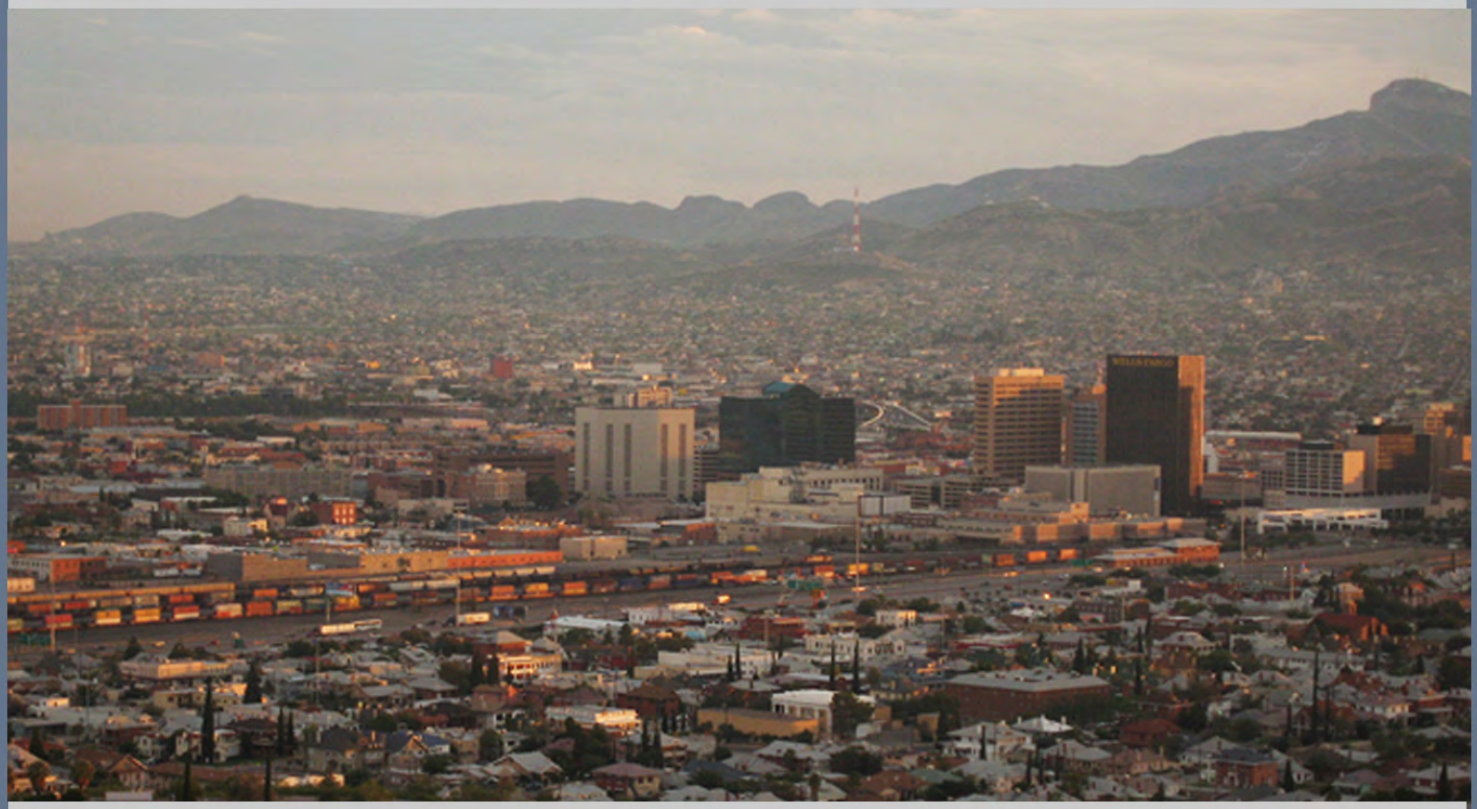
EL PASO REGION FREIGHT RAIL STUDY

Final Report

April 2011



Texas Department of Transportation

Prepared by

HNTB

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ACKNOWLEDGMENTS

The *El Paso Region Freight Study* could not be undertaken without the cooperative participation of public, private, and governmental representatives from region, the State of Texas, the Union Pacific Railroad, and the BNSF Railroad.

Participants who have contributed to this study are listed as follows:

Union Pacific Railroad

BNSF Railway

City of El Paso

El Paso Chamber of Commerce

Camino Real Regional Mobility Authority

El Paso Metropolitan Planning Organization

City of Sunland Park

El Paso District, Texas Department of Transportation

Rail Division, Texas Department of Transportation

Customs and Border Patrol

EXECUTIVE SUMMARY

The purpose of the El Paso Region Freight Study is to provide an analysis of freight rail mobility for the region, which is comprised of the six counties contained in TxDOT's El Paso District. The results of this study include a review of rail initiatives and improvements planned for the region, an inventory of the existing rail system, an analysis of freight rail movement trends into, out of, and through the region, an analysis of freight rail operations and constraints, and a review of safety issues and potential improvements at roadway-rail at-grade crossings.

Regional Background

Currently, the Union Pacific Railroad (UP) and the BNSF Railway (BNSF) interchange with the Mexican railroad, Ferrocarril Mexicano (FXE), or Ferromex, in El Paso, Texas and Ciudad Juárez, Chihuahua, Mexico. The UP rail lines through El Paso connect the West Coast to San Antonio and the Dallas-Fort Worth area. The East-West route is commonly referred to as UP's Sunset Route. The BNSF line runs from El Paso, where it interchanges with the Ferromex to Isleta, New Mexico near a connection to the BNSF's primary East-West line known as the Transcon Route. The UP and BNSF have rail yard and intermodal terminal facilities in El Paso.

El Paso serves as a crossover station for both international rail traffic and east-west traffic within the United States. Container ships loaded with manufactured goods that call on the Ports of Los Angeles and Long Beach have their cargo distributed to the U.S. interior by rail using the Sunset Route (Los Angeles to New Orleans) as a principal link to markets in the southeast, generating high volumes of intermodal rail traffic through El Paso.

Trains are permitted to only operate between 10:00 pm and 7:00 am on the Mexico side of the El Paso crossing due to safety and congestion concerns in Ciudad Juárez. The permitted operating hours for trains limits the capacity of the international crossing to approximately 10 trains per day. As a result, rail customers will have to divert traffic to other crossings once capacity is reached, which results in reduced competitiveness of the El Paso/ Ciudad Juárez region and raises costs to shippers and receivers in Mexico.

Local and regional initiatives are being taken to resolve the problems created by the effects that train operations have on livability in El Paso as well as foster the economic growth and vitality of the region by supporting rail operations.

The following studies and initiatives were reviewed:

- El Paso Regional Intermodal Rail Project, City of El Paso, 2002
- El Paso MPO Border Improvement Plan, El Paso Metropolitan Planning Organization (MPO), 2006
- El Paso Downtown 2015 Plan, City of El Paso, 2006

- Rail in the Pass: Past, Present and Future Impacts of Rail in the El Paso Region, El Paso MPO, 2008
- Statewide Intercity Passenger Rail Study, Texas Transportation Institute (TTI), 2010

Planned Improvements and Recent Projects

The previously completed studies for the El Paso region listed above identified several improvements for rail freight movement in the El Paso Region. The rail infrastructure improvements in the El Paso and Ciudad Juárez region that have been completed or are being moved forward in the planning or design phases are listed as follows, based on possible implementation timeframes.

- Completed: BNSF Chihuahuita Connection
- Short-Term: Roadway/ Rail Grade Separations in Ciudad Juárez, UP Yard Operations Relocation to Santa Teresa
- Mid-Range: BNSF El Paso Yard Relocation
- Long-Term: Santa Teresa Rail Bypass and International Border Crossing, New Intermodal Terminal in Ciudad Juárez

Rail System Inventory

More than 535 miles of mainline railroad tracks, 8 miles of rail bridge structures, six rail yards, and three rail border crossings make up the rail network within the El Paso region. Two of the rail border crossings are located in El Paso and the third is located in Presidio, although the Presidio crossing is currently out of service due to a fire that destroyed the U.S. side of the rail bridge in 2008. The two El Paso rail border crossings consist of steel bridges on each side of the Paso Del Norte International Bridge. The eastern crossing is owned and operated by UP and continues along the Valentine Subdivision on the U.S. side of the border. The western crossing, known as the Black Bridge, is owned and operated by BNSF and continues along the El Paso Subdivision on the U.S. side of the border.

The railroads serving the region consist of the UP, BNSF, and Texas Pacifico Transportation, which operates the South Orient Railroad owned by the Texas Department of Transportation. Each of the rail lines within the El Paso region are shown in Figures 1 and 2.

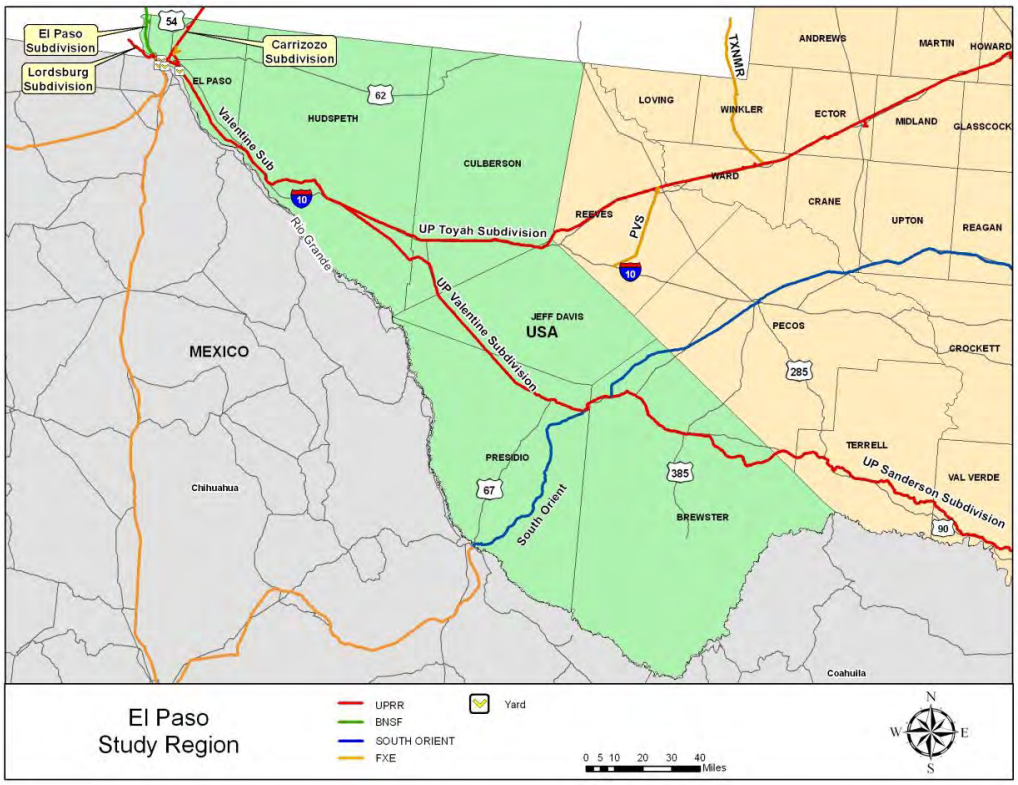


Figure 1: El Paso Region Railroad Subdivisions

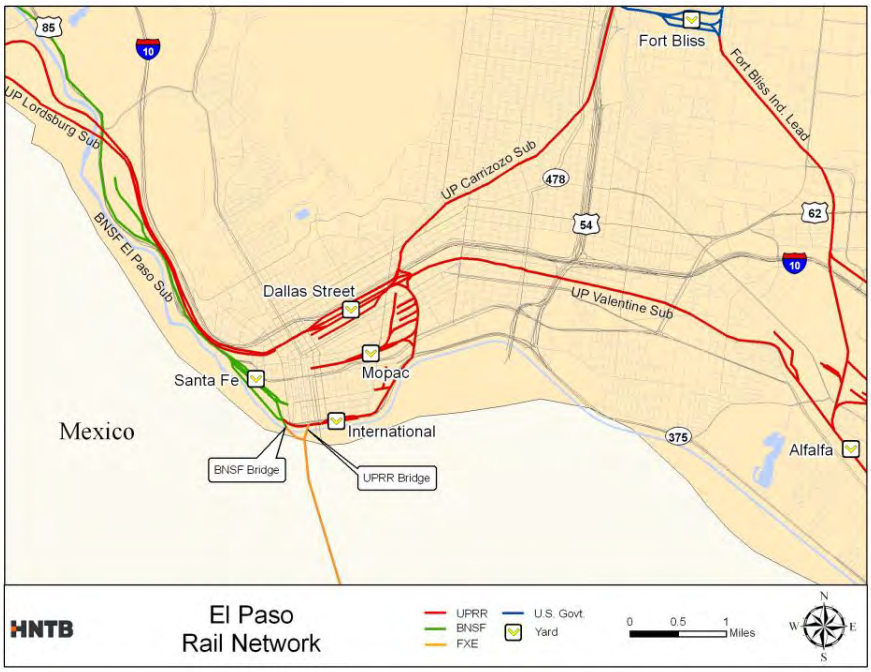


Figure 2: El Paso Terminal

Freight Rail Movement Trends

In general, railways are best suited to hauling large, heavy, low-value loads that are not overly time-sensitive over distances greater than 500 miles. As shown in Figure 3, more than 90 percent of rail freight for the El Paso region is transported to or from regions outside of Texas, primarily the Western United States. The El Paso region's rail freight movement is forecasted to increase by 13 percent in volume between 2008 and 2035.

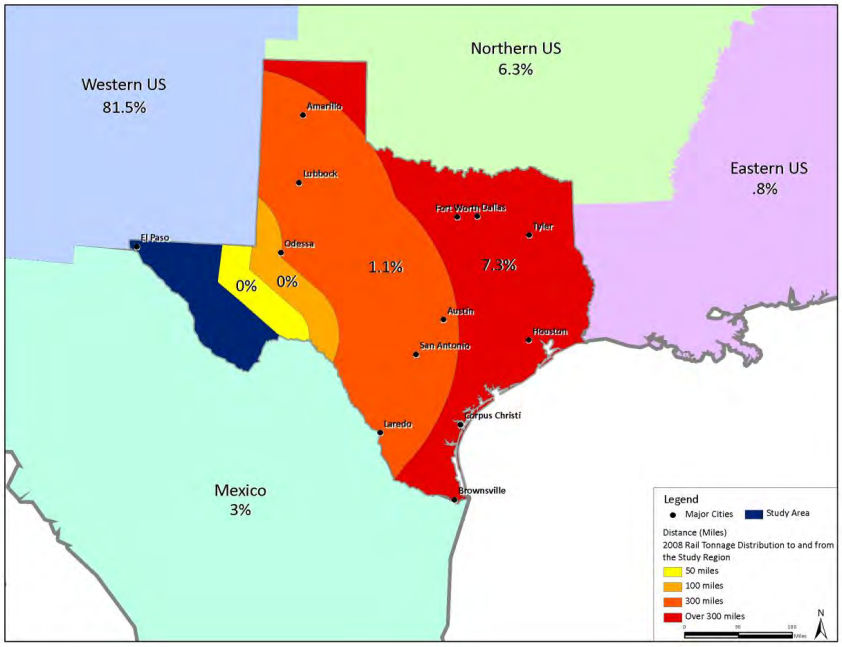


Figure 3: Rail Freight Distribution by Travel Distance

In both 2008 and projected to 2035, rail freight transported out of the El Paso region (exports) is the predominant movement type and is also expected to be the fastest growing movement type. The largest growth is expected in rail freight transported between the El Paso region and northern and eastern states, while the smallest growth is projected between the El Paso region and the Western United States. However, rail freight traffic between the El Paso region and the Western U.S. is expected to remain the predominant movement type.

Rail freight between Mexico and the U.S. crossing the Texas-Mexico border within the Study Region consists primarily of through international freight not originating or destined for the El Paso region.

The largest volume of rail tonnage is located on the UP Valentine Subdivision between El Paso and Sierra Blanca. The next highest volume rail segments are the UP Toyah Subdivision from Sierra Blanca toward Dallas-Fort Worth, and the UP Carrizozo Subdivision running north from El Paso.

Commodity Trends

The rail freight in the El Paso region is fairly evenly distributed among the commodities of building materials, food, miscellaneous mixed shipments, chemical/ petroleum products, machinery, wood, and raw materials, listed in descending order of volume. The internal rail freight movements within the El Paso region are composed primarily (more than 75 percent) of miscellaneous mixed load shipments. Rail imports for the El Paso region are more evenly distributed by commodity, while rail exports are composed primarily of building materials, food, and miscellaneous mixed shipments. The distribution of rail freight by commodity in the El Paso region is not projected to change significantly between 2008 and 2035.

Border Crossings within the Study Region

The freight moved through the two active border crossings located in El Paso comprises 11 percent of all U.S.-Mexico rail trade across the Texas border. Additional rail freight previously crossed the border at Presidio, although that crossing is currently out of service. Approximately 86 percent of U.S.-Mexico rail trade crosses the Texas border, while the remainder crosses at the Arizona and California borders.

Rail Operations

The El Paso District Base Case has 2,175 track miles of railroad and 438 trains per week as modeled using Rail Traffic Controller (RTC). The modeled network includes all principal rail lines and yards between San Antonio on the east and Anapra, New Mexico on the west, as well as the part of the UP Toyah Subdivision between Pecos and Sierra Blanca, the UP Eagle Pass Subdivision between Spofford and Piedras Negras, the BNSF El Paso Subdivision between Rincon, New Mexico and the international crossing to Ciudad Juárez at El Paso, and the UP Carrizozo Subdivision between Tower 47 in El Paso and the New Mexico state line.

Approximately 31% of all trains in the simulation use the UP Toyah Subdivision to or from Fort Worth, another 24% use the UP Carrizozo Subdivision to or from Tucumcari, and about 21% use the Sunset Route (UP Valentine, Sanderson, and Del Rio Subdivisions) to or from San Antonio. In addition, 13% of the measured trains operate to or from Eagle Pass, and the remaining 11% operate across the BNSF El Paso Subdivision to or from Belen, New Mexico.

The results of the Base Case model show that the practical capacity of all these subdivisions is adequate with the possible exception of the line to Eagle Pass. The Eagle Pass subdivision is un-signaled, has lower allowable train speeds, and includes the interchange to/from Mexico, which can be time consuming. On the other modeled subdivisions, main track capacity east and north of El Paso is adequate based on the modeling results. Additionally, the existing train delays associated with fuel and crew changes at Dallas or Piedras Streets in El Paso will be eliminated once the UP fueling facility is relocated to Santa Teresa, New Mexico as planned.

The Base Case results suggest that investment will likely be needed in the route to the Mexican border if rail traffic grows substantially in the next 10 to 20 years. The remainder of the El Paso Region network likely has capacity for growth. East-west traffic across the UP Sunset Route west of El Paso divides into the three available routes east of El Paso, the topography is relatively favorable to railroad operations, track speeds are consistently high, and sidings are well spaced. The BNSF El Paso Subdivision also appears to have capacity for growth based on the modeling results, although the small yard at El Paso and constrained capacity on the Mexican side limit the capacity of the international rail crossing at El Paso.

Safety Issues and Potential Improvements

Safety hazards involving freight rail operations include rail-roadway crossing accidents, trespasser casualties, train accidents and derailments, and hazardous material spills. Approximately 200 public at-grade roadway-rail crossings are located in the El Paso District. The six-county El Paso District experienced 27 roadway-rail at-grade crossing accidents, primarily located in El Paso County, from January 2005 through December 2009, including two fatalities and 12 injuries. A total of 24 trespasser incidents occurred in the El Paso District, of which 20 occurred in El Paso County, during the same time period.

There were 35 reported train accidents, which include derailments and train collisions, within the El Paso District from 2005 through 2009. Data provided by the railroads to the Federal Railroad Administration (FRA) shows the total cost of equipment and infrastructure damage was nearly $3 million within the study area over five years. The Federal Railroad Administration (FRA) reports that the majority (nearly 82 percent) of serious events involving train derailments or train collisions have been associated with track conditions and human factors.[1] Incidents caused by human factors may be the result of errors on the part of the railroad locomotive crew or other employees, including failure to properly secure equipment, exceeding train speed limitations, improper train make-up, failure to apply or secure brakes, and other similar incidents. Incidents in El Paso County caused by track condition include wide gauge of track (rail spaced too far apart), defective or missing rail ties, defects or damage at switches, and damaged rails. Since the FRA bases track class on specific track standards (e.g., number of good rail ties per defined length, consistency of track gauge, etc.) that relate to maximum allowable train speeds, records of maximum train speeds on each rail corridor can be used to infer track conditions without conducting an extensive and costly field inventory.[2] The UP and BNSF rail lines in the study area are all designated as class 3 or higher and the South Orient is designated as excepted track within the study region.[3]

[1] National Rail Safety Action Plan Progress Report 2005-2007, Federal Railroad Administration, U.S. Department of Transportation, May 2007.

[2] Maximum allowable train speeds for freight and passenger rail are prescribed according to track classification in the Code of Federal Regulations, Title 49, Transportation, Part 213 (49 CFR 213), Subpart A – Classes of Track: Operating Speed Limits.

[3] A railroad is allowed to operate sections of track designated as Excepted Track in certain cases where track quality (crossties, track gage, rail condition, etc.) does not meet Class I standards. For

One method of increasing safety is to eliminate or minimize the number of potential incident locations within a particular area. Safety is increased by eliminating roadway-rail crossings through the use of grade separations or crossing closures that would reroute traffic to grade separations. Another method of improving safety is to upgrade warning protection to devices such as flashing lights with gates.

Eighteen grade separations and 13 adjacent crossings that may be closed in conjunction with the grade separations were identified as potential improvements at roadway-rail grade crossings within the study region. The improvements identified were based on the daily volumes and speeds of vehicular and train traffic at the crossings, as well as roadway characteristics such as number of lanes, grade crossing warning device and accident history. The crossings identified for potential grade separation had a minimum daily traffic volume of 5,000 vehicles and were located on the higher volume rail lines. These roadways would likely have the highest benefit-to-cost ratios for implementing the potential grade separations at the grade crossings. Crossing closures that may be grouped with the grade separations include nearby crossings that could only be rerouted to either an existing or proposed grade separation and not any nearby at-grade crossings. Nearly all of the grade crossing improvements identified are located within El Paso County. Grade crossings analyzed outside of El Paso County had lower daily traffic volumes or were located along low train volumes lines such as the South Orient. These crossings would likely have public benefits significantly less than the costs of the improvements.

Additionally, three crossings within the study region are on the TxDOT program through 2010 for signal upgrades and have not yet been completed. The projects, when funded, will consist of upgrading the warning protection devices at each crossing to flashing lights with gates and typically take up to two years to complete.

example, Excepted Track must be identified in the timetable under special instructions and restrictions and cannot be located within 30 feet of an adjacent track that can be subjected to simultaneous use in excess of 10 mph. The track must not be on bridges or public roadways and must limit the number of cars placarded by Hazardous Material Regulations (49 CFR 172) to five cars per train. Train speeds on Excepted Track must not be in excess of 10 mph and passenger service is prohibited.

SECTION 1: PROJECT BACKGROUND

Regional Background

Currently, the Union Pacific Railroad (UP) and the BNSF Railway (BNSF) Interchange with the Mexican railroad, Ferrocarril Mexicano (FXE), or Ferromex, in El Paso, Texas and Ciudad Juárez, Chihuahua, Mexico. The rail lines in the El Paso region have been in place for more than 100 years. The UP lines connect the West Coast to San Antonio and the Dallas-Fort Worth area. The East-West route is commonly referred to as UP's Sunset Route. The BNSF El Paso Subdivision runs from Isleta, New Mexico to El Paso, where it interchanges with the Ferromex. At Belen, New Mexico, just south of the Subdivision terminus point of Isleta, the El Paso Subdivision connects to the BNSF's primary East-West line known as the Transcon Route. The UP and BNSF have rail yard and intermodal terminal facilities in El Paso. The Ferromex runs through the Mexican State of Chihuahua and through downtown Ciudad Juárez, terminating at the border crossing bridge spanning the Rio Grande.

Trains are permitted to only operate between 10:00 pm and 7:00 am on the Mexico side of the crossing due to safety and congestion concerns in Ciudad Juárez. The permitted operating hours for trains limits the capacity of the international crossing to approximately 10 trains per day. As a result, rail customers will have to divert traffic to other crossings once capacity is reached, which results in reduced competitiveness of the El Paso/ Ciudad Juárez region and raises costs to shippers and receivers in Mexico. The rail problem in Ciudad Juárez is so bad that rail companies are sending their truck containers through the Bridge of the Americas to get to the rail yards on the U.S. side. As a result, Ferromex desires to have this window increased to 24/7 operations in order to improve their competitiveness with the Eagle Pass and Laredo international rail crossings.

Review of El Paso Rail Studies and Initiatives

Once a terminal railroad network, El Paso has become a crossover station for both international rail traffic and east-west traffic within the U.S. This rail traffic has grown considerably since intermodal container imports from Asia began providing a significant share of consumer goods to U.S. markets. Container ships loaded with Asian manufactured goods that call on the Ports of Los Angeles and Long Beach will have their cargo distributed to the U.S. interior by rail using the Sunset Route (Los Angeles to New Orleans) as a principal link to markets in the southeast, generating high volumes of intermodal rail traffic through El Paso. Also, passage of the North American Free Trade Agreement (NAFTA) has generated significant growth in through train traffic at the El Paso international rail crossing where the El Paso Southern had performed switching operations over a century ago. With the overwhelming increase in through train operations, local and regional initiatives are being taken to resolve the problems created by the effects that train operations have

on livability in El Paso. The following sections review the initiatives that have been proposed in the past or are currently underway.

El Paso Regional Intermodal Rail Project

In 2003, the City of El Paso developed a Regional Intermodal Rail Concept Plan intended to address long-term problems related to rail operations in the city. The overall goal of the plan was to develop a truck and rail bypass around the north side of El Paso that would expedite freight movements and create opportunities for redeveloping downtown. Regional improvements included the following five general projects:

- International rail crossing and interchange at Santa Teresa, New Mexico
- Rail connection and intermodal facility at El Paso International Airport (EPIA)
- Relocation and redevelopment of existing downtown rail sites and construction of a new rail trench
- Rail outer loop
- Roadway outer loop (Northeast Parkway)

The El Paso City Council funded the first phase of an investigation into the feasibility of its conceptual plan, which was completed in 2003 as the El Paso Regional Intermodal Rail Project, Feasibility & Development Report. This report assessed the potential for stimulating jobs and trade-related economic activities, improving the efficiency of goods movement and mobility, enhancing the quality of life in El Paso and surrounding communities, and addressing environmental concerns related to growth in the movement of goods.

The extent of economic analysis in Phase I was limited to the preparation of initial project cost estimates without estimates of corresponding project benefits. However, the study noted that the analysis of railroad operations found existing conditions to be reasonable and efficient, with sufficient reserve capacity to meet the needs of UP and BNSF within their planning time horizons. As a result, the study recommended that each of the proposed projects be assessed in terms of benefit to the public sector, which was not to be performed until Phase II of the project. Upon accepting the Phase I report, the city council voted not to proceed with Phase II, so public sector economic feasibility of the El Paso Regional Intermodal Rail Project was never examined.

Even though economic analyses were not performed in this study, the report stated that the following projects would provide significant national, regional, and local benefits through the creation of engineering and construction jobs over 3-4 years and additional jobs related to potential land development:

- Santa Teresa Bypass and International Crossing – This project was reported as the only option supported by KCS, UP, and BNSF for addressing the long-term needs of international rail traffic.

- Dallas Yard (West) Redevelopment – UP was reported to be non-committed to relocating the Dallas Yard, estimated to cost $35 million, although the railroad had already removed a large amount of track and other structures.
- EPIA Intermodal Facility – The viability of the estimated $58 million El Paso International Airport (EPIA) intermodal facility is based on the idea that distribution centers need access to both rail and air freight transportation. Since an intermodal yard would be constructed near the airport rather than along railroad mainline, this project would require new track to be constructed from the UP Tucumcari Subdivision east to the airport. The recommendation for a new rail line extending from the UP Tucumcari Subdivision to an EPIA intermodal facility does not include a discussion on whether rail service would be provided by UP or provided a shortline railroad. In most cases, Class I railroads prefer to limit operations to mainline, long-haul activities, but the development of an intermodal yard at EPIA in the absence of an outer northeast rail loop would in fact isolate the yard from other railroad operations.

Projects examined but not recommended in the El Paso Regional Intermodal Rail Project include:

- Extension of the Bataan Trench 4.5 miles to the east – benefits of this costly project would primarily come from the elimination of grade crossings
- Railroad outer loop – the study determined that the railroads would not significantly benefit from a longer, northeast perimeter route that could add to fuel and crew costs.
- Relocation of BNSF El Paso Yard (known locally as Santa Fe Yard), UP Paisano Yard, UP International Yard, and UP Alfalfa Yard for the purpose of downtown redevelopment – BNSF El Paso Yard and UP International Yard were thought to be candidates for relocation in the event that the Santa Teresa border crossing is completed, while the UP Paisano and Alfalfa Yards were determined necessary for serving local industry.

El Paso MPO Border Improvement Plan

In 2006, the El Paso MPO solicited services to investigate ways to alleviate vehicular congestion, improve air quality at international bridges, encourage international mass transit, improve the movement of commercial truck and rail cargo, increase vehicle occupancy for international crossers, and improve connectivity between ports-of-entry inspection facilities and the region's transportation system. The scope of investigation in this study covers both the Santa Teresa, New Mexico port-of-entry area and Ciudad Juárez, Mexico. The rail component of this study involves evaluation of the feasibility of relocating UP and BNSF railroad lines located downtown and in residential areas as a means of avoiding the adverse impacts of traffic congestion at crossings, exposure to hazardous materials, and noise and vibration caused by the large numbers of trains moving through the area. A

particular motivation for this work was to create opportunities for redevelopment and passenger rail service on relocated railroad rights-of-way and at rail yards, with the expectation that the majority of local businesses served by the railroads would be relocated.

El Paso Downtown 2015 Plan

The September 2006 El Paso Downtown 2015 Plan was presented at the El Paso City Council meeting on October 31, 2006, which included a framework for land uses that included the division of downtown into redevelopment districts. These districts define the boundaries for desired land uses such as retail, mixed use, and convention events, as shown in Figure 1-1. Examination of Figure 1-1 indicates that portions of the existing UP Paisano Yard at the eastern end of the residential mixed use district would be incorporated into the city's redevelopment plans. However, the 2003 El Paso Regional Intermodal Rail Project, Feasibility & Development Report indicated that Paisano Yard is necessary for serving local industry.

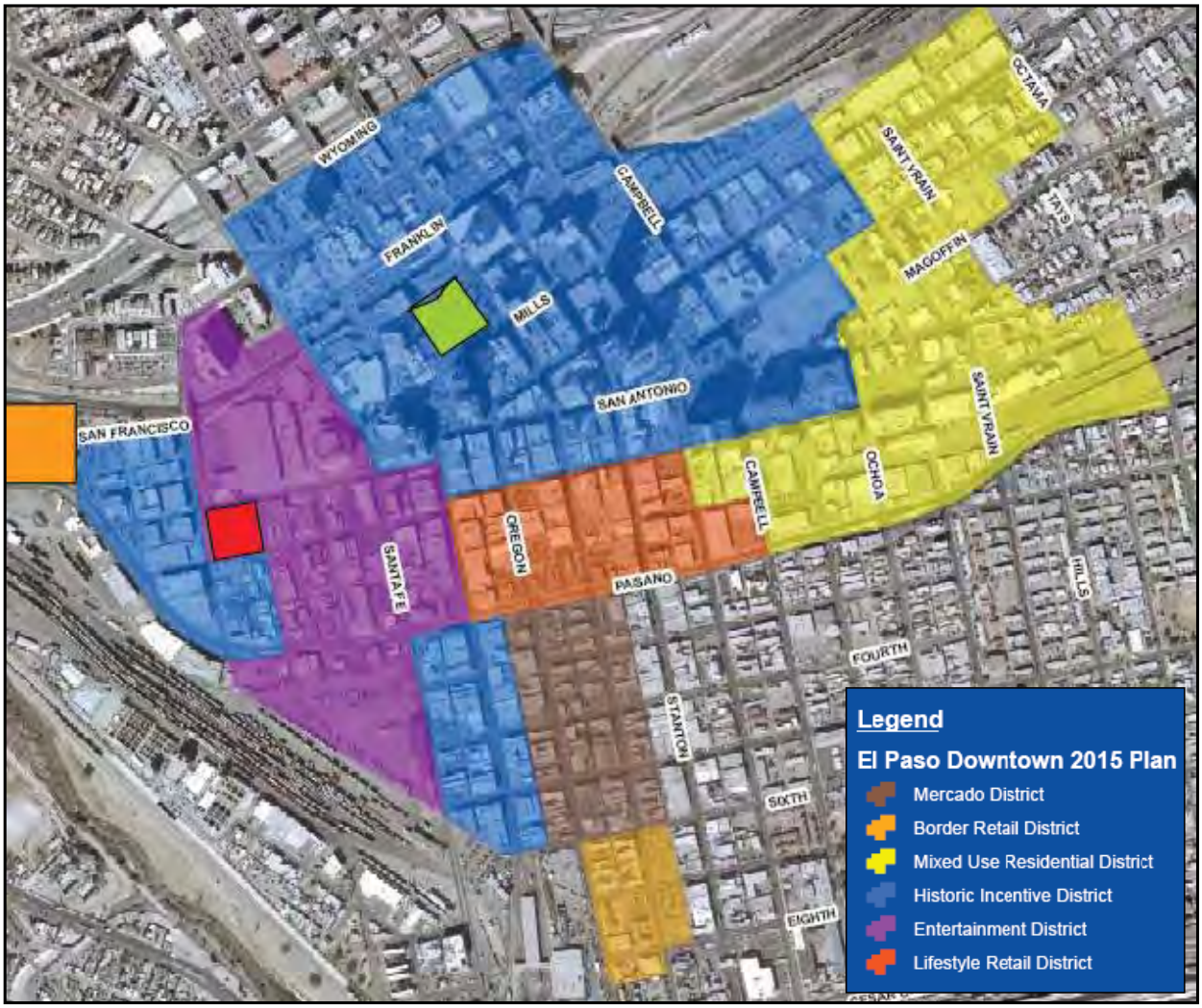


Figure 1-1: Redevelopment Districts Outlined in the El Paso Downtown 2015 Plan

Rail in the Pass

In 2008, the El Paso Metropolitan Planning Organization (MPO) produced a report, Rail in the Pass: Past, Present and Future Impacts of Rail in the El Paso Region, which examined the challenges presented by commercial truck and rail operations in the region. The primary concern for rail-related problems in El Paso are reported to involve congestion caused by the approximate 35 trains that pass through El Paso each day, leading to significant vehicle delays at the city's 68 at-grade crossings. Rail operations account for about 15 percent of all congestion and air pollution at signalized intersections whether they are highway-rail grade crossings or roadway intersections. Conditions are expected to diminish further as rail traffic from West Coast ports increases and El Paso experiences an expected rise to over 100 trains per day by 2035.

Traffic projections for 2035 have led to recommendations by the MPO that include:

- Santa Teresa Infrastructure Improvements Commercial inspection facilities are recommended, including FAST lanes.
- Santa Teresa Intermodal Rail Station – The New Mexico Department of Transportation (NMDOT) is constructing a train refueling station at Santa Teresa that will relieve congestion caused by refueling operations in El Paso.
- Railroad Grade Separations – Grade separations are recommended for Airport Dr., Airway Blvd., Carolina Ave., SH 20, Zaragoza Rd., and Sunland Park Dr.
- Fort Bliss Railway – Plans have been made to construct a 76-mile railway connecting railheads at White Sands Oro Grande Range and McGregor Range to the existing Biggs Army field by 2015. This line is intended to help mobilize armored vehicles and eliminate the movement of vehicles over roadways.

At the time of the 2008 report, fuel prices in the U.S. were at an all time high, and the El Paso MPO emphasized a modal shift in freight transportation from truck to rail as a means of addressing the rising cost of energy. Inherent in this shift, however, is the need to mitigate the effects that rail congestion has on central areas of El Paso. Development of a new international rail crossing between Mexico and New Mexico at Santa Teresa is considered the most likely long-term solution to this problem.

Statewide Intercity Passenger Rail Study

In 2010, the Texas Transportation Institute (TTI) completed an investigation of potential intercity passenger transit routes, where travel patterns for 19 distinct origin-destination city pairs within Texas were examined in order to predict which routes might benefit from intercity rail or express bus service.[1] This research focused

[1] Morgan, C. A., Sperry, B.R., Warner, J.E. et al, Potential Development of an Intercity Passenger Transit System in Texas – Final Project Report, prepared by the Texas Transportation Institute for the Texas Department of Transportation, Report No. FHWA/TX-10/0-5930-2, May 2010.

on long distance intercity and interregional corridors to identify city pairs most in need of additional transit capacity in coming decades. The size and distribution of urban population centers shown in Figure 1-2 was used to identify strategic transit corridors by incorporating factors such as:

- Corridor length
- Projected population growth and demographic patterns
- Average travel speeds
- Intercity travel demand – market size from which ridership is drawn, measured in average annual daily traffic (AADT) for highway travel, and numbers of flights per day for airline travel.
- Intercity travel capacity – volume-capacity ratio and percent trucks (measure of roadway impedance) for highway travel, and number of scheduled flights per day and percent of occupied seats per flight for airline travel.

Figure 1-2 illustrates how El Paso, with a population of over 680,000, is separated from cities as large or greater by much longer distances than other city pairs in the state. Three transit corridors linking El Paso to other Texas cities were analyzed, consisting of a direct 636-mile route between El Paso and San Antonio, a 621-mile route between El Paso and Dallas-Fort Worth (DFW) via Abilene, and a 648-mile route between El Paso and DFW via San Angelo.

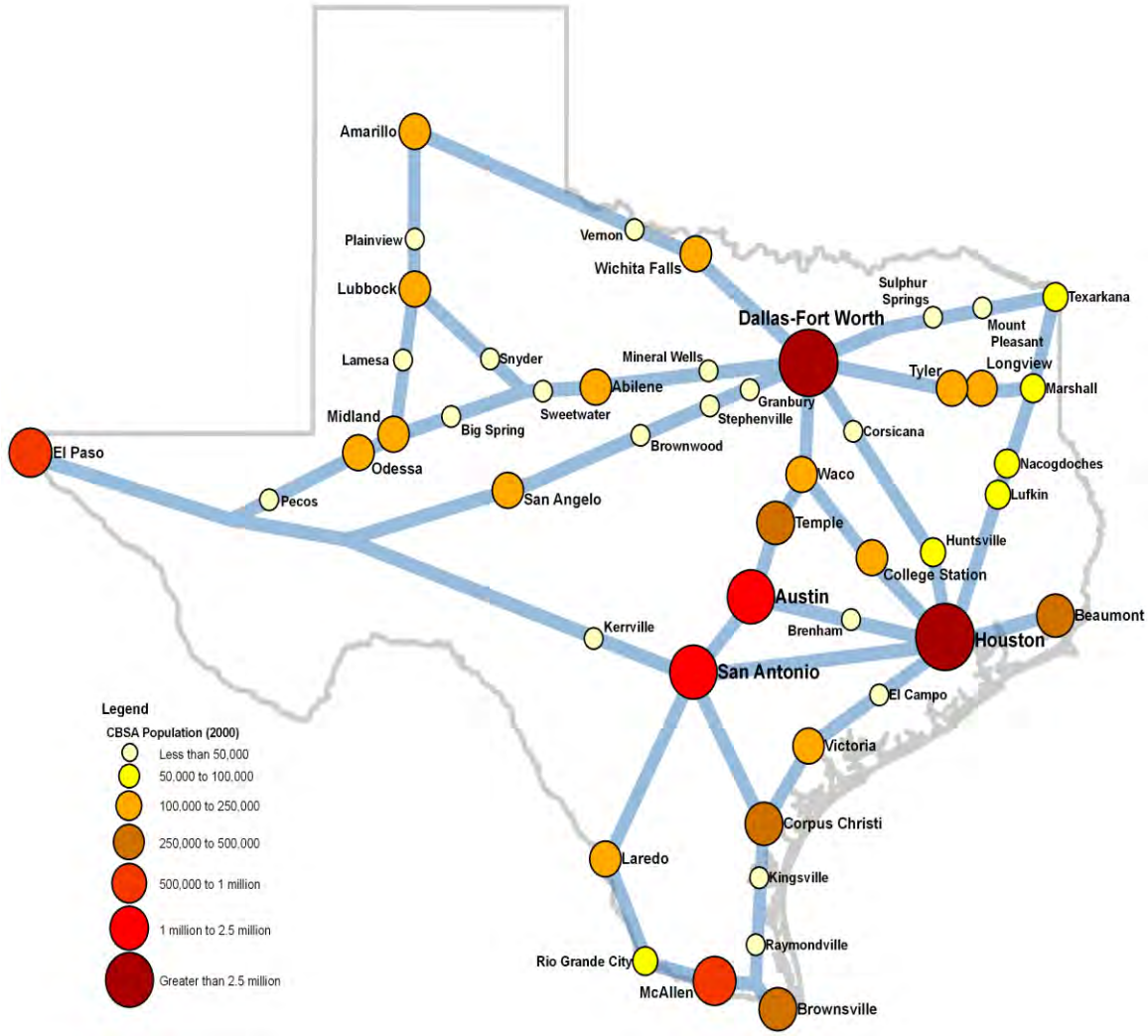


Figure 1-2: Populations and Distributions of Texas Cities

The El Paso-DFW route via Abilene ranked third among all 19 origin-destination city pairs in terms of need for additional transit service, with DFW-San Antonio and DFW-Houston routes ranked first and second, respectively. This figure suggests that the need for transit service between El Paso and DFW may be greater than the need for service between San Antonio and Houston, two of the state's largest cities. The El Paso-DFW route via San Angelo (ranked ninth) and the El Paso-San Antonio route (ranked sixteenth) were shown to be in less need for additional transit service.

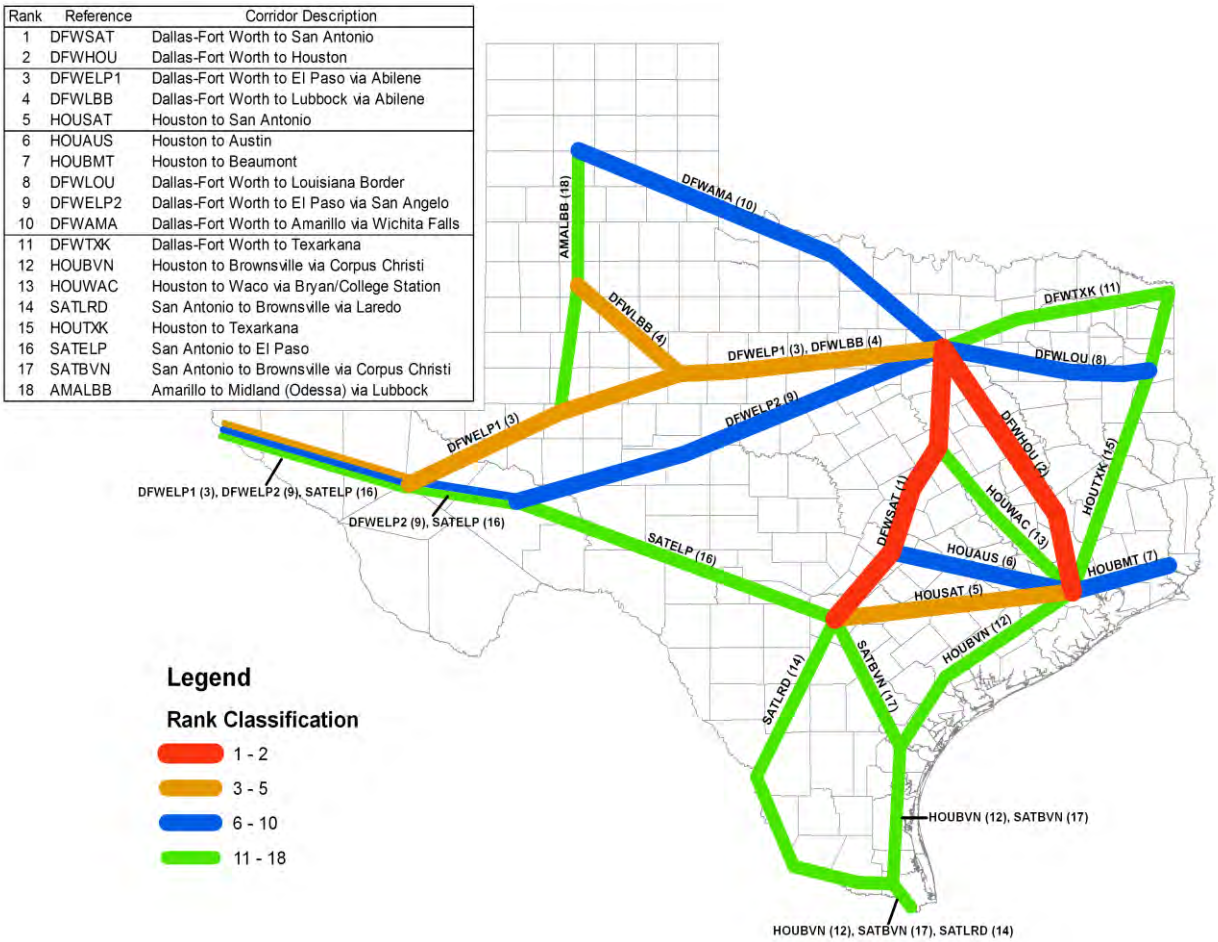


Figure 1-3: Texas Transportation Institute Rankings of Transit Corridors

Planned Improvements and Recent Projects

The previously completed studies for the El Paso region summarized above identified several improvements for rail freight movement in the El Paso Region. The rail infrastructure improvements in the El Paso and Ciudad Juárez region that have been completed or are being moved forward in the planning or design phases are listed as follows, based on possible implementation timeframes.

- Completed: BNSF Chihuahuita Connection
- Short-Term: Ciudad Juárez Grade Separations, UP Yard Operations Relocation
- Mid-Range: BNSF El Paso Yard Relocation
- Long-Term: Santa Teresa Rail Bypass and International Border Crossing

BNSF Chihuahuita Improvements

The Chihuahuita neighborhood is a historic but economically disadvantaged area of El Paso located near BNSF's El Paso Yard. Prior to June 2010, the interchange of international trains between Ferromex and BNSF on the yard lead tracks would

block Canal Road, which serves as the only entrance to Chihuahuita. Consequently, this disruption would reduce access to the neighborhood by emergency responders, expose motorists to grade crossing accidents, reduce roadway mobility, and increase emissions from idling automobiles.

In 2009, a $1.5 million project was initiated to construct 550 feet of connecting track from BNSF Track 130 to the Black Bridge International Rail Crossing, as shown in Figure 1-4, to allow southbound trains from the U.S. to operate over Track 130 while northbound trains from Mexico continue to use the yard lead track. This project, completed in June 2010, included a rehabilitation of Track 130, comprised of replacing 90-lb jointed rail with 136-lb welded rail and replacing 40 percent of existing ties with new ties and associated ballast and surfacing work, and removal of the existing diamond crossing. Completion of these rail improvements has provided the railroads with an alternative location (Track 130) to park southbound trains while interchanging BNSF locomotives with Ferromex locomotives, reconnecting air brake hoses on the locomotives to the train, and performing air brake tests prior to being moved into Mexico.

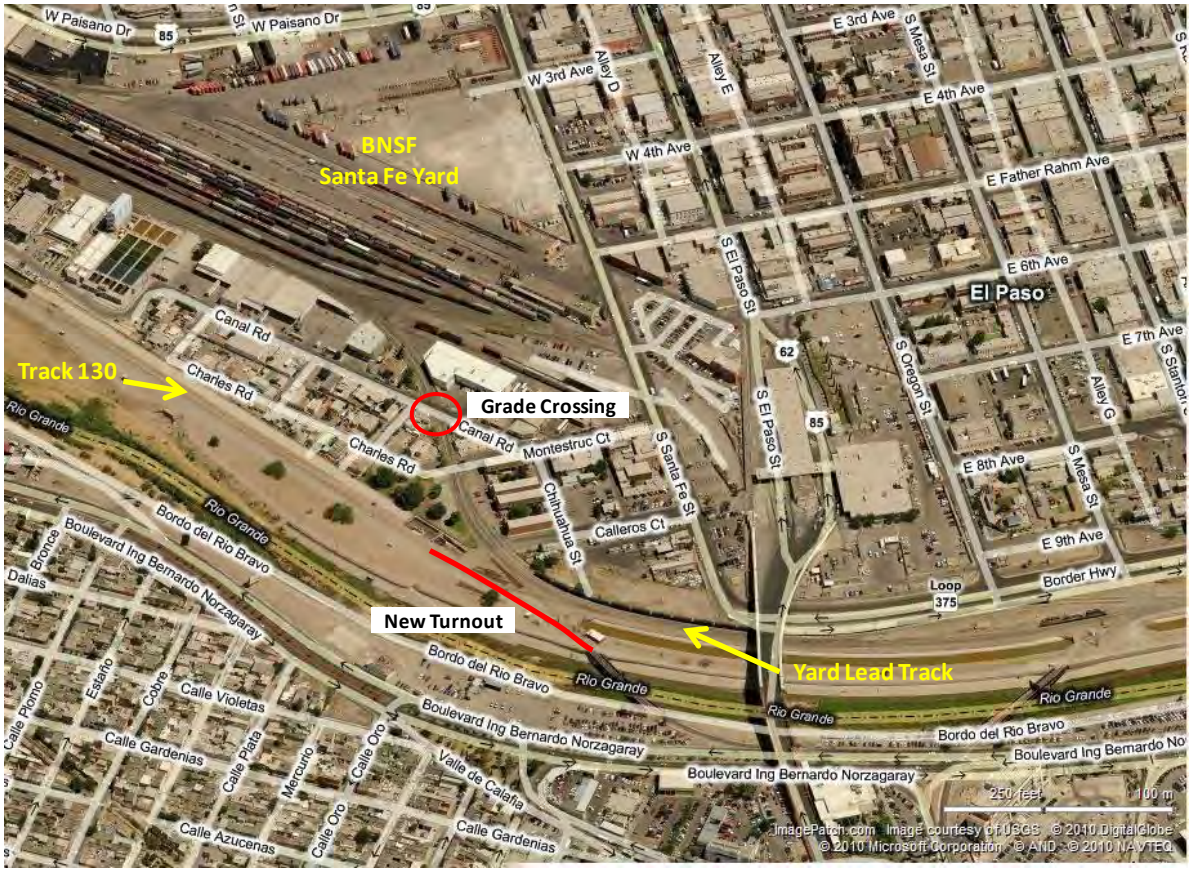


Figure 1-4: BNSF Chihuahuita Connection at the U.S.-Mexico Border

Rail/ Roadway Grade Separations in Ciudad Juárez

Despite limited time windows for train operations, Ciudad Juárez street congestion and accidents still occur at the at-grade crossings during the morning rush-hour. Five major crossings are located between Ferromex's rail yard in Ciudad Juárez and the international border crossing within a distance of less than a mile. Nearly 18,000 vehicles cross the rail line daily through the 5 grade crossings during the hours of permitted train operations. The five crossings proposed to be grade separated are listed as follows:

- Municipio Libre
- Vicente Guerrero
- 16 de Septiembre
- David Herrera
- Boulevard Fronterizo

The grade separations would expand the operating window and would increase the capacity of the international crossing, reducing train congestion and delay. The grade separation at Boulevard Fronterizo has been identified as the first project that will be built and cost-benefit analysis has been submitted to the Mexican government for approval. Approximately 5,500 vehicles cross daily through the Boulevard Fronterizo grade crossings during the hours of train operation (10 pm –7 am). The grade separation will provide free-flowing vehicular traffic, resulting in reduced auto delay, reduced auto idling and emissions, reduced congestion, reduced accidents, and reduced auto operating costs for an estimated present value benefit of approximately $19 million. Additionally, the grade separation is expected to expand the daily operating window of the international rail crossing from 9 to 12 hours, reducing the need to divert freight to other international gateways for an estimated benefit of more than $49 million. The benefit of avoiding freight diversions is comprised of avoidance of increased shipping costs, reduced shipper inventory costs, and environmental savings. Lastly, the improved efficiency of train operations resulting from the expanded operating window would provide an estimated benefit of more than $61 million, comprised of reduced locomotive emissions associated with train dwell time, reduced shipping costs, and reduced inventory costs. The total estimated benefit is nearly $130 million, while the estimated cost of the grade separation is $13.4 million.[2]

UP Yard Operations Relocation to Santa Teresa

UP, in partnership with the State of New Mexico, has expressed their intent to relocate many railroad operations from El Paso to the Santa Teresa area, west of where the UP Sunset Route intersects the UP Tucumcari Line. Although the project was previously on hold, UP is moving forward with relocating fueling facilities from El Paso to Strauss Yard in Santa Teresa.

[2] 2010 Border to Border Transportation Conference Presentation: Update on Border Crossing Improvements at El Paso/ Juárez, November 16, 2010, Nate Asplund, AVP, Mexico Business Unit, BNSF.

Among all UP operational facilities in El Paso, construction of a new rail yard in Santa Teresa, New Mexico would likely affect the need for existing facilities at Dallas Yard. All activity related to train crews, locomotives, and administration at the El Paso terminal is handled at Dallas Yard. Figure 1-5 shows this facility extending to the east of the Bataan Trench in the central business district of El Paso and representing the confluence of the UP Lordsburg, Carrizozo, and Valentine Subdivisions. The locomotive fueling station at the southeast end of Dallas Yard would become the first aspect of yard operations relocated to Santa Teresa in the event that the capital investment is made. Several tracks on the western end of the yard have been removed over time, and the construction of a new yard at Santa Teresa could allow this area to be redeveloped according to the city's needs. However, connection with the Carrizozo Subdivision (to Kansas City and Chicago) off of a depressed mainline near Dallas Street may not be possible, which would prevent much of the former rail yard site from being developed around an extended Bataan Trench. In the event that the existing mainline remains at grade through abandoned rail yard facilities, urban redevelopment would require grade separation structures to serve as connections of north-south streets shown in Figure 1-5.

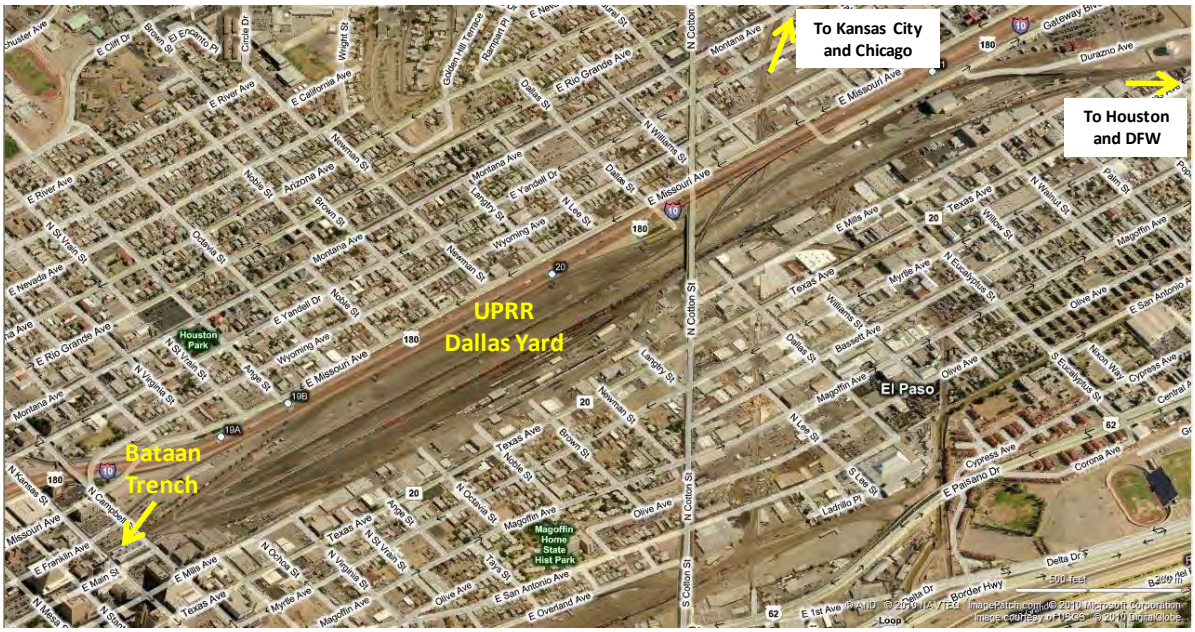


Figure 1-5: Dallas Yard and Surrounding Development in Downtown El Paso

Long-range prospects for a new intermodal facility at Santa Teresa could reduce the volume of similar operations at Alfalfa Yard, which is situated on 95 acres adjacent to the Valentine Subdivision. UP's Alfalfa Yard serves as the primary classification yard and only intermodal yard in El Paso. Whether or not intermodal operations are relocated to Santa Teresa, this facility will continue to support the numerous manufacturing and refining industries that exist in the Alfalfa region.

BNSF El Paso Yard Relocation

The 44-acre BNSF El Paso Intermodal Terminal, known locally as Santa Fe Yard extends to the southeast from SH 85 (Paisano Drive) on the western edge of town, paralleling the Rio Grande and terminating at Santa Fe Street (Figure 1-4) near the Chihuahuita neighborhood. The Texas Department of Transportation is currently investigating the feasibility of acquiring right-of-way at this facility for use in the westward extension of Border Highway, which currently terminates at South Santa Fe Street near the approach tracks to Santa Fe Yard. The acquisition of railroad right-of-way at this location is contingent upon BNSF agreeing to relocate Santa Fe Yard to a new site. A potential site for the yard relocation may be located near Vado, New Mexico, in coordination with the construction of the potential bypass route and new international border crossing at Santa Teresa, as shown in Figure 1-6. A feasibility analysis and environmental documentation would be required to determine estimated costs, operational impacts, and public benefits associated with the yard relocation as well as identify a preferred site for the relocated yard.

Santa Teresa Rail Bypass and International Crossing

The international border crossing at Santa Teresa, New Mexico is currently a toll-free roadway facility between the U.S. and Mexico used as a port of entry for commercial as well as non-commercial traffic. El Paso is located 13 miles to the west, and currently serves as a federally mandated stop for safety inspections and locomotive refueling. However, UP plans to invest $300 million in a major new refueling station near the Santa Teresa municipal airport as part of efforts to upgrade its Sunset Route that runs between Los Angeles and New Orleans. This new facility will support the large numbers of intermodal trains that move from West Coast ports to eastern markets.[3] The UP Yard operations relocation and the potential BNSF yard relocation provide for the opportunity to relocate the international rail crossing out of El Paso.

A possible new 52-mile international railroad bypass, shown in Figure 1-6, would bypass the cities of El Paso and Ciudad Juárez and would include a new international rail border crossing at Santa Teresa. The project has an estimated cost of approximately $500 million. The New Mexico Department of Transportation has secured federal funds to study the feasibility of the bypass and border crossing and expects to initiate the study in 2011. The relocation of the international crossing out of El Paso could potentially provide capacity for passenger rail on the existing rail line between Ciudad Juárez and El Paso, which could ease pedestrian traffic at existing border crossings.

[3] Robinson-Avila, K., Grant Helps Fund Santa Teresa Railroad Study, *New Mexico Business Weekly*, Thursday, August 19, 2010.

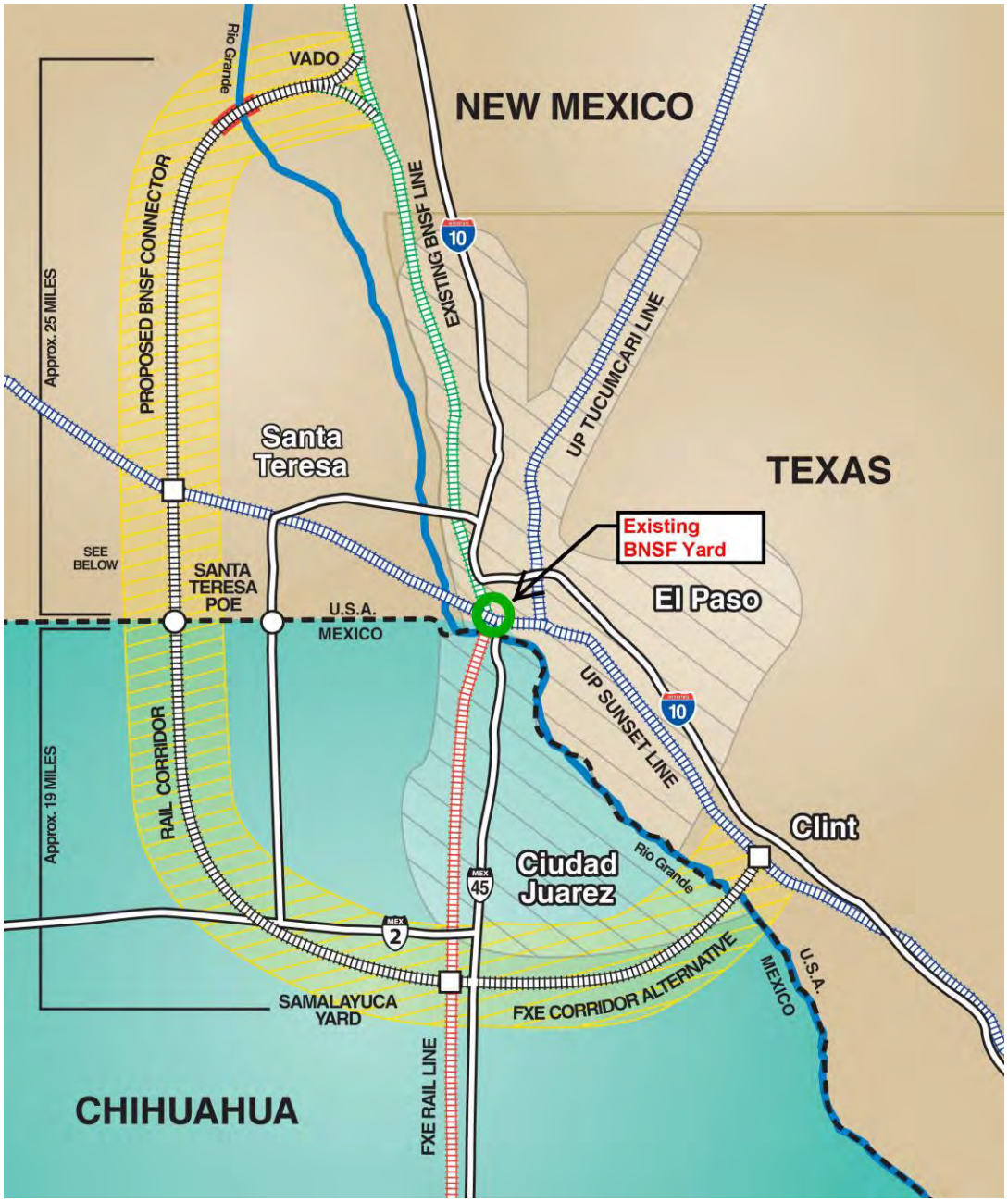


Figure 1-6: Possible Santa Teresa Bypass and International Crossing

New Intermodal Terminal in Ciudad Juárez

Ferromex has indicated it will need a new intermodal facility south of Ciudad Juárez near Samalayuca to support traffic destined for the proposed Santa Teresa crossing in the event that it is built. Construction of a new intermodal terminal could also benefit the Maquiladora industry, which imports materials duty-free and then assembles and re-exports the goods. Additionally, Electrolux has indicated the desire to increase business and would like to ship products by rail versus truck. A new intermodal terminal in Mexico would provide shippers with a modal choice

allowing truck traffic to potentially be shifted to rail, which would reduce short haul truck movements across the border.

Modifications to Ysleta-Zaragoza Border Crossing

The Ysleta-Zaragoza Bridge border crossing is located near State Loop 375 on the southeast side of El Paso, Texas. The bridge is composed of two separate structures, one for commercial traffic, and the other one for noncommercial traffic. The truck bridge is a four-lane facility with two lanes for each direction. An additional bridge at the Ysleta-Zaragoza border crossing is to be constructed with six commercial lanes including a Free and Secure Trade (FAST) lane. The existing commercial and passenger bridges would be used for passenger and dedicated commuter lane usage. If the Ysleta-Zaragoza improvements are not completed, a modal shift from truck to rail may be required due to exceeded capacity of the highway crossing.

SECTION 2: PURPOSE OF STUDY

The purpose of the El Paso Region Freight Study is to provide an analysis of freight rail mobility for the region, which is comprised of the six counties contained in TxDOT's El Paso District. The results of this study include an inventory of the existing rail system, an analysis of freight rail movement trends into, out of, and through the region, a review of rail initiatives and improvements planned for the region, an analysis of freight rail operations and constraints, and a review of safety issues and potential improvements at roadway-rail at-grade crossings.

The Study is intended to be conducted in two Phases. Phase I, which is covered within this report document, consists of an analysis of the existing freight rail system and operations within the El Paso District. Phase II, when approved by TxDOT, will identify alternatives and associated feasibility for rail system/roadway improvements within the region and model rail system improvement recommendations to develop a realistic cost/benefit analysis.

Goals

This study was completed to address the following goals:

1. Inventory Existing Rail System
    - Review previous freight/passenger rail corridor studies conducted within the past five years that are applicable to the study area.
    - Determine the physical characteristics of the existing rail lines in order to create a rail network inventory.
2. Conduct Region-Wide Freight Rail Operational Study
    - Identify trends for rail freight movements by origin and destination and commodity type for the 2008 base year and projected to 2035.
3. Evaluate Planned Transportation Infrastructure and Facility Relocations/ Improvements
    - Identify recent and planned improvements and relocations of transportation infrastructure and facilities throughout the El Paso region.
4. Identify Freight Rail Constraints
    - Determine infrastructure constraints inhibiting freight rail efficiencies.
5. Conduct Roadway/ Rail Grade Crossing Analysis
    - Obtain and compile data and statistics for vehicle/ train accidents, vehicle pedestrian accidents, train derailments, and incidents involving hazardous materials.
    - Identify potential grade separations and crossing closures at at-grade crossings.

SECTION 3: RAIL FREIGHT OPERATIONAL STUDY

Introduction

As mentioned in the previous section of the report, the purpose of this study is to analyze freight rail movements and operations in the El Paso region with the goal of identifying freight rail constraints and potential improvements. This section describes the existing and projected future characteristics of freight rail activity in the study region in terms of volumes, commodities, and origin-destination information. The Study Region is comprised of six counties as shown in Figure 3-1. This section of the report first describes the available tools as well as the freight modeling process and methods to forecast rail freight flows to and from the region. Following the modeling methods section, technical information is provided on rail freight flows to, from, and within the region.

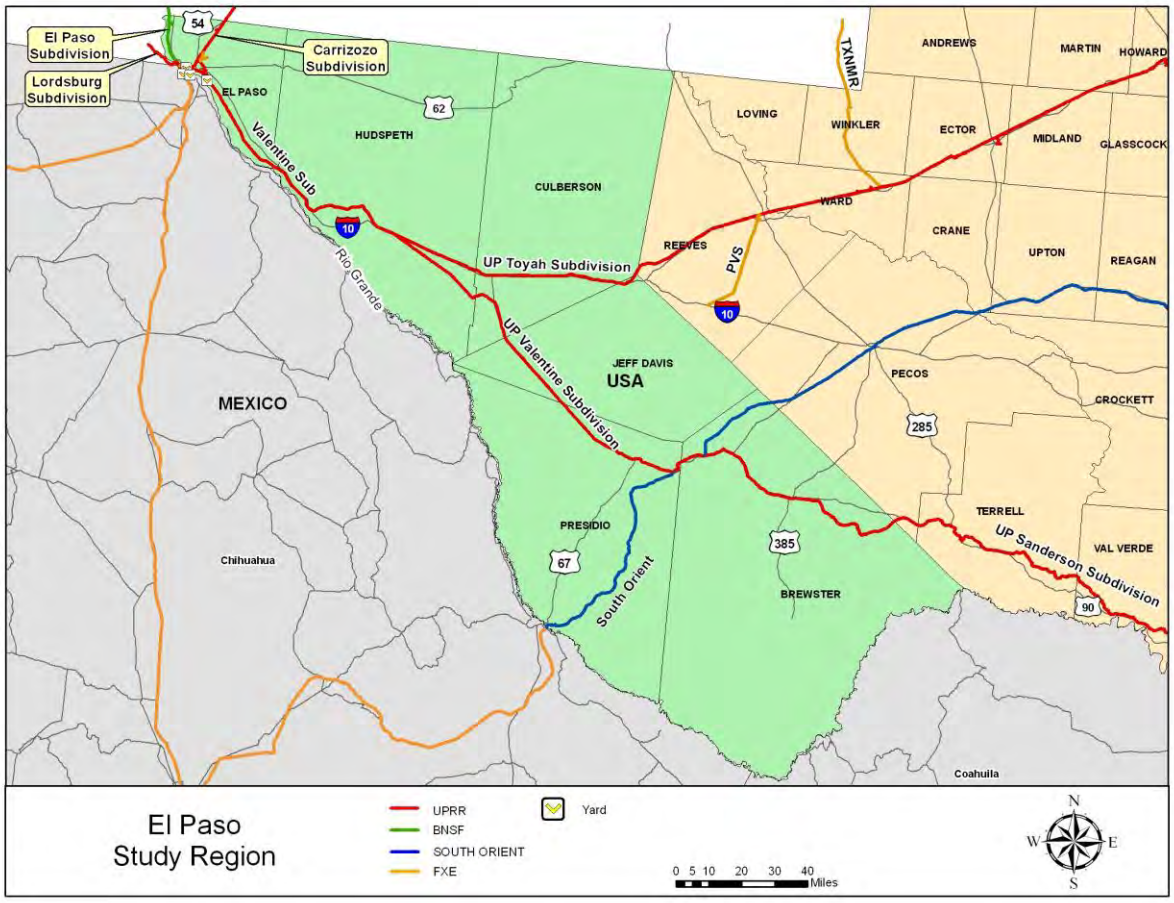


Figure 3-1: Study Region Map

Freight Modeling Methods

The transportation system was analyzed and evaluated in this study using the Texas Statewide Analysis Model (SAM) and its components. The Texas SAM is a data rich resource and the only readily available, validated planning tool that comprehensively

covers the entire State of Texas. One component of the SAM is the Texas-North American Freight Flow Model (TX-NAFF model). The TX-NAFF consists of a roadway network, rail network and zone structure that covers North America. In the case of this study freight rail trip tables were developed from 2008 STB Waybill data in order to develop a data source with which to update the SAM base year freight rail flows.

The SAM is a critical tool for analyzing current and future freight movements for the study area in the context of all passenger and freight movements on the system.

The following sections briefly describe the use of the SAM and its companion models to assign 2008 and 2035 rail freight flows to the rail system.

Texas Statewide Analysis Model (SAM)

The SAM is a travel demand model developed by TxDOT to analyze passenger and freight travel within the State of Texas. The SAM covers the entire state of Texas and includes tools to help evaluate traffic originating or terminating in other U.S. states and Mexico.

In its default implementation, the SAM was validated for a 1998 base year and a 2025 forecast year. The SAM was recently updated in support of the TxDOT study "Effect of the North American Free Trade Agreement on the Texas Highway System" to a base year of 2003 and forecast years including 2030 and 2035.

The SAM uses demographic data such as population and employment combined with inventories of existing multimodal transportation networks and facilities to predict the number of trips that will be generated and how those trips are likely to be distributed on the transportation system. The input demographics are aggregated to traffic analysis zones (TAZ). The SAM's 4,472 TAZs are depicted in Figure 3-2.

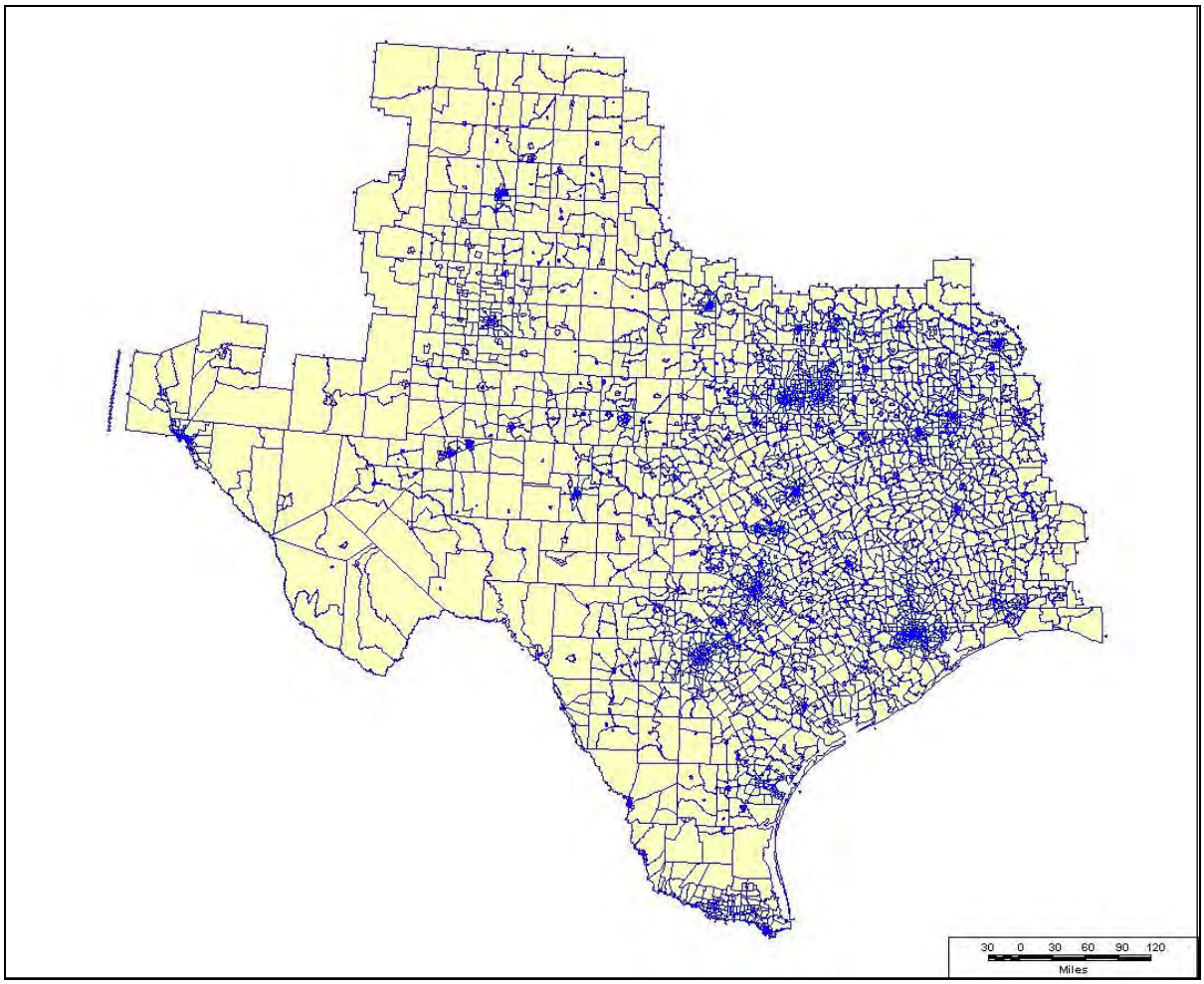


Figure 3-2: Texas SAM Traffic Analysis Zone Structure

The SAM is supported and supplemented by the Texas-North America Freight Flow Model (TX-NAFF) developed by TxDOT to account for external trips. The TX-NAFF is used to estimate trips from Mexico to states other than Texas within the continental United States.

The revised TX-NAFF zone structure has a total of 334 zones. These include:

- 254 Texas counties
- 48 U.S. states and the District of Columbia; and,
- 31 Mexican States and Federal District

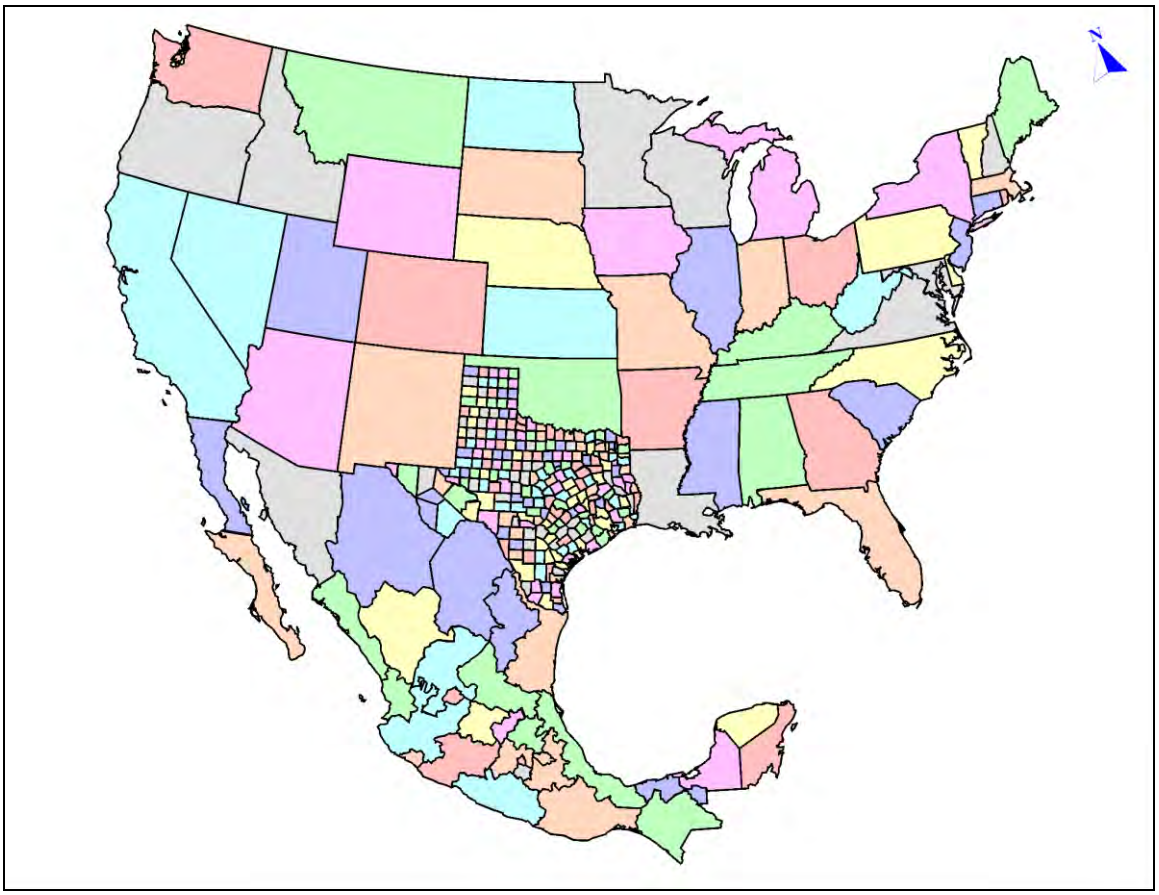


Figure 3-3: TX-NAFF Zone Structure

The SAM and TX-NAFF share a roadway network. This approach ensures network consistency across models since modifications and project additions need only be made to one network layer. The network is multi-modal in Texas containing the freight rail, passenger rail, and passenger air networks in addition to the roadway network. The combined roadway network is depicted in Figure 3-4.

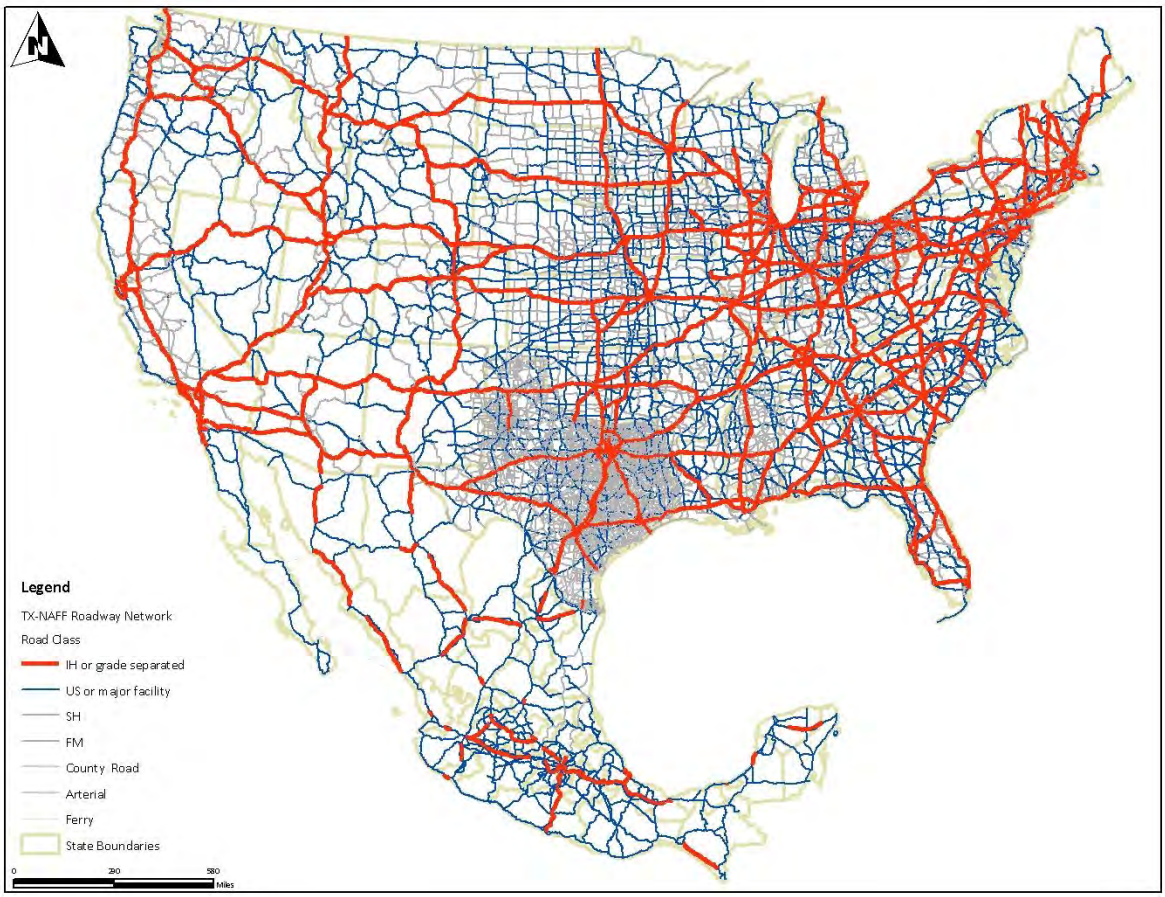


Figure 3-4: SAM and TX-NAFF Roadway Network by Road Class

2035 Roadway Network

The SAM includes anticipated roadway improvements through the year 2035 for the El Paso region based on future growth and mobility needs. Roadway projects are based upon the El Paso Metropolitan Planning Organization (MPO) *Mission 2035 Metropolitan Transportation Plan*, August 2010. While this study does not focus on passenger or truck travel, the inclusion of major roadway projects in the SAM network allows the analysis to account for any influence that new infrastructure projects may have on the statewide distribution of freight by travel mode. Several large roadway projects were identified and included in the SAM roadway network; although, while these projects have local importance, they do not appear to have a large impact on interstate freight travel times. The planned roadway projects for the Study Region are shown in Figure 3-5 and listed in Appendix B.

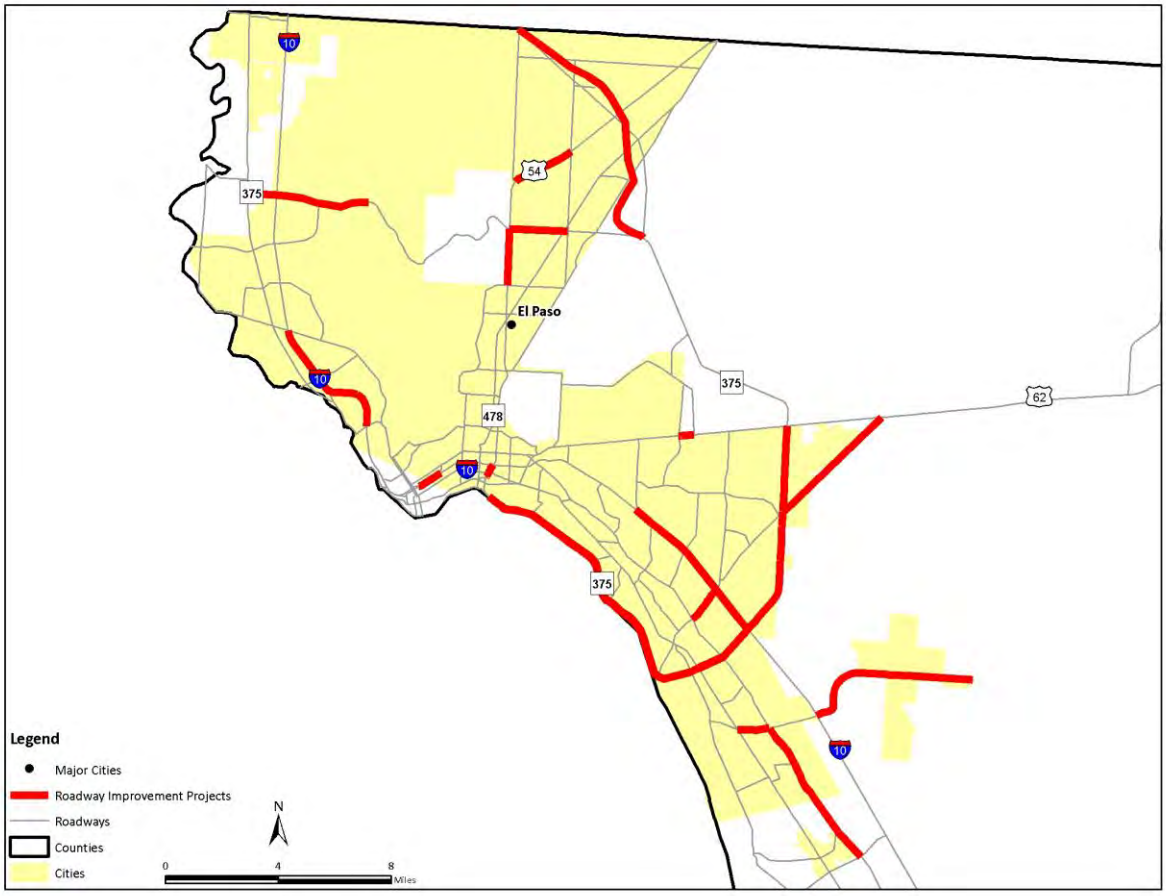


Figure 3-5: Planned Roadway Improvements

Freight Generation and Distribution

The SAM freight models are based upon Transearch data, which is survey data representing a sample of all Texas freight movements within, to, through, and from the state. This 1998 dataset includes freight movements by transport mode (highway, rail, water).

The SAM uses Transearch data to build a travel forecasting model that can predict the amount of freight tonnage transported across the state by mode. The SAM commodity groups are listed in Table 3-1.

Commodity Group	Commodity Type (STCC2)
1 - Agriculture	1 – Farm Products 8 – Forest Products 9 – Fresh Fish and Marine Products
2 – Raw Material	10 – Metallic Ores 11 – Coal 13 – Crude Petroleum or Natural Gas 14 – Nonmetallic Minerals
3 – Food	20 – Food or Kindred Products 21 – Tobacco Products
4 – Textiles	22 – Textile Mill Products 23 – Apparel or Related Products 30 – Rubber or Misc. Plastics 31 – Leather or Leather Products
5 – Wood	24 – Lumber or Wood Products 25 – Furniture or Fixtures 26 – Pulp, Paper or Allied Products 27 – Printed Matter
6 – Chemicals/Petroleum	28 – Chemicals or Allied Products 29 – Petroleum or Coal Products
7 – Building Materials	32 – Clay, Concrete, Glass or Stone 33 – Primary Metal Products 34 – Fabricated Metal Products
8 – Machinery	19 – Ordnance or Accessories 35 – Machinery 36 – Electrical Equipment 37 – Transportation Equipment 38 – Instruments, Photo and Optical Equip. 39 – Misc. Manufactured Products
9 – Miscellaneous Mixed	40 – Waste or Scrap Materials 41 – Misc. Freight Shipments 42 – Shipping Containers 43 – Mail or Contract Traffic 44 – Freight Forwarder Traffic 45 – Shipper Association Traffic 46 – Misc. Mixed Shipments 47 – Small Packaged Freight Shipments
10 – Secondary	50 – Secondary Traffic
11 - Hazardous	48 – Waste Hazardous Materials 49 – Hazardous Materials or Substances

Table 3-1: SAM Commodity Groups

After generation the trips or tonnage are distributed between origins and destinations based upon average trip length information gathered in surveys and from patterns evident in the Transearch dataset.

Freight Mode Choice

The statewide freight flow tonnage estimates (produced at the county level) are allocated to highway, rail, and waterway modes by a mode choice model. The mode choice model is based on a LOGIT probability function that estimates the probable

share of freight to a given mode based upon the utility or disutility of the mode's travel times and costs relative to the other modes available.

For each mode, the mode choice model estimates the relative change from the shares observed in the base year Transearch data for each non-base year condition presented. While rail and waterborne movements are assigned to their respective networks at the county level, the highway freight tonnage estimates are disaggregated to even smaller geographic areas (traffic analysis zones — TAZ) prior to being assigned to the road network.

Assignment

Because the routing of rail traffic is complicated by ownership of specific rail lanes and the trackage rights between rail companies, the SAM in its basic configuration does not contain the ability to accurately route rail traffic. To address the routing forecast requirements of this study, the 2008 Surface Transportation Board (STB) Waybill data was used to enhance the routing abilities of the SAM. The STB collects freight flow information directly from freight management companies, and the STB's waybill data is considered to be an accurate sampling of freight flow.

SAM rail flows were first updated to reflect the 2008 Waybill data. The SAM's forecasted rail tonnages, by commodity type, were then routed with rail capacities and travel times developed from the Waybill data.

Additionally, 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 valid prediction of rail freight movements throughout the State. The modified SAM was then applied to the 2035 forecast year to produce freight forecasts by mode.

Rail Freight Movements and Commodities

In general, railways are best suited to hauling large, heavy, low-value loads that are not overly time-sensitive over distances greater than 500 miles. As shown in Figure 3-6, more than 90 percent of rail freight for the Study Region is transported to or from regions outside of Texas, primarily the Western United States.

Table 3-2 shows the tonnages of freight transported by rail to and from the Study Region in 2008 and projected to 2035. In both 2008 and 2035, rail freight transported out of the Study Region (exports) is the predominant movement type and is also expected to be the fastest growing movement type. The largest growth is expected in rail freight transported between the Study Region and northern and eastern states, while the smallest growth is projected between the Study Region and the Western United States. However, rail freight traffic between the Study Region and the Western U.S. is expected to remain the predominant movement type.

Table 3-3 shows that rail freight between Mexico and the U.S. crossing the Texas-Mexico border within the Study Region consists primarilly of freight exported from regions of Texas and the U.S. outside of the Study Region into Mexico, meaning that it is through international freight not origintaing or destined for the Study Region.

The largest volume of rail tonnage is located on the UP Valentine Subdivision between El Paso and Sierra Blanca. The next highest volume rail segments are the UP Toyah Subdivision from Sierra Blanca toward Dallas-Fort Worth and the UP Carrizozo Subdivision running north from El Paso.

Annual Rail Tons				
Origin	Destination	2008	2035	% Change from 2008 to 2035
From Study Region				
Study Region	Other Texas Counties	1,000,289	1,496,395	49.60%
Study Region	Western US	8,442,285	8,782,605	4.03%
Study Region	Northern US	1,249,510	2,204,253	76.41%
Study Region	Eastern US	141,710	244,373	72.45%
Study Region	Mexico[1]	569,078	1,073,771	88.69%
	Total	11,402,872	13,801,397	21.03%
To Study Region				
Other Texas Counties	Study Region	703,908	922,927	31.11%
Western US	Study Region	8,005,896	8,008,109	0.03%
Northern US	Study Region	26,817	35,450	32.19%
Eastern US	Study Region	16,564	25,612	54.63%
Mexico[1]	Study Region	26,555	31,519	18.69%
	Total	8,779,740	9,023,617	2.78%
Within Study Region				
Study Region	Study Region	22,904	33,454	46.06%

Table 3-2: Rail Freight Movements for the Study Region[1]

[1] Freight Movement to/from Mexico crossing Texas border.

Annual Rail Tons				
Origin	Destination	2008	2035	% Change from 2008 to 2035
From Mexico				
Mexico[2]	Study Region	8,511	13,053	53.37%
Mexico[2]	Other Texas Counties	327,562	411,541	25.64%
Mexico[2]	US Regions Outside Texas	17,710,778	19,745,451	11.49%
	Total	18,046,851	20,170,044	11.76%
To Mexico				
Study Region	Mexico[2]	452,926	760,033	40.41%
Other Texas Counties	Mexico[2]	12,591,609	22,218,581	43.33%
US Regions Outside Texas	Mexico[2]	21,387,830	20,540,632	-4.12%
	Total	34,432,365	43,519,246	20.88%

Table 3-3: Rail Freight Movements between Mexico and the U.S.[2]

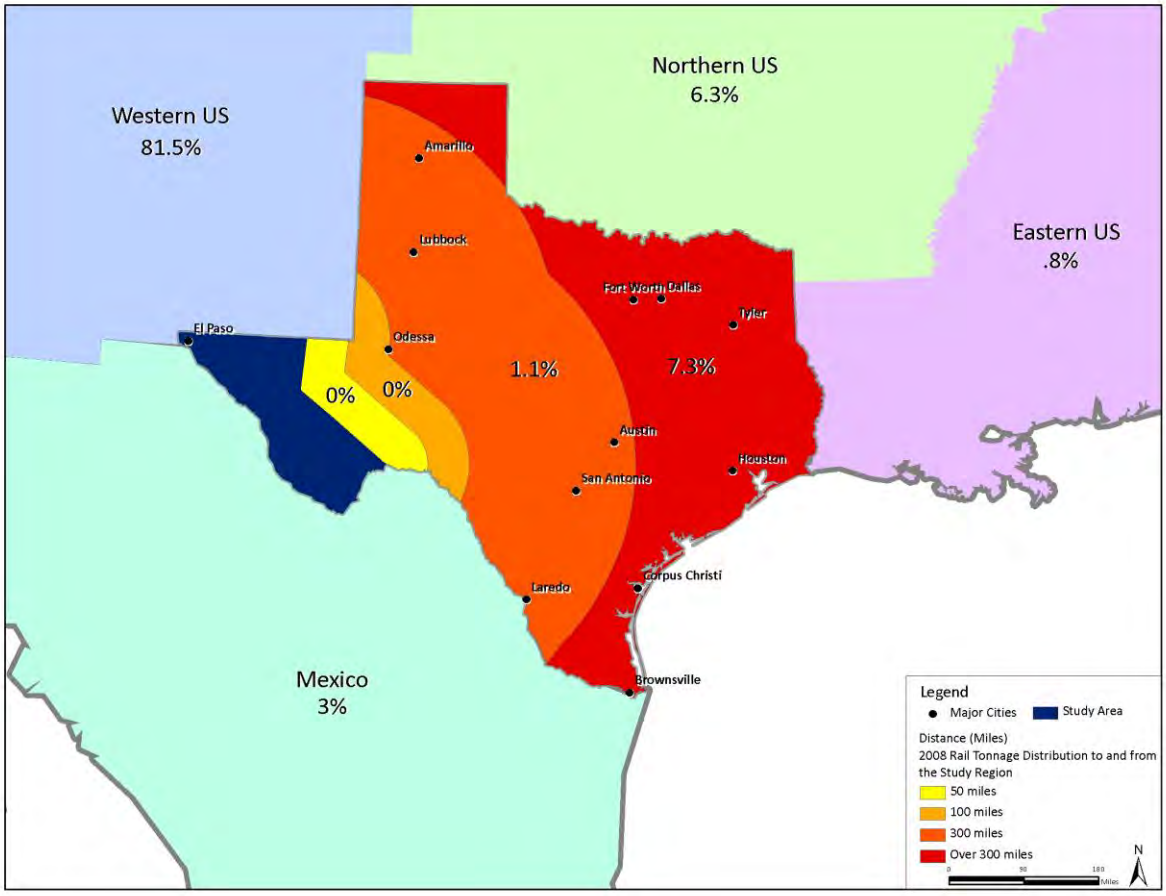


Figure 3-6: 2008 Rail Freight Distribution by Travel Distance

[2] Freight Movement to/from Mexico crossing the border of the study region.

Rail Freight Movements within Texas

Unlike truck freight, rail movements are limited in their ability to deliver door-to-door service. Intermodal centers, rail yards, and ports of entry are the primary locations in which rail freight can be either sent or received. Figures 3-7 and 3-8 illustrate the origins and destinations for freight rail movements between the Study Region and other Texas counties in 2008 and projected to 2035. In 2008, the largest in-state freight rail movements were between the Study Region and the Houston area, Dallas-Fort Worth, Amarillo, Corpus Christi and Laredo. The SAM results show that San Antonio is projected to emerge as an additional major origin/ destination for movements to/ from the Study Region in the future.

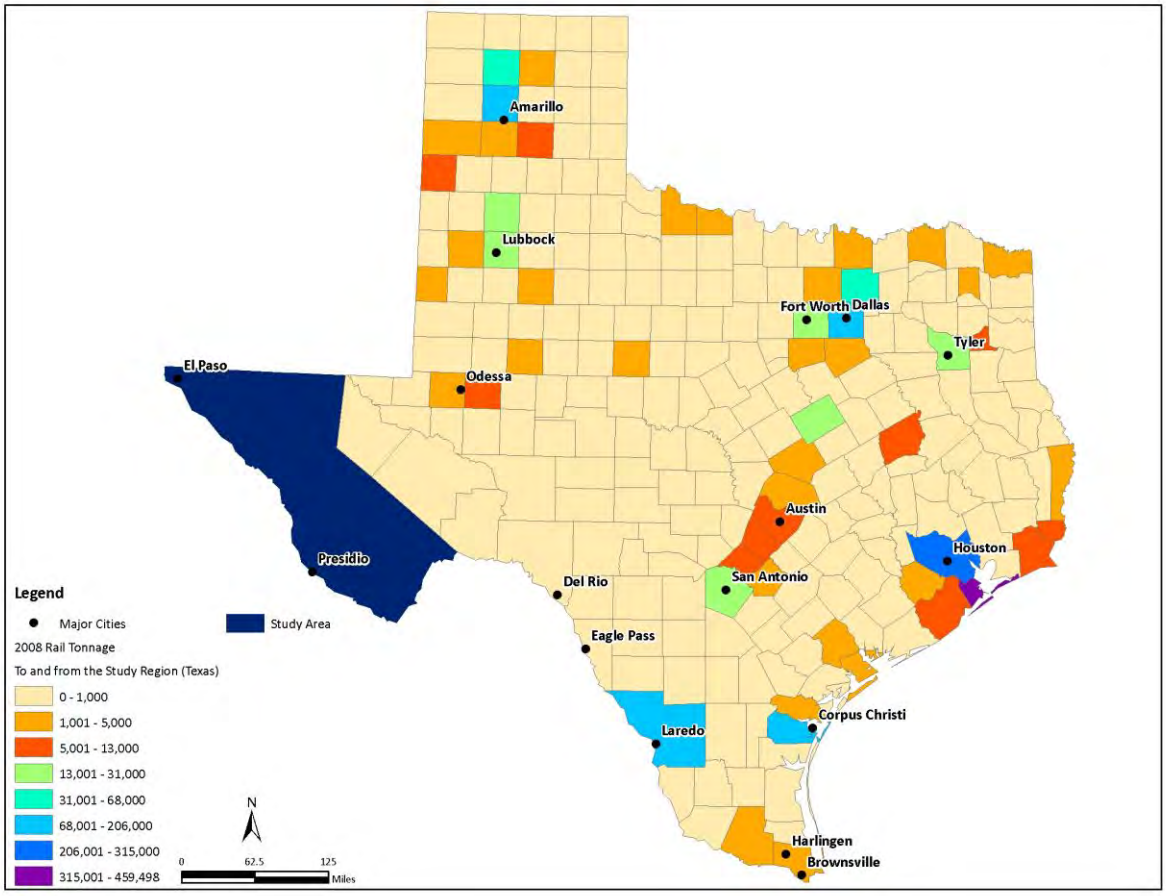


Figure 3-7: 2008 Rail Movements within Texas To and From the Study Region

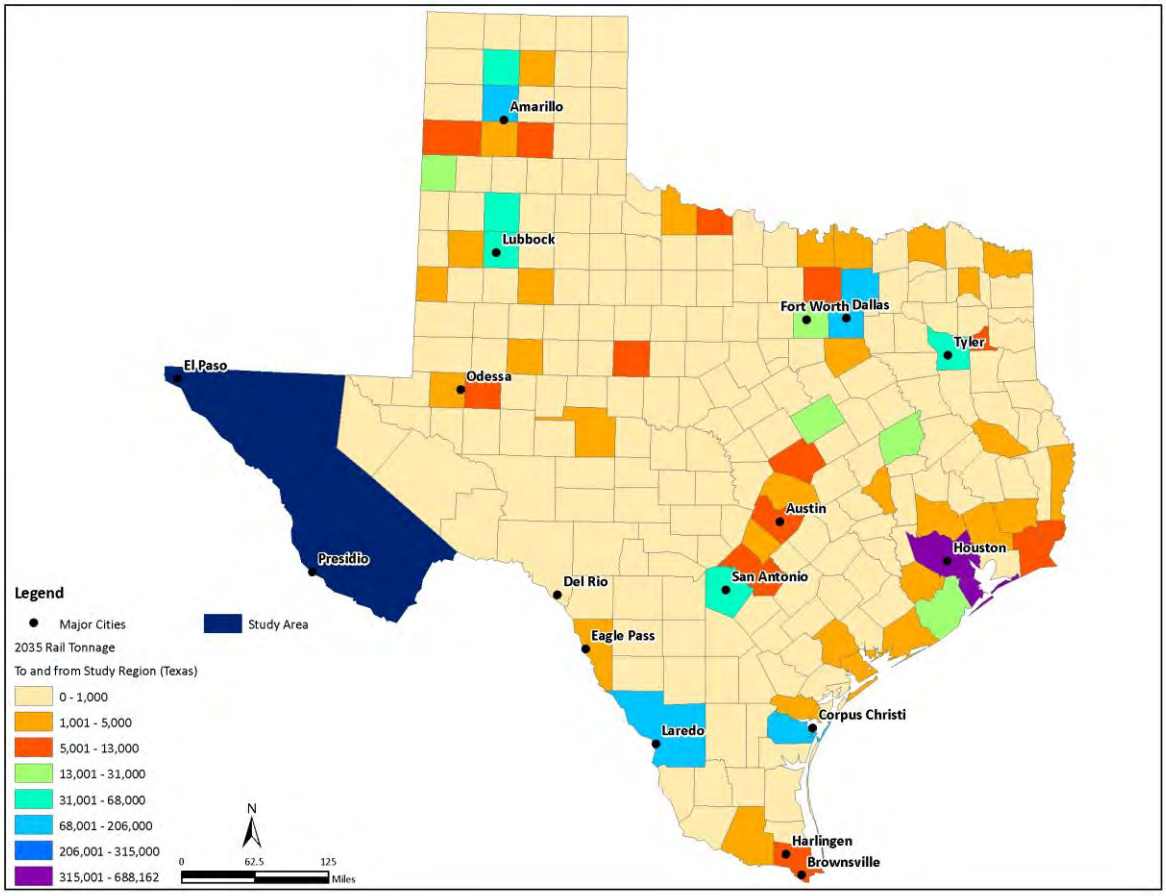


Figure 3-8: 2035 Rail Movements within Texas To and From the Study Region

Rail Freight Movements Outside of Texas

As previously mentioned, rail freight is most effective when carrying long haul cargo. The majority of domestic rail freight that travels between the study region and states outside of Texas originates or is destined for the Western U.S., as illustrated previously in Figure 3-6. The primary U.S. destinations for rail freight outside of Texas from the Study Region are California, Illinois, Arizona, and Washington. The primary U.S. origins for rail freight outside of Texas to the Study Region are South Dakota, New Mexico, Iowa, California, and Nebraska.

Figures 3-9 and 3-10 illustrate the directions of travel for rail freight between the Study Region and areas outside Texas.

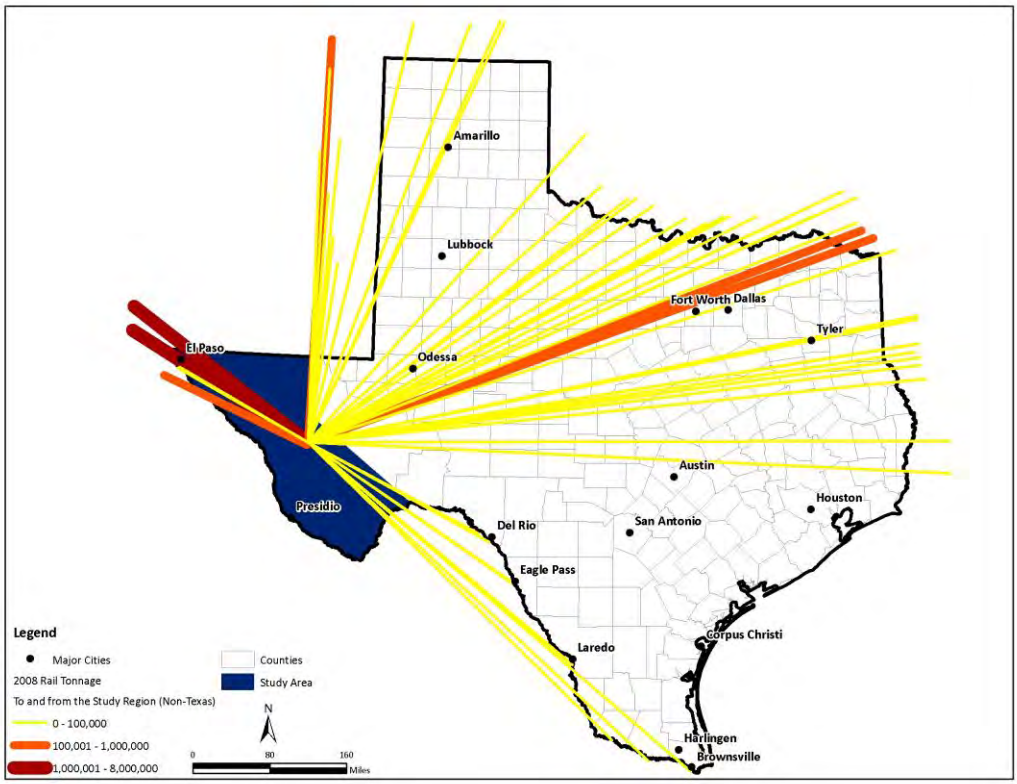


Figure 3-9: 2008 Rail Movements between the Study Region and Other States

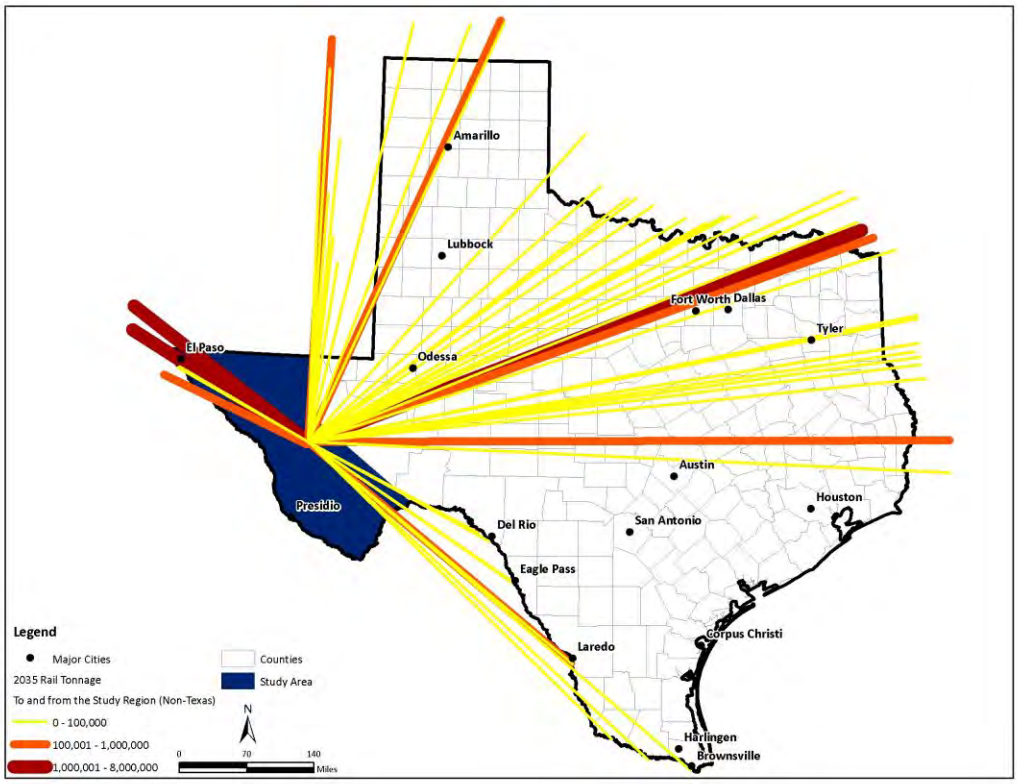


Figure 3-10: 2035 Rail Movements between the Study Region and Other States

Rail Freight Commodity Trends

The overall rail tonnage into, out of, and within the Study Region is projected to increase by 13 percent between 2008 and 2035. Table 3-4 indicates that the largest commodity by volume transported by rail in the Study Region is building materials, both in 2008 and as projected in 2035. The tonnage is fairly evenly distributed among the remaining commodities except for textiles, which is significantly lower in volume. Figures 3-11, 3-12, and 3-13 further illustrate the commodity tonnage distribution within the region for both 2008 and 2035.

The rail freight transported within the Study Region (internal movements) is composed primarily (more than 75 percent) of miscellaneous mixed load shipments. Rail freight destined for the Study Region (imports) is more evenly distributed by commodity, while rail freight originating in the Study Region (exports) is composed primarily of building materials, food, and miscellaneous mixed shipments. The distribution of rail freight by commodity in the Study Region does not change significantly between 2008 and 2035. Figures 3-14, 3-15, and 3-16 further illustrate the commodity tonnage distribution by movement type (internal, imports, exports) for 2008.

Commodity	Total Rail Tons (Internal, Imports, Exports)		
	2008	2035	Annual Growth Rate
Agriculture	2,288,160	2,319,808	0.05%
Raw Material	1,773,937	2,163,650	0.74%
Food	3,140,420	3,273,678	0.15%
Textiles	61,567	116,711	2.40%
Wood	2,072,193	2,103,582	0.06%
Chemicals/Petroleum	2,568,854	2,753,517	0.26%
Building Material	3,304,281	4,300,823	0.98%
Machinery	2,316,637	2,462,203	0.23%
Miscellaneous Mixed	2,674,570	3,357,976	0.85%
Hazard	4,896	6,520	1.07%
Total	20,205,516	22,858,467	0.46%

Table 3-4: Rail Freight Commodity Distribution and Growth

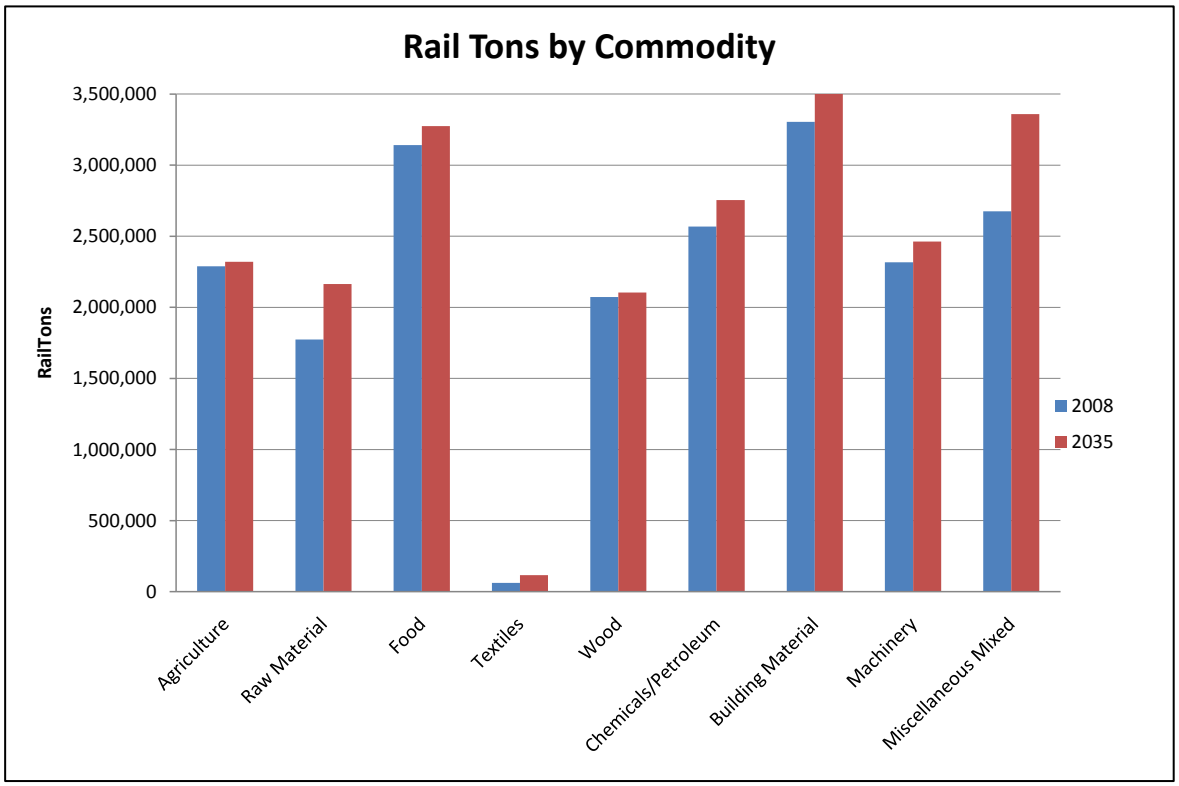


Figure 3-11: Rail Freight Commodity Distribution

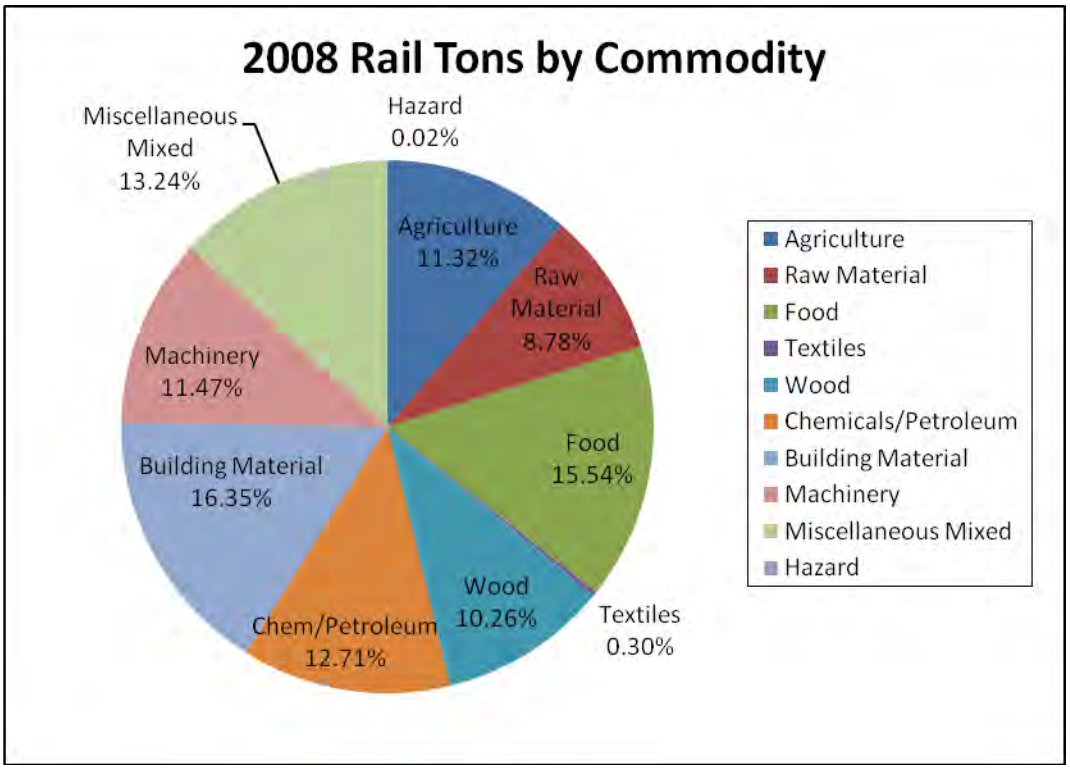


Figure 3-12: 2008 Rail Commodity Distribution (Imports, Exports, and Internal)

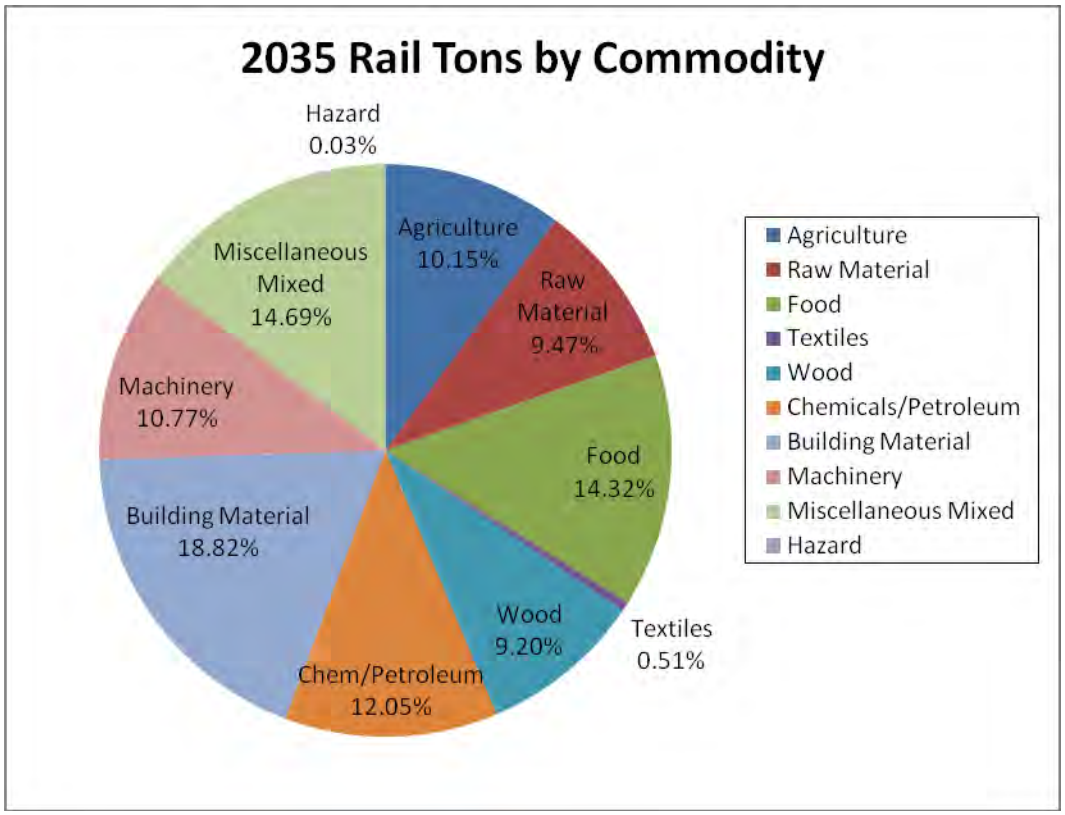


Figure 3-13: 2035 Rail Commodity Distribution (Imports, Exports, and Internal)

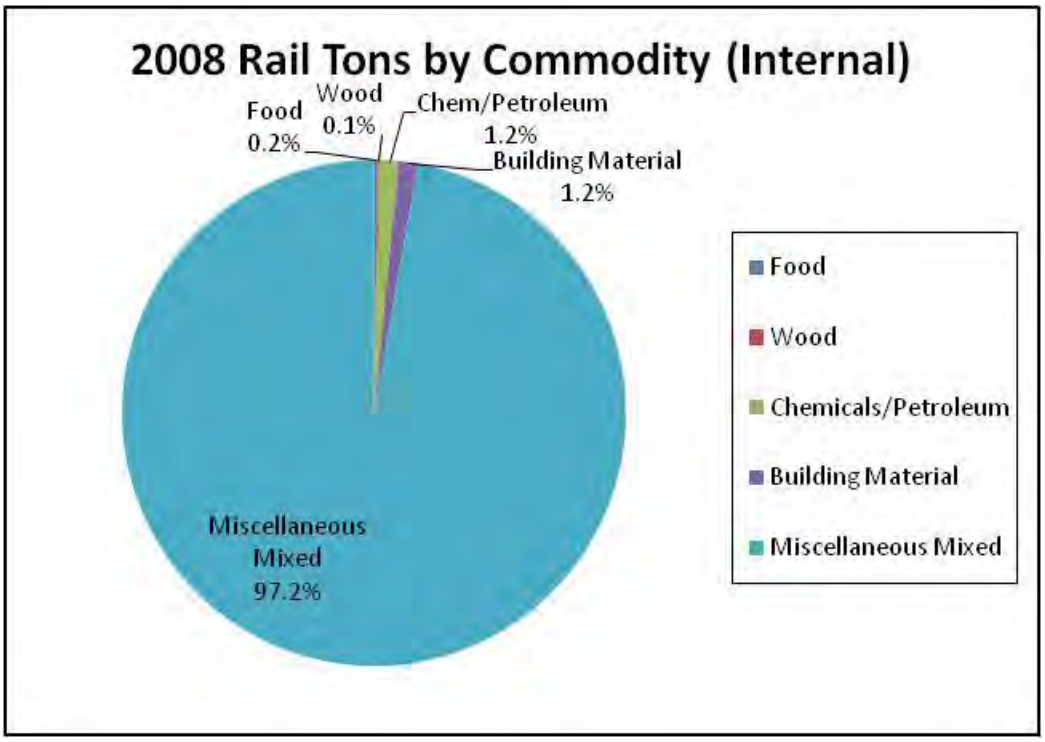


Figure 3-14: 2008 Rail Freight Within the Study Region Commodity Distribution

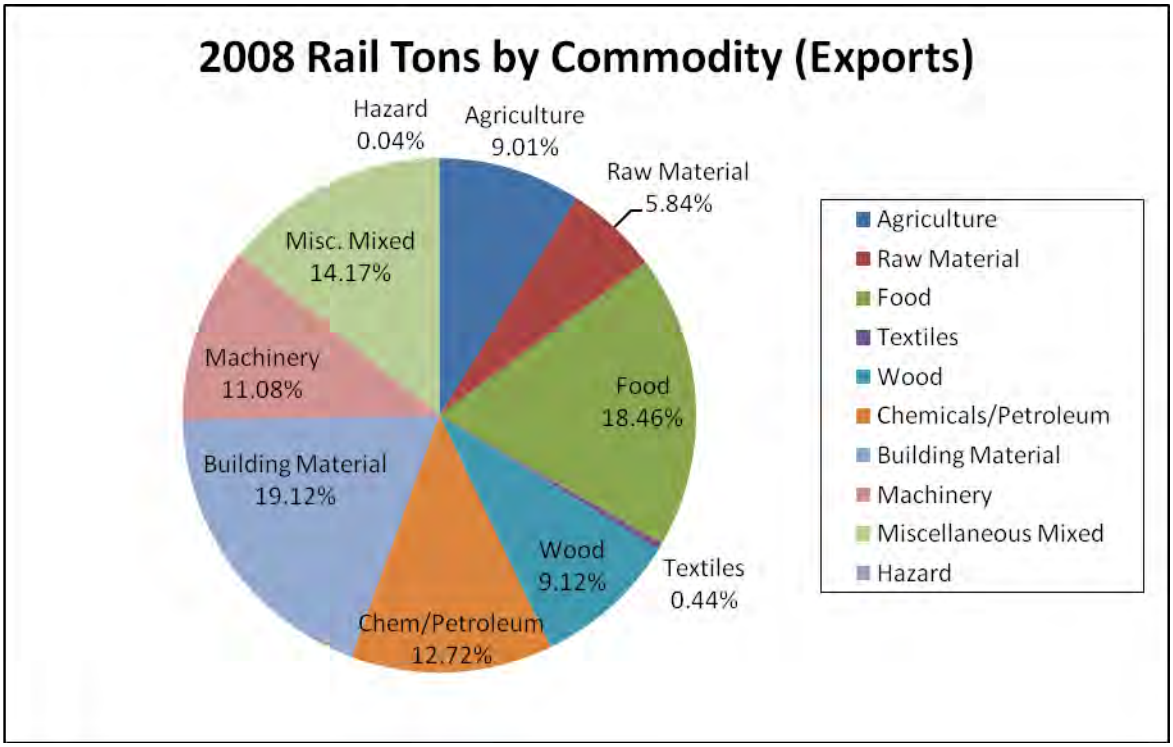


Figure 3-15: 2008 Rail Freight Out Of the Study Region Commodity Distribution

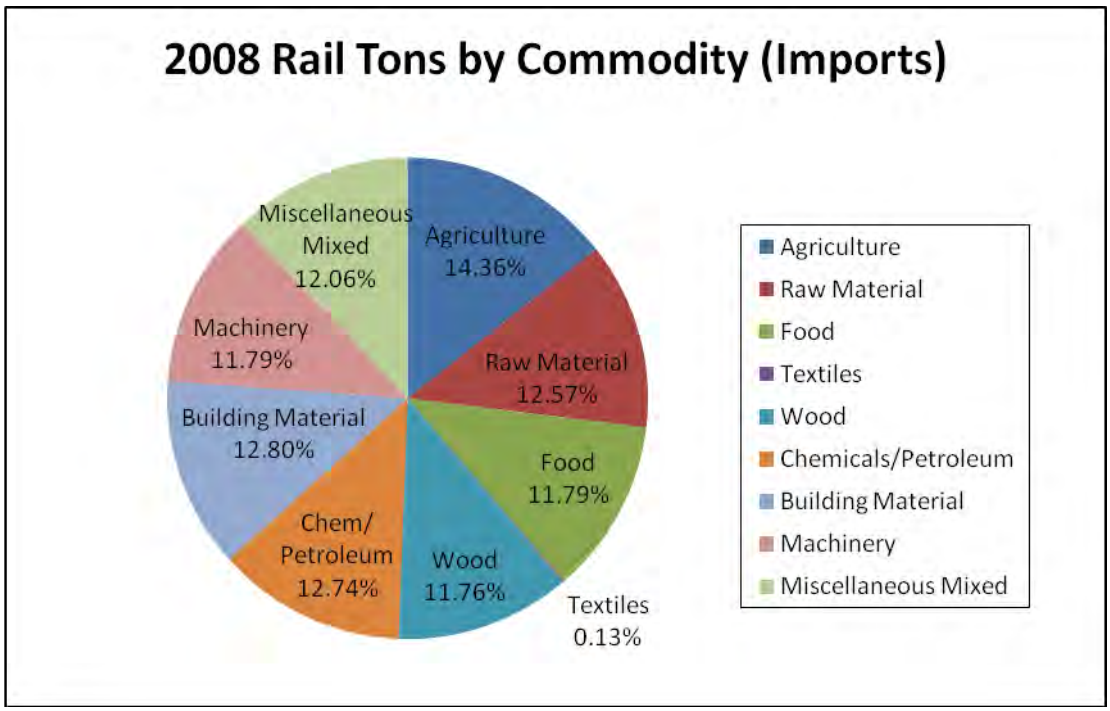
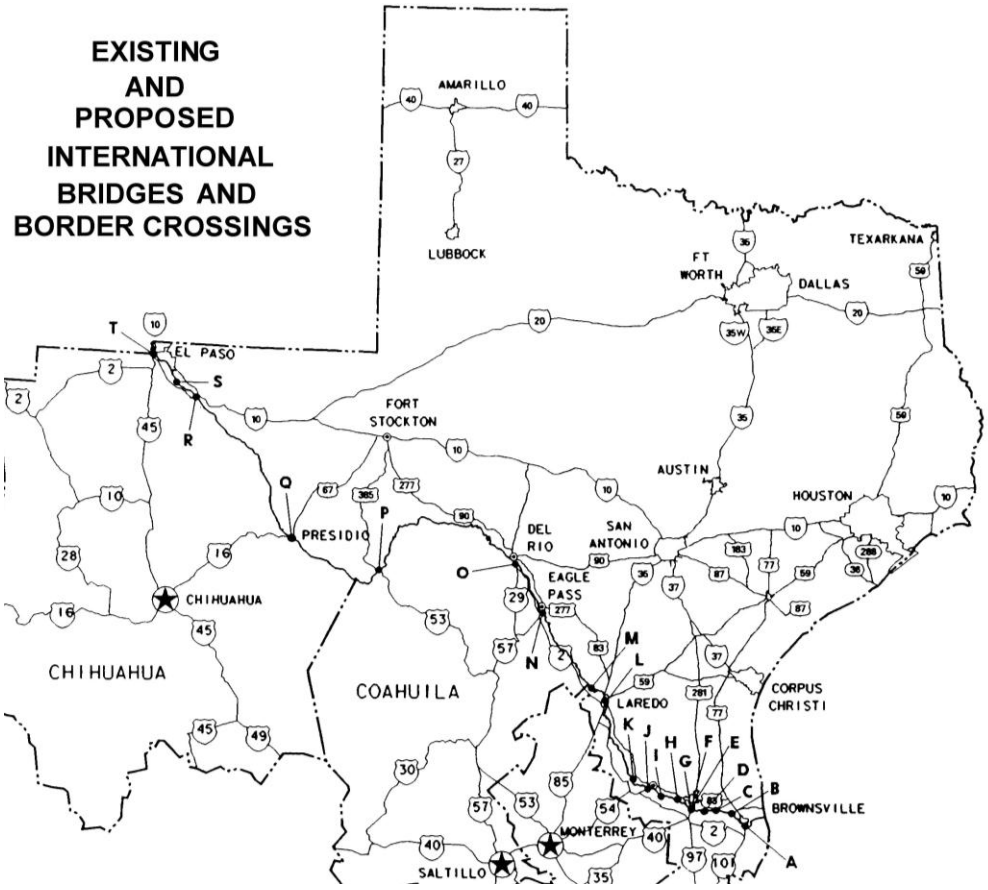


Figure 3-16: 2008 Rail Freight Into the Study Region Commodity Distribution

Rail Border Crossings

There are 31 existing Texas-Mexico border crossings, including five rail-only crossings (Brownsville, Laredo, Eagle Pass, and two at El Paso), 23 operational vehicular border crossings, and three dam or ferry crossings. Additionally, there are seven proposed crossings along the Texas-Mexico border, two of which are under construction. The locations of the existing, proposed, and closed crossings are shown in Figure 3-17 (note that several locations such as Brownsville, El Paso, and Laredo include more than one border crossing).



A	Brownsville-Matamoros	K	Falcon Heights-Ciudad Guerrero
B	Los Indios-Lucio Blanco	L	Laredo-Nuevo Laredo
C	Progreso-Nuevo Progreso	M	Laredo-Columbia
D	Donna-Rio Bravo (Proposed)	N	Eagle Pass-Piedras Negras
E	Pharr-Reynosa	O	Del Rio-Ciudad Acuna
F	Hidalgo-Reynosa	P	La Linda (Closed)
G	Mission-Reynosa (Proposed)	Q	Presidio-Ojinaga
H	Los Ebanos-Gustavo Diaz Ordaz	R	Fort Hancock-El Porvenir
I	Rio Grande City-Camargo	S	Fabens-Caseta
J	Roma-Ciudad Miguel Aleman	T	El Paso-Ciudad Juárez

Figure 3-17: U.S.-Mexico Border Crossings Along Texas Border[3]

[3] Source: Texas-Mexico International Bridges and Border Crossings Existing and Proposed, TxDOT, 2009.

The Study Region includes two active rail border crossings with Mexico, which are located in El Paso, as well as an inactive border crossing at Presidio that has been out of service since the bridge burned down in 2008. The rail border crossings locations within the Study Region are shown in Figure 3-18.

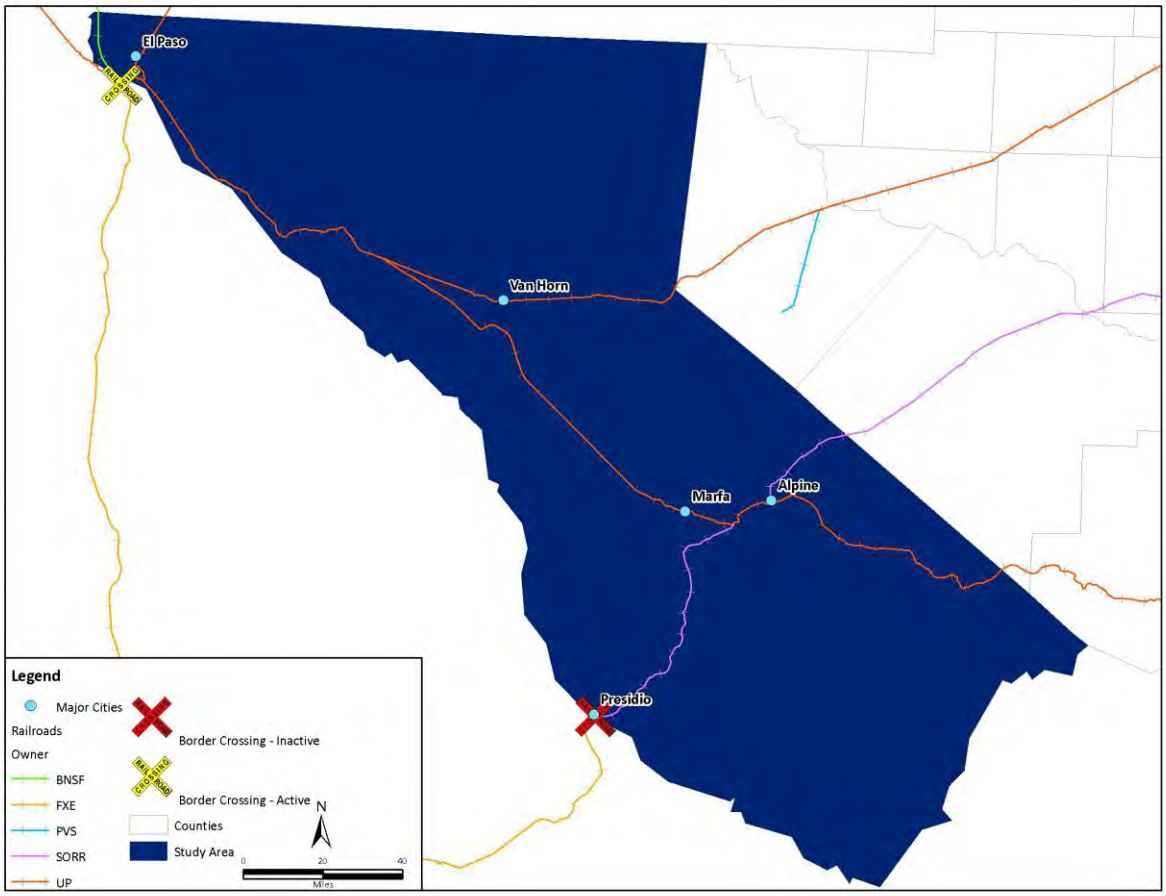


Figure 3-18: El Paso Region Rail Border Crossings

As shown in Figure 3-19, the freight moved through the border crossings within the Study Region comprises 11 percent of all U.S.-Mexico rail trade across the Texas border. Additional rail freight previously crossed the border at Presidio, although that crossing is currently out of service. Approximately 86 percent of U.S.-Mexico rail trade crosses the Texas border, while the remainder crosses at the Arizona and California borders.

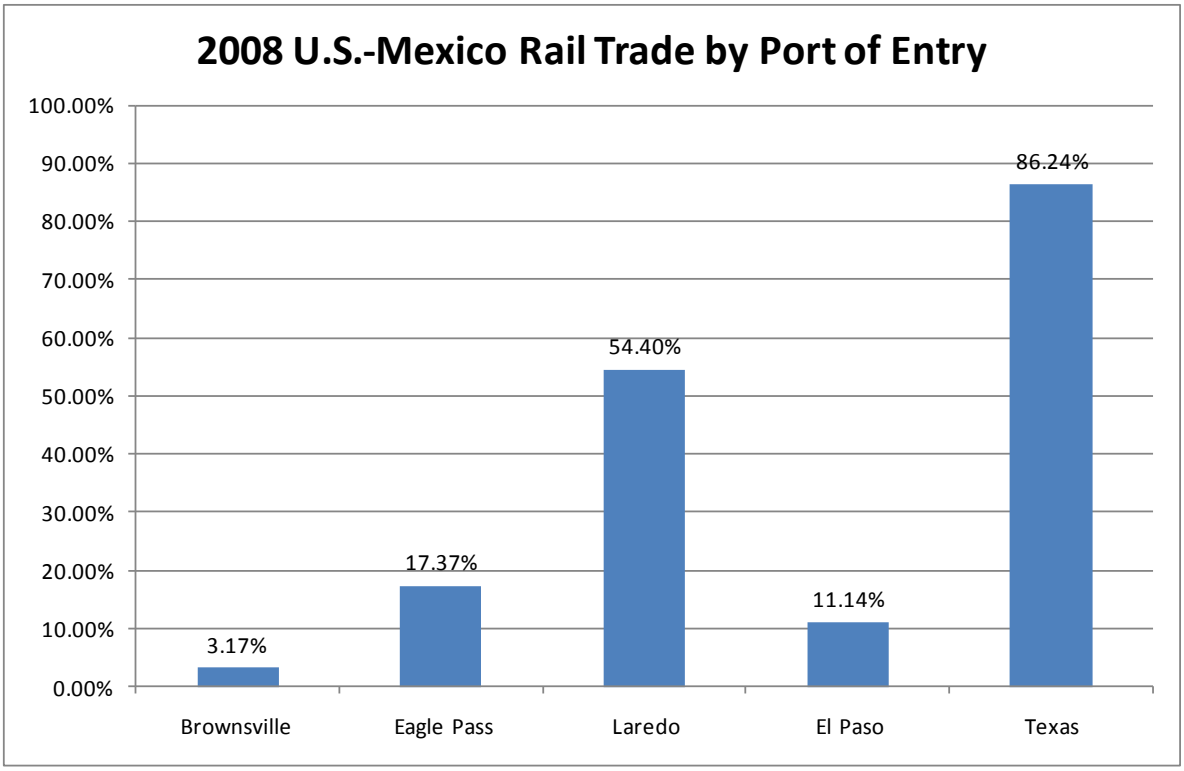


Figure 3-19: Percentage of Rail Trade ($ Value) by Texas Port of Entry
Source: North American TransBorder Freight Data
(http://www.bts.gov/programs/international/transborder/TBDR_QA.html)

SECTION 4: EXISTING RAIL SYSTEM INVENTORY

El Paso is distinguished as a primary international railroad crossing where two Class I U.S. railroads, UP and BNSF, interchange with one of Mexico's major railroads, Ferrocarril Mexicano (Ferromex). The Ferromex line through northern Mexico to El Paso was at one time known as the Mexico North-Western Railway. Started as the Rio Grande, Sierra Madre & Pacific Railway, the Mexico North-Western was financed by Canadian interests to reach logging and mining operations in the western part of Chihuahua, and owned the El Paso Southern Railway that was formed in 1897 to extend the railroad into El Paso.

The El Paso Southern consisted of only two miles of track and performed switching operations between Mexico North-Western and three US railroads, the El Paso & Northeastern, the Galveston, Harrisburg & San Antonio (a Southern Pacific company), and the Atchison, Topeka & Santa Fe. In 1937, the Railroad Commission of Texas reclassified the El Paso Southern as a terminal railroad since its function was to provide switching service in El Paso to each of the four line haul railroads. The Mexico North-Western Railway was merged into the Ferrocarriles Nacionales de Mexico (Mexico's state-owned railroad) in 1954. However, the Mexican government privatized and divided the railroad into four separate entities in 1995, in which the original Mexico North-Western line became part of Ferrocarril Mexicano (Ferromex).

The El Paso & Northeastern consisted of what is now the eastern-most end (within the City of El Paso) of UP's Lordsburg Subdivision, which extends from El Paso to Tucson, and Carrizozo Subdivision, which makes up the southern section of UP's line from El Paso to Kansas City. The western segment of the Galveston, Harrisburg & San Antonio is now UP's Valentine Subdivision, which runs between El Paso and Alpine. As a Southern Pacific company the Galveston, Harrisburg & San Antonio was essentially the Texas segment of Southern Pacific's Sunset Route that extends from Los Angeles to New Orleans. To the west of El Paso, the Sunset Route is comprised of double track sections that were substantially formed through Southern Pacific's acquisition of the El Paso & Southwestern, which was purchased by Southern Pacific in 1924.

El Paso has two rail border crossings that consist of steel bridges on each side of the Paso Del Norte International Bridge as shown in Figure 4-1. The eastern crossing is owned and operated by UP and continues along the Valentine Subdivision to Alfalfa Yard on the U.S. side of the border. The western crossing is owned and operated by BNSF and continues along the El Paso Subdivision to the BNSF El Paso Intermodal Terminal, Santa Fe Yard, on the U.S. side of the border. An additional border crossing is located within the study area at Presidio, although the crossing has been inactive since 2008 when the U.S. side of the bridge burned down.

Figure 4-1: El Paso Rail Border Crossings[1]

More than 535 miles of mainline railroad tracks, eight miles of rail bridge structures, six rail yards, and three rail border crossings make up the rail network within the El Paso region. The railroads serving the region consist of the UP, BNSF, and Texas Pacifico Transportation, which operates the South Orient Railroad owned by the Texas Department of Transportation. Each of the rail lines within the El Paso region are listed below and shown in Figures 4-2 and 4-3.

- Class I Railroads
  - UP
    - Carrizozo Subdivision
    - Lordsburg Subdivision
    - Toyah Subdivision
    - Valentine Subdivision
    - Sanderson Subdivision
  - BNSF
    - El Paso Subdivision
- Shortline Railroads
  - South Orient Railroad

[1] Texas Rail Plan, Texas Department of Transportation, November 2010.

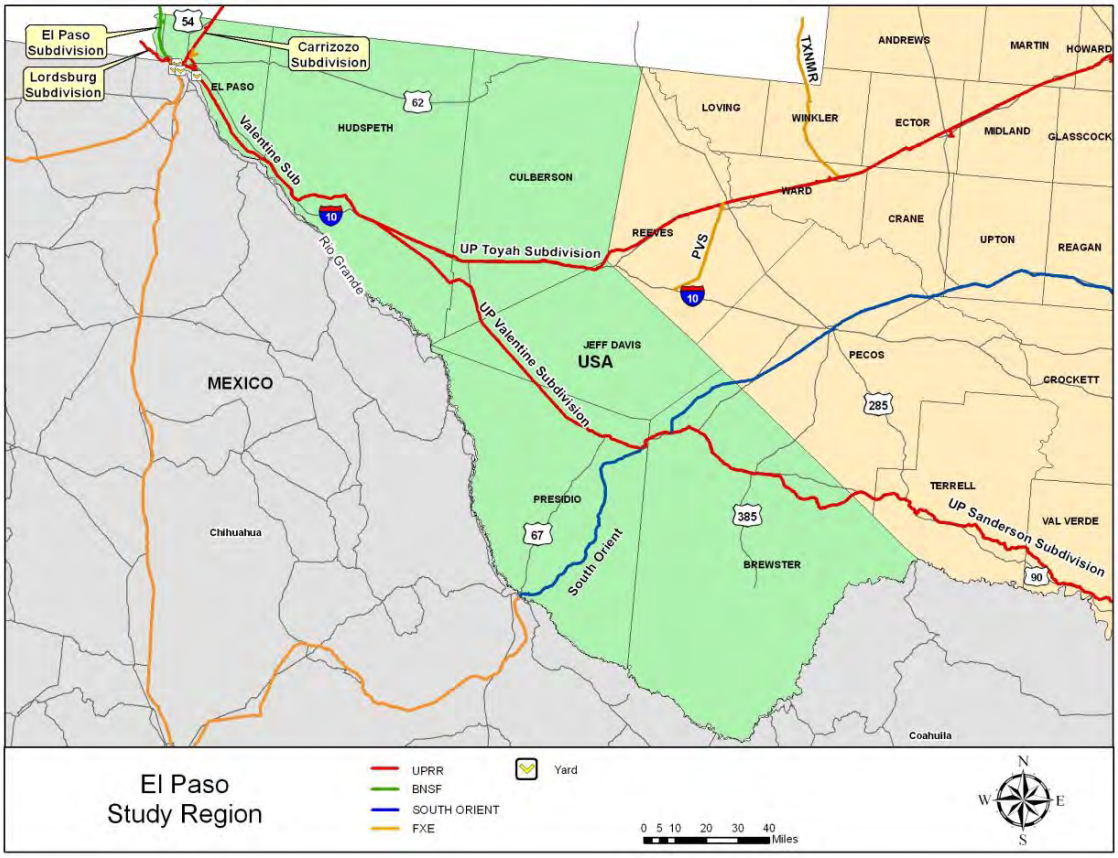


Figure 4-2: El Paso Region Railroad Subdivisions

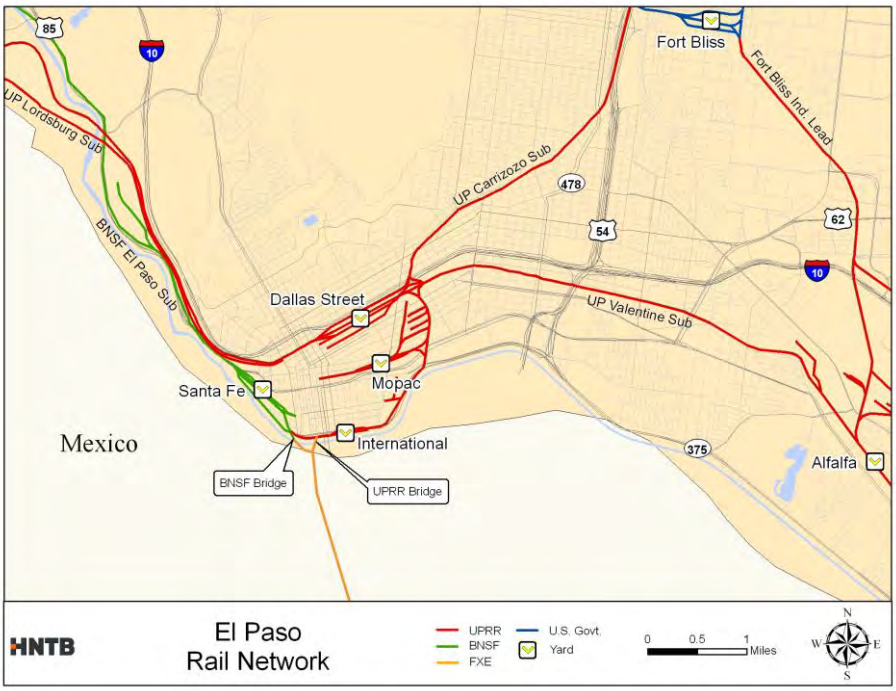


Figure 4-3: El Paso Terminal

The physical characteristics of each rail line are summarized in this section, with detailed inventories for the track, bridges, and roadway-railroad crossings included in Appendix C of this report. Tables 4-1 and 4-2 summarize the track mileage data for the rail lines in the El Paso region.

Railroad Subdivision:	**Miles of Mainline Track:**	**Miles of Siding Track:**	**Total Miles (ML & Sidings):**
UP			
Carrizozo	18.18	1.79	19.97
Lordsburg	15.12	0.00	15.12
Sanderson	73.94	17.33	91.27
Toyah	79.96	9.19	89.15
Valentine	216.26	34.46	250.72
Subtotal:	*403.46*	*62.77*	*466.23*
BNSF			
El Paso	19.48	5.57	25.05
Shortline Railroads			
South Orient	112.20	7.31	119.51
Total:	**535.14**	**75.65**	**610.79**

Table 4-1: El Paso Region Track Inventory Summary by Subdivision[2]

Railroad Subdivision:	**Miles of Mainline Track:**	**Miles of Siding Track:**	**Total Miles (ML & Sidings):**
UP			
El Paso	91.98	11.57	103.55
Hudspeth	110.72	17.38	128.1
Culberson	66.18	9.97	76.15
Jeff Davis	30.34	3.75	34.09
Presidio	120.24	12.32	132.56
Brewster	115.68	20.66	136.34
Total:	**535.14**	**75.65**	**610.79**

Table 4-2: El Paso Region Track Inventory Summary by County[3]

[2] Not including yard tracks.
[3] Not including yard tracks.

UP Carrizozo Subdivision

The Carrizozo Subdivision starts at West Vaughn, New Mexico, where the line meets the UP Tucumcari Subdivision, and ends in El Paso, Texas at Tower 47. The subdivision is approximately 228 miles in length, of which approximately 18 miles are within the study region in El Paso County. The rail line is single track with limited sidings and terminates at Tower 47 at the northern end of the UP Dallas Street Yard in El Paso. BNSF has trackage rights along the entire length of the subdivision.

This section of railroad was constructed by the El Paso and Northeastern Railroad in 1899. In 1905, the El Paso and Southwestern Railroad purchased the tracks from the El Paso and Northeastern Railroad. Southern Pacific took control of the El Paso and Southwestern Railroad in 1924; at that time the line was as part of what was known as the Golden State Route, which extended from El Paso to Kansas City. The subdivision is now owned and operated by UP, which acquired the Southern Pacific Railroad in 1996.

Table 4-3 summarizes the track mileage data for the subdivision through El Paso County. The Carrizozo Subdivision includes six railroad bridges for a total length of nearly 370 feet within the study area, with each bridge ranging from approximately 20 to 120 feet long.

County:	Miles of Mainline Track:	Miles of Siding Track:	Total Miles:
El Paso	18.18	1.79	19.97

Table 4-3: UP Carrizozo Subdivision Track Inventory Summary

UP Lordsburg Subdivision

The Lordsburg Subdivision is an east-west line between Tucson, Arizona and El Paso, Texas, where it terminates just east of Tower 47 at the UP Dallas Street Yard. The subdivision is approximately 311 miles in length, of which approximately 5 miles are within the limits of the study region in El Paso County. The Amtrak Sunset Limited route that runs from Los Angeles, California to New Orleans, Louisiana runs along the Lordsburg Subdivision.

The rail line consists of three mainline tracks within the project limits (just north of the international crossing), and crosses the Rio Grande River and U.S. 85/Paisano Drive into Mexico with two mainline tracks. The line continues west approximately 16 miles into New Mexico with two mainline tracks until it reaches Strauss, where the line transitions to a single mainline track.

The main section of this railroad was constructed by the Southern Pacific Railroad in 1881, with other portions of the subdivision completed prior to 1881. This section of railroad was part of a segment of line considered the second transcontinental rail link at that time. The El Paso and Northeastern Railroad also completed a segment of track at the eastern terminus in 1899 and was purchased by Southern Pacific in

1924. The subdivision is now owned and operated by UP, which acquired the Southern Pacific Railroad in 1996.

Table 4-4 summarizes the track mileage data for the Lordsburg Subdivision, while Table 4-5 displays the locations and lengths of major bridges on the subdivision through El Paso County.

County:	Miles of Mainline Track:	Miles of Siding Track:	Total Miles:
El Paso	5.04 (for each of three mainlines)	0.00	15.12
Total	**15.12**	**0.00**	**15.12**

Table 4-4: UP Lordsburg Subdivision Track Inventory Summary

Milepost:	Location/ Description (Length):	County:
1292.44	Rio Grande (1673') (on Mainline No. 2)	El Paso
1292.96	Rio Grande (1132') (on Mainline No. 1)	El Paso

Table 4-5: UP Lordsburg Subdivision Major Bridge Inventory

UP Sanderson Subdivision

The Sanderson Subdivision runs between Alpine, Texas, where it meets the Valentine Subdivision, and Del Rio, Texas, where it meets the Del Rio Subdivision. The subdivision is approximately 231 miles in length, of which approximately 74 miles are within the limits of this study in Brewster County. The rail line consists of a single mainline track with limited sidings.

The Sanderson Subdivision was constructed in 1881 and 1882 by the Galveston, Harrisburg, and San Antonio Railway and is now owned and operated by UP.

Table 4-6 summarizes the track mileage data for the Sanderson Subdivision, while Table 4-7 displays the locations and lengths of major bridges on the subdivision within the El Paso District. The subdivision includes more than 137 railroad bridges for a total length of nearly 7,500 feet within the study area, with each bridge ranging from approximately 15 to 380 feet long.

County:	Miles of Mainline Track:	Miles of Siding Track:	Total Miles:
Brewster	73.94	17.33	91.27

Table 4-6: UP Sanderson Subdivision Track Inventory Summary

Milepost:	Location Description:	County:
547.45	(379')	Brewster
548.01	(271')	Brewster
549.94	(284')	Brewster
561.78	(240')	Brewster
597.80	(314')	Brewster

Table 4-7: UP Sanderson Subdivision Major Bridge Inventory

UP Toyah Subdivision

The Toyah Subdivision runs between the end of the Valentine Subdivision at Sierra Blanca and Sweetwater, Texas where it meets the Baird Subdivision, which continues to Fort Worth. The subdivision is approximately 321 miles in length, of which approximately 80 miles are within the limits of this study crossing through Hudspeth, Culberson, and Jeff Davis Counties and through the cities of Sierra Blanca and Van Horn. The rail line consists of a single mainline track with sidings.

The Toyah Subdivision was constructed in 1881 by the Texas and Pacific Railway Company, which was later acquired by Missouri Pacific and eventually merged with UP.

Table 4-8 summarizes the track mileage data for the Toyah Subdivision, while Table 4-9 displays the locations and lengths of major bridges on the subdivision within the El Paso District. The subdivision includes more than 60 railroad bridges for a total length of nearly 4,500 feet within the study area, with each bridge ranging from approximately 15 to 350 feet long.

County:	Miles of Mainline Track:	Miles of Siding Track:	Total Miles:
Hudspeth	28.11	2.78	30.89
Culberson	47.32	6.41	53.73
Jeff Davis	4.53	0.00	4.53
Total	**79.96**	**9.19**	**89.15**

Table 4-8: UP Toyah Subdivision Track Inventory Summary

Milepost:	Location/ Description (Length):	County:
764.30	Waterway (167')	Hudspeth
739.80	Hillside Creek (174')	Culberson
730.65	Wild Horse Creek (348')	Culberson
717.90	Waterway (155')	Culberson
694.15	Waterway (175')	Jeff Davis
694.01	Waterway (181')	Jeff Davis

Table 4-9: UP Toyah Subdivision Major Bridge Inventory

UP Valentine Subdivision

The Valentine Subdivision starts just east of Tower 47 at the UP Dallas Street Yard in El Paso at the terminus of the Lordsburg Subdivision and ends west of Alpine, Texas where the line continues east toward Del Rio as the Sanderson Subdivision. The subdivision is approximately 216 miles in length, all of which is within the limits of this study. The Valentine Subdivision crosses through El Paso, Hudspeth, Culberson, Jeff Davis, Presidio, and Brewster Counties and passes through the cities of El Paso, Sierra Blanca, Valentine, and Marfa. The Amtrak Sunset Limited route runs along the Valentine Subdivision and the BNSF also has trackage rights on this segment of track from El Paso to Sierra Blanca. The rail line consists of a double track mainline from Tower 47 in El Paso for approximately 12 miles going east, where it transitions to a single mainline track with limited sidings for the remainder of the subdivision.

The Valentine Subdivision was constructed in 1881 by the Galveston, Harrisburg, and San Antonio Railway. The track was leased to Southern Pacific in the mid- to late-1880s and was leased to the Texas and New Orleans Railroad Company in 1934. In 1961 the track merged with Southern Pacific. The subdivision is now owned and operated by UP, which acquired the Southern Pacific Railroad in 1996.

Table 4-10 summarizes the track mileage data for the Valentine Subdivision, while Table 4-11 displays the locations and lengths of major bridges on the subdivision within the El Paso District. The subdivision includes nearly 330 railroad bridges for a total length of nearly 14,000 feet within the study area, with each bridge ranging from approximately 15 to 270 feet long.

County:	Miles of Mainline Track:	Miles of Siding Track:	Total Miles:
El Paso	39.20	4.21	43.41
Hudspeth	82.61	14.60	97.21
Culberson	18.86	3.56	22.42
Jeff Davis	25.81	3.75	29.56
Presidio	44.34	8.34	52.68
Brewster	5.44	0.00	5.44
Total	**216.26**	**34.46**	**250.72**

Table 4-10: UP Valentine Subdivision Track Inventory Summary

Milepost:	Location/ Description (Length):	County:
779.61	(222')	Hudspeth
775.16	(224')	Hudspeth
770.97	Diablo Creek (270')	Hudspeth
749.35	Balluca Canyon (246')	Hudspeth
705.32	Drainage Ditch (255')	Hudspeth

Table 4-11: UP Valentine Subdivision Major Bridge Inventory

BNSF El Paso Subdivision

The BNSF El Paso Subdivision begins in Isleta, New Mexico (south of Albuquerque) and ends in El Paso, Texas at the border with Mexico. The subdivision is approximately 241 miles in length, of which approximately 19 miles are within the limits of the study in El Paso County. The rail line consists of a single mainline track with limited sidings with a yard near the southern terminus at the border with Mexico.

The El Paso Subdivision was constructed from El Paso to the Texas-New Mexico border by the Rio Grande and El Paso Railroad Company in 1881 as a connection to the Atchison, Topeka, and Santa Fe Railway (AT&SF) line to the north. The segment from El Paso to the state line was leased by AT&SF as it was its only connection to Mexico at the time. The Rio Grande and El Paso Railway connection was absorbed by the AT&SF in 1994; in 1996 the AT&SF merged with the Burlington Northern Railroad to form BNSF Railway Company.

Table 4-12 summarizes the track mileage data for the El Paso Subdivision, while Table 4-13 displays the locations and lengths of major bridges on the subdivision within the El Paso District. The subdivision includes nearly 30 railroad bridges for a total length of nearly 1,400 feet within the study area, with each bridge ranging from approximately 15 to 210 feet long.

County:	Miles of Mainline Track:	Miles of Siding Track:	Total Miles:
El Paso	19.48	5.57	25.05

Table 4-12: BNSF El Paso Subdivision Track Inventory Summary

Milepost:	Location/ Description (Length):	County:
1143.91	(209')	El Paso

Table 4-13: BNSF El Paso Subdivision Major Bridge Inventory

South Orient Railroad

The South Orient Railroad starts at the Texas-Mexico border at Presidio, runs northeast through Alpine and Fort Stockton, and ends at San Angelo Junction near San Angelo, Texas. The subdivision is approximately 386 miles in length, of which approximately 112 miles are within the limits of this study. The rail line consists of a

single mainline track with limited sidings and has trackage rights along a portion of the UPRR Valentine Subdivision from Paisano to Alpine.

The segment of the South Orient Railroad from Alpine to Girvin was constructed by the Kansas City, Mexico, and Orient Railway in 1913 to connect with the Galveston, Harrisburg, and San Antonio Railway line that traveled east-west. After the railroad was purchased by the Atchison, Topeka, and Santa Fe in 1924, the segment of track from Alpine to Presidio was completed. In 1992 the South Orient Railroad Company bought the track and sold it to the Texas Department of Transportation in 2001. The line is currently operated through lease by Texas Pacifico Transportation.

Table 4-14 summarizes the track mileage data for the South Orient, while Table 4-15 displays the locations and lengths of major bridges on the subdivision within the El Paso District. The subdivision includes nearly 150 railroad bridges for a total length of nearly 12,600 feet within the study area, with each bridge ranging from approximately 15 to 450 feet long.

County:	Miles of Mainline Track:	Miles of Siding Track:	Total Miles:
Brewster	36.30	3.33	39.63
Presidio	75.90	3.98	79.88
Total	**112.20**	**7.31**	**119.51**

Table 4-14: South Orient Railroad Track Inventory Summary

Milepost:	Location/ Description (Length):	County:
1019.50	(1140') Presidio Border Crossing – Destroyed in Fire/ Out of Service	Presidio
1009.50	(424')	Presidio
998.50	(300')	Presidio
967.20	(308')	Presidio
929.00	(448')	Brewster

Table 4-15: South Orient Railroad Major Bridge Inventory

SECTION 5: RAIL MODELING

Rail Traffic Controller

Rail Traffic Controller (RTC) is a computer program created by Berkeley Simulation Software, LLC, which simulates the operation of trains over a railroad network. Variations can be made in network track layouts, train consists and schedules, and operating rules and constraints, which allows the testing of such changes before they are implemented. RTC is used by almost all North American Class I railroads to evaluate and plan their operations and capital expenditures. The Class I carriers whose track and trains are modeled in this study (BNSF and UP) use the model, are familiar with the methodology, and accept the model's results when it is used to their standards.

RTC Input Files:

The simulation model consists primarily of two kinds of files:

- *Network files* include track, signals, grades, curves, bridges, road crossings, and railroad junctions or interlockings. These files can be as detailed as required to obtain accurate results; distances can be specified to within six feet, though that level of precision is seldom required. The network files also allow the simulation to reflect the specific time that segments of track must be withdrawn from service for maintenance-of-way activity.

- *Train files* include all information related to individual trains including their identity, type, weight, length, locomotives, time and day of operation, relative priority, origin and destination, route, railroad carrier, and intermediate work, if any. In all simulation cases run for this study, each train instance is treated individually. Additionally, no two days in the model are identical. Some freight trains operate on completely random schedules, according to traffic demands; or according to availability of resources, such as locomotives and crews. This variation in rail operations is fully captured in these RTC simulations.

RTC Dispatching Logic:

As the simulation "dispatcher" sends trains across the railroad network, it resolves conflicts between trains in the same manner as an actual railroad dispatcher. The model's dispatcher resolves conflicts with full knowledge of all trains on the modeled network and with the anticipating capability available to a computer program. Unless a train is badly delayed, or the crew is nearing the federally mandated 12 hours-of-continuous-service limit, both actual railroad dispatchers and the simulation program "dispatcher" will generally give preference to passenger trains over expedited freight trains, to expedited freight trains over lower priority manifest freight trains, and to through manifest trains over local freight trains or yard engines. These priorities are determined by the freight railroads and are incorporated into the meet-pass logic used to resolve train conflicts.

RTC and actual dispatchers make decisions based on many factors involved in train performance:

- Priority
- Type of train
- Time available for the train and engine crew to work
- Train length and weight
- Locomotive power
- Scheduled work

When there is a particularly complicated series of conflicts, the model, as well as an actual dispatcher, discards normal priorities and seeks alternate solutions that will keep the railroad as fluid as possible under the circumstances. The RTC model fails occasionally, and repeated failures are a good sign that what's being attempted is impossible or at the very least unsustainable; which means that the rail demand being placed on the available infrastructure network and the practical capacity of that network are incompatible.

The model will generally minimize the total cost of delay for all trains involved in a conflict or a series of conflicts, with up to 30 trains involved in a related series of conflicts. These conflicts frequently arise around congested terminals or on high-density line segments. Every decision to advance one train and delay another has its own set of resulting impacts; RTC sorts through the impacts and settles on the solution that seems to work best. However, there are times when the RTC model makes an incorrect or poor decision, just as actual dispatchers. The RTC decisions are analyzed and are left standing if they are realistic or have no significant impacts. Others are rejected in the case "resolution" process, whereby the RTC user intervenes to change an initial RTC decision for a better or more realistic one.

In reality, dispatchers make decisions in real time without the knowledge possessed by RTC and without the luxury of revising decisions until the delay cost is minimized. As a result, RTC solutions may be more optimistic than can be expected in real life. In practice, RTC base cases designed to measure current performance under current conditions in order to establish a starting point for subsequent comparisons typically calibrate to within a small percentage of actual movement records. The process of validating the base case model is an important part of ensuring that model outputs in planning cases are reliable.

RTC Performance Measures:

RTC is designed to measure railroad performance in time. There are measures, such as fuel consumption, which are not specifically time-related, but the measures used are time-related for most practical purposes. Some measures are "absolute" numbers, while some are ratios or normalized measures of performance.

The measures used and those shown in the following discussions of the simulation cases are as follows:

Train count – the number of trains over a period (per day or per week) measured in the model. This number is always less than the number of trains in the case since trains that do not complete their entire run within the measured week are excluded from the statistics so that they do not distort the results. All trains in the case are dispatched; however, not all trains are measured.

Average speed – the average operating speed (in miles per hour) of the measured trains operating across the entire network or across a specific part of the network (i.e., a railroad Subdivision or District).

Delay Ratio – This is the ratio of congestion-related delay to "ideal" or "unimpeded" running time. Unimpeded time equals the time it would take to operate all the trains, including any en-route work they need to do or requirements they would have to meet (like federally mandated brake system tests), without any congestion-related delay. The numerator in the ratio, which varies, is delay - meaning that a higher ratio indicates worse conditions. The denominator doesn't change within a case and represents the irreducible minimum amount of time that it would take to run the railroad. The ratio is one measure of "normalized" delay. The ratio allows comparison of performance between simulation cases or between segments of the railroad network, where the train counts are not the same. A lower the delay ratio indicates expected better sustainable train performance.

Delay Hours/Day – This is the absolute number of train-hours per calendar day lost to congestion related delay. A "train-hour" is a useful measure, since it has an associated economic value. Reductions in delay hours equate to reductions in costs. However, a freight-train hour is one train either sitting still or running for one hour and does not account for the difference in value of one hour lost by a train with 100 loaded cars of time-sensitive freight versus one hour lost by a local train switching 20 cars per shift. Generally, those solutions that eliminate the largest number of delay hours per day turn out to be the most cost-effective at generating private benefits.

Delay Minutes/100 Train-miles – This is an alternate railroad industry measure of normalized delay. It functions much like the delay ratio (the numerator is actually the same, except reduced to minutes instead of hours), but the denominator is the distance trains travel over time, rather than just the time itself. These ratios often will be extremely high in terminals, because switch engines seldom go very far. By the same token, a significant reduction in delay minutes per 100 train miles will suggest a significant improvement in asset and labor productivity.

The RTC Base Case

Before the simulation model can be used to test alternative operating or investment plans, a base case in the model that represents the real world under current conditions must be built. Current performance can be validated; however, future or planning case performance can't be validated because it is hypothetical, and there is

no sure real-world test that can be performed to ensure that planning case results are realistic.

As a result, a base case is used and is refined until it yields performance numbers that match those in the current operation. Once it is verified that the current world is described correctly by the model, the model results can be trusted. The subsequent planning cases then have credibility also and can be trusted to have measured the effect of identified changes well enough that those results can be used to make investment decisions or to make changes to the operating plan.

The El Paso District Base Case has 2,175 track miles of railroad and 438 trains per week. The modeled network includes all principal rail lines and yards between San Antonio on the east and Anapra, New Mexico on the west, as well as the part of the UP Toyah Subdivision between Pecos and Sierra Blanca, the UP Eagle Pass Subdivision between Spofford and Piedras Negras, the BNSF El Paso Subdivision between Rincon, New Mexico and the international crossing to Ciudad Juárez at El Paso, and the UP Carrizozo Subdivision between Tower 47 in El Paso and the New Mexico State line.

The Base Case simulation network was constructed largely from railroad “track charts” supplied by the carriers. These schematic maps show the infrastructure network in sections, often in sheets showing five miles at a time. The detail on these charts allows the proper location of signals, switches, grade crossings, sidings, and yard tracks; and conveys the correct distances and grades between points. These charts, along with railroad timetables, also show the proper speed limits for trains on various parts of the network.

The Base Case train files were constructed partially from abstracted historical data covering train movements in the recent past. Neither BNSF nor UP participated directly in the study, so no proprietary data related to their train movements was used. Rather, a generic train file was constructed with trains distributed by type and frequency to simulate a typical operation across the network.

In addition, observational data was used where available to help make the train files as representative as possible. However, since the Class 1 railroads did not actively participate in this study, no formal interviews with railroad operating personnel were conducted, and therefore the information has not yet been confirmed as up-to-date or completely accurate. It should be accurate enough to describe the general relationship between demand, capacity, and performance.

There are 432 freight trains and six passenger trains in the Base Case train file. Of the 438 trains, 419 freight trains and all six passenger trains have complete, and therefore measured, runs in the simulation case. In the Base Case, the 419 measured freight trains in the simulation week break down as follows by type of train:

- Intermodal – 249
- Vehicles/Auto Parts – 38
- Manifest – 89
- Grain – 20
- Other Unit (chemicals, rock) – 11
- Locals – 6

Approximately 31% of all trains in the simulation use the UP Toyah Subdivision to or from Fort Worth, another 24% use the Carrizozo Subdivision to or from Tucumcari, and about 21% use the Sunset Route (UP Valentine, Sanderson, and Del Rio Subdivisions) to or from San Antonio. In addition, 13% of the measured trains operate to or from Eagle Pass, and the remaining 11% operate across the BNSF El Paso Subdivision to or from Belen, New Mexico.

Base Case Results

Table 5-1 below summarizes the Base Case train performance for all of the trains and track infrastructure modeled in the RTC network for one week; and for the each individual railroad subdivision (the BNSF El Paso Subdivision and the UP Carrizozo, Del Rio, Eagle Pass, Lordsburg, Sanderson, Toyah, and Valentine Subdivisions).

It is important to note that RTC measures all train delay only at the network level. When delay is measured in sub-sets of the network, such as individual subdivisions, the delay measured only accounts for trains that are stopped. The model has no way to attribute delay due to acceleration, deceleration, or slow running due to restrictive signals, when it is looking only at a specific train's performance across a piece of the network. Consequently, the subdivision-specific delay will typically account for only 85 to 90% of what RTC at the network level calls True Delay. Thus, in Table 5-1, the network performance measures a delay of 28.3 minutes per 100 train miles, which seems larger than the total should be if the delays on the three major subdivisions are considered. The difference is in RTC's statistical process, and is not the result of excessive delays being incurred in the terminals at San Antonio or El Paso.

In addition, the results for the Valentine Subdivision include all trains operating between El Paso and Sierra Blanca, irrespective of whether they operate via the UP Toyah Subdivision or the UP Valentine Subdivision east of that point. Consequently, the number of measured trains across the Valentine Subdivision is the sum of the train counts across the Sanderson and Toyah Subdivisions.

Similarly, the train count for the Del Rio Subdivision is approximately equal to the sum of the counts for the Sanderson and Eagle Pass Subdivisions, since all through trains to or from those two subdivisions also operate across the Del Rio Subdivision.

Subdivision	Trains (week)	Average Speed	Delay Ratio	Delay Mins per 100 Train Miles
Network	419	29.3 mph	20.4%	29.9
BNSF El Paso	43	21.1 mph	9.0%	17.1
UP Carrizozo	97	36.5 mph	10.5%	15.6
UP Del Rio	153	33.3 mph	13.2%	18.6
UP Eagle Pass	54	9.1 mph	18.2%	57.9
UP Lordsburg	309	9.6 mph	19.8%	45.8
UP Sanderson	87	29.8 mph	10.9%	18.3
UP Toyah	126	38.9 mph	9.4%	13.2
UP Valentine	213	37.8 mph	12.0%	16.9

Table 5-1: El Paso Region Base Case Rail Operations

As a general rule, delay ratios higher than 30% on a terminal subdivision and higher than 12 to 15% on a main-line subdivision, suggest that the railroad may be suffering high levels of congestion-related delay. Delays of more than 70 minutes per 100 train-miles on a main-line subdivision also cause concern. Inside terminals, delays per 100 train-miles are a bit misleading because trains don't go very far under the best of circumstances, so the denominator is small.

Using those standards, the results of the Base Case model show that the practical capacity of all these subdivisions is adequate with the possible exception of the line to Eagle Pass. The Eagle Pass subdivision is un-signaled, has lower allowable train speeds, and includes the time consuming interchange to/from Mexico. On the other modeled subdivisions, main track capacity east and north of El Paso is adequate based on the modeling results. Additionally, the existing train delays associated with fuel and crew changes at Dallas or Piedras Streets in El Paso will be eliminated once the UP fueling facility is relocated to Santa Teresa, New Mexico as planned.

Findings from the Base Case

The Base Case results suggest that investment will likely be needed in the route to the Mexican border if rail traffic grows substantially in the next 10 to 20 years. The remainder of the network in the El Paso study region likely has capacity for growth. East-west traffic across the UP Sunset Route west of El Paso divides into the three available routes east of El Paso; the topography is relatively favorable to railroad operations; track speeds are consistently high; and sidings are well spaced.

The BNSF El Paso Subdivision also appears to have capacity for growth based on the modeling results, although the small yard at El Paso and constrained capacity on the Mexican side limit the capacity of the international rail crossing at El Paso.

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

Historically, many towns and cities established adjacent to the railroads and major truck routes have thrived and turned into large municipalities over time, and are now faced with the dilemma of having railroad and truck freight operations pass directly through their central business districts. Additionally, as the municipalities have grown and prospered, so has residential land use adjacent to the truck routes and rail lines. Truck and rail freight movement through populated areas brings with it a potential exposure to safety hazards.

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 ($7,700 in 2006) or if there are any injuries or evacuations ordered in response to the incident.[1]

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.[2]

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 transportation mode. The annual reported number of incidents, property damage, reported personal injuries and fatalities is consistently larger for trucks as opposed to rail.

Safety Data and Statistics

Safety hazards involving freight rail operations include rail-roadway crossing accidents, trespasser casualties, train accidents and derailments, and hazardous material spills. The following section provides reported annual safety statistics such as the number of incidents, the resulting injuries and fatalities, and, in some cases, estimated damages as reported by the railroads over the time period from January 2005 through December 2009.[3] All safety data and statistics presented in this section were obtained from the FRA Office of Safety Analysis unless referenced otherwise.

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

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

[3] Complete data for 2010 was not available at the time of completion of this report.

Roadway-Rail At-Grade Crossing Accidents

Approximately 200 public at-grade roadway-rail crossings are located in the El Paso District. Table 6-1 depicts the number of public at-grade crossings for Texas and the El Paso District study area sorted by the type of warning device. The crossings listed for the El Paso District only include crossings with mainline tracks and exclude crossings at industry tracks and sidings. Table 6-2 shows the number of public and private crossings in the study limits, sorted by county, and includes crossings at mainline, industry, and siding tracks.

Texas 2010		El Paso District 2010	
Crossbucks (passive)	3589	Crossbucks (passive)	46
Lights only (active)	943	Lights only (active)	11
Gates (active)	4697	Gates (active)	94
Stop Signs	209	Stop Signs	18
Special Warning	65	Special Warning	8
Highway Traffic Signal	54	Highway Traffic Signal	6
Other (passive & active)	406	Other (passive & active)	6
Unknown	0	Unknown	12

Table 6-1: Public At-Grade Crossings for Texas and the El Paso District

County	Total		Private	Public
	Count	%		
Brewster	47	12.7	32	15
Culberson	14	3.8	5	9
El Paso	236	64.0	90	146
Jeff Davis	12	3.3	9	3
Hudspeth	19	5.1	8	11
Presidio	41	11.1	24	17
Total	**369**	**100**	**168**	**201**

Table 6-2: Total At-Grade Roadway-Rail Crossings for El Paso District

Figure 6-1 depicts the number of roadway-rail incidents in the state of Texas for the five-year time period from January 2005 through December 2009. The largest concentration of incidents within the study area over the five-year period occurred in El Paso County, which is the highest and most densely populated county in the study region due to the city of El Paso.

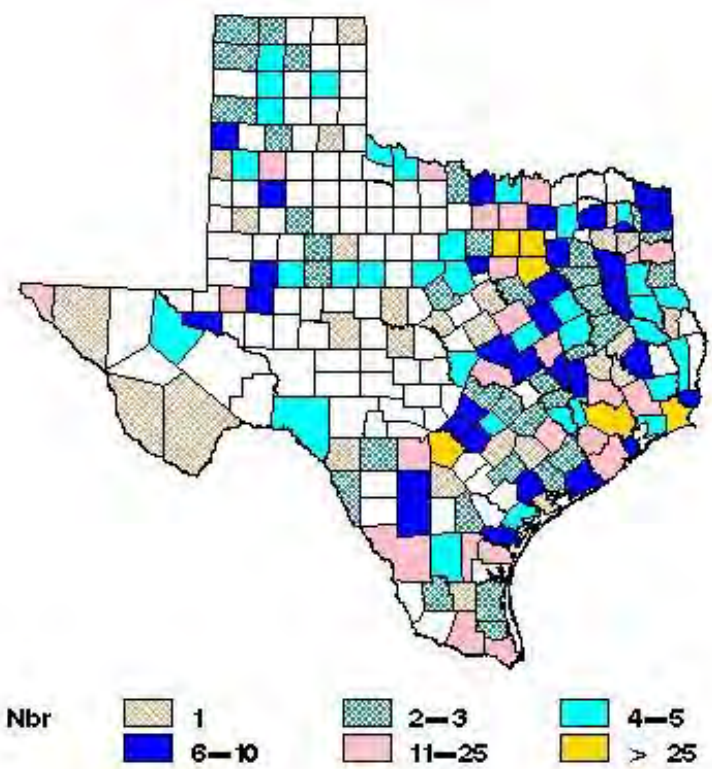


Figure 6-1: Roadway-Rail Incidents for Texas, January 2005 to December 2009

The six-county El Paso District experienced 27 roadway-rail at-grade crossing accidents from January 2005 through December 2009, including two fatalities and 12 injuries, as shown in Table 6-3. The roadway-rail incidents that occurred in El Paso County in the five-year timeframe accounted for nearly 90 percent of the total roadway-rail incidents within the six-county study area.

Roadway-Rail Incidents for El Paso District															
County	Totals			At Public Crossings						At Private Crossings					
				Motor Vehicle			Other			Motor Vehicle			Other		
	Cnt	Kld	Inj	Cnt	Kld	Inj	Cnt	Kld	Inj	Cnt	Kld	Inj	Cnt	Kld	Inj
Brewster	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Culberson	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
El Paso	24	2	9	18	2	5	0	0	0	6	0	4	0	0	0
Hudspeth	1	0	3	1	0	3	0	0	0	0	0	0	0	0	0
Jeff Davis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Presidio	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Total:	27	2	12	21	2	8	0	0	0	6	0	4	0	0	0
*Cnt = Incident Count, Kld = Fatalities, Inj = Injuries															

Table 6-3: Roadway-Rail Incidents for the El Paso District by County (2005-2009)

Trespasser Incidents

Trespasser incidents consist of pedestrians either injured or killed while trespassing on railroad property and do not include roadway-rail incidents. Trespasser incidents may include collisions with on-track equipment, slipping/ stumbling/ falling, exposure to fumes, etc., with the majority of incidents consisting of being struck by on-track equipment or slipping/ stumbling/ falling. A total of 24 trespasser incidents occurred in the El Paso District study limits from 2005 through 2009, of which 20 occurred in El Paso County. The number of trespasser incidents by county and year from 2005 through 2009 in the study area is listed in Table 6-4. Trespasser incidents consist of deaths and injuries caused by trespassing onto railroad property and do not include accidents associated with traffic at roadway-rail interfaces.

Trespasser Casualties (deaths and injuries) in El Paso District							
County	Total		Total Year Counts				
	Cases	% of Total	2005	2006	2007	2008	2009
Brewster	1	4.2%	0	1	0	0	0
Culberson	0	0.0%	0	0	0	0	0
El Paso	20	83.3%	7	6	4	2	1
Hudspeth	2	8.3%	2	0	0	0	0
Jeff Davis	0	0.0%	0	0	0	0	0
Presidio	1	4.2%	0	0	0	0	1
Total:	24	100%	9	7	4	2	2

Table 6-4: El Paso District Trespasser Incidents (2005 through 2009) by County

Train Accidents

There were 35 reported train accidents, which include derailments and train collisions, within the El Paso District from 2005 through 2009. Data provided by the railroads to the Federal Railroad Administration (FRA) shows the total cost of equipment and infrastructure damage was nearly $3 million within the study area over five years. Table 6-5 provides a summary of the train accident damage statistics in the El Paso District.

Train Accidents							
County	Totals				Type of Accident		
	Accidents	Killed	Injured	Reportable Damage	Collisions	Derailments	Other
Brewster	1	0	0	$721,047	0	1	0
Culberson	0	0	0	$0	0	0	0
El Paso	33	0	2	$1,846,604	4	26	3
Hudspeth	0	0	0	$0	0	0	0
Jeff Davis	0	0	0	$0	0	0	0
Presidio	1	0	0	$135,332	0	1	0
Total:	35	0	2	$2,702,983	4	28	3

Table 6-5: Train Accidents in the El Paso District by County (2005 through 2009)

Figure 6-2 depicts the number of train accidents, excluding roadway-rail incidents, in the state of Texas for the time period from January 2005 through December 2009.

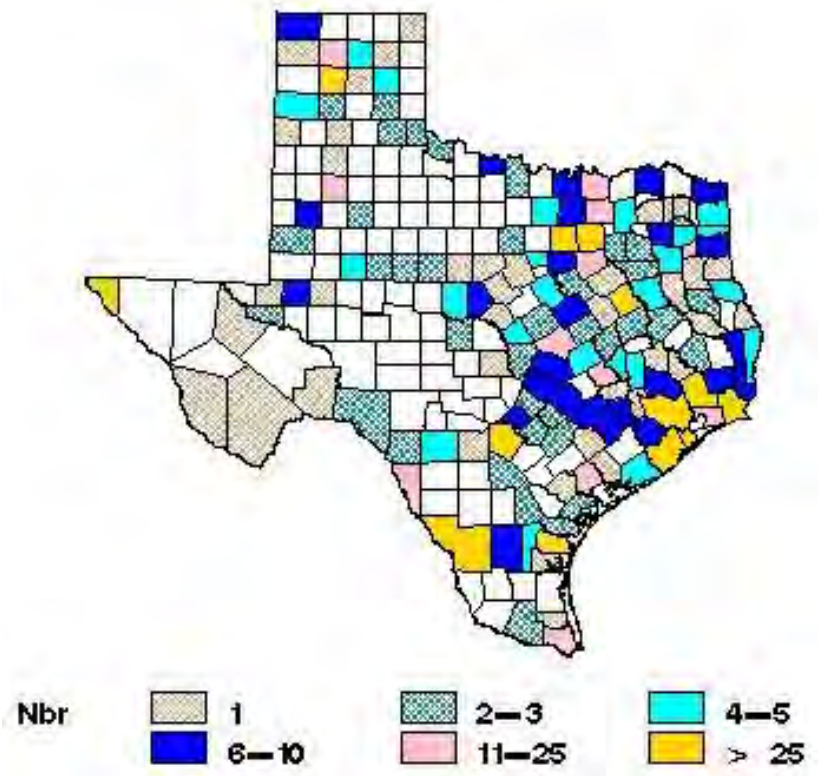


Figure 6-2: Train Accidents for Texas, January 2005 through December 2009

The Federal Railroad Administration (FRA) reports that the majority of serious events involving train derailments or train collisions have been associated with track conditions and human factors.[4] Figure 6-3 shows how track condition and human factors together make up almost 82 percent of these high-risk train accidents. Figure 6-3 also shows that signal and equipment failures together comprise 6 percent, and miscellaneous factors cause the remaining 12 percent of rail incidents that pose harm to the public.

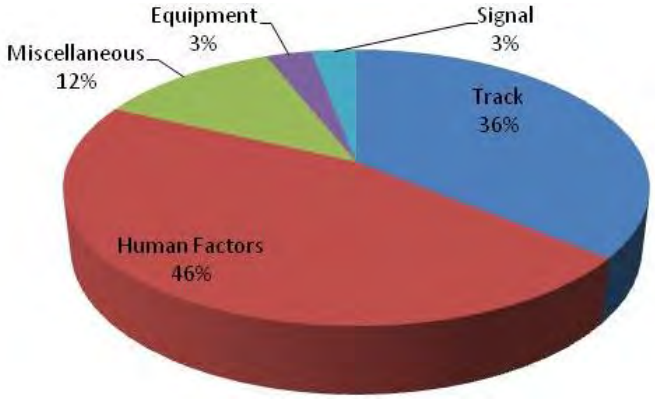


Figure 6-3: Causes of Non-Grade Crossing Train Accidents in El Paso County

[4] National Rail Safety Action Plan Progress Report 2005-2007, Federal Railroad Administration, U.S. Department of Transportation, May 2007.

Incidents caused by human factors may be the result of errors on the part of the railroad locomotive crew or other employees, including failure to properly secure equipment, exceeding train speed limitations, improper train make-up, failure to apply or secure brakes, and other similar incidents. Miscellaneous factors include extreme environmental incidents, such as flooding, among other causes not attributable to human error or deficiencies in equipment or infrastructure. Incidents in El Paso County caused by track condition include wide gauge of track (rail spaced too far apart), defective or missing rail ties, defects or damage at switches, and damaged rails.

Maximum allowable train speeds for freight and passenger rail are prescribed according to track classification in 49 CFR 213 – Track Safety Standards.[5] Since the FRA bases track class on specific track standards (e.g., number of good rail ties per defined length, consistency of track gauge, etc.) that relate to maximum allowable train speeds, records of maximum train speeds on each rail corridor can be used to infer track conditions without conducting an extensive and costly field inventory. Figure 6-4 diagrams the locations of track classes for the El Paso rail network according to railroad operating timetables, which correlate to maximum allowable freight train speeds listed in Table 6-6. The Class 1 rail lines in the study area are all designated as class 3 or higher and the South Orient is designated as excepted track within the study region.[6]

Table 6-6 lists the FRA-compiled accident rates for each track class in terms of cars derailed per billion freight car miles traveled.[7] One billion freight car miles is equivalent to a 100-car train traveling 100,000 times over a corridor distance of 100 miles. These statistics exclude incidents involving highway-rail grade crossing accidents and, thus, reflect the potential for track and operating conditions at each FRA track class (which may involve human factors) to cause a derailment. Derailments per billion freight car miles traveled during the 1992-2001 period are listed in Table 6-6 according to FRA track class and associated maximum track speed. Table 6-6 represents statistics collected nationwide and provides no indication of when or where an accident involving a derailment will actually occur.

[5] Code of Federal Regulations, Title 49, Transportation, Part 213 (49 CFR 213), Subpart A – Classes of Track: Operating Speed Limits.

[6] A railroad is allowed to operate sections of track designated as Excepted Track in certain cases where track quality (crossties, track gage, rail condition, etc.) does not meet Class I standards. For example, Excepted Track must be identified in the timetable under special instructions and restrictions and cannot be located within 30 feet of an adjacent track that can be subjected to simultaneous use in excess of 10 mph. The track must not be on bridges or public roadways and must limit the number of cars placarded by Hazardous Material Regulations (49 CFR 172) to five cars per train. Train speeds on Excepted Track must not be in excess of 10 mph and passenger service is prohibited.

[7] Anderson, R.T. and Barkan, C.P.L., Railroad Accident rates for Use in Transportation Risk Analysis, Transportation Research Record, No. 1863, National Research Council, Washington, D.C., 2004, pp. 88-98.

Figure 6-4: FRA Class of Track in El Paso District

Performance Measure	FRA Track Class				
	1	2	3	4	5
Maximum Allowable Speed for Freight Trains (mph)	10	25	40	60	80
Cars Derailed per Billion Freight Car Miles	3979	726	300	77	42

Table 6-6: Relationship of Track Speed and Derailment Rate to FRA Track Class

Hazardous Materials and Truck vs. Rail Freight

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 four percent of hazardous material tonnage shipments. Pipelines, water, and air transport accounted for the remaining 52 percent of hazardous material tonnage.[8] Table 6-7 lists the shipments and tons shipped for all modes of hazardous material transport in the U.S. for the year 1998.

Mode	No. of Shipments	% by Mode	Tons Shipped	% by Mode
Truck	768,907	93.98	3,709,180	42.94
Rail	4,315	0.53	378,916	4.39
Pipeline	873	0.11	3,273,750	37.90
Water	335	0.04	1,272,925	14.73
Air	43,750	5.35	4,049	0.05
Daily Totals	818,180	100.00	8,638,820	100.00
Annual Totals	298,635,700		3,153,169,300	

Table 6-7: Hazardous Material Shipments and Tons Shipped in the U.S. by Mode[4]

Table 6-8 summarizes the highway and rail incidents involving hazardous material transported by truck and rail from 2005 through 2009.

As shown in Table 6-8, the number of incidents and damages reported involving hazardous materials transported on highways is significantly larger than those reported for hazardous materials transported via rail. This may be partly because of the presence of personal vehicles on the same roadways as heavy trucks as well as the tendency for truck shipments to include more intermediate and transfer movements between the origin and destination than rail shipments. Additionally, the number of incidents per tonnage shipped is far lower for rail than highway shipments of freight. Average truck weights as determined from FHWA data were found to be approximately 30 tons (including the weight of the empty truck) as opposed to a typical loaded rail car weight of up to 143 tons.

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

	2005	2006	2007	2008	2009
Trucks					
Number of Truck Incidents in the U.S. involving hazmat	13,460	17,160	16,933	14,808	12,728
Injuries	178	192	161	153	153
Fatalities	24	6	9	6	12
Property Damage ($ million)	$40.2	$59.5	$47.3	$43.1	$50.7
Number of Truck Incidents in Texas involving hazmat	1,268	1,383	1,416	1,312	985
Injuries	8	31	34	4	30
Fatalities	2	0	1	1	1
Property Damage ($ million)	$4.3	$6.0	$4.6	$3.9	$6.4
Rail					
Number of Rail Incidents in the U.S. involving hazmat	745	703	752	750	643
Injuries	693	25	56	63	38
Fatalities	10	0	0	1	1
Property Damage ($ million)	$15.5	$10.7	$27.3	$10.1	$17.6
Number of Rail Incidents in Texas involving hazmat	83	101	91	80	104
Injuries	7	3	4	6	9
Fatalities	0	0	0	0	0
Property Damage ($ million)	$0.42	$0.65	$0.13	$0.25	$1.30

Table 6-8: 2005 through 2009 Truck and Rail Hazardous Material Incident Data[9]

The expected frequency of hazardous material releases, based on nationwide rail derailment data, is shown in Table 6-9 as expected releases per billion railcar miles traveled. For example, based on FRA statistics, hazardous materials transported by rail on class 2 track could be expected to experience four releases per billion freight car miles traveled. Figure 6-5 plots the expected releases listed in Table 6-9 for each track class, illustrating how there is not a significant decrease in release frequencies from class 4 to class 5 track while release frequency drops significantly as track class increases from class 1 to class 4. The most frequent causes of hazardous materials incidents for rail transportation were defective components and loose closure of components or devices.[10]

Frequency of Occurrence	FRA Track Class				
	1	2	3	4	5
Hazmat Releases per Billion Freight Car Miles*	8	4	2	1	0

* Decimals are rounded to the nearest whole number (class 5 release rate is actually 0.4)

Table 6-9: Hazardous Material Release Frequency per FRA Track Class

[9] U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration Office of Hazardous Materials Safety: Hazardous Materials Incident Data, 10 Year Incident Summary Reports

[10] U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration Office of Hazardous Materials Safety: Hazardous Materials Incident Data, Yearly Incident Summary Reports

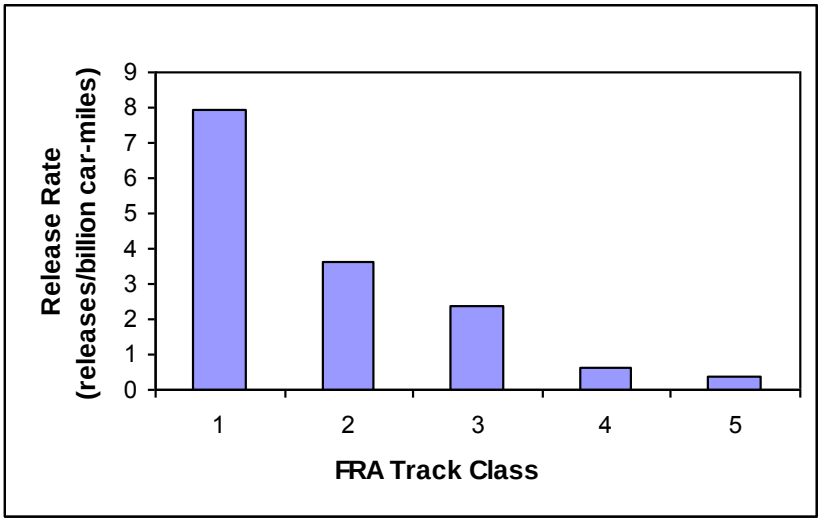


Figure 6-5: Rates of Hazmat Release by FRA Track Class

Emergency Response Operations

Operation Lifesaver was started by the state of Idaho in partnership with UP in 1972, when there were over 12,000 roadway-rail accidents nationally, as a one-time, one-state, six-week "safety blitz" educating the traveling public of the hazards of roadway-rail interface. The reduction in grade crossing accidents in Idaho was so astonishing that the program was continued and is now active in 49 states. The state of Texas became involved in this campaign in 1977.

The U.S. Department of Transportation has developed federal regulations governing the transport of hazardous materials to avoid emergency situations that may pose dangers to those transporting the materials and to the public.

> The Hazardous Materials Regulations (HMR; 49 CFR Parts 171-180) specify requirements for the safe transportation of hazardous materials in commerce by rail car, aircraft, vessel, and motor vehicle. These comprehensive regulations govern transportation-related activities by offerors (e.g., shippers, brokers, forwarding agents, freight forwarders, and warehousers); carriers (i.e., common, contract, and private); packaging manufacturers, reconditioners, testers, and retesters; and independent inspection agencies. The HMR apply to each person who performs, or causes to be performed, functions related to the transportation of hazardous materials such as determination of, and compliance with, basic conditions for offering; filling packages; marking and labeling packages; preparing shipping papers; handling, loading, securing and segregating packages within a transport vehicle, freight container or cargo hold; and transporting hazardous materials.[11]

Currently, the City of El Paso has an Office of Emergency Management (OEM) to prepare and mitigate the effects of emergencies and disasters in the region. The OEM is responsible for developing and implementing plans to protect the community

[11] Overview of the Hazardous Materials Regulations, Pipeline and Hazardous Materials Safety Administration, U.S. Department of Transportation.

in the event of a disaster. The OEM directs local emergency response activities and coordinates with the City and the County. The OEM is also responsible for providing emergency notification to provide individuals with vital information during a citywide emergency.

In addition, the operating railroads also have emergency response guidebooks that include instructions on how to deal with accidents, collisions, derailments, and specific hazardous material accidents and exposures. BNSF and UP have sponsored a national outreach program, Transportation Community Awareness and Emergency Response (TRANSCAER) at multiple locations in the mid-western U.S. in recent years. The program aims to help communities prepare to respond to transportation incidents involving hazardous materials and includes training for proper tank-car loading and securement techniques.

Safety Improvements

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 locales has increased the exposure rate of the roadway-rail interface, stressing the importance of a more proactive approach to minimizing incidents and hazards associated with the movement of freight.

One method of increasing safety is to eliminate or minimize the number of potential incident locations within a particular area. Safety is increased by eliminating roadway-rail crossings through the use of grade separations or crossing closures that would reroute traffic to grade separations. Another method of improving safety is to upgrade warning protection to devices such as flashing lights with gates.

Table 6-10 lists potential improvements at roadway-rail grade crossings within the study region. The list of improvements consists of potential grade separations and adjacent crossings that may be closed in conjunction with the grade separations. This list is based on the daily volumes and speeds of vehicular and train traffic at the crossings, as well as roadway characteristics such as number of lanes, grade crossing warning device and accident history. The crossings identified for potential grade separation had a minimum daily traffic volume of 5,000 vehicles and were located on the higher volume rail lines. These roadways would likely have the highest benefit-to-cost ratios for implementing the potential grade separations at the grade crossings. Crossing closures that may be grouped with the grade separations include nearby crossings that could only be rerouted to a grade separation and not any nearby at-grade crossings.

The estimated public benefits shown in Table 6-10 are based on public costs associated with vehicular safety and impedance at the existing at-grade crossings. The estimated public benefits were determined by using a grade crossing “impedance” or delay model which takes into account the volume and frequency of vehicular and train traffic at roadway-rail grade crossings, estimating the amount of time motorists are delayed by rail traffic. The model measures the anticipated public

costs (burden) associated with traffic delays and calculates the extra emissions and fuel usage experienced while delayed by a train at each of the rail crossings analyzed. The cost of collisions is added to time costs, emissions, and fuel used to provide an annualized estimate of total public burden per grade crossing as included in Appendix D. Forecasts for growth in both rail and vehicular traffic were used to provide an annualized estimate of public costs projected for a 20-year study period. Estimated costs and benefit-to-cost ratios associated with the identified improvements are anticipated be identified in Phase 2 of this study, if approved by TxDOT.

Subdivision	Grade Crossing Street Name	City	Crossing Number	ADT	Accident History (2005-2009)	Potential Improvement	Estimated Public Benefit
UP Valentine	Zaragosa Road	El Paso	741231D	14,350	1	Grade Separation	$7,720,000
UP Valentine	Copia Street	El Paso	741204G	17,600	0	Grade Separation	$6,510,000
UP Valentine	San Marcial	El Paso	741200E	375	0	Crossing Closure	
UP Valentine	Estrella	El Paso	741201L	375	0	Crossing Closure	
UP Valentine	Cebada Street	El Paso	741202T	375	0	Crossing Closure	
UP Valentine	Grama Street	El Paso	741203A	375	0	Crossing Closure	
UP Valentine	Buford Street	Clint	764227D	11,880	1	Grade Separation	$5,140,000
UP Valentine	Fabens Street	Fabens	764089S	9,600	0	Grade Separation	$4,350,000
UP Valentine	3rd Street	Fabens	764090L	50	0	Crossing Closure	
UP Valentine	4th Street	Fabens	742914X	1,930	0	Crossing Closure	
UP Valentine	Penndale Road	El Paso	741229C	7,820	2	Grade Separation	$4,050,000
UP Carrizozo	Montana Street	El Paso	741159P	19,700	0	Grade Separation	$3,050,000
UP Carrizozo	Yandell Drive	El Paso	741158H	2,080	0	Crossing Closure	
UP Valentine	FM 1110	Clint	764083B	7,900	0	Grade Separation	$2,760,000
UP Valentine	Chelsea Drive	El Paso	741212Y	6,670	0	Grade Separation	$2,390,000
UP Valentine	Concepcion Street	El Paso	741209R	375	0	Crossing Closure	
UP Carrizozo	Missouri Avenue	El Paso	741614F	16,570	0	Grade Separation	$2,370,000
BNSF El Paso	Country Club Road	El Paso	019780K	18,360	0	Grade Separation	$2,270,000
UP Valentine	FM 1505/Clark Road	El Paso	741216B	7,600	0	Grade Separation	$2,230,000
UP Carrizozo	Piedras Street	El Paso	741165T	5,790	1	Grade Separation	$2,170,000
UP Carrizozo	Rosewood Street	El Paso	741160J	375	0	Crossing Closure	
UP Carrizozo	Maple Street	El Paso	741161R	375	0	Crossing Closure	
UP Carrizozo	Birch Street	El Paso	741162X	375	0	Crossing Closure	
UP Carrizozo	Cedar Street	El Paso	741163E	375	1	Crossing Closure	
UP Carrizozo	Elm Street	El Paso	741164L	375	0	Crossing Closure	
BNSF El Paso	Redd Road	El Paso	019776V	7,590	1	Grade Separation	$1,700,000
BNSF El Paso	W. Green Avenue	El Paso	019620W	2,000	0	Crossing Closure	
BNSF El Paso	FM 1905/ Washington Street	Anthony	019753N	9,500	1	Grade Separation	$1,680,000
BNSF El Paso	Sunland Park Drive	El Paso	019786B	9,250	1	Grade Separation	$1,360,000
BNSF El Paso	FM 259	El Paso	019769K	9,000	0	Grade Separation	$970,000
BNSF El Paso	Suset Drive	El Paso	019781S	7,790	0	Grade Separation	$770,000
BNSF El Paso	Executive Center	El Paso	019797N	5,060	0	Grade Separation	$520,000

Table 6-10: Potential Grade Crossing Improvements within Study Region

Table 6-11 lists the crossings that are on the TxDOT program through 2010 for signal upgrades and have not yet been completed. The projects, when funded, will consist of upgrading the warning protection devices at each crossing to flashing

lights with gates and typically take up to two years to complete. TxDOT also maintains a crossing surface replacement program that consists of re-planking at-grade crossings for state maintained roadways.

Subdivision	Grade Crossing Street Name	City	Crossing Number	ADT	Accidents ('05-'09)
BNSF El Paso	FM 259	El Paso	019769K	9,000	0
BNSF El Paso	Montoya Road	El Paso	019587Y	4,010	0
BNSF El Paso	FM 505/ Scenic Loop	Valentine	742878E	230	0

Table 6-11: TxDOT Planned Signal Upgrade Projects

Figures 6-6 and 6-7 show the location of the identified potential grade crossing improvements listed in Tables 6-10 and 6-11 as well as the annual tonnage volumes on each rail line. As shown in the figure, nearly all of the grade crossing improvements identified are located within El Paso County. Grade crossings analyzed outside of El Paso County had lower daily traffic volumes or were located along low train volumes lines such as the South Orient. These crossings would likely have public benefits significantly less than the costs of the improvements.

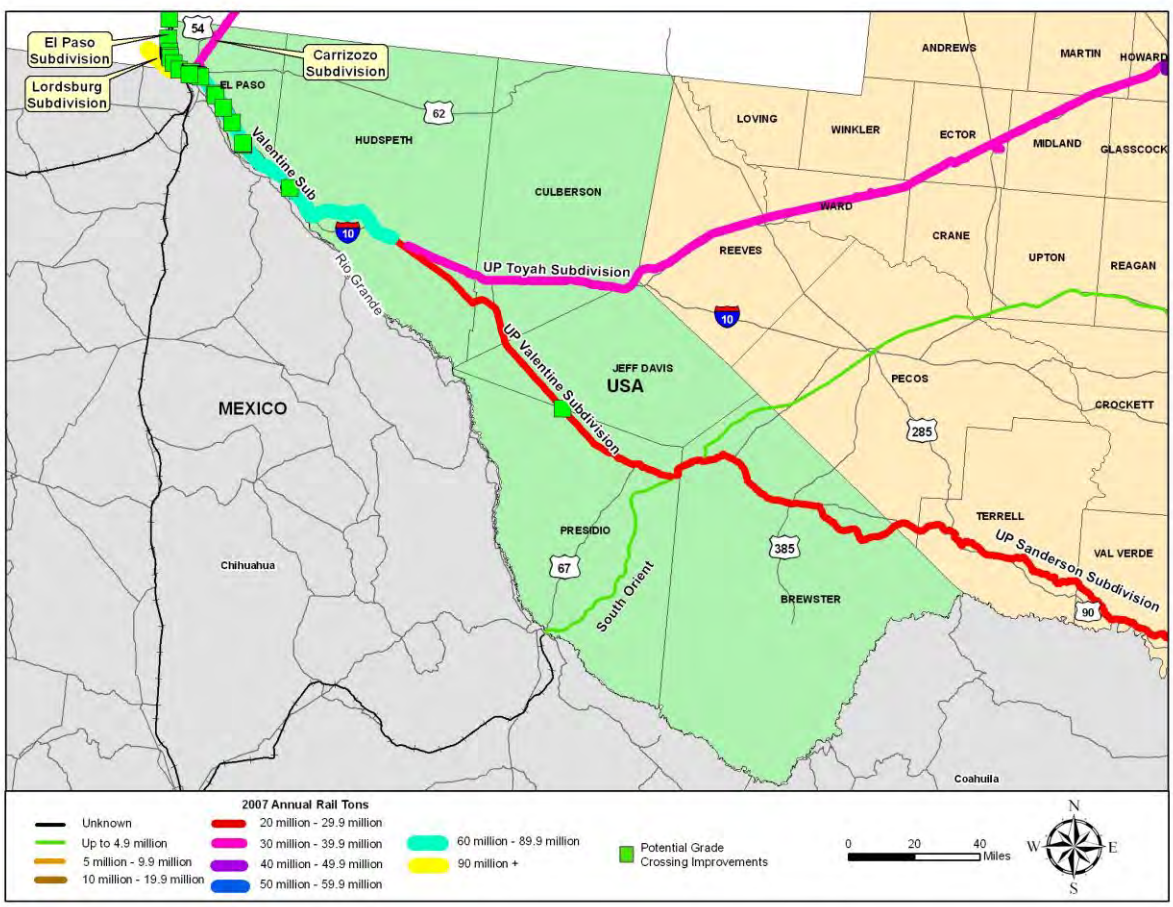


Figure 6-6: Potential Grade Crossing Improvements within Study Region

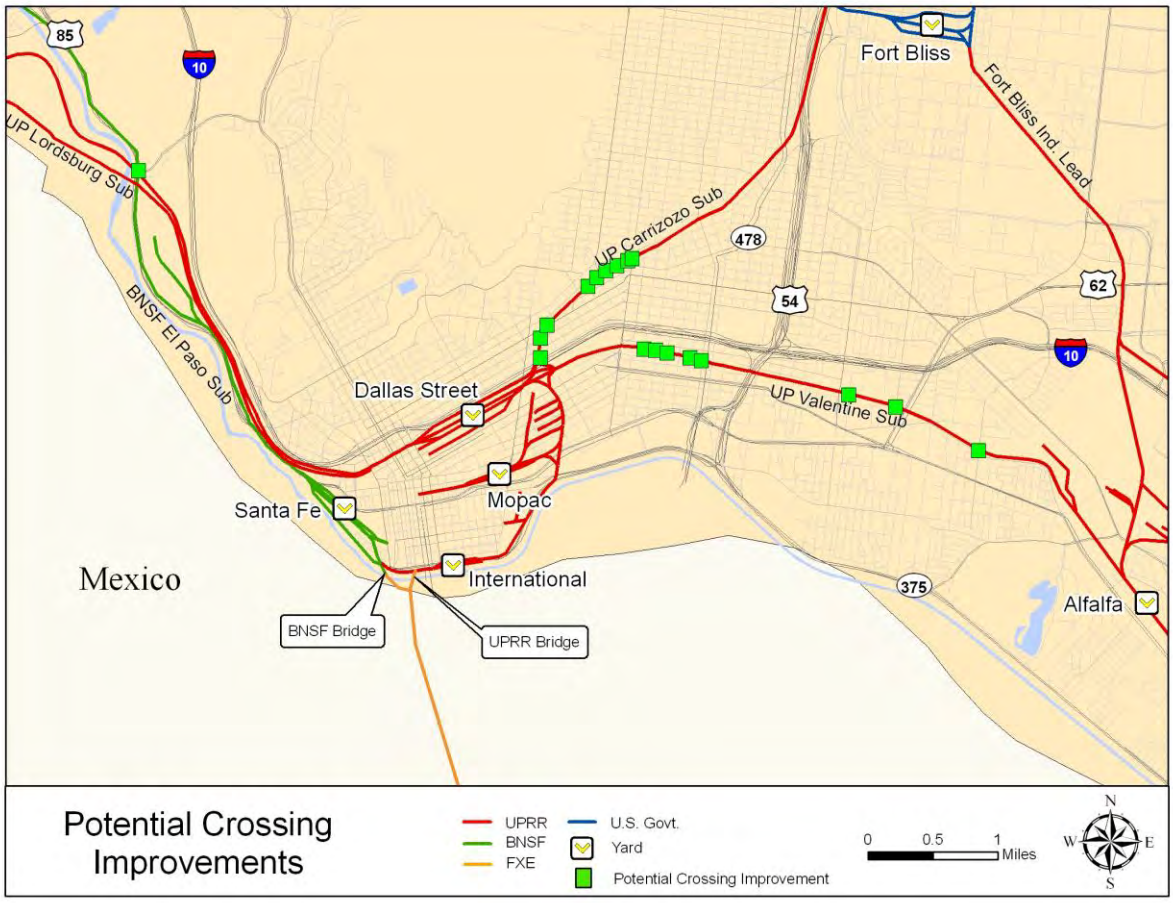


Figure 6-7: Potential Grade Crossing Improvements in El Paso