, 4th, 6th, and 7th Streets between ½ mile and 1 mile. The vehicular traffic along these streets could be rerouted to cross the railroad over the existing U.S. 70 overpass.

The crossing closures are each estimated to cost $50,000. The estimated public benefit calculated for the closure of 3rd Street is $16,000, which is 32 percent of the estimated cost to implement the crossing closure. The estimated public benefit calculated for the closure of 4th Street is $141,000, which is nearly three times the estimated cost to implement the crossing closure. The estimated public benefit calculated for the closure of 6th Street is $303,000, which is six times the estimated cost to implement the crossing closure. The estimated public benefit calculated for the closure of 7th Street is $15,000, which is 30 percent of the estimated cost to implement the crossing closure.

Crossing Closure of Avenue P on the BNSF Slaton Subdivision

Avenue P is currently a two-lane roadway that crosses the BNSF Slaton Subdivision west of Spur 326 and north of U.S. 82 in Lubbock. Accommodating approximately 2,500 daily vehicles, Avenue P provides access to and from residential areas on the north side and commercial areas on the south side of the Slaton Subdivision. The location of the potential crossing closure as well as alternative traffic routing and an associated distance are included in the figures in Appendix E.

Closing the crossing would increase the travel distance to access these residences and businesses from Avenue P by over one mile. The vehicular traffic along Avenue P could be rerouted to cross the railroad over the existing Spur 326 overpass.

The crossing closure is estimated to cost $50,000. The estimated public benefit calculated for the closure of Avenue P is $518,000, which is 10 times the estimated cost to implement the crossing closure.

Crossing Closure of Avenue M on the BNSF Slaton Subdivision

Avenue M is currently a two-lane roadway that crosses the BNSF Slaton Subdivision west of Spur 326 and north of U.S. 82 in Lubbock. Accommodating approximately 1,420 daily vehicles, Avenue M provides access to and from residential areas on the north side and commercial areas on the south side of the Slaton Subdivision. The location of the potential crossing closure as well as alternative traffic routing and an associated distance are included in the figures in Appendix E.

Closing the crossing would increase the travel distance to access these residences and businesses from Avenue M by around 1-1/4 miles. The vehicular traffic along Avenue M could be rerouted to cross the railroad over the existing Spur 326 overpass.

The crossing closure is estimated to cost $50,000. The estimated public benefit calculated for the closure of Avenue M is $316,000, which is over six times the estimated cost to implement the crossing closure.

Roadway/Rail Capacity Enhancements

Direct Connectors at U.S. 84/Loop 289 Interchanges for U.S. 84 Bypass

U.S. 84 is a four-lane roadway between the northwest and southeast ends of Loop 289 within the city of Lubbock. In 2003 a volume of approximately 26,000 vehicles per day traveled along this section of U.S. 84. That volume is expected to increase to approximately 49,000 vehicles by 2025. Around 18 percent of the daily traffic along this section of U.S. 84 is composed of trucks.

The U.S. highway is not a limited-access facility and incurs slower travel times due to other vehicles entering and exiting the highway via side streets at lower speeds within Lubbock. As a result, U.S. 84 sustains a lower capacity threshold than a freeway section with a capacity assumed to be approximately 12,000 vehicles per lane per day. Thus, the V/C ratio is projected to be 1.02 for 2025, indicating that the roadway will be heavily congested.

Shifting truck traffic from U.S. 84 to the north and east sections of Loop 289 is projected to decrease the V/C ratio on U.S. 84 while keeping the V/C ratio on the north and east sections of Loop 289 within acceptable levels in 2025. The proposed direct connections, one at the northwest and two at the southeast interchange, would increase use of an underutilized portion of Loop 289 while providing a non-stop route around Lubbock and limiting the amount of truck traffic on U.S. 84 through the center of Lubbock.

The estimated cost of the widening of the proposed direct connectors connecting U.S. 84 to the north and east sections of Loop 289 is $84.7 million.

Widening of Interstate 27 from Loop 289 to U.S. 62 (from six to eight lanes)

Interstate 27 is currently a six-lane roadway between the south end of Loop 289 and U.S. 62 within the city of Lubbock. In 2003, a volume of approximately 61,000 vehicles per day traveled along this section of Interstate 27. That volume is expected to increase to around 118,000 vehicles by 2025. Approximately 21 percent of the northbound daily traffic along this section of Interstate 27 is composed of trucks.

The interstate is a limited-access facility, which allows vehicles access to the facility in particular locations and incurs faster travel times than U.S. and state highways. As a result, Interstate 27 sustains a higher capacity threshold than a U.S. or state highway section with a capacity of approximately 20,000 vehicles per lane per day. Thus, the V/C ratio is projected to be approximately 0.98 for 2025, indicating heavy congestion.

Widening Interstate 27 between the south end of Loop 289 and U.S. 62 from six to eight lanes is projected to decrease the V/C ratio to around 0.74, allowing for only moderate congestion in year 2025. Adding the proposed lanes would increase the capacity and allow vehicles to travel at higher speeds throughout the day.

The estimated cost of the widening of Interstate 27 from six to eight lanes between the south end of Loop 289 and U.S. 62 is $21.3 million.

Odessa District

The TxDOT Odessa District is located between the El Paso, Lubbock, and San Angelo Districts and contains the counties of Andrews, Crane, Ector, Loving, Martin, Midland, Pecos, Reeves, Terrell, Upton, Ward, and Winkler. Major roadways that traverse the District include Interstate 10, Interstate 20, and U.S. 385. Many of the major roadways in the District carry large volumes of truck traffic, generally over 15 percent of the total traffic volume.

The Odessa District is served by the UP, Texas Pacifico Transportation, Ltd (TXPF), the Pecos Valley Southern Railway, and the Texas-New Mexico Railroad (TNMR).

A list of planned future network improvements has been provided by TxDOT for use in identifying areas of planned reconstruction or widening of major roadways. Some of these areas in the Odessa District are segments of farm-to-market roads and SH 158 for the Ports to Plains Corridor. The planned improvements by TxDOT are not included as proposed improvements in this study unless additional widening of the roadway was deemed necessary. The complete list of planned future improvements by TxDOT in the Odessa District can be viewed in Table 3-23 and Figure 3-54 of this report.

Potential improvements within the Odessa District consist of one grade separation and one roadway capacity enhancement as listed in Table 8-3 with their associated costs and benefit/cost ratios.

Odessa District						
Grade Separations	County	Estimated Cost	Estimated 10-year Public Benefit	Ratio: Benefit/ Cost	Estimated 20-year Public Benefit	Ratio: Benefit/ Cost
Midkiff Rd	Midland	$ 4,760,000	$ 2,341,000	0.49	$ 6,844,000	1.44
Roadway/Rail Capacity Enhancements	County	Estimated Cost	Estimated 10-year Public Benefit	Ratio: Benefit/ Cost	Estimated 20-year Public Benefit	Ratio: Benefit/ Cost
U.S. 385 (Interstate 20 to Andrews)	Ector/Andrews	$ 108,690,000	N/A	N/A	N/A	N/A

Table 8-3: Odessa District Potential Improvements

Grade Separations

Grade Separation of Midkiff Road on the UP Toyah Subdivision

Midkiff Road is currently a four-lane roadway that crosses the UP Toyah Subdivision in Midland County within the city of Midland. This roadway, with approximately 26,520 vehicles crossing the railroad tracks daily, has been identified as a potential candidate for grade separation. The potential four-lane roadway overpass would separate vehicular traffic from the Toyah Subdivision.

A preliminary layout of the overpass is included in the figures in Appendix E. The land use in the vicinity of Midkiff Road consists of large commercial tracts.

Access to adjacent properties would not be available along the Midkiff Road overpass for a length of over ¼ mile. However, some of these adjacent properties would still have access via other entrances along the local Midland street network.

Those properties that do not have access were included in the estimated cost of right-of-way acquisition. Also, Bankhead Highway and Industrial Avenue would not have access to Midkiff Road, although they would not be closed due to the overpass.

The grade separation of Midkiff Road is estimated to cost $4.8 million, with an estimated public benefit of $6.8 million, which is nearly one-and-a-half times the estimated cost of the grade separation.

Roadway/Rail Capacity Enhancements

Widening of U.S. 385 from SH 115/SH 176 and Interstate 20 (from four to six lanes)

U.S. 385 is a four-lane roadway between SH 115/SH 176 and Interstate 20 north of Odessa. In 2003, a volume of approximately 12,500 vehicles per day traveled along this section of U.S. 84. That volume is expected to increase to around 31,000 vehicles by 2025. Approximately 19 percent of the daily traffic along this section of U.S. 385 is composed of trucks.

The U.S. highway is not a limited-access facility and incurs slower travel times due to other vehicles entering and exiting the highway via side streets at lower speeds within Odessa. As a result, U.S. 385 sustains a lower capacity threshold than a freeway section with a capacity of approximately 10,000 vehicles per lane per day. Thus, the V/C ratio is around 0.78 for 2025, indicating heavy congestion.

Widening U.S. 385 between SH 115/SH 176 and Interstate 20 from four to six lanes is projected to decrease the V/C ratio to around 0.52, indicating moderate congestion in 2025. Adding the proposed lanes would increase the capacity of the roadway and allow vehicles to travel at higher speeds along U.S. 385 during the day.

The estimated cost of the widening of U.S. 385 from four to six lanes between SH 115/SH 176 and Interstate 20 is $108.7 million.

SECTION 9: ECONOMIC DEVELOPMENT

Studies and plans created by Chambers of Commerce, MPO's, economic development corporations, and other planning agencies in the West Texas region were reviewed in order to identify development opportunities having potential for major economic impact on the region. The studies and plans reviewed are organized by metropolitan area and are summarized as follows:

Amarillo

The Amarillo Economic Development Corporation (EDC), which is governed by board members appointed by the Amarillo City Commission, was formed to attract new business and industry as well as assist existing industries with growth in the Amarillo area. The Amarillo EDC has identified the target industries of aviation/ aerospace, business and financial services, manufacturing, transportation and logistics, food technologies, and wind power as areas of focus for recruitment and retention efforts.

Large transportation projects that may potentially be implemented in the Amarillo area include Loop 335 and IH-27. TxDOT contracted a study to assess the feasibility of relocating a portion of the southwest quadrant of Loop 335. TxDOT conducted a feasibility study to expand IH-27 from 4 to 6 lanes between Amarillo and Canyon. The MPO is particularly interested in a bypass around or through the central business district connecting IH-27 to US 87/287 on the Ports-to-Plains Corridor route. The MTP also reports that the general public consensus demonstrates that existing transportation facilities are providing for citizens' needs.

The Amarillo EDC reports that the civilian labor force within the Amarillo metropolitan area amounts to 126,509 people. Additionally, the Household Survey states that Amarillo's job market has increased by 400 jobs from last year, with a 7 percent gain in the manufacturing industry. However, building permits and construction in progress as well as unit prices for natural gas, wheat, cattle, corn, and cotton are all on the decline.

According to the Amarillo MPO 2005 to 2030 Metropolitan Transportation Plan (MTP), the population of the City of Amarillo has increased 14 percent from 1990 to 2003 (179,287), while Potter County population has increased by 20 percent and Randall County has increased by 22 percent over the same time period. Population growth is projected to remain at approximately 1 percent annual growth over the next five years. Growth has continued to move to the northwest and southwest portions of the city, while other areas have experienced population decreases. Economic growth is expected in the service, government, and trade industry sectors.

The cost of living in Amarillo is significantly lower than the national average, as shown in Table 9-1, and the average income and wages are on the rise. Average weekly wages have increased by 16 percent from October 2007 ($634.28) to October 2008 ($736.42).

	All Items Index	Grocery	Housing	Utilities	Trans	Health Care	Misc.
Amarillo	**86.2**	**88.5**	**80.6**	**96.0**	**95.0**	**92.5**	**84.3**
Dallas	94.6	99.2	76.7	117.7	108.0	105.1	96.3
Albuquerque	100.7	106.4	105.8	95.2	104.3	98.9	95.2
Phoenix	100.4	98.4	101.8	91.0	103..8	101.8	101.5
Reno	112.1	109.7	126.9	90.1	102.2	111.6	109.6
Denver	100.6	104.5	101.8	91.6	99.0	109.1	100.2
San Diego	150.3	113.6	232.7	93.8	110.7	118.6	125.6

COMPARATIVE COST OF LIVING BY CATEGORY

SOURCE: ACCRA COST OF LIVING, 4TH QUARTER 2005

Table 9-1: Amarillo Cost of Living

Midland-Odessa

The Odessa Chamber of Commerce reports that in terms of output, 48 percent of all local production is directly related to oil and gas activity, while 18 percent of the employment base is energy dependent. Recent large developments in the region include a 550 mw gas-fired power plant that began construction in Spring 2006. Additionally, Coca-Cola Enterprises purchased a lot in the Parkway Industrial Park to construct a new $3 million regional distribution center. Penwell, located in Ector County, has been named one of four finalists for the FutureGen Project, which is a public-private partnership to design, build, and operate the world's first coal-fired, zero-emissions power plant.

The Odessa Chamber of Commerce states that the Midland-Odessa region provides opportunities for economic development since it is strategically located to become a major distribution center for goods going in and out of Mexico with direct links to IH-20 and U.S. Highway 385 and an average civilian labor force of approximately 124,500. According to the Midland-Odessa MPO (MOTOR) 2005-2030 MTP, Midland County is expected to have a population growth of 17 percent from 2005 (120,027) to 2030 (140,659) and Ector County is expected to have a population growth of nearly 22 percent from 2005 (126,723) to 2030 (154,160).

The Midland Chamber of Commerce lists economic development goals such as developing an "Energy Cluster", consisting of a Center of Energy Innovation and Commercialization on a site within the ClayDesta Plaza, as well as developing a vertical business park in the central business district. The Midland Chamber of Commerce Economic Development Division's Strategic Plan, as developed by the Midland Development Corporation, states that properties with access to Midland International Airport, the IH-20/FM 1788 interchange, and the UP rail line present tremendous promise for the long-term development of an inland port. The Strategic Plan reports that a major focus of economic development in the region is to attract private sector interest in developing a port facility including logistics, distribution, and warehousing facilities in the La Entrada al Pacifico (LEAP) zone. Based on survey results from 2006 received from the director of economic development at the Chamber of Commerce, a container facility is needed in the region and is currently being studied.

Lubbock

The Lubbock Economic Development Alliance, created by the Lubbock City Council to promote economic development for the area, has identified the industries of biosciences, business services, clean/ renewable energy, advanced security, and light manufacturing as their focus for future development of the region. The top existing industries in the area consist of mining, construction, manufacturing, trade, transportation, and utilities.

The Lubbock MPO (LMPO) reports that the Lubbock area population is projected to increase 24 percent from 2000 to 2030, which is equivalent to a total of approximately 43,000 people and an annual growth rate of 0.7 percent. Major transportation corridors currently planned or under construction as listed in the 2032 MTP include the following:

- Marsha Sharp Freeway (US 62/ 82 - upgrades existing highways to freeway status and will provide a freeway facility from Wolfforth to East Loop 289, phased construction currently underway.
- Ports-to-Plains Corridor - listed in TEA-21 as a Congressional High Priority, an application has been made to fund the study of extending IH-27 from Lubbock to Mexico. Ultimately, the Ports-to-Plains corridor would run from Denver, CO to Mexico via IH-27.
- La Entrada Al Pacifico – proposed highway and rail corridor from Lamesa, Texas to Mexico's pacific coast to potentially divert traffic from the El Paso border crossing to the Presidio border crossing and possibly relieve congestion at the Ports of Los Angeles and Long Beach.
- Outer Loop – feasibility study underway to assess need, scope of project, potential alignments, and fatal flaw analysis for a bypass around Lubbock.
- Northwest Passage – new capacity and interchange improvements in the northwest portion of the Lubbock Metropolitan Area.

A major development in the region is the Reese International Transload Terminal (Reese Technology Center). The benefits that will be received to the region and users are very broad – greatly reduced costs, improved logistics, reduced highway congestion and pollution, jobs, regional capital investment and the utilization of idle capital facilities. Currently the region has one small container yard with a capacity to handle 10,000 – 11,000 containers of cotton per year. The Lubbock region ships between 12,000 and 15,000 loaded cotton containers to Dallas on 18-wheel trucks; these containers are then loaded unto unit trains and shipped to the West Coast, frequently passing through Lubbock again. A Transload facility would allow these containers to be placed on unit trains and shipped directly to the West Coast. Additionally, the Reese Technology Center as well as the Lubbock International

Airport have been designated as a Foreign Trade Zone (FTZ 260) allowing merchandise to be admitted without paying customs duties or excise taxes.

Trucking goals for the region include locating compatible land use along major streets to encourage trucks to confine their travel to arterials, expressways, and freeways, discouraging truck travel through residential neighborhoods, and providing adequate off-street loading spaces for businesses which receive or distribute goods by truck.

Although more than $1 billion of improvements have been identified for the West Texas region in the respective metropolitan areas' transportation plans, such improvements are primarily geared toward meeting current and future capacity demands and may not necessarily encourage economic development in the region.

There are currently several active transportation projects that will have an impact on the overall freight movements and may potentially increase economic development throughout the West Texas area, some of which were listed in the review of regional plans previously discussed in this section. The following provides a brief description of these projects:

Reese Technology Center:

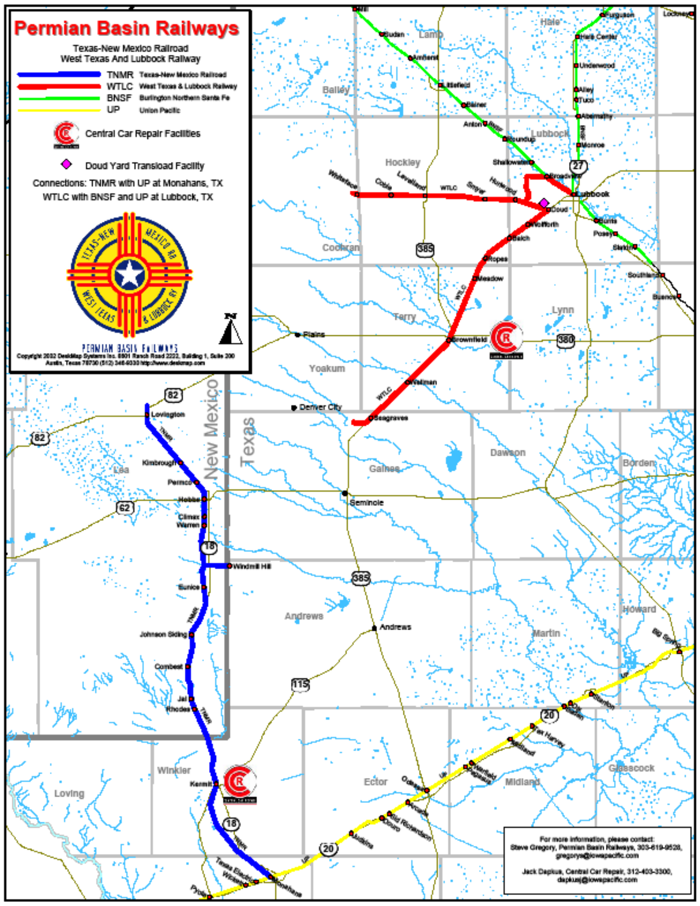
The Reese Technology Center, located west of Lubbock, Texas at the deactivated United States Air Force Reese Airbase, is currently a 2,500 acre site that has attracted multiple businesses to the area and supplies approximately 720 employment positions with an estimated annual economic impact of $27 million. The Lubbock Economic Development Alliance (LEDA) is reportedly looking at the possibility of establishing a transload terminal at the Reese Center. According to Eric Williams, the Reese Technology Center's executive director, the transload facility would be designed to handle as many as 45,000 rail containers for the cotton industry in addition to other local and regional manufacturers with potential revenue of as much as $60 million.[1]

The Reese Facility is serviced by the West Texas & Lubbock Railroad which has access to the BNSF line at Lubbock. Because a transload facility would have the ability to receive and ship unit trains, the Class I railroads could incorporate the trains into their schedules without considerations for multiple stops and set-out moves. The BNSF could stop service at the current smaller Lubbock based container yard in the event of the construction of a transload facility at the Reese Facility. The potential benefits of a transload facility at the Reese Center could be increased with the implementation of the Seminole/ Gains County Rail Service Extension project, which would extend the rail network from the Reese Center south through Seminole, Texas with a new connection west to Hobbs, New Mexico then south on the Texas New Mexico Railroad and connect to the Union Pacific mainline to the west coast at Monahans, Texas.

[1] http://reesetechnologycenter.com, Lubbock Online, story by Chris Van Wagenen, September 2007

Seminole/Gains County Rail Service Extension Project:

The Seminole Economic Development Corporation (SEDC), together with the Permian Basin Railways (owner of the Lubbock and Western Railway as well as the Texas and New Mexico Railroad) are working toward bringing rail service to the Seminole/Western Gaines County area. The proposed rail line would connect the Texas and New Mexico Railroad, at Hobbs, New Mexico, with the Lubbock and Western Railway at Seagraves, Texas via Seminole, Texas. This proposed line not only connects these two shortline railroads, but also provides a connection between the BNSF in Lubbock, Texas to the UP in Monahans, Texas, thus providing an opportunity for increased movement of products within the United States and on to foreign markets.



This section of West Texas is a leading producer of cotton and peanuts. Without the availability of rail service, the products are currently trucked to either Brownsville, Texas or Fort Worth, Texas before being loaded on a train. With the costs of trucking increasing at a rate of 15 percent per year, the producers are seeking more economical shipping methods. International markets, especially with China, are purchasing the local long fiber cotton to blend with their short fiber cotton to make a more durable weave for cloth. With the bio-fuel market growth throughout West Texas, plants are converting cotton seeds into diesel fuel.

La Entrada al Pacifico Trade Route:

As referenced in the Midland-Odessa and Lubbock regional plans, the La Entrada al Pacifico ("Gateway to the Pacific") Trade Route is a proposed highway and railroad corridor extending from Lamesa, Texas south to Mexico's Pacific coast. Long term plans, after the completion of a highway, and the improvement of rail facilities, would offer Texas access to a Pacific deep water port that is approximately 500 miles closer than the Port of Los Angeles.

One of the biggest challenges of this proposed route will be the construction of a 121-mile highway between the Mexican cities of Choix and San Rafael. This section crosses the Sierra Madres through Copper Canyon where no highway exists today. Two construction projects are currently in progress within Texas that will ultimately be on this corridor. One project is along 13 miles of U.S. 67 from State Highway 17 to the Presidio County line. The other project is along U.S. 67 from east Alpine towards the Brewster and Pecos County line. Each of these projects includes adding passing lanes to the existing highway. The alignment for the supporting railroad is still being evaluated. The original South Orient Railroad, currently owned by TxDOT, follows the proposed corridor between Presidio and McCamey, Texas. The La Entrada al Pacifico Rural Rail Transportation District (LEAP), together with the Midland-Odessa Transportation Alliance (MOTRAN) are leading the effort to study the economic feasibility of a north-south rail line connecting the Midland-Odessa area to other rail systems. This connection would provide competitive service and increased rail shipping opportunities for the current businesses and future economic prospects.

Ports-to-Plains Trade Corridor

The Ports-to-Plains Trade Corridor has been described as a four-lane highway between the Texas-Mexico border and Denver, Colorado via the existing IH-27 corridor between Amarillo and Lubbock, Texas. This corridor has been defined in the *Transportation Equity Act for the 21st Century (TEA-21)* as one of the 43 "high priority corridors" on the national highway system. A feasibility study is currently in progress that is evaluating the traffic demands; NAFTA/International trade flow; and the national, state, and local benefits of the corridor. This corridor would provide a gateway to trade throughout the nation as well as with Mexico and Canada, and will improve the regional mobility and economic status of the West Texas area.

The northern section of this alignment will either follow U.S. 87 north of Amarillo to IH-25 then to Denver, or U.S. 287 north of Amarillo to IH-70 then to Denver. The southern section of the alignment currently consists of several alignments south of Laredo that will end in either Del Rio, and/or Laredo, Texas. Results of the feasibility study have not been completed at this time. However, the feasibility study has noted that a continuous four-lane highway was not feasible along the entire corridor limits. Additional potential highway improvements have been identified such as additional truck climbing lanes, intersection improvements, and relief routes at corridor towns/cities.

Region-Specific Markets

The natural resources of the West Texas region have served as a large basis for economic opportunity throughout its history, particularly in the areas of petroleum and agricultural production. As the region takes the lead nationally in the development of wind energy, future opportunity will continue to benefit from the unique combination of natural resources available in West Texas. The availability of land in this region also provides opportunity for the development of distribution and large-scale manufacturing centers located near major transportation corridors.

Petroleum

Transportation of petroleum from West Texas should be discounted as a rationale for new infrastructure due to the natural decline of oil production exhibited by the fields in this area. Figure 9-1 plots monthly oil production history for the state during the past quarter century, showing that current production is less than one half the volume produced in 1981.[2] West Texas oil production is characterized by increasing portions of water per volume (i.e., the water cut) of total fluid production. Texas production, of which the fields of West Texas are a significant component, continues to decline regardless of price and tends to moderate in decline only during price spikes such as those shown in Figure 9-1 for West Texas Intermediate. Consequently, the need to transport petroleum from the region will decline over time in proportion to the rate of decline from local fields.

January 1981 - May 2008

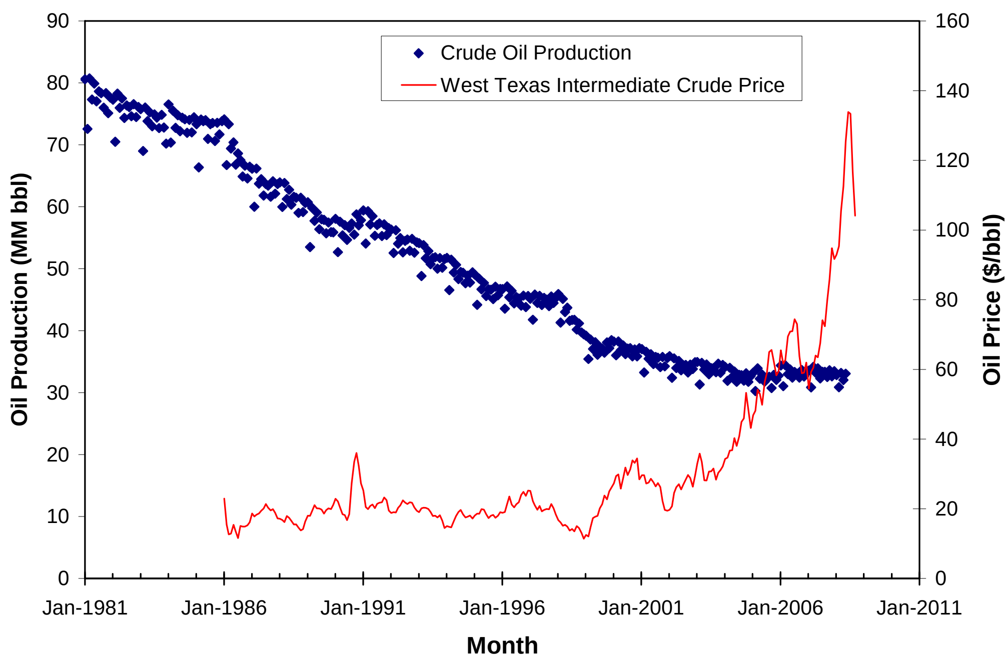


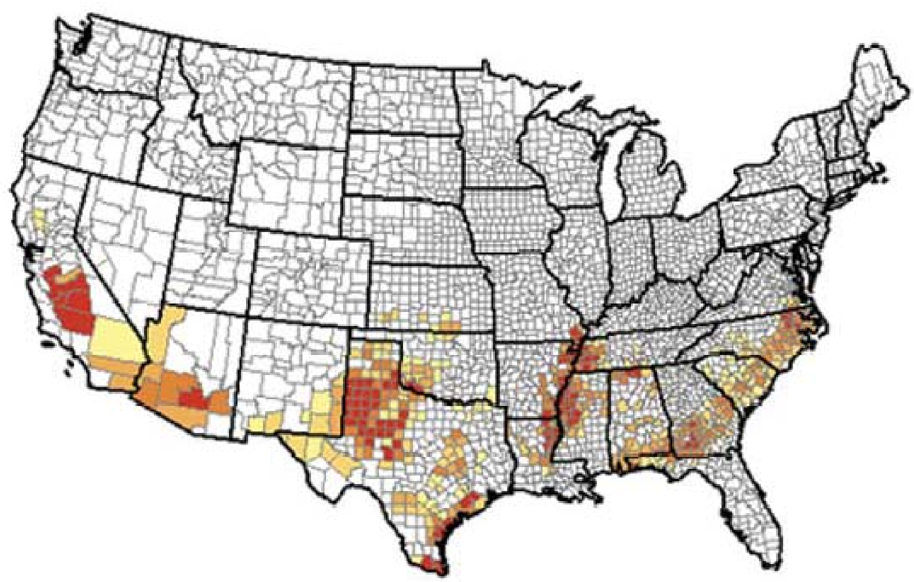
Figure 9-1: Texas Onshore Oil Production History

2 Oil production and price data is available from the Energy Information Administration, U.S. Department of Energy.

Cotton

Statistics for cotton production from 2001 to 2005 show average annual production from Texas to be 5.96 million bales, which is 30 percent of an average 19.9 million bales of produced throughout the entire U.S. each year (see Figure 9-2).[3] The total economic value of cotton production in 2005 was estimated to be $5.75 billion. This value includes $2.07 billion in gross product value, $1.19 billion in sales from agricultural inputs (i.e., fertilizers, seed, chemicals, etc.), $0.73 billion in induced household spending, and $1.76 billion in value added income.

The majority of the state's cotton production occurs in the northwestern High Plains in West Texas. Annual cotton yields vary with the availability of rainfall and growing season quality, and eradication of the boll weevil now creates opportunities for late season productivity that did not previously exist.[4] Cotton production in Texas has trended upward in recent years, as shown by annual production volumes over the last 10 years listed in Table 9-2, with record-breaking yields occurring since 2004.[5]



Source: U.S. Department of Agriculture

Figure 9-2: U.S. Cotton Acres Planted in 2005

[3] Cotton Council International, U.S. Cotton Production by State.

[4] Robinson, J.R.C. and McCorkle, D.A., Trends and Prospects for Texas Cotton, Reprint from Cotton Outlook Special Feature, *Texas: Connecting the Old West to the New East*, May 2006.

[5] U.S. Department of Agriculture.

Year	Cotton Production (1000 bales)
1998	3,653
1999	5,095
2000	3,971
2001	4,296
2002	5,082
2003	4,374
2004	7,778
2005	8,484
2006	5,845
2007	8,296
2008	5,324

Table 9-2: Texas Cotton Production History

Transportation and Logistics

The Motor Carrier Act of 1935 provided for federal oversight of interstate trucking, giving the government the same regulatory power that it established over railroads with passage of the Interstate Commerce Act in 1887. Similar to the regulation of railroads, the federal government gained the authority to decide which companies could become motor carriers, and which services and rates these companies could offer. Deregulation of both trucking and railroads began in 1980 with passage of a new Motor Carrier Act and the Staggers Act, respectively, as a move by Congress to reinstitute competition and rate flexibility into these industries.

The Airport Improvement Act of 1995 eliminated state or local regulation of trucking rates, routes and services that remained after federal regulations were eliminated in 1980 (i.e., the Motor Carrier Act). Oversight of motor carriers by the Interstate Commerce Commission (ICC) also ended with the ICC Termination Act of 1995, whereby a new Department of Transportation was designated with authority over transportation issues, with a Surface Transportation Board having purview over rate and service disputes.

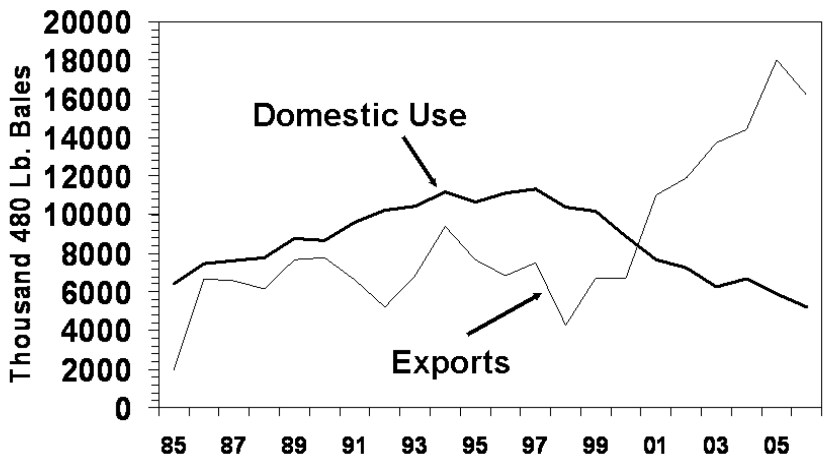
The impact of deregulation on the transportation of cotton in Texas was coincident with a drastic change in the share handled by truck versus rail. Rail had still transported 42 percent of cotton produced in Texas up to the mid 1980s, versus 58 percent transported by truck. By the mid 1990s, only 25 percent of all cotton was transported by rail versus 75 percent transported by truck. Thus, railroads lost 57 percent of the cotton transportation market in Texas following truck deregulation despite large delivery distances.[6]

Domestic Use versus Exports

Prior to the passage of the North American Free Trade Agreement (NAFTA) in 1993, a majority of cotton produced in the U.S. was used domestically. Figure 9-3 shows

[6] Robinson, J.R.C., Park, J.L, and Fuller, S., Cotton Transportation and Logistics: A Dynamic System, Department of Agricultural Economics, Texas A&M University, 2007.

how the source of increasing demand for U.S. cotton had shifted from primarily domestic textile mills to foreign manufactures by 2000. Table 9-3 lists the percent volumes of domestically produced cotton received for export to foreign manufactures (2002-2006), showing that warehouses in Los Angeles, Savannah, Houston-Galveston, and Laredo are the top export locations, respectively.[7] In 2005, 5.2 million bales of U.S. cotton out of a total 14.6 million exported bales were shipped to China, by far the largest single consumer of U.S. cotton and a primary reason for such large volumes warehoused at Los Angeles.



Source: Department of Agricultural Economics, Texas A&M University

Figure 9-3: Comparison of U.S. Cotton Exports to Domestic Use

Warehouse Location	Export %
East Coast	
Savannah, GA	14.08
Charleston, SC	4.07
Norfolk, VA	1.74
Other	0.67
West Coast	
Los Angeles, CA	42.18
San Francisco, CA	6.09
Seattle, WA	0.07
Other	0.01
Gulf Ports	
Houston-Galveston, TX	12.22
Laredo, TX	11.86
New Orleans, LA	3.96
Other	1.27
Great Lakes	
Detroit, MI	1.43
Ogdensburg, NY	0.34
Buffalo, NY	0.01
Other	0.00

Source: Cotton Council International

Table 9-3: U.S. Cotton Exports, 2002-2006.

[7] Cotton Council International, Warehousing of U.S. Cotton Exports by Port Average Percentage 2002-2006

The drastic shift in demand for U.S. cotton from domestic mills to foreign manufactures has diverted the movement of cotton transported in Texas. Prior to the mid 1990s, shipments of Texas cotton to mills in the southeastern U.S. had increased from 37 percent of total yield in 1987 to over 60 percent in 1994. This trend reversed by the mid 1990s to the point that, by 2005, most of Texas' cotton yield was destined for border crossings or ports shown in Table 3. This table indicates that most of the state's cotton is bound for foreign manufactures, the majority of which is shipped to the Pacific coast.

Table 9-4 shows that the majority of cotton shipped to the west coast is transported by rail in intermodal containers, most likely assembled into unit trains at locations such as Dallas or Fort Worth. This process of loading of containerized shipments of West Texas cotton in rail yards located in the Dallas-Fort Worth area for destination to the west coast adds to the total cost of transportation. Table also shows that all Texas cotton shipped to the Atlantic coast is transported by truck, that a majority of the cotton (67 percent) destined for the Ports of Houston and Galveston is transported by truck, and almost all of the cotton destined for Mexico is transported by truck.

Border Crossing or Port	Destination of Texas Cotton (%)	Export by Truck (%)	Export by Rail Boxcar (%)	Export by Container (%)
Mexican Border	13.3	87.9	0.5	11.6
Houston/Galveston	19.8	66.7	1.3	32.0
Other Gulf Ports	0.7	82	14	4
Atlantic Coast	1.1	100	0	0
Pacific Coast	43.8	22.1	2.3	75.6
Other	9.1	52.5	2.5	45.0

Source: Department of Agricultural Economics, Texas A&M University

Table 9-4: Destinations and Transportation Modes of Texas Cotton Exports.

Alternative Energy

The decline in oil production shown in Figure 9-1 is part of a larger energy resource challenge caused by the depletion of U.S. and international petroleum reserves. Records of worldwide oil production indicate that the month of greatest oil supply thus far was May 2005. The reality of these worldwide production declines is that the use of alternative energy in the U.S. will likely continue to evolve out of economic necessity. Industries built upon economic necessity realize long term stability and viability of corporate business models, and provide reasonable justification for infrastructure investments.

Wind Energy

Governmental policies toward infrastructure development are becoming aligned with growing expectations for market-based demand for new technologies that support sustainable energy systems. Wind energy is among the most prevalent of plans for new large-scale energy systems, and West Texas dominates as the most viable region of the state for the development of wind energy. Creation of the Renewable Portfolio Standard (Senate Bill 7, 1999), mandating a cumulative installation of 2,880 megawatts (MW) of electric generating capacity from renewable energy technologies by 2009, provided the incentive for the construction of wind energy farms that met this standard within six years. Today, the state generates approximately 26 percent of all wind energy in the U.S., as shown in Table 9-5, and operates under a new mandate (Senate Bill 20, 2005) that reset the RPS mandate for renewable energy generation to 5,880 MW by 2015.

Year	Texas (MW)	U.S. (MW)
1999	180	2,500
2000	181	2,566
2001	1,096	4,261
2002	1,096	4,685
2003	1,293	6,374
2004	1,293	6,740
2005	1,995	9,149
2006	2,739	11,575
2007	4,296	16,596

Table 9-5: Comparison of Texas-U.S. Wind Energy Capacity.

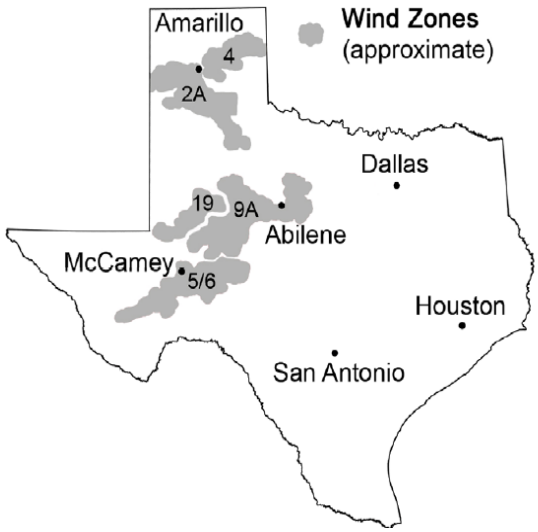
The rapid expansion of wind generating facilities in Texas has created a need for additional transmission infrastructure capable of delivering supplies of electricity to market. Section 39.904(g) of Texas Senate Bill 20 required the Public Utility Commission to designate competitive renewable energy zones and develop a plan to construct transmission infrastructure necessary to bring renewable energy to market. The Electric Reliability Council of Texas (ERCOT) submitted a report identifying areas having the highest wind potential in the state and the transmission facilities required to transport electricity generated in those areas.[8] In general, four discrete regions of wind generation development were identified as follows:

- Gulf Coast
- Southwest (McCamey area)
- Central-western Texas (Abilene-Odessa, San Angelo, west to Culberson Co.)
- Texas Panhandle

ERCOT identified renewable energy zones based on the most cost-effective solutions to transporting additional wind electric energy from high wind zones to customer load while maintaining system security. In 2008, the Public Utility Commission rulemaking process resulted in an Interim Order in Docket No. 33672, designating Zones 2A, 4, 5/6, 9A, and 19 in Figure 9-4 as areas of the state where

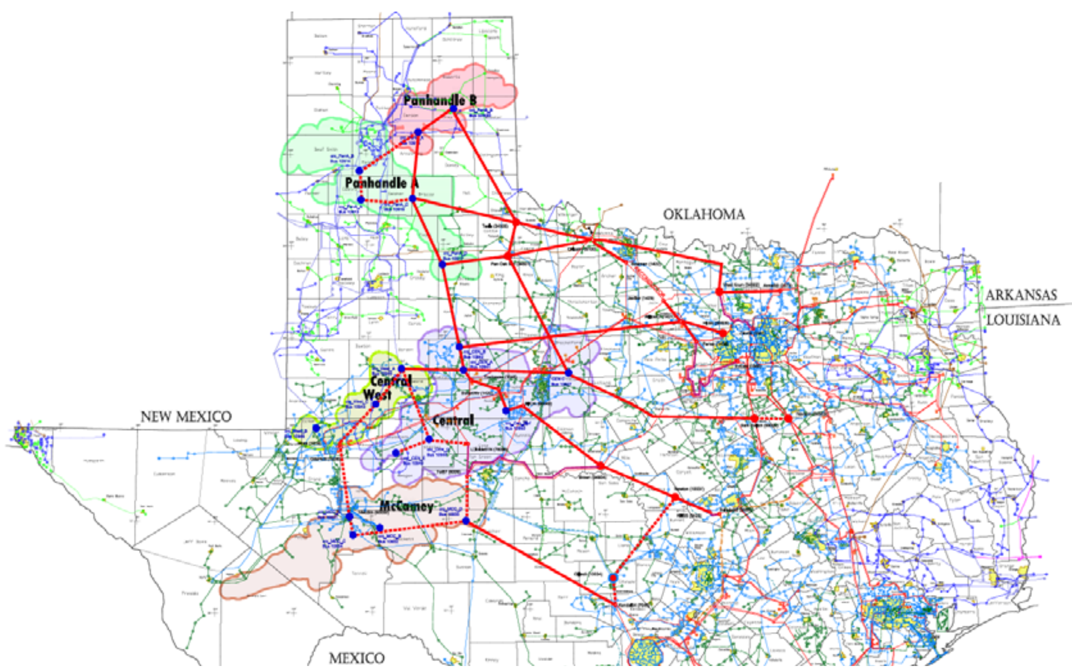
[8] *Analysis of Transmission Alternatives for Competitive Renewable Energy Zones in Texas*, Electric Reliability Council of Texas, December 2006.

transmission facilities will be built to encourage the development of wind energy. The transmission system configuration recommended by the Public Utility Commission to support the renewable energy zones (i.e., Zones 2A, 4, 5/6, 9A, and 19 in Figure 9-4) is shown in Figure 9-5.[9] Final recommendations on the most beneficial cost effective transmission improvements will follow in final order of Docket No. 33672.



Source: The Wind Coalition

Figure 9-4: Recommended Competitive Renewable Energy Zones



Source: Texas Public Utilities Commission

Figure 9-5: Transmission Optimization for Public Utilities Commission CREZ Study

[9] Presentation by Chairman Barry T. Smitherman of the Texas Public Utilities Commission before the Texas State Senate Committee on Business and Commerce, October 6, 2008.

The map of wind speeds in Figure 9-6 shows that West Texas makes up the southern end the most prolific wind corridor in the U.S. Given the state's lead in the development of wind energy, this region has the potential to be transformed into an economy supported by wind energy research, development, and infrastructure manufacturing, particularly when coupled with the newly created academic and research programs in wind engineering at Texas Tech University. Figure 9-7 shows the proximity of West Texas to other wind markets that have been created by legislation for renewable portfolio standards in other states similar to those created by Senate Bill 7 in Texas.

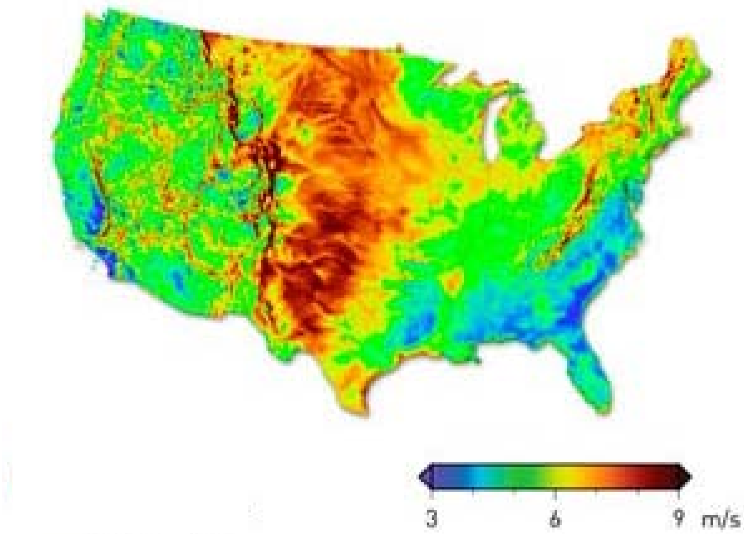
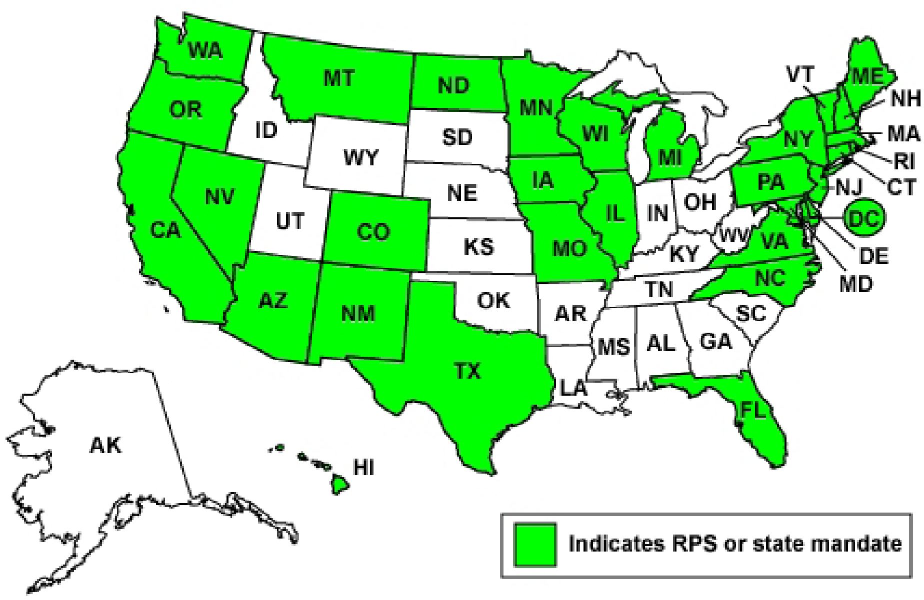


Figure 9-6: Wind Speeds within the Continental U.S.



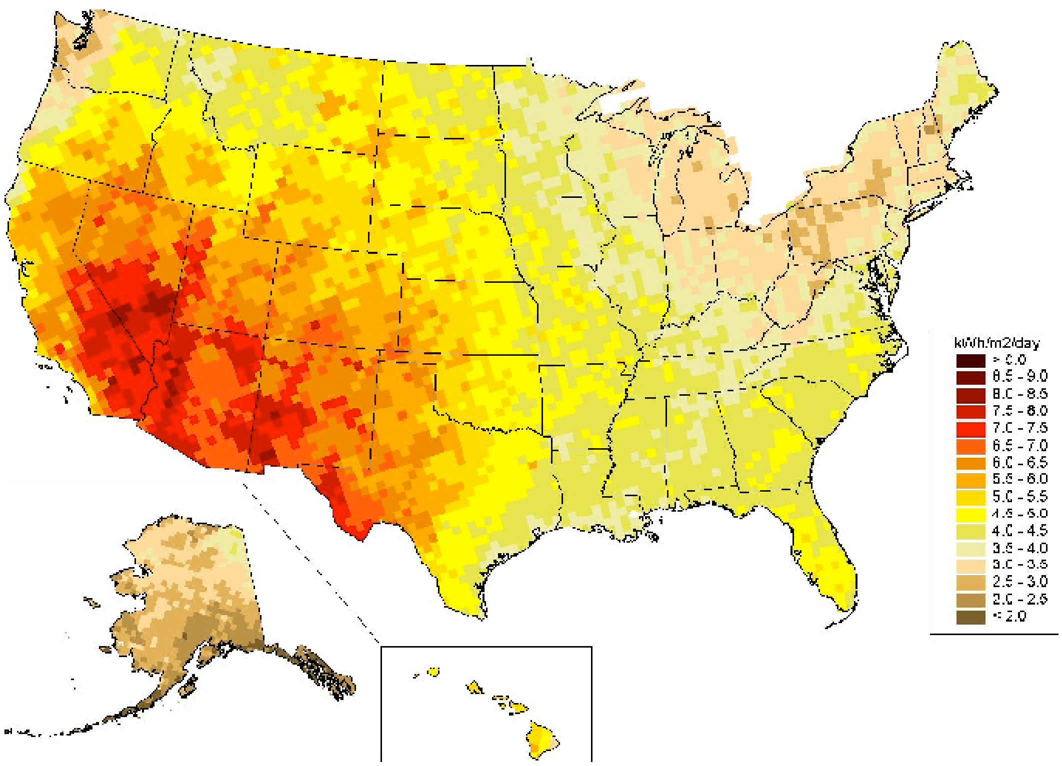
Source: Energy Information Administration, U.S. Department of Energy

Figure 9-7: States with Renewable Portfolio Standards through 2007

Solar Energy

Similar to the wind industry, West Texas has the potential for development as both a region for solar energy production and component manufacturing. Major markets for solar technology development include large panel manufacturing for solar farm arrays, applications for commercial rooftops, and cutting edge work on the integration of solar power generation into building materials. Opportunities for the region's academic institutions to contribute in to research and development in the areas of science, engineering, and architecture could further stimulate economic development related to solar power.

Figure 9-8 shows the potential for solar energy development throughout the U.S. based on annual sunlight intensity. West Texas holds a similar position as a resource base for the development of solar energy as it does for the development of wind energy even though the area is not quite as uniquely positioned within the main resource corridor.



Source: Ausra, Inc.

Figure 9-8: U.S. Solar Resources