Dallas-Fort Worth Region Freight Study

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EXECUTIVE SUMMARY

The Dallas-Fort Worth Metroplex is served by three Class I railroads (Union Pacific Railroad, BNSF Railway, and Kansas City Southern Railway), two shortline railroads (Dallas, Garland and Northeastern Railroad and Fort Worth and Western Railroad), and two passenger rail systems (Dallas Area Rapid Transit, and Trinity Railway Express). Collectively, these systems make up a regional rail network comprised of over 1,300 miles of mainline track that routinely exhibit constrained freight mobility due to steady increases in annual train volumes relative to modest growth in rail capacity. The primary source of this congestion occurs at Tower 55 near downtown Fort Worth, where nine Class I rail lines in the region converge at the Tower 55 interlocking. The demand for truck freight services in the region has created similar congestion problems on the roadway network. Additionally, vehicular mobility is reduced at highway-rail grade crossings that experience long block times as a result of increasing train volumes and congestion-induced reductions in train speeds.

The purpose of this study was to identify infrastructure projects within TxDOT's Dallas and Fort Worth Districts that have the potential to improve regional freight mobility. Phases I and II of the study, contained in this report document, assess the existing freight rail system, provide a region wide evaluation of freight rail and truck operations, constraints, and safety issues, and identify potential infrastructure projects that will improve mobility and safety. Phase III of this study, when approved by TxDOT, will determine the feasibility of implementing passenger rail service on existing freight rail corridors.

Freight Movement Analysis

Current and future year truck and rail freight activity was analyzed using statewide and regional transportation models. The Texas Statewide Analysis Model (SAM) was used to project future truck and rail freight movements on a tonnage basis, whereas the Dallas-Fort Worth Regional Travel Model (DFWRTM) was used to project future truck and total vehicle movements on a volume basis. As a detailed regional model, the DFWRTM also provided a means of identifying existing and future areas of roadway congestion on the Dallas-Fort Worth roadway network.

Projections of truck freight from the SAM indicate that cargo moving strictly within the Dallas-Fort Worth area is likely to increase by approximately 52 million tons (11 percent increase) between 1998 and 2025. Truck freight moving from the area to outside destinations during this time will increase by approximately 112 million tons (23 percent increase), and truck freight originating outside of Dallas-Fort Worth being delivered to the area will increase by approximately 139 million tons (28 percent increase). The largest increase in truck freight on Dallas-Fort Worth

roadways will come from through freight, which is projected to increase by 187 million tons (38 percent increase).

Projections of rail freight from the SAM show somewhat smaller increases in tonnage handled by local industries between 2004 and 2025 when compared to locally based truck freight. Rail freight moving within the Dallas-Fort Worth area is projected to increase by only 2 million tons (1 percent increase), rail freight from the area to outside destinations will increase by approximately 22 million tons (8 percent increase), and rail freight originating outside of Dallas-Fort Worth being delivered to the area will increase by approximately 47 million tons (17 percent increase). As with truck freight, the largest increase in rail freight on the Dallas-Fort Worth rail corridors will come from through freight, which is projected to increase by 208 million tons (74 percent increase). Consequently, rail freight moving through the Dallas-Fort Worth area that is not handled by local industries will make up the greatest increase in freight tonnage on the transportation network in terms of absolute tonnage and percent growth.

The DFWRTM analyses reflected truck volumes and congestion on the roadway network. The highest truck volumes on the Dallas-Fort Worth roadway network occur on major sections of I-20, I-30, I-35, I-820, and I-635, which are intended to support the movement of vehicles through and around the Dallas-Fort Worth area. These corridors are distinguished by a traffic mix consisting of more than 15 percent trucks, as compared to other roadways in the area with lower truck volumes. When total vehicular traffic is included in the DFWRTM analyses, traffic volume-to-capacity (V/C) ratios indicated that the greatest congestion currently exists in Dallas, Collin, Tarrant, and Denton Counties, and will extend to include Johnson, Parker, Ellis, and Rockwall Counties within the next two decades. The areas of highest projected traffic congestion also overlap with the roadway sections of highest projected truck volumes (I-20, I-30, I-35, I-820, and I-635), which supports the findings that indicate the greatest benefits (measured as reductions in vehicle delay, fuel consumption, and emissions) from investment are located in Dallas, Tarrant, Collin, Denton, and Rockwall Counties.

Rail Network Operations and Investment Analysis

The Dallas-Fort Worth rail network consists of 22 rail corridors that are typically single mainlines with siding tracks installed over approximately 10 to 15 percent of the mainline track length. Double tracked rail line segments exist on the UP Dallas (43 percent), BNSF Fort Worth (8 percent), and BNSF Wichita Falls (12 percent) Subdivisions, with greater than average total lengths of siding track on the UP Choctaw (20 percent), BNSF DFW (18 percent), BNSF Fort Worth (31 percent), and Trinity Railway Express (18 percent) Subdivisions. Train operations over

these rail corridors were modeled with the Rail Traffic Controller (RTC) computer program using railroad network files that detail the physical rail infrastructure within the Dallas-Fort Worth area and train files that contain routing and dispatching information for trains in the study region. Of these simulated trains, 1,595 freight and 360 passenger trains complete their run during the 7-day simulation period and are included in the analysis of railroad performance measurements.

Specific train types modeled in RTC include yard engines and intermodal, manifest, grain, coal, auto, and work trains. Approximately 70 percent of all trains operating in the Dallas-Fort Worth area are through trains, which is consistent with the results of SAM analyses that found the greatest amount of rail tonnage to be through freight. Of these through trains, 23 percent are “expedited” intermodal and auto trains that carry time-sensitive cargo. Consequently, operations on the Dallas-Fort Worth rail network must accommodate a mix of trains with different relative priorities, which places particular stress on line capacity at high volume rail junctions.

RTC simulation of train operations on the existing network (the Base Case) shows that most of the rail congestion problem in the Dallas-Fort Worth area exists at Tower 55 on the UP Fort Worth Subdivision south of downtown Fort Worth, and at Tower 60 on the UP Duncan Subdivision just north of the Trinity River. Approximately 40 percent of total rail network delay occurs on railroad subdivisions that intersect either or both Tower 55 and Tower 60, most of which is attributable to train conflicts at these interlockings. With congestion at Tower 55 considered the most problematic and largest contributor to rail network delay, the predominant focus on rail improvements in this report involve construction and extensions of second mainlines, installation of rail connections, and relocation of existing mainline in the Tower 55 area. Results from RTC simulation of nearly $94 million in at-grade rail improvements associated with Tower 55 showed that the public sector would realize approximately $364 million in benefits related to reductions in vehicle impedance and accidents at grade crossings, and that the railroads would save approximately $55 million from reductions in train delay times. A saturation analysis, in which trains were added to the RTC model until delay equal to that of the Base Case was reached, found that these improvements alone would improve rail capacity at Tower 55 by 18 percent in terms of the number of trains able to pass through the interlocking. The immediate effect of implementing the at-grade improvements would be a reduction in current train delay times by 23 to 24 percent.

In addition to Tower 55 improvements, an analysis was made to determine the benefits associated with rerouting Amtrak Trains 21 and 22 from the UP Dallas Subdivision to the Trinity Railway Express (TRE). Results from RTC simulation of

$3 million in sidings and connections installed on the TRE showed that the public sector would realize approximately $72 million in benefits related to reductions in vehicle impedance and accidents at grade crossings, and that the railroads would save approximately $5 million from reductions in train delay times resulting from the rerouting of Amtrak trains.

An examination of Federal Railroad Administration (FRA) data showed that 274 roadway-rail grade crossing accidents occurred during a five year period in the 16-county Dallas-Fort Worth region from January 2002 to December 2006. Included in these accidents were 31 fatalities and 90 injuries, which emphasize the importance of eliminating vehicle-train interactions wherever possible. This study identified 47 grade crossings where the public benefit realized by eliminating vehicle impedance and accidents at the existing crossings would be greater than the estimated cost of constructing grade separations. An additional 42 grade crossings were identified for potential closure within the Tower 55 area that are either included in quiet zone studies by the City of Fort Worth or could have traffic rerouted over a nearby grade separated roadway.

Identified Grade Crossing Improvements

At an estimated cost of $342.5 million, 44 identified potential grade separations would separate railroad lines from streets, thereby reducing safety hazards and delays. For the citizens that travel across these roadway-rail crossings these projects could provide relief from blocked intersections and traffic congestion on the roadways. It also means improved safety by allowing emergency and law enforcement vehicles to respond without delay while improving the quality of life for residents in the impacted neighborhoods. The estimated 20-year public benefit value of the identified grade separations totals $1.28 billion.

Also identified are 37 locations where grade crossings may be closed for an estimated cost of $1.95 million. These safety improvements minimize conflict points between trains and cars by closing crossings and encouraging motorists to use grade-separated roadways or alternate streets, which have better safety systems in place. The estimated 20-year public benefit value for the crossing closures totals $47.6 million.

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

SECTION 1: PROJECT BACKGROUND

The growth of the city of Dallas began as the city was located at the intersection of roads leading to Austin, Houston, the Red River, and the Gulf Coast. The railroad network was started in 1872 with a line running through Dallas from south to north, creating communities such as Richardson. In 1873, a line was built that ran through Dallas from east to west and established additional communities, including Grand Prairie and Mesquite. By 1885, five railroads ran through Dallas County and many communities had been founded along the rail lines.

Organized transportation in Fort Worth began in 1872 as the first westbound stage arrived, followed by the stage line to Yuma, Arizona in 1878. Fort Worth soon became the eastern terminus both for the route to Yuma and a rail line to San Diego, California. By 1900, multiple railroads were operating to and through Fort Worth forming the rail network that now branches out in all directions. Rail transportation between Dallas and Fort Worth was provided in 1902 by four electric interurban railways, which were phased out in time with the increasing presence of automobiles.

Dallas and Fort Worth are now part of a dense urban Metroplex with an international airport, colleges and universities, and industries and businesses that support a thriving economy. The Dallas area has one of the highest concentrations of corporate headquarters in the U.S., and is home to large corporate operations for Texas Instruments, AT&T, Verizon, ExxonMobil, American Airlines, and many other companies of all sizes. The Texas agriculture and livestock industries are based in Fort Worth. The Metroplex is now served by three Class I railroads (Union Pacific Railroad, BNSF Railway, and the Kansas City Southern Railway), two shortline railroads (Dallas, Garland and Northeastern Railroad and the Fort Worth and Western Railroad), and two passenger rail systems (Dallas Area Rapid Transit and Trinity Railway Express) for a total of more than 1500 miles of track.

Nine Class I railroad mainlines converge near downtown Fort Worth at Tower 55, which is considered a source of problems and delays for both the traveling public and the operating railroads. Additionally, Dallas, Fort Worth, and the surrounding communities now experience many locations of congestion relating to the interaction between vehicular travel and freight movement that traverses the region.

Previous Reports

One of the first tasks to be completed before proceeding with alternatives or concepts in this study was to locate and review any transportation studies previously

performed within the last five years involving the Dallas-Fort Worth region. The studies that addressed transportation issues within the study region were identified and reviewed and are briefly summarized below:

The Metropolitan Transportation Plan: Mobility 2025, NCTCOG, April 2005

The Metropolitan Transportation Plan (MTP), prepared by NCTCOG in April 2005, outlines a plan to meet the mobility needs of the Dallas-Fort Worth metropolitan area in consideration to the availability of financial resources. The plan outlines a total of more than $45 billion of improvements through 2025.

The plan projected an annual cost of congestion in 2025 of $11.5 billion and 53% of roadway lane-miles highly congested by 2025. Transportation System Management Improvements identified in the study include intersection improvements/grade separations, traffic signal improvements, and freeway bottleneck removal.

The rail transit system is currently comprised of approximately 45 miles of DART light rail and 35 miles of TRE commuter rail. The plan proposes an increase to a total of 148 miles of regional commuter rail by 2015. The costs of identified necessary improvements to the rail, bus, and paratransit system through 2025 total $8.3 billion. The plan also recommends the addition of 3000 lane-miles of freeway/Tollway capacity for a total cost of $12.4 billion.

NCTCOG's current planning goals for primary goods movement consist of improving economic competitiveness by improving the efficiency of goods movement, improving the safety of goods movement, and reducing the air quality impact of goods movement. The NCTCOG lists priorities as new rail structures; truck traffic needs; coordination with air cargo facilities; freeway and arterial bottleneck removals; interchange improvements; and freight access improvements.

This study references other NCTCOG studies for additional detail and information such as the Freight Bottleneck Study, the Railroad Crossing Reliability Partnership Program (RCRPP), and the Regional Rail Corridor Study (RRCS). The Freight Bottleneck Study has not yet been completed and will analyze congested rail-to-rail intersections and truck routes as well as intermodal connections.

Texas Metropolitan Mobility Plan (TMMP), NCTCOG, June 2006

The TMMP is a needs-based plan that quantifies transportation needs beyond the fiscal constraint barrier. The TMMP estimates that the DFW region has a total transportation need of approximately $114.9 billion, which includes the $45 billion identified in the MTP plus an unfunded need of $69.9 billion from the TMMP. The additional $69.9 identified in the TMMP includes $6.7 million for goods movement/freight rail costs.

Tower 55, which is being independently studied in the NCTCOG Tower 55 Rail Reliever Study is identified as the most acute freight bottleneck location with more than 100 trains per day passing through the location. The report also identifies

significant air cargo facilities such as DFW International Airport, which handles nearly 900,000 U.S. tons of cargo each year, and the Fort Worth Alliance Airport, which handled 171,090 metric tons in 2002.

NCTCOG performed an analysis of the region's hazardous material routing in 1985 and identified the I-20 corridor, the I-820 Loop, and the I-635/Loop 12/I-20 corridor to have lower traffic volumes, high design standards, and fewer population and employment activity areas, making them safer routes for hazardous materials transport around the central urban areas.

Mobility 2030, NCTCOG, Draft (final version not yet released)

Section 19 of the Mobility 2030 Plan compares TTC-35 Draft Tier One EIS with long-term vision for Outer Loop/Rail Bypass adopted by the Regional Transportation Council (RTC). The Mobility 2030 Metropolitan Transportation Plan outlines a new outer loop/rail bypass with connections to the south to Hillsboro along the SH 360 corridor and to the north to Gainesville via the I-35 corridor.

The concept includes a freight rail bypass plus an auto and truck outer loop. The plan identifies the need to receive federal environmental approval to secure ROW while rural land prices are low and negative social impacts can be minimized and the need to identify a private sector investor. The priorities of the plan are to preserve ROW today and stage construct roadway, truck, and rail facilities tomorrow and use the TTC-35 initiative as a funding source.

Regional Rail Corridor Study (RRCS), NCTCOG, August 2004

The RRCS includes a review, inventory, and assessment of transit needs throughout eight rail corridors in the DFW region. Study results included an inventory of the capital and operating costs for identified improvements in each rail corridor. The eight corridors consisted of: the DART/MKT Carrollton to Denton Corridor, the DART Plano to McKinney Corridor, the BNSF Carrollton to Frisco Corridor, the BNSF Duncanville to Midlothian Corridor, the BNSF Dallas to Waxahachie Corridor, the UP Fort Worth to Dallas Corridor, the FWWR Cotton Belt Corridor, and the BNSF Fort Worth to Cleburne Corridor.

The RRCS report includes line descriptions detailing typical right-of-way widths, railroad owners and operators, average train volumes, roadway-railroad crossings, sidings and length for each corridor. The corridors were evaluated and analyzed for four different rail system alternatives and a bus rapid transit system.

Tower 55 Sketch Plan, NCTCOG, May 2007

The Tower 55 Sketch Plan provides a description of the existing conditions at the Tower 55 rail intersection in Fort Worth. This report is the starting point for the Federal Environmental Study for the Tower 55 Rail Reliever Project, which is currently underway as part of the NCTCOG Freight Bottleneck Study. The Tower 55 Rail Reliever Project is intended to improve safety, reduce delay, and improve the movement of trains at Tower 55.

The UP, BNSF, FWWR, and TRE corridors intersect at Tower 55, which is identified in the report as the "busiest at-grade railroad intersection in the United States." Trains using the crossing are currently required to wait an average of 90 minutes primarily due to intersecting through traffic between the north/south lines and the east/west lines, complex turning moves done at the crossing, and nearby terminal operations. The operating railroads and local agencies are cooperating in the Tower 55 Rail Reliever Study to identify a plan to improve Tower 55. Alternative concepts include capacity and operational improvements, a north/south trench, an east/west flyover, a commuter rail grade separation, and a FWWR bypass. The completed Tower 55 study will provide a preferred alternative and associated cost estimate.

Many of the improvements identified in the Tower 55 study have been analyzed in this study and are discussed in Section 7 of this report.

Survey of Local Trucking Firms, NCTCOG, Spring 2003

The Transportation Department of the NCTCOG distributed surveys to trucking professionals listed in NCTCOG's goods movement database and members of the Dallas and Fort Worth chapters of the Texas Motor Transportation Association in the spring of 2003 and received 20 responses. The survey asked for perceived dangerous and congested roadway facilities and suggested improvements. The returned surveys identified portions of I-20, I-30, I-35E, I-35W, I-45, I-635, U.S. 75, SH 310, Loop 12, U.S. 287, SH 360, and Loop 820 as dangerous and congested locations. Suggested improvements varied by location and included the proposed addition of dedicated truck lanes, added roadway capacity, and modified roadway geometrics.

Of the respondents, 59 percent reported having long haul trucks in the DFW region and 41 percent reported having short haul trucks in the region. When asked about the implementation of dedicated truck lanes, 5 percent of respondents thought them to be harmful, while 80 percent favored them, and 15 percent thought they would be neither harmful nor helpful.

Other survey questions centered on topics such as message signs, freeway ramps, communication technologies, lane restrictions, idle time restrictions, night deliveries, truck parking facilities, roadway geometrics and turning radii, and safe havens.

Goods Movement Survey, NCTCOG, July 2002

The Transportation Department of the NCTCOG distributed surveys at public meetings, Surface Transportation Technical Committee (STTC) meetings, Regional Transportation Council (RTC) meetings, and via the NCTCOG website in the summer of 2002 regarding the movement of goods and received 89 responses.

Survey results showed that more than 90 percent of the respondents favored high safety standards for trucks entering the U.S. under NAFTA (i.e. trucks from Mexico or Canada). Additionally, 82 percent of respondents favored installing enhanced

crossing protection at roadway-railroad crossings and 79 percent favored spending public monies to improve freight rail safety and efficiency in order to reduce the number of trucks on the road and to create opportunities for commuter rail.

2030 Transit System Plan, Dallas Area Rapid Transit (DART), October 2006

The DART 2030 Transit System Plan, as prepared by Dallas Area Rapid Transit in October 2006, provides an overview of planned updates and expansions of service to the existing DART network. The key elements of the plan include approximately 43 miles of additional rail service and a comprehensive network of enhanced and rapid bus corridors.

The additional rail service network includes an extension of the Blue Line, an express rail line to DFW International Airport, a Lake Highlands Station on the existing Blue Line, a light rail branch off the forthcoming Green Line, a light rail extension of the Red Line, and a rail line in West Dallas. The planned rapid bus network consists of 77 miles of enhanced bus service corridors, 20 miles of rapid bus service corridors, and strengthened and new express bus service for a total of 116 miles of permanent managed HOV lanes – six more than the 1995 plan.

Master Development Plan: TTC-35 High Priority Trans-Texas Corridor, Chapter 3B: Facility Traffic and Revenue (Rail), Cintra Zachry and Texas Department of Transportation (TxDOT), Sept. 2006

Section 3B of the TTC-35 Master Development Plan summarizes the existing freight rail situation in Texas as well as data pertaining to potential high speed rail in Texas. The report shows that 9.3 million carloads traveled from, to, or through Texas in 2004, transporting 424 million tons by rail. The report states that between 65 and 75 percent of BNSF and UP tonnage movements would intersect or flow parallel to TTC-35. The identified TTC-35 freight corridor facilities include an east and west loop around the Dallas-Fort Worth Metroplex along with other metropolitan area rail bypasses. The plan identifies a projected annual freight corridor demand of more than 22.3 gross ton miles for the loop around the Dallas-Fort Worth Metroplex. Section 4 of the report contains proposed locations for intermodal facilities along the TTC-35 corridor.

Railroad Crossing Reliability Partnership Program Recommendations (RCRPP), NCTCOG, August 2004

The RCRPP maintains a list of roadway-railroad crossings in the region, including those that are at-grade and grade separated. The program also evaluates the crossings and provides recommendations for improvements. The recommendations of the RCRPP include a list of projects for the DFW region that includes the implementation of signal upgrades, medians, crossing gates, crossing closures, train warning horns and lights, sidewalks, re-surfacing, and various technologies for train detection and warning at railroad-roadway crossings. The list consists of 44 projects, which include improvements at nearly 80 roadway-railroad crossings in the Dallas-Fort Worth region. The program developed scores for each project based on project exposure, protection, community benefits, and corridor location. The list also

identifies the estimated costs, requested and recommended federal funds, and implementation year for each project.

Regional Mobility Initiatives (RMI), NCTCOG, January 2006

The January 2006 edition of NCTCOG's publication of *Regional Mobility Initiatives (RMI)* is focused on the issue of goods movement in the Dallas-Fort Worth region. The RMI issue describes the region as an international logistics hub and lists large employers, past volumes of freight entering the region by all modes of transportation, and locations of freight transportation facilities including foreign trade zones, industry parks, airports, yards, and intermodal facilities as well as freight-oriented development areas. The RMI gives recommendations for promoting good freight-oriented developments, which consist of clustering intermodal partners, creating direct spur track access, having an available industrial workforce, and creating truck staging areas.

Also identified in the publication are freight rail conditions in the region, including daily freight rail volumes on the existing rail lines and both current and projected freight rail bottlenecks. Current freight rail bottlenecks identified consist of Tower 55, an intersection of freight and passenger lines in Carrollton, T&P station in Fort Worth, and Belt and MP junctions east of downtown Dallas. Projected freight rail bottlenecks consist of locations in Denton, the intermodal transportation center in Fort Worth, Haltom City, and the Cedars neighborhood in downtown Dallas. The report identifies a regional rail bypass to be included as part of the TTC-35 initiative an essential element to alleviate congestion in the region. Forecasted truck volumes on the region's roadways as well as truck bottlenecks are also identified, with the TTC-35 outer loop discussed again as a potential solution for congestion relief.

Several of the previous studies reviewed and summarized above contain references to the Trans-Texas Corridor (TTC). TxDOT has recently stated that the State will no longer be moving forward with TTC as originally envisioned (approximately 4,000 miles of a corridor up to 1,200 feet wide). However, certain corridor projects such as I-35 and I-69 will continue to be developed.

SECTION 2: PURPOSE OF STUDY

The purpose of the Dallas-Fort Worth Region Freight Study is to develop a list of potential projects for TxDOT's Dallas and Fort Worth Districts with evaluations and recommendations for near-term, mid-range, and long-term improvements and/or activities that may improve freight mobility within the region. The overall concept of the study is envisioned to evaluate freight movements and operations within the region and identify opportunities to increase freight movement efficiency, determine the physical and financial viability of potential improvements, and include an analysis of potential freight corridor connections to the I-35 corridor.

The entire study is intended to be conducted in three phases. Phase I, which is covered within this report document, encompasses establishing an inventory of the existing freight rail system, conducting a region wide freight rail and truck operational study, identifying freight rail and truck constraints, and identifying freight rail and rail/roadway interface safety issues. Phase II, also included in this report, includes identifying potential rail system and roadway improvements within the region and performing a cost/benefit analysis for the potential projects. Phase III, when approved by TxDOT, is intended to determine the feasibility of implementing passenger rail service on existing freight rail corridors.

Project Approach

The work completed as part of Phases I and II was broken down into the following tasks:

- Task 1 – Inventory Existing Rail System
  - Review previous freight/passenger rail corridor studies conducted within the past 5 years that are applicable to the study area.
  - Create a rail network inventory of the physical characteristics of the existing rail lines within the study area.
- Task 2 – Conduct Truck Freight and Freight Rail Operational Study
  - Identify existing rail and truck traffic volumes and operation impacts within the study area.
  - Project rail and truck freight volumes to the year 2030 and create current and projected freight flow models in Rail Traffic Controller (RTC) and the Statewide Analysis Model (SAM).
- Task 3 – Identification of Freight Movement Constraints
  - Meet and coordinate with freight rail carriers within the study area regarding operating impacts, parameters and costs. Concurrently, obtain engineering data required to establish a baseline layout of the track geometry for the study area.
  - Incorporating the train volume and flow data obtained, establish a Base Case operational model utilizing RTC software.
  - Determine infrastructure constraints inhibiting freight rail efficiencies.

- Determine vehicular freight movement constraints and/or conflicts that inhibit traffic mobility along the major and minor arterials as defined by the TxDOT's Dallas and Fort Worth Districts.

- Task 4 – Identification of Freight Rail and Rail/Roadway Interface Safety Issues.
  - Obtain and compile data from the Federal Railroad Administration and that provided by TxDOT for the past 5 years, showing safety statistic trends for vehicle/train accidents, vehicle/pedestrian accidents, train derailments, and train accidents involving hazardous materials.
  - Summarize the existing procedures established by both the railroads and other response agencies for emergency response to hazardous material spills, including clean-up procedures.
  - Using FRA methodology, estimate public costs associated with vehicular impedance and safety at existing public at-grade roadway-railroad crossings within the study area to qualify the feasibility of grade separating or closing current at-grade crossings.
- Task 5 – Develop Alternatives and Feasibilities for Rail System/Roadway Improvements for the DFW Region area.
  - Identify potential improvements to the existing railway infrastructure that may increase the efficiency of through-freight rail operations and improve road user mobility and safety within the Region. Improvements may include:
    - Track improvements and/or additions
      - Existing interlockings/wyes within the Region
      - Siding extensions
      - ML Track additions
      - Capital Improvements as identified by the railroads
    - Roadway/Rail re-alignments. Grade crossing locations and conceptual designs will be recommended based on a prioritized ranking of grade crossing impedance and safety conditions.
    - Railway yard improvements/relocations
      - Evaluate the DFW Region rail yards with an emphasis placed on major facilities
    - Existing railway line consolidation
    - Joint use freight corridors
    - Rail line relocation alternatives
    - Corridors identified in the MPO/County Freight Rail Improvement Plan
  - Identify potential improvements to be analyzed utilizing RTC Modeling.
- Task 6 – Modeling of Existing System, Improvements, and Alternatives
  - Building on the Rail Traffic Controller (RTC) Base Case modeled for train operations within the Region established in Task 3, prepare and model train operations to establish an enhanced Base Case model which incorporates planned or proposed improvements within the Region's rail network.
  - Prepare and model for train operations for a minimum of three (3) and a maximum of seven (7) alternatives within the Region determined in

Task 5 as the most desirable scenarios freight rail improvements. Alternatives will include the operation of Amtrak over Trinity Railway Express (TRE) and UP/BNSF identified Tower 55 At-Grade Improvements as well as potential additional Tower 55 scenarios.

  - Determine the most desirable options by utilizing appropriate engineering methods to determine the operational viability of existing and conceptual routes; identifying additional support infrastructure, including rail yards, sidings, set-out tracks, and connections or separations to/from existing rail corridors necessary to implement the potential improvements identified within the study area.
  - Utilize RTC modeling to provide a comparison of the alternatives selected versus the Base Case for existing traffic volumes and forecasted growth scenarios.
- Prepare order of magnitude capital cost estimates for the alternatives identified and modeled including a realistic cost/benefit analysis per alternative.
- Identify potential funding sources for the identified improvements.

SECTION 3: FREIGHT OPERATIONAL STUDY

Introduction

This section is intended to supplement and provide guidance to the Dallas and Fort Worth Districts in identifying current and projecting future truck and rail freight activity in the region.

The freight movement within the region was analyzed using two models: the Texas Statewide Analysis Model (SAM) and the Dallas-Fort Worth Regional Travel Model (DFWRTM). The SAM was the primary tool used to determine future truck and rail freight tonnage movement. SAM is a statewide travel demand modeling package developed for and used by TxDOT to analyze the movement of people and freight throughout the state. The DFWRTM, developed by the North Central Texas Council of Governments (NCTCOG), was used to estimate future truck volumes as well as identify areas of congestion within the Dallas-Fort Worth metropolitan area. The DFWRTM provided a more comprehensive roadway network for the metroplex as well as more closely calibrated volumes. However, the DFWRTM was limited to the Dallas-Fort Worth Metroplex and was unable to project truck volumes within the region, throughout the state, the rest of the country, and Mexico.

Following the discussion of modeling methods, technical information is provided on truck freight flows, rail freight movements and a comparison of truck and rail movements for the entire Dallas-Fort Worth region. It is through an understanding of the movement of truck and rail freight that the region can begin to develop ways to accommodate and capitalize on future commodity movements.

Statewide Analysis Model (SAM)

The SAM is a family of interrelated models that generate passenger trip estimates and freight tonnage flows for highway, aviation, and railroad networks, as well as waterway facilities along the Texas Gulf Coast. The maps and data produced by the SAM are particularly useful in planning regional transportation system improvements and addressing future needs and priorities. SAM was developed using base year (1998) transportation planning data to validate the adequacy of the model in estimating passenger flows by travel mode. In urban areas, transportation data from existing urban models was extracted. In the remaining rural areas, national and state travel survey and demographic data (population, employment, and other socioeconomic factors) were used to prepare travel estimates, which were then compared to traffic counts. SAM freight models were used to develop estimates of freight tonnage flow.

Model Calibration

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

- Reebie Transearch Database – This 1998 survey data includes a sample of all Texas freight movements (within, to, from, and through the State), but does not include freight movements between Texas and Mexico.
- Wharton Economic Forecasting Associates (WEFA) – Similar to the Reebie data, the WEFA data included only intra-U.S. flows and did not include freight movements between Texas and Mexico.
- Latin America Trade Transportation Study (LATTS) – This study collected data from the DRI/Mercer World Sea Trade Service (WSTS), which integrates world trade databases and economic/trade models to produce historical data and forecasts of freight movements around the world.

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

The freight model produces freight flow tonnage estimates for the following nine commodity types:

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

Trip Generation

Trip generation is the process of converting people and jobs into trips. These trips become auto trips, truck trips, and in this case tons of commodities. All trip generation model estimates for the freight model were developed at the county level since Reebie freight data defined freight origins and destinations as counties. More specifically, the trip generation model applies equations relating variables for employment types and special freight handling facilities to the tonnages produced or attracted to individual counties. Freight transportation demand growth is affected by

increases in both employment and worker productivity. The trip generation equations estimate freight tonnages based on employment and productivity increases; the resulting estimates were then compared to 1998 Reebie control total data and the equations iteratively adjusted to obtain reasonably accurate freight tonnage estimates by commodity and movement type. In short, freight movement was calculated using a system of equations; these calculations were compared to freight data from individual counties from 1998, and adjustments were made to develop accurate totals to use in the study.

Finally, equivalent annual trips were converted to average daily trip tables. The overall tonnage movements estimated by the freight model at the county and district level are provide a representation of base year freight movements and provide an effective basis for projecting future year freight movements.

Mode Choice and Assignment

The statewide freight flow tonnage estimates (produced at the county level) are allocated to highway, rail, and waterway modes by a mode choice model. While rail and waterborne movements were assigned to their respective networks at the county level, the highway freight tonnage estimates were disaggregated to even smaller geographic areas (traffic analysis zones — TAZ) prior to being assigned to the road network.

Dallas – Fort Worth Regional Travel Model (DFWRTM)

Through close coordination with TxDOT, Dallas Area Rapid Transit (DART) and the Fort Worth Transportation Authority (FWTA), the NCTCOG developed the DFWRTM that is primarily used for long-term performance evaluations. The model was developed based on travel patterns in the Dallas-Fort Worth area and used jointly by the four agencies. The DFWRTM relies on the results of various surveys and U.S. census data.

The developers followed a four-step process designed to model travel behavior and predict travel demand and project long-range demand. The four-step process consists of trip generation, trip distribution, mode choice and traffic assignment. The trip generation model determines the number of trips generated in a specific area. Estimations of the major socioeconomic variables (population, employment, income, etc.) were used to develop the trip generation model. The trip distribution model determines the pattern of travel over the transportation system (or the origin and destination of trips). The mode choice model allocates the travel to various modes and the traffic assignment estimates travel flows over the transportation network.

The study team was provided origin-destination matrices and the area roadway network for base year (2007) and future year (2030). The provided information was used to prepare a base year model of the existing Dallas-Fort Worth system, and to analyze truck volumes, total volumes, and congested areas projected to 2030. The model also identified areas of roadway congestion for the base year and projected year 2030. The projected roadway network in 2030 includes all recommended

projects presented in the *Mobility 2030: The Metropolitan Transportation Plan for the Dallas – Fort Worth Area.* These improvements include additional lanes for through or turning traffic as well as new roadway segments.

Truck Freight Movements and Commodities

The movement of truck freight into, within, and out of the region is significant today and will continue to be a key modal choice to transport goods and materials for the state of Texas and the country. This region represents one of the largest inland ports in the nation where freight is moved, transferred, and distributed across the state and the country. According to NCTCOG's *Mobility 2025 Plan*, more than 600 motor/trucking centers and almost 100 freight forwarders operate out of the Dallas-Fort Worth metropolitan area. This region represents approximately one-third of the state's total economic output.

In addition to freight and trucking operations, this region provides three major commercial airports to serve state, national, and global cargo. While DFW International Airport is the third busiest airport, it is also the 19th largest freight airport in the world, handling nearly 900,000 tons of cargo each year. Providing air freight service for manufacturing, warehousing, and distribution firms in the region, the Alliance Airport, located north of Fort Worth, is the largest commercial/industrial airport in the nation. Located just north of downtown, Dallas Love Field provides regional passenger and freight service within Texas and to the three adjacent states. The airport averages approximately 24,000 tons per year and maintains air cargo facilities. All information was provided by the North Texas Commission, which is a consortium of businesses, cities, counties, chambers of commerce, economic development entities, and higher education institutions whose goal is committed to enhancing the overall economic vitality and quality of life of North Texas.

Table 3-1 illustrates that while the movement of truck tons within the region (internal to internal) is forecasted to increase by over 50 million tons, a much larger increase occurs for tonnage movements coming into (138.9 million), out of (112.1 million), and through (187.5 million) the region between 1998 and 2025. The through-freight (external to external) movements compose approximately 38 percent of the annual truck tonnage for the region, while movements into and out of the region compose 29 and 24 percent of the total truck tonnage, respectively. The largest single movement type of through freight is composed of truck shipments that pass through the Dallas-Fort Worth region between other Texas counties and northern U.S. states. These figures demonstrate the importance of truck freight activity in the region, and the important economic role of this area in Texas and the nation.

Annual Truck Tons				
Origin	**Termination**	**1998**	**2025**	**Percent Change**
Internal to Internal				
Dallas-Fort Worth Districts	Dallas-Fort Worth Districts	33,474,627	85,130,745	154%
Internal to External				
Dallas-Fort Worth Districts	Other Texas Counties	61,637,848	137,505,868	123%
Dallas-Fort Worth Districts	Western U.S.	1,057,999	2,634,354	149%
Dallas-Fort Worth Districts	Northern U.S.	13,753,982	34,246,597	149%
Dallas-Fort Worth Districts	Eastern U.S.	4,231,994	10,537,415	149%
Dallas-Fort Worth Districts	Mexico	5,289,993	13,171,768	149%
	Subtotal	85,971,816	198,096,002	130%
External to Internal				
Other Texas Counties	Dallas-Fort Worth Districts	71,684,099	160,857,321	124%
Western U.S.	Dallas-Fort Worth Districts	1,494,569	3,660,494	145%
Northern U.S.	Dallas-Fort Worth Districts	19,429,394	47,586,417	145%
Eastern U.S.	Dallas-Fort Worth Districts	5,978,275	14,641,975	145%
Mexico	Dallas-Fort Worth Districts	7,472,844	18,302,468	145%
	Subtotal	106,059,181	245,048,674	131%
External to External				
Other Texas Counties	Other Texas Counties	38,452,814	83,758,309	118%
Other Texas Counties	Eastern U.S.	6,749,443	11,019,874	63%
Other Texas Counties	Northern U.S.	22,411,696	36,113,523	61%
Other Texas Counties	Western U.S.	2,594,235	4,170,148	61%
Other Texas Counties	Mexico	1,201,258	4,729,403	294%
Eastern U.S.	Other Texas Counties	5,992,004	12,601,553	110%
Eastern U.S.	Western U.S.	5,308,271	12,372,737	133%
Eastern U.S.	Northern U.S.	97,331	180,753	86%
Eastern U.S.	Mexico	6,039,437	17,627,729	192%
Northern U.S.	Other Texas Counties	23,817,172	52,381,138	120%
Northern U.S.	Eastern U.S.	147,819	291,229	97%
Northern U.S.	Mexico	14,345,115	57,439,437	300%
Western U.S.	Other Texas Counties	993,465	2,173,351	119%
Western U.S.	Eastern U.S.	3,518,496	7,075,410	101%
Mexico	Other Texas Counties	531,106	2,062,791	288%
Mexico	Eastern U.S.	3,675,093	10,163,501	177%
Mexico	Northern U.S.	1,707,555	10,897,600	538%
	Subtotal	137,582,310	325,058,486	136%
	Total	**363,087,934**	**853,333,908**	**135%**

Table 3-1: Truck Freight Movements

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

Truck Movements within the State

Figure 3-1 illustrates that large numbers of trucks moved between the Dallas-Fort Worth region and Houston, San Antonio, Austin, El Paso, Amarillo and the Lower Rio Grande Valley in 1998. Although trucks were moving to other parts of the state, their final destination remains in those major growth markets. Figure 3-2 shows the continuing trend of truck freight movement to and from the same major urban areas. As expected, origins and destinations along the I-35 corridor continue to produce heavy truck movement.

These trends heighten the need to plan and accommodate for trucks along the major highway corridors both inside and outside of the major urban centers. With current traffic volumes nearing capacity on most of the highway facilities, new corridors such as the I-35 corridor under development will play an integral role in keeping auto and truck traffic moving.

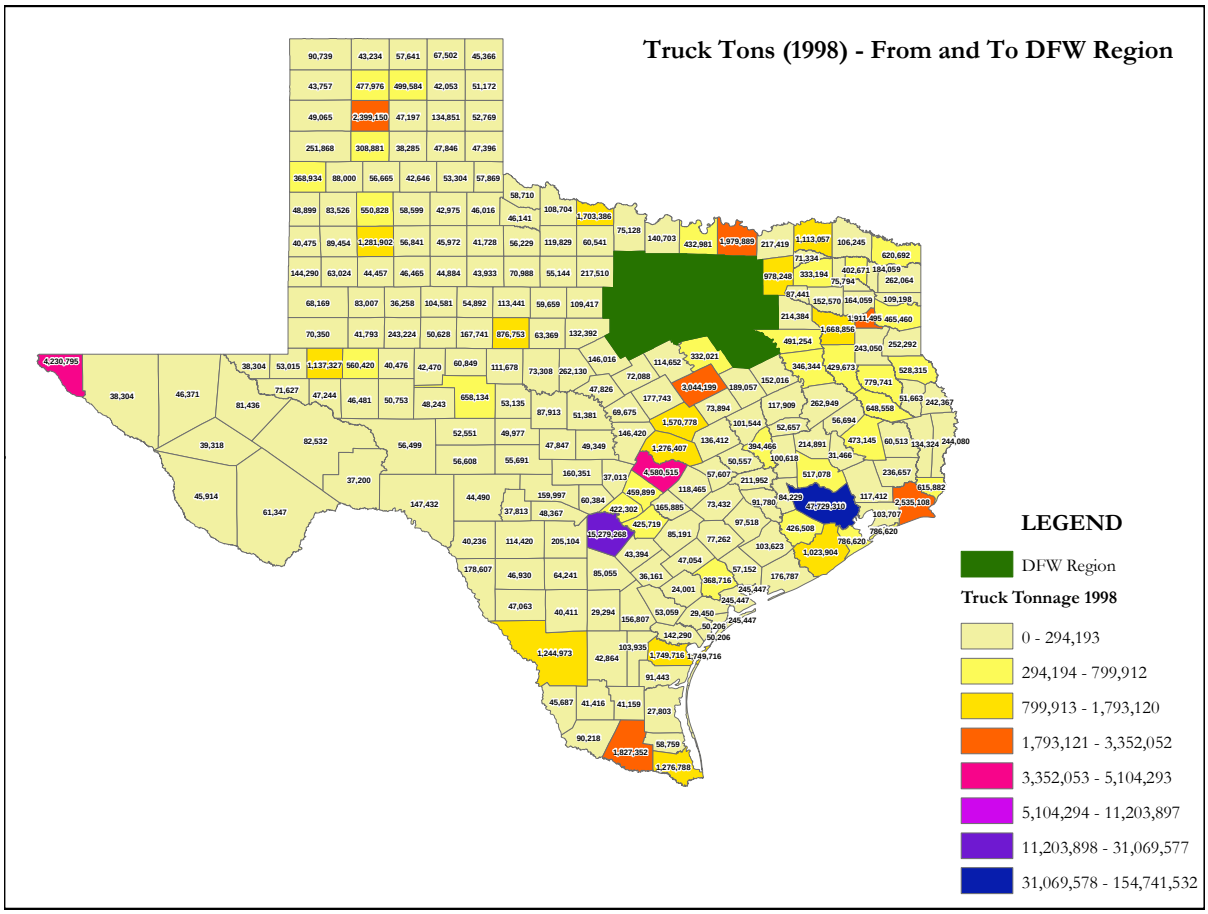


Figure 3-1: 1998 Truck Movements within Texas To and From the Dallas-Fort Worth Region

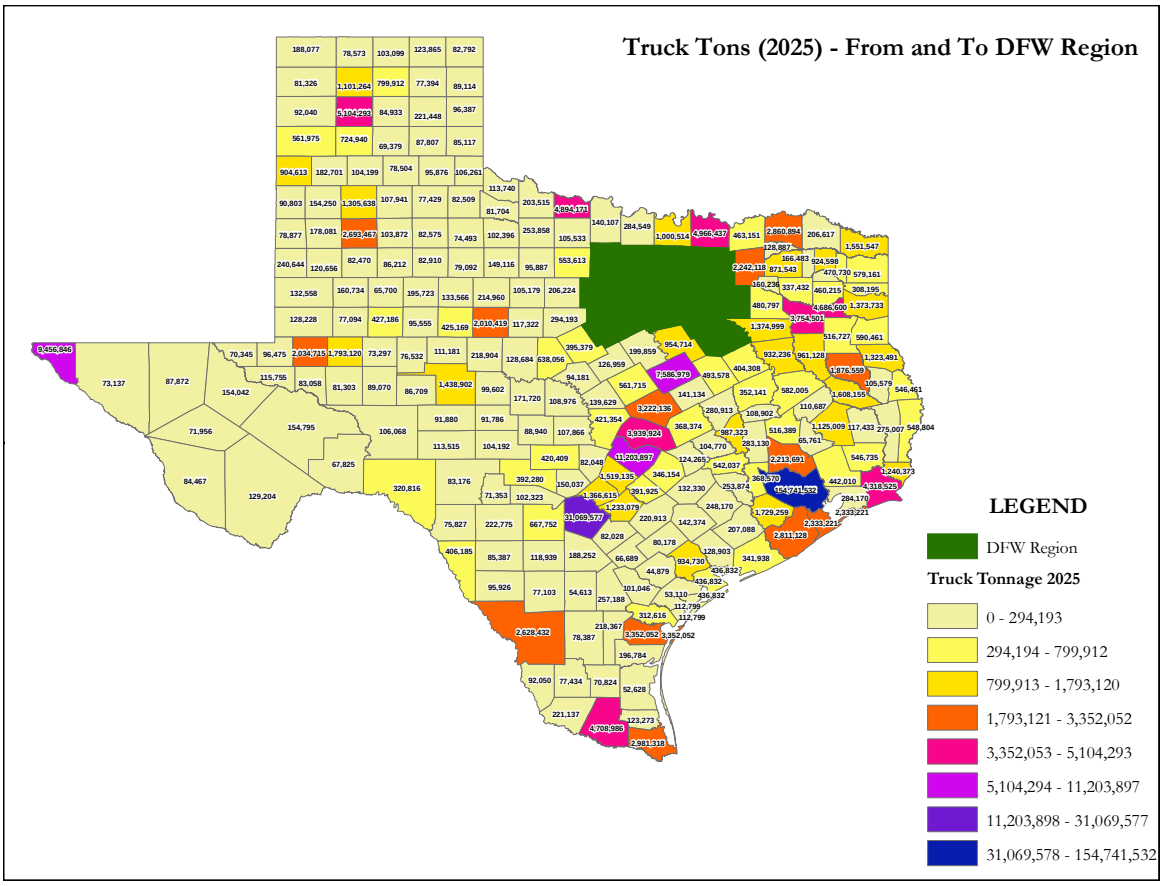


Figure 3-2: 2025 Truck Movements within Texas To and From the Dallas-Fort Worth Region

Truck Movements Outside of the State

Long haul truck movements between other parts of the country and the Dallas-Fort Worth region are expected to experience large increases between 1998 and 2025. Major movements seem to occur between Louisiana, Oklahoma, New Mexico, and Mexico and the Dallas-Fort Worth region. Figures 3-3 and 3-4 show 1998 and projected 2025 movements between the Dallas-Fort Worth Districts and areas outside of the state.

These movements outside of the state of Texas further illustrate the need for additional truck allowance on the highway system. Additionally, with highways nearing capacity, long haul truck movement may be better served by shifting the freight cargo to rail.

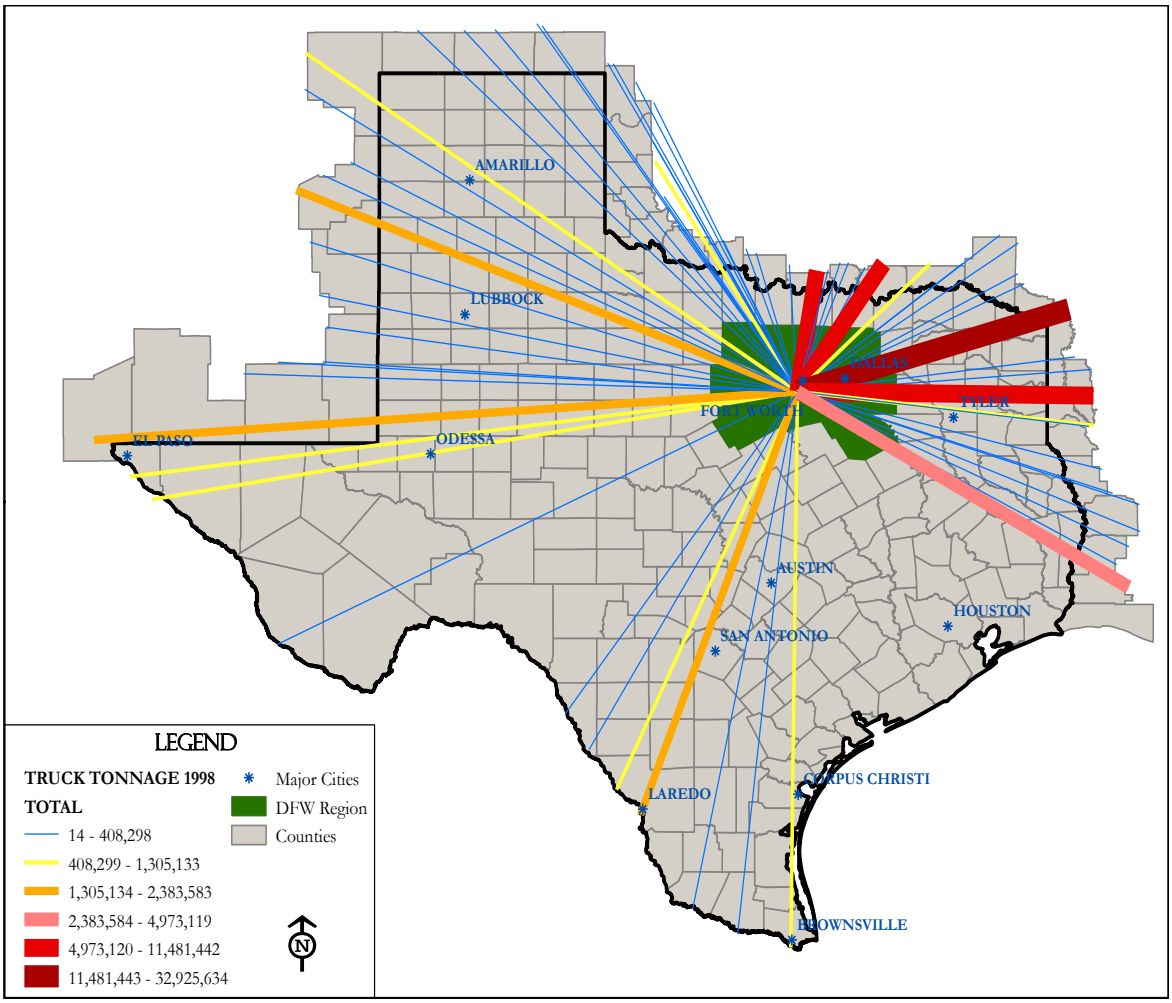


Figure 3-3: 1998 Truck Movements From Outside of Texas to Dallas-Fort Worth Region

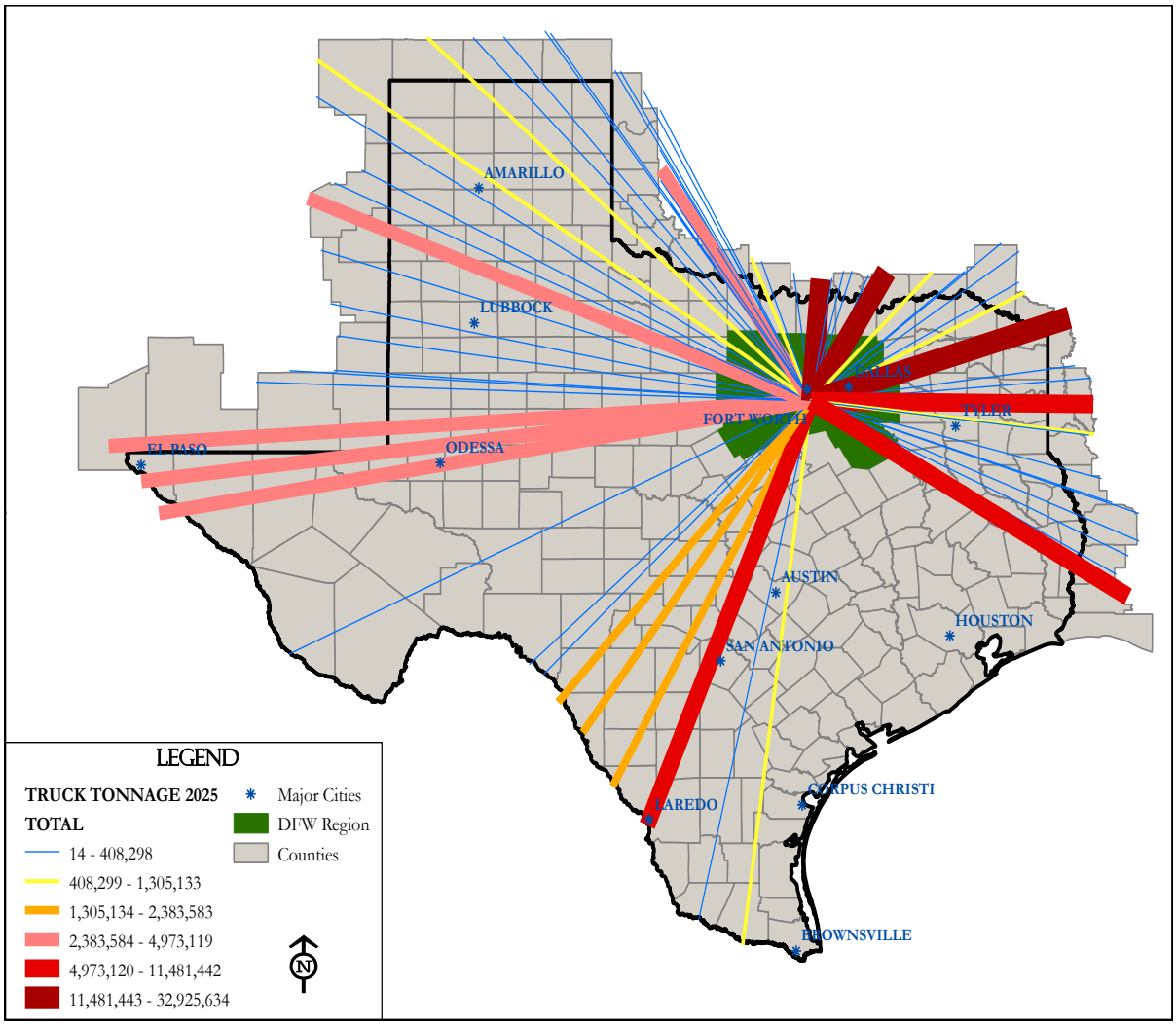


Figure 3-4: 2025 Movements From Outside of Texas to Dallas-Fort Worth Region

Figure 3-5 shows the distribution of truck tonnage projected in 2025 between the Dallas-Fort Worth region and areas within a 50, 100, 300, and more than 300 mile radius within Texas as well as the Western U.S., the Northern U.S., the Eastern U.S., and Mexico. The analysis showed that 29 percent of truck movement would stay within the Dallas-Fort Worth area while 38 percent is projected to travel between 100 miles and 300 miles from the area. Based on projections, 69 percent of truck freight traffic could travel within 300 miles of the Dallas-Fort Worth area. Eight percent of the truck freight is distributed to an area within Texas outside of the 300 mile radius. The remaining percentages are split between Mexico (5%), Western U.S. (1%), Northern U.S. (13%), and Eastern U.S. (4%).

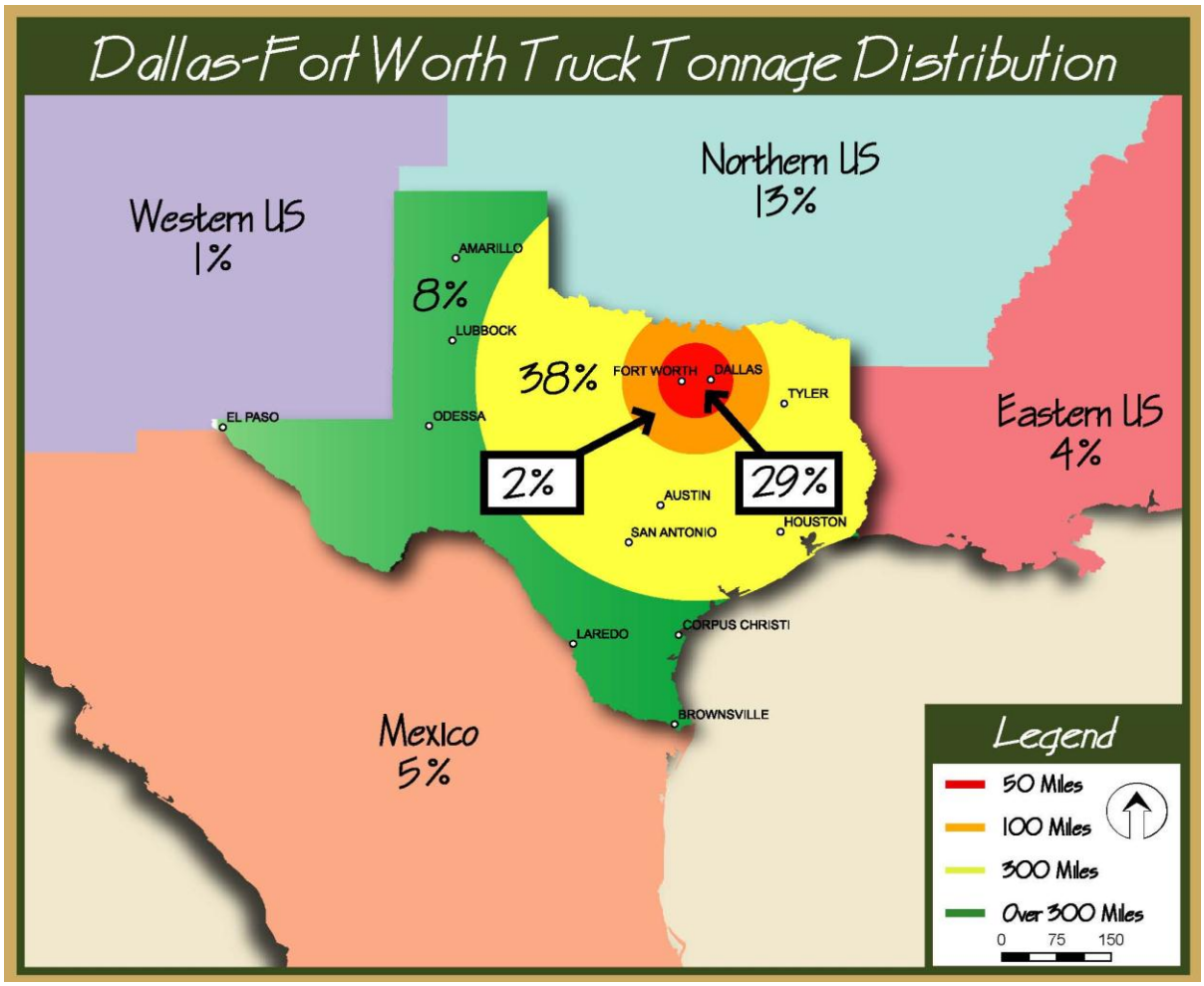


Figure 3-5: 2025 Truck Tonnage Distribution for Dallas-Fort Worth Region

Truck Commodity Trends

Commodity trends provide insight into economic and industry growth trends and a means of comparison between transportation modes (truck and rail). The greatest commodity volumes moving by truck are generally low value, bulk materials — consistent with traffic moving through bulk ports.

As Table 3-2 indicates, textiles will be the fastest growing commodity with more than 217 percent growth between the base and projected future year. Other commodities observing similar growth are building materials (205 percent) and machinery (180 percent). All of the nine commodity groups show significant increases and represent a positive economic outlook for the entire region. However, this amount of substantial growth will require additional infrastructure. Chemical/petroleum and raw material products transported by truck resulted in the lowest projected growth percentages for the region.

The leading products moving by truck (in terms of tonnage percentage in the region) in 1998 were chemical/petroleum and building materials. However, projections showed that the growth of chemical/petroleum compared to the other commodities

was relatively low. Estimates showed that the chemical/petroleum commodities hauled by truck decreased from 21.5 percent of the products in 1998 to 13.5 percent of products hauled by trucks for the region in 2025. Due to the estimated development growth for the region, the building materials commodity represented over one-quarter of the total projected tonnage hauled by trucks in 2025. Food products were also projected to increase significantly between the base and future years. Accounting for approximately 14 percent of the total truck tonnage each, wood and secondary products are projected to remain a steady portion of the truck movement for the region. Secondary products are an exception to the low-value tendency among the top commodities (by weight). Secondary products consist of re-handled freight from warehouse or distribution centers, and the truck drayage portions of truck/rail or truck/air intermodal trips. Figures 3-6, 3-7 and 3-8 further illustrate the commodity tonnage breakdown within the region for 1998 and 2025.

Commodity	**Truck Tons**		
	1998	**2025**	**Percent Increase**
Building Materials	45,197,038	137,178,418	204%
Food	44,238,046	112,005,985	153%
Wood	32,210,490	75,321,015	134%
Secondary	30,671,755	74,428,704	143%
Chemical/ Petroleum	48,297,592	71,711,757	48%
Machinery	9,995,009	27,791,583	178%
Raw Materials	10,406,357	16,611,911	60%
Textiles	2,957,858	9,375,546	217%
Agriculture	1,531,479	3,850,504	151%
Total	**225,505,624**	**528,275,422**	**134%**

Table 3-2: Truck Commodity Growth

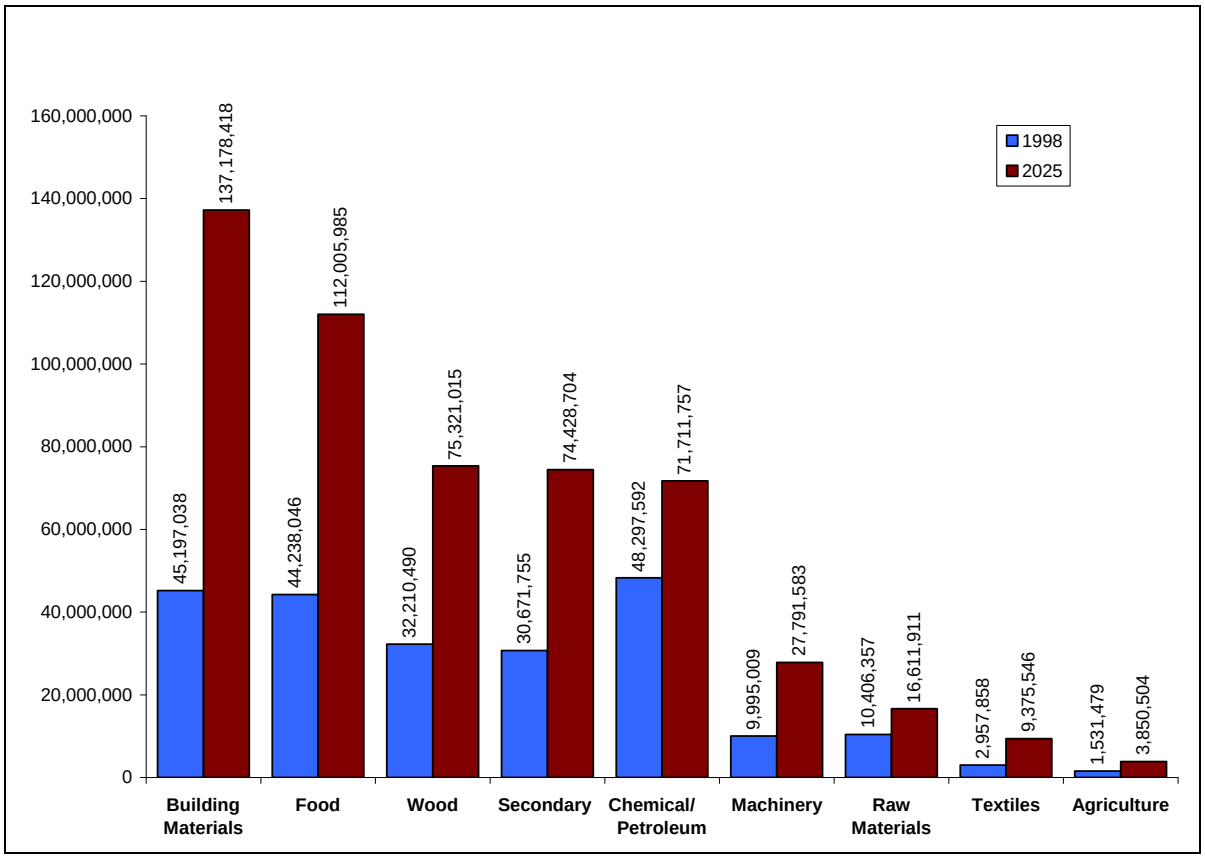


Figure 3-6: Total Truck Tons by Commodity

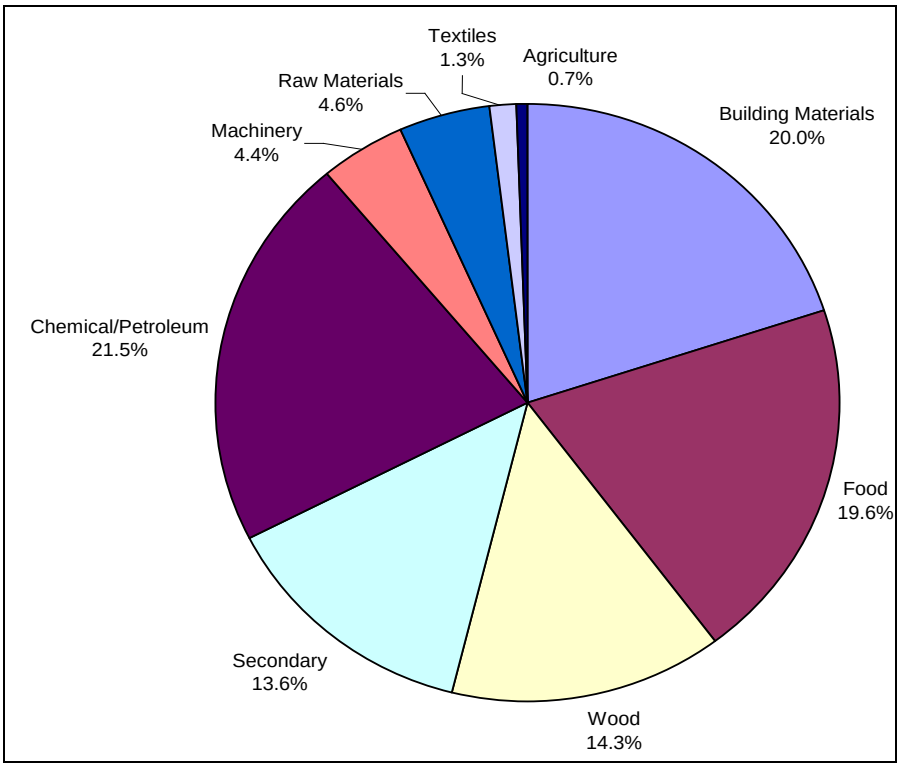


Figure 3-7: Percentage of Truck Tons by Commodity (1998)

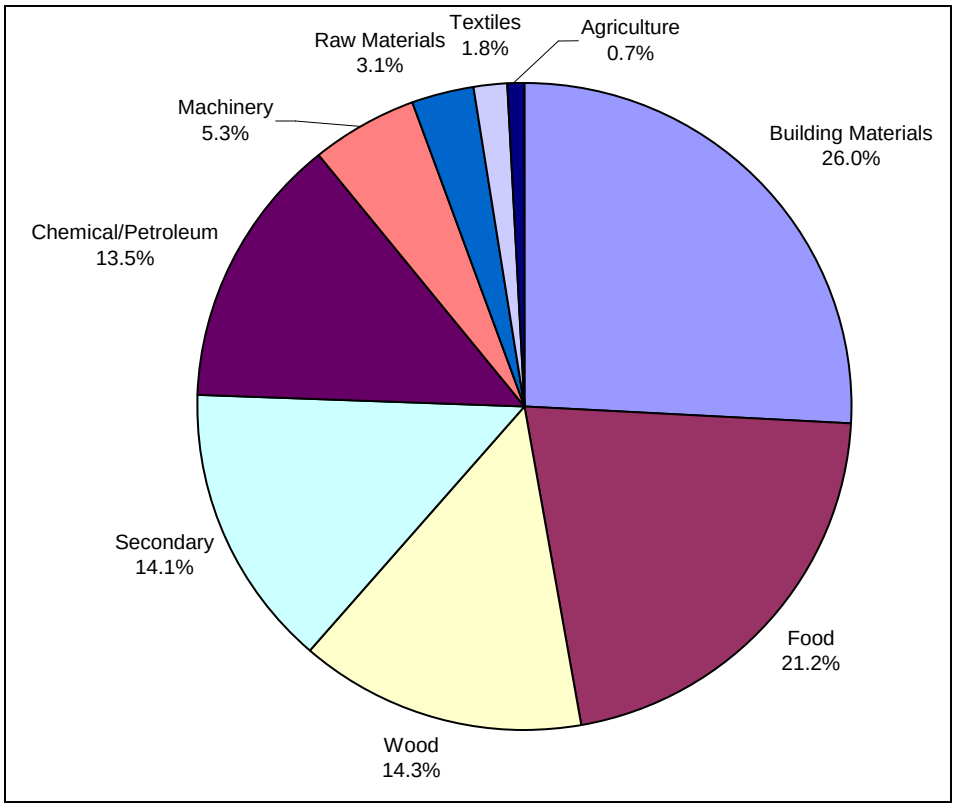


Figure 3-8: Percentage of Truck Tons by Commodity (2025)

Rail Freight Movements and Commodities

The SAM was not specifically designed to analyze freight rail movement, and as a result, the 1998 base year freight rail volumes (based on 1998 Reebie data and incorporated into the SAM) were well below actual 1998 freight tonnages. However, the SAM incorporates methodology and analytical techniques that are hence it's usage for this study. Freight railroads do not typically publicize their internal forecasts for commodity growth, which complicated the availability of accurate information to be used for the base year within the SAM. To get a more accurate and updated picture of the 2004 and subsequent 2025 rail freight movements, data was collected from the Surface Transportation Board (STB) Waybill Data.

Freight rail commodity movements were analyzed for movements within the state of Texas and out-of-state locations within the country and/or Mexico as determined by the SAM. The growth patterns resulting from SAM forecasting were then applied to these patterns, providing forecasts based on 2004 actual information. It is important to note that products coming into the state of Texas also come from air cargo and water vessels.

Table 3-3 illustrates that through-freight (external to external) movements compose nearly 80 percent of the annual rail tonnage for the region, while movements into and out of the region compose 13 and 6 percent of the rail tonnage, respectively, in

2004. The percentages of each movement type are not expected to change significantly in 2025, with a slight decrease in the percentage of through movements and slight increases in the percentages of all other movement types. Modest increases will occur via rail freight internal to the region (1.9 million tons), while the greatest percentages of growth are projected for imports (47.1 million tons) and exports (21.9 million tons), particularly between Dallas-Fort Worth Districts and other states in the U.S. and Mexico. Although projected to have the lowest percentage of growth, through movements are expected to have the largest increase in total tonnage (208.1 million) between 2004 and 2025. The majority of through movements are composed of rail shipments that pass through the Dallas-Fort Worth region destined for other Texas counties, eastern U.S. states, and Mexico.

The challenge for the region will be to efficiently transport this additional tonnage and determine how the state may plan for the additional infrastructure to accommodate such needs. The state and national economies, and possibly national security, are dependent on the efficient transport of these goods; therefore, it is in the best interests of both private and public sectors to improve the freight transportation system.

Annual Rail Tons				
Origin	**Termination**	**2004**	**2025**	**Percent Change**
Internal to Internal				
Dallas-Fort Worth Districts	Dallas-Fort Worth Districts	1,088,588	3,032,765	179%
Internal to External				
Dallas-Fort Worth Districts	Other Texas Counties	4,344,162	11,445,430	163%
Dallas-Fort Worth Districts	Western U.S.	3,427,526	8,630,598	152%
Dallas-Fort Worth Districts	Northern U.S.	3,559,354	8,962,544	152%
Dallas-Fort Worth Districts	Eastern U.S.	1,054,623	2,655,569	152%
Dallas-Fort Worth Districts	Mexico	1,713,763	4,315,299	152%
	Subtotal	14,099,428	36,009,439	155%
External to Internal				
Other Texas Counties	Dallas-Fort Worth Districts	2,534,296	6,671,548	163%
Western U.S.	Dallas-Fort Worth Districts	9,953,379	25,062,863	152%
Northern U.S.	Dallas-Fort Worth Districts	10,336,201	26,026,819	152%
Eastern U.S.	Dallas-Fort Worth Districts	3,062,578	7,711,650	152%
Mexico	Dallas-Fort Worth Districts	4,976,690	12,531,431	152%
	Subtotal	30,863,144	78,004,311	153%
Exernal to External				
Other Texas Counties	Other Texas Counties	4,090,597	9,296,711	127%
Other Texas Counties	Eastern U.S.	2,886,702	6,669,556	131%
Other Texas Counties	Northern U.S.	3,461,730	7,696,657	122%
Other Texas Counties	Western U.S.	4,278,359	8,920,164	108%
Other Texas Counties	Mexico	434,337	992,438	128%
Eastern U.S.	Other Texas Counties	7,907,375	18,269,531	131%
Eastern U.S.	Western U.S.	3,996,595	9,233,899	131%
Eastern U.S.	Northern U.S.	1,803,964	4,168,022	131%
Eastern U.S.	Mexico	21,415,655	49,479,624	131%
Northern U.S.	Other Texas Counties	23,591,875	49,164,955	108%
Northern U.S.	Eastern U.S.	4,421,401	10,215,387	131%
Northern U.S.	Mexico	13,861,219	20,957,845	51%
Western U.S.	Other Texas Counties	58,522,011	115,504,659	97%
Western U.S.	Eastern U.S.	19,747,013	45,624,324	131%
Mexico	Other Texas Counties	184,213	417,826	127%
Mexico	Eastern U.S.	16,784,665	38,779,989	131%
Mexico	Northern U.S.	105,592	218,397	107%
	Subtotal	187,493,303	395,609,984	111%
Total		**233,544,463**	**512,656,500**	**120%**

Table 3-3: Rail Freight Movements
(Source: Statewide Analysis Model based on 2004 Surface Transportation Board Waybill Data)

Rail Freight Movements within the State

Rail movements are somewhat limited in their ability to deliver door-to-door service. Intermodal centers, rail yards, and ports of entry (both land and water) are the

primary locations in which rail freight can be either sent or received. Figure 3-9 illustrates the origin and destinations for freight rail movements in 2004. Houston, San Antonio, Amarillo, Laredo, Eagle Pass, and Brownsville handled the largest movements. Figure 3-10 shows other locations such as El Paso, the Texas Gulf Port cities, and parts of east Texas potentially emerging as major origins or destinations in future years. Accommodating these and other locations with freight rail service will be critical to the future of Texas in terms of economic growth and providing opportunities to shift truck cargo to rail cars.

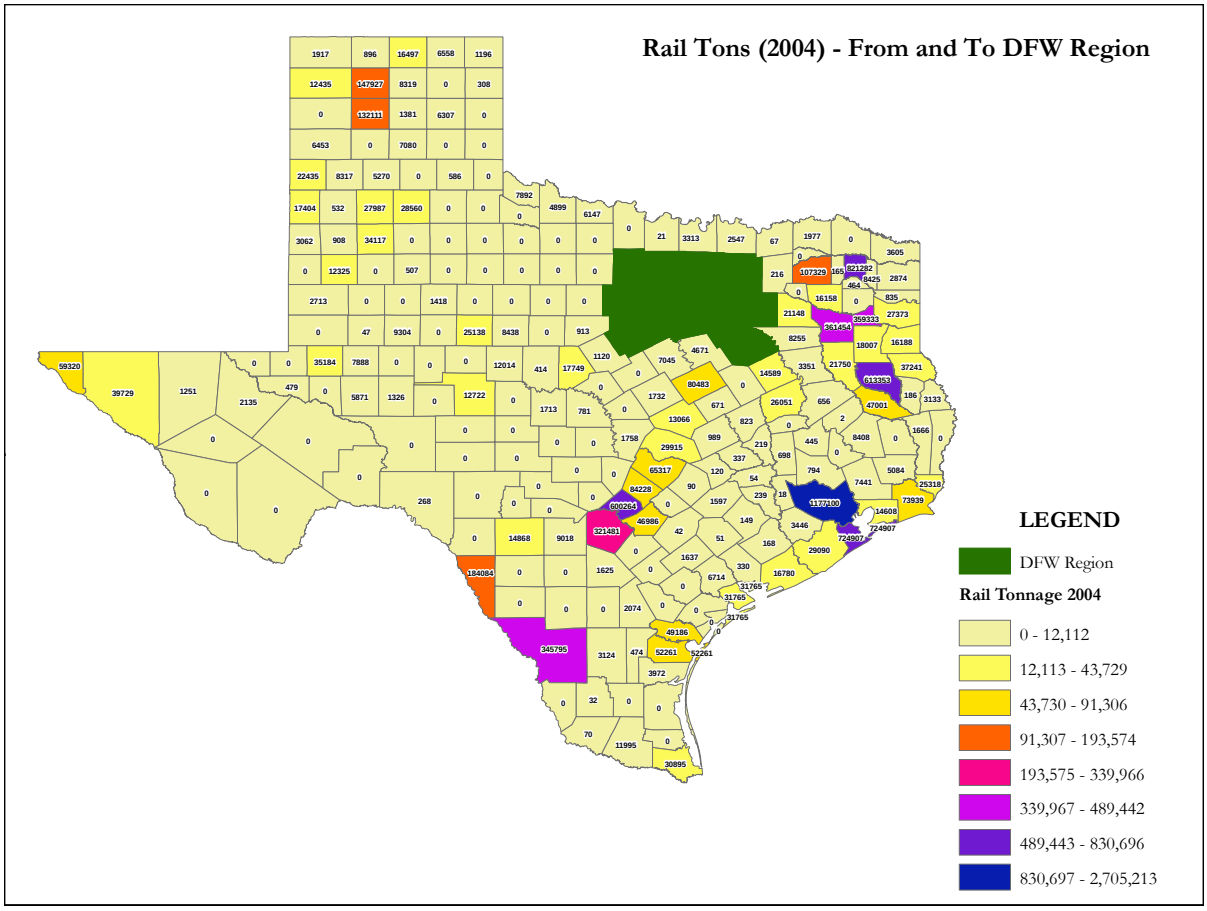


Figure 3-9: 2004 Rail Freight Movements

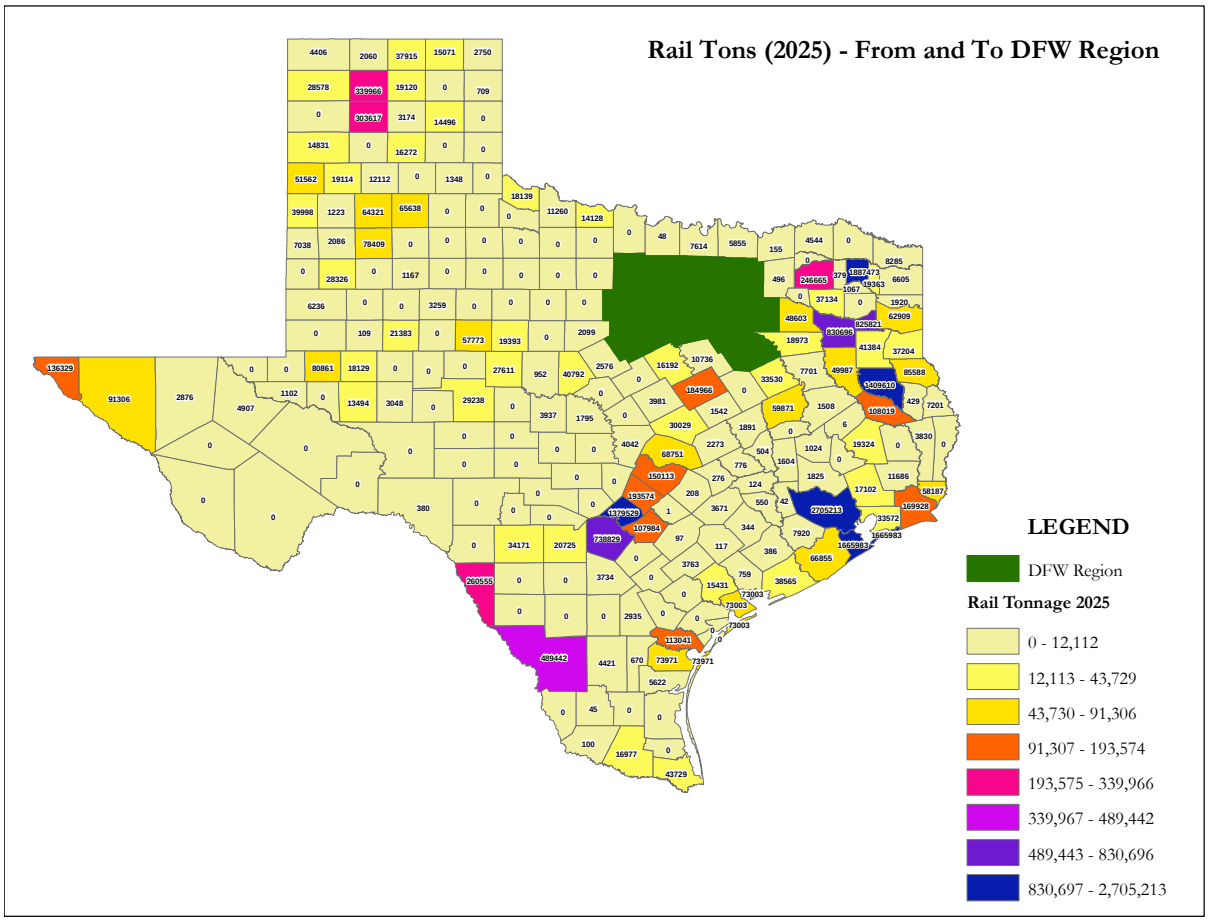


Figure 3-10: 2025 Rail Freight Movements

Rail Freight Movements Outside of the State

Rail freight is most cost effective when carrying long haul cargo. The cost effectiveness of utilizing rail to transport cargo over long distances has lead to the continued growth of tonnage movement between the Dallas-Fort Worth Districts and locations outside of the state. Figure 3-11 illustrates that major rail freight movements are occurring to and from Oklahoma and New Mexico, and moderate movements to and from Mexico, Louisiana, and the Texas Gulf Ports. Figure 3-12 shows the growth of movements for these areas by 2025.

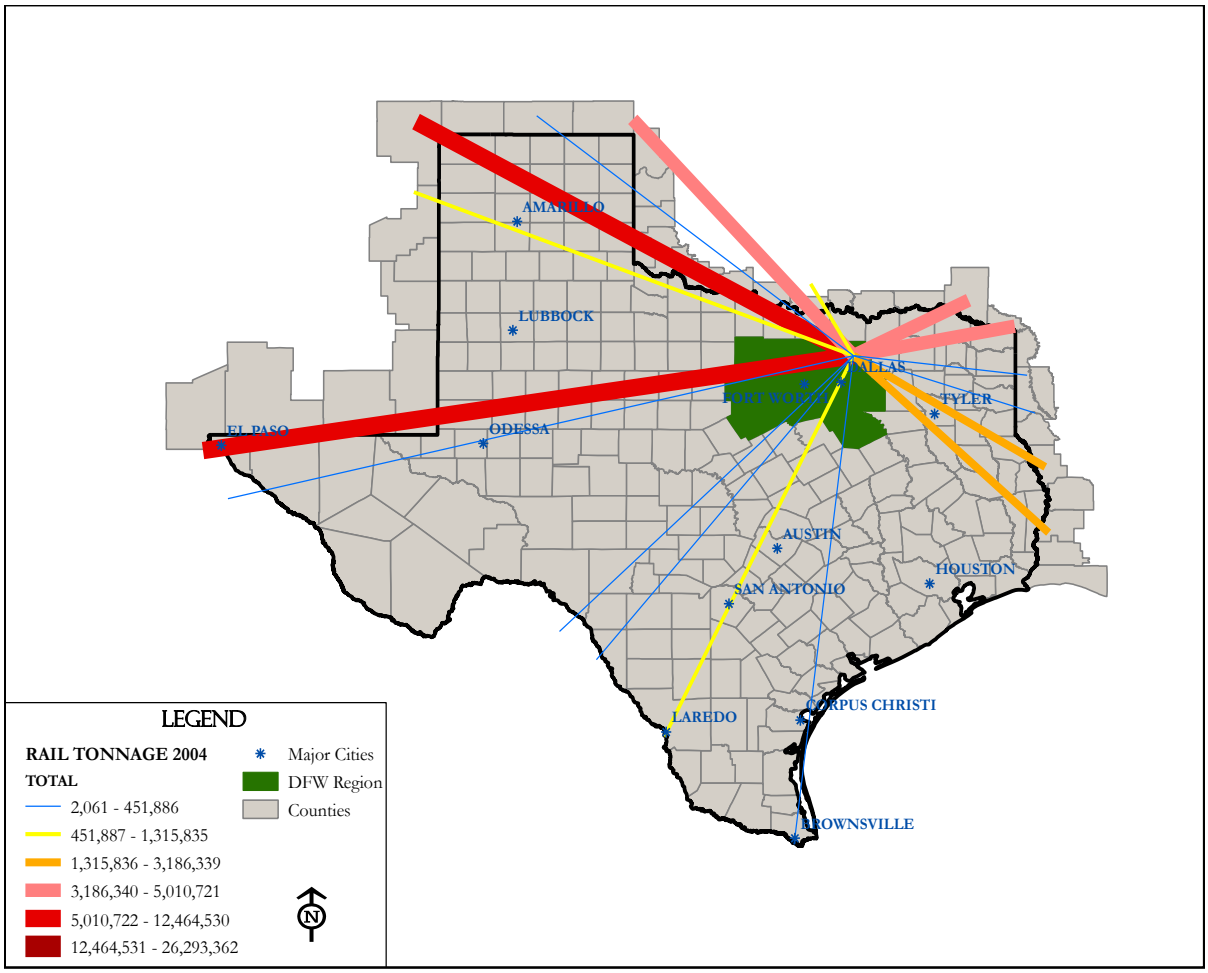


Figure 3-11: 2004 Freight Rail Outside of Texas to and from Dallas-Fort Worth Region

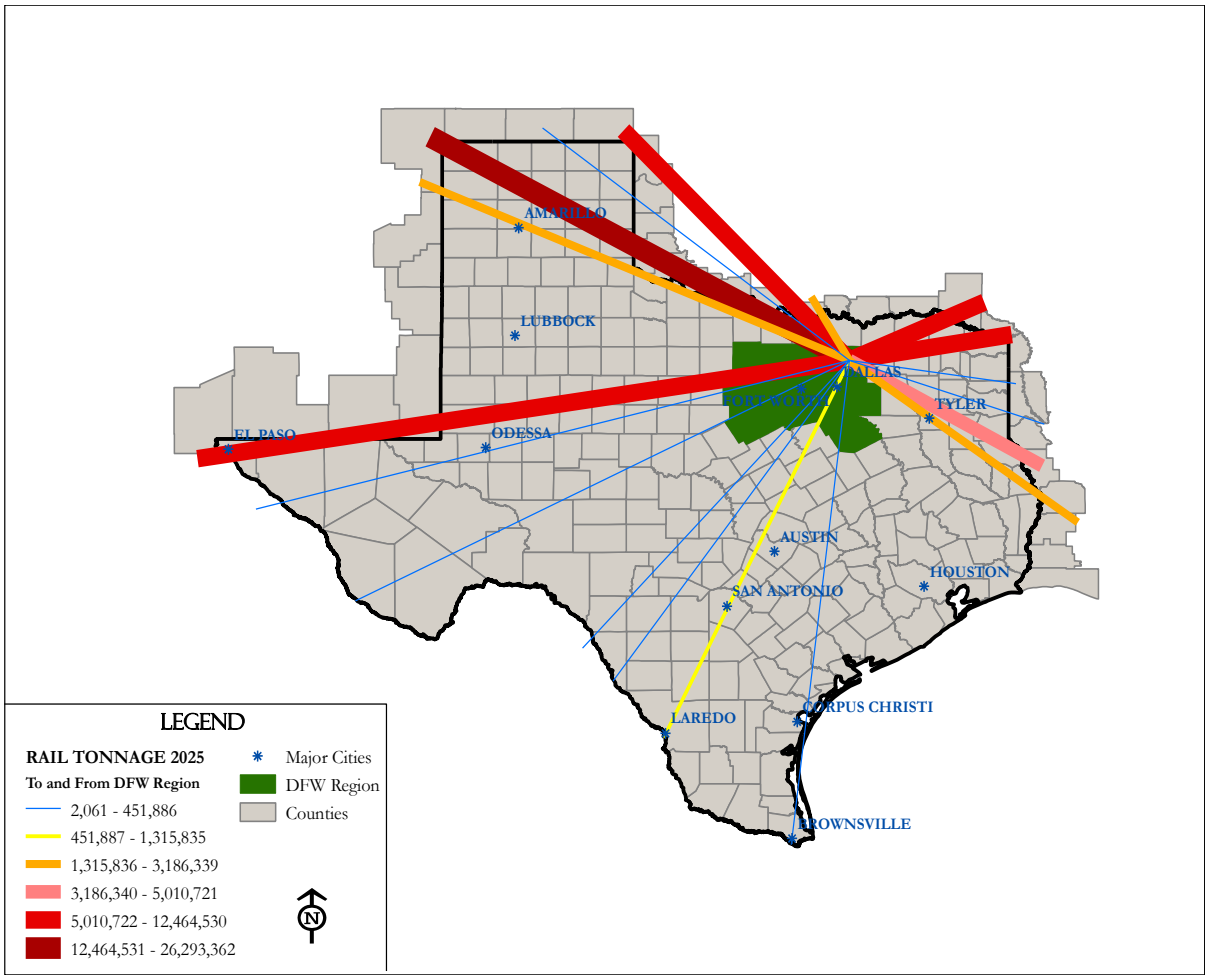


Figure 3-12: 2025 Freight Rail Outside of Texas to and from Dallas-Fort Worth Region

Figure 3-13 shows the distribution of rail tonnage projected in 2025 between the Dallas-Fort Worth region and areas within radii of 50, 100, 300, and more than 300 miles within Texas as well as the Western U.S., the Northern U.S., the Eastern U.S., and Mexico. The analysis showed that 11 percent of rail tonnage is projected to stay within the Dallas-Fort Worth region while 10 percent is projected to travel between 100 and 300 miles from the area. Based on projections, approximately 24 percent of rail freight traffic travels within 300 miles of the Dallas-Fort Worth region. A projected two percent of the rail freight is distributed to an area within Texas outside of the 300 mile radius. The remaining percentages are split between Mexico (13%), Western U.S. (26%), Northern U.S. (27%), and Eastern U.S. (8%).

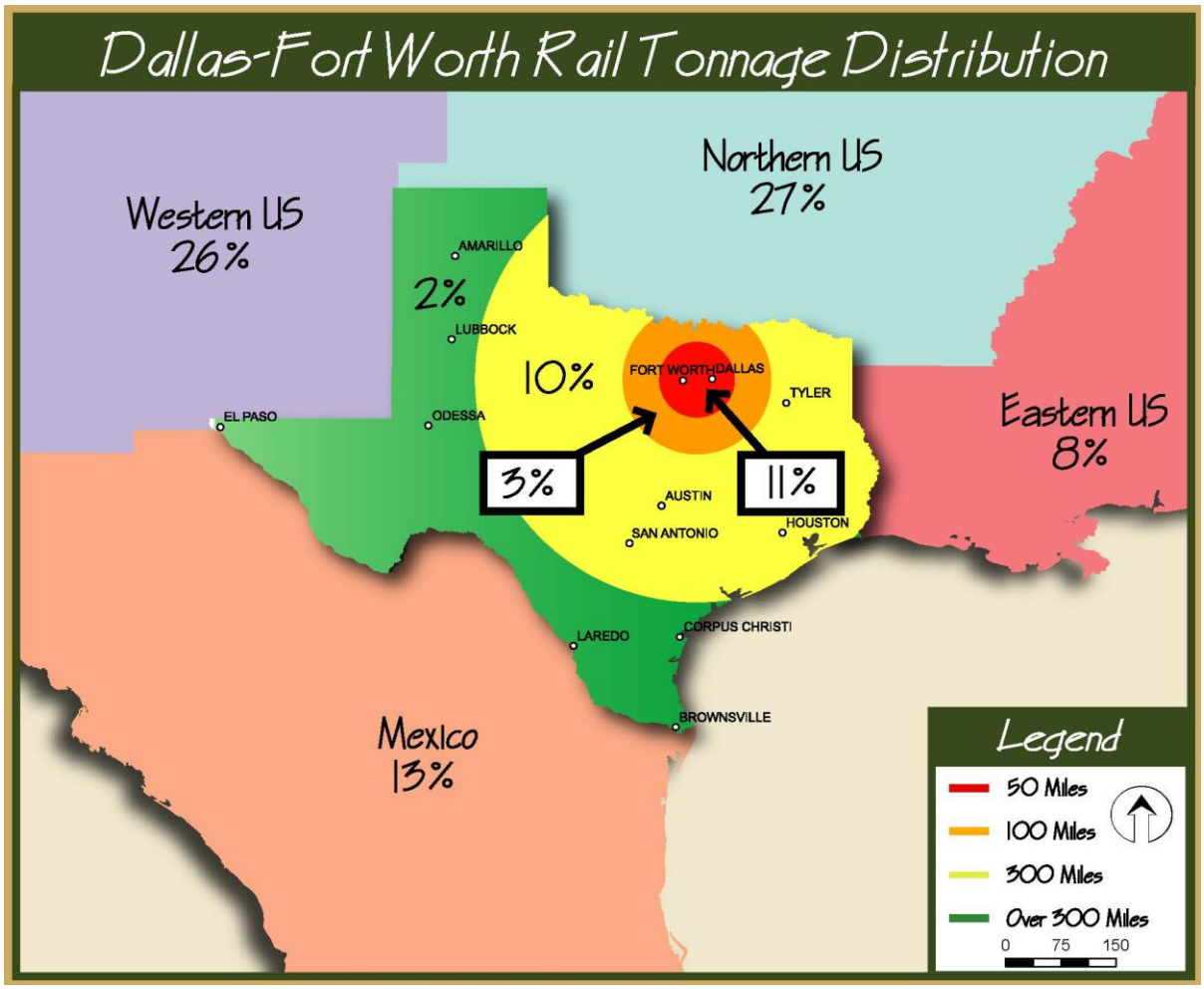


Figure 3-13: 2025 Rail Tonnage Distribution for Dallas-Fort Worth Region

Freight Rail Commodity Trends

Table 3-4 shows a comparison between 2004 and 2025 rail commodities. The secondary and raw materials tonnage growth of over 21 and 19.5 million, respectively, dominates all other commodities tonnage increases. Secondary products are projected to result in the second highest increase by tonnage. Secondary rail commodities include hazardous materials and products that are transferred at intermodal facilities, which include containerized or packaged products. Chemical/petroleum, food, wood, agriculture, and building materials are projected to increase between 3.6 and 7.4 million tons by year 2025. The tonnage growth for machinery and textiles are estimated between 1.8 and 2.1 million.

Commodity	Rail Tonnage		
	2004	2025	Percent Increase
Secondary	13,870,684	34,975,487	152%
Raw Materials	12,619,358	32,145,798	155%
Building Materials	4,739,731	12,148,363	156%
Agriculture	3,721,636	9,427,903	153%
Wood	3,447,077	8,835,173	156%
Food	2,694,978	6,827,102	153%
Chemical/ Petroleum	2,372,388	6,060,311	155%
Machinery	1,400,375	3,589,289	156%
Textiles	1,184,933	3,037,091	156%
Total	**46,051,160**	**117,046,516**	**155%**

Table 3-4: Rail Freight Commodity Growth

Figures 3-14, 3-15 and 3-16 display the commodities being moved by rail within the Dallas-Fort Worth Districts by tonnage and commodity.

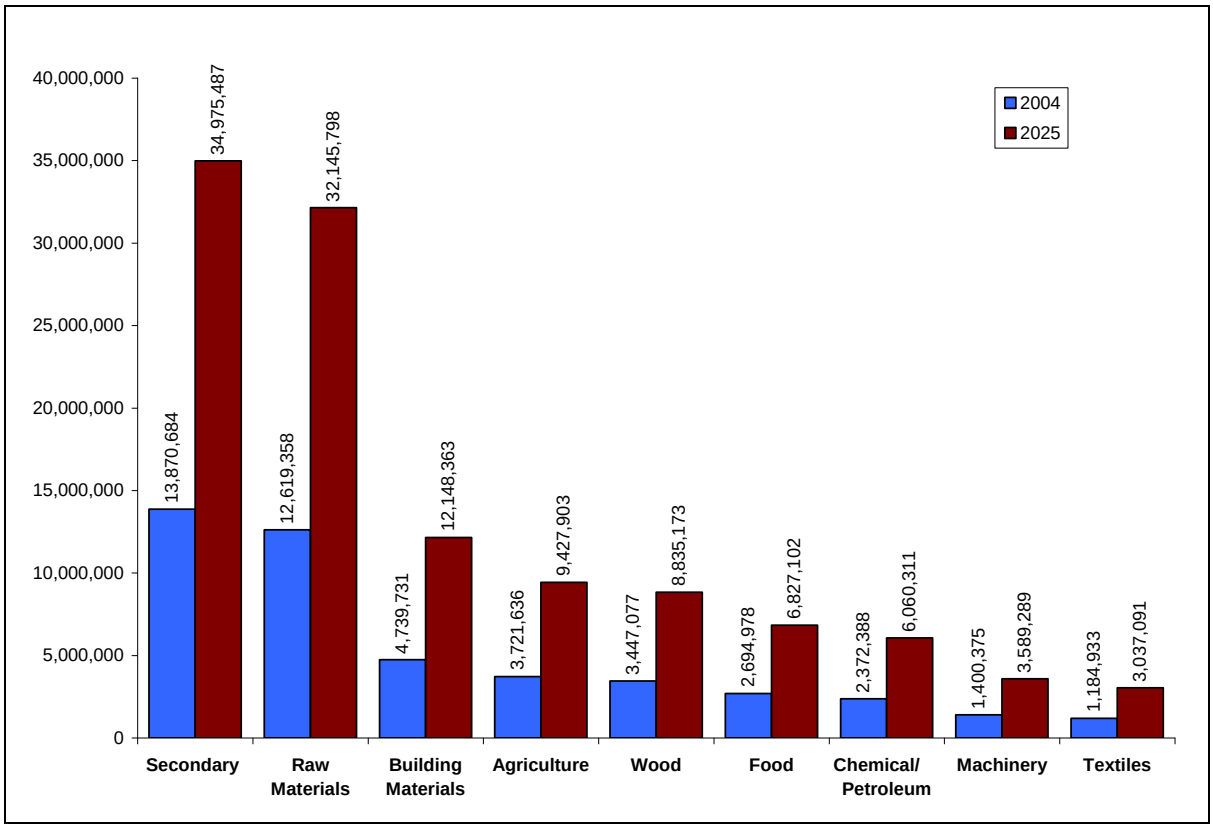


Figure 3-14: Freight tonnage by commodity

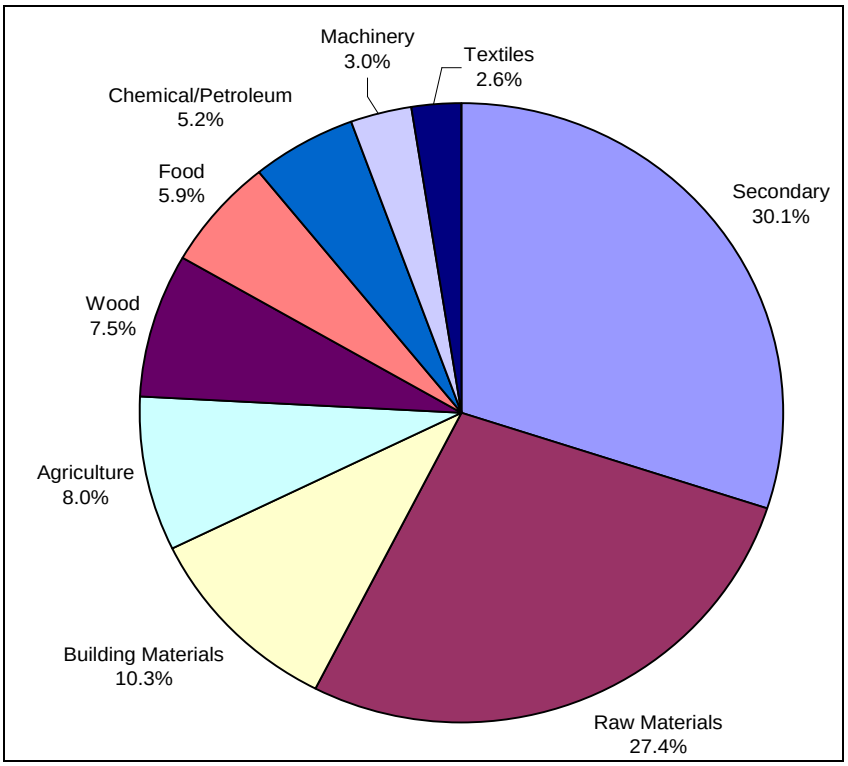


Figure 3-15: Percentage of freight rail by commodity (2004)

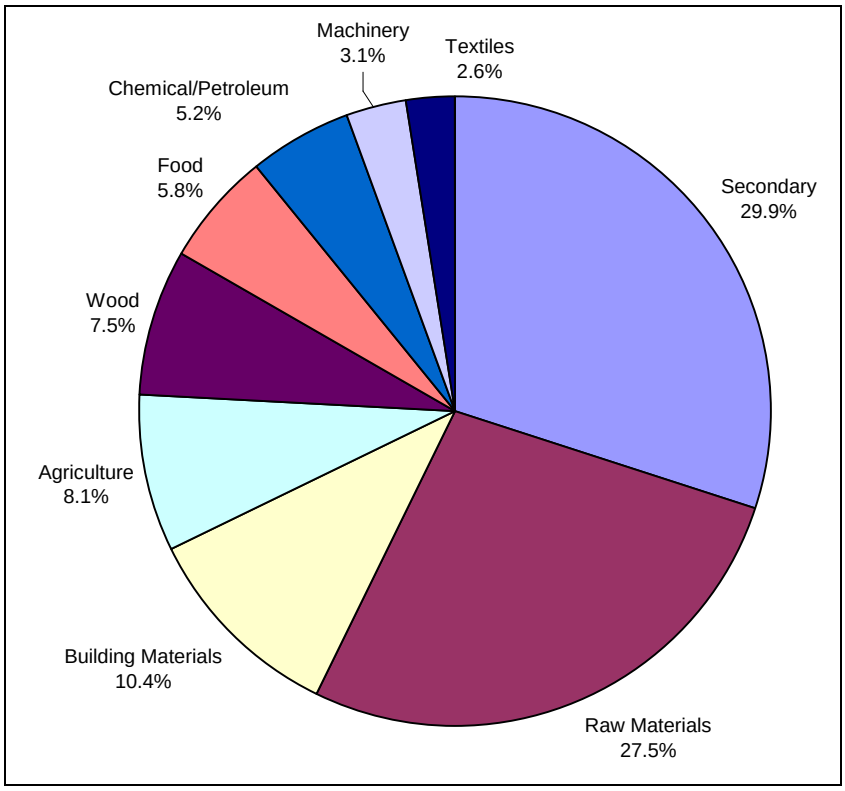


Figure 3-16: Percentage of freight rail by commodity (2025)

The challenge to accommodate the forecasted growth in freight rail movements will include planning for new or expanded rail facilities that can capitalize on the growth markets. These new facilities must be planned in a way that allows for the ability to shift the truck cargo burden to rail cars.

The percentage of growth is one way to analyze data; however, examining the percentage that each commodity has on the market is equally important. Analyzing the trends in commodity movements can aid in further understanding the trip generation and distribution of rail freight movements. In general, railways are best suited to hauling large, heavy, low-value loads that are not time-sensitive over distances greater than 300 to 400 miles. The largest products being moved by rail in the region (in terms of tonnage) are raw materials, secondary materials, and building materials. While growth occurs for all commodity types analyzed, the transportation of raw material and secondary products shows the greatest growth for the region.

Rail Freight Findings Summary

- Freight tonnage moved by rail is forecasted to more than double by 2025;
- Raw materials and secondary materials constitute a majority of the freight rail tonnage being shipped within Texas in 2004 and as forecasted in 2025; and,
- Over 53 percent of rail tonnage is estimated to travel between the Dallas-Fort Worth region and the Western and Northern U.S.

Rail and Truck Freight Comparison

Table 3-5 provides a comparison of truck and rail tonnages within the region. An increase of 135 percent between 1998 and 2025 is expected to occur for truck tons as opposed to a rail tonnage increase of 120 percent between 2004 and 2025. The predicted increases of both rail and truck tonnages are substantial and may need to be addressed through additional infrastructure improvements and/or enhancements. Figure 3-17 charts the overall tonnage and growth.

Year	Truck Tons	Rail Tons
1998 (Truck), 2004 (Rail)	363,087,934	233,544,463
2025	853,333,908	512,656,500
Percent Increase	135%	120%

Table 3-5: Rail and Truck Tons Comparison

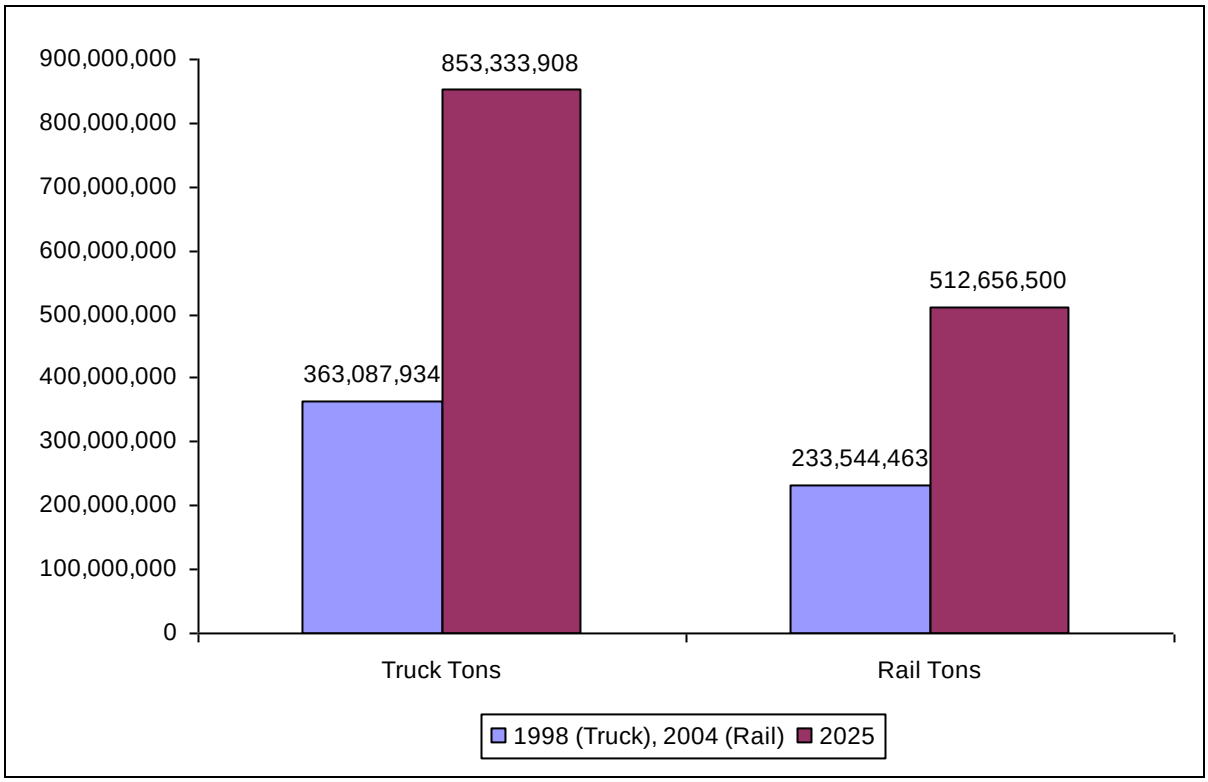


Figure 3-17: Total Rail / Truck Tons

Traffic Capacity Analysis

While the SAM was used to project truck tonnages, the DFWRTM was used to analyze truck volumes. The local regional model was used because it provided a more comprehensive local roadway network and more recent demographic information. The DFWRT was used to project and evaluate various transportation and environmental characteristics for the 2007 conditions, 2030 No-Build scenario and the 2030 Build scenario. The 2030 No-Build scenario consists of projected 2030 traffic volumes applied to the existing 2007 roadway network, while the 2030 Build scenario includes all recommended projects presented in the *Mobility 2030: The Metropolitan Transportation Plan for the Dallas – Fort Worth Area.*

Measures of Effectiveness

Through the analysis of the transportation network using the DFWRTM with and without the projected roadway improvements for the base year 2007, 2030 Build and 2030 No-Build scenarios, the following measures of effectiveness were compared:

- Vehicle miles traveled per day;
- Vehicle hours of travel per day;
- Hours of daily delay;
- Daily emissions in terms of VOC, CO and NOx;
- Daily excess fuel consumption; and,
- Total cost savings.

Vehicle-Miles of Travel

Vehicle miles traveled (VMT) is the regional total of all miles traveled in an average day. It is the sum of distance traveled by all vehicles in the DFWRTM. This can reflect the spatial relationship between residence and employment or other destinations. Lower VMT often reflects a better spatial match between residence and employment, while higher average VMT can indicate a spatial mismatch between place of residence and place of employment.

The traffic volumes on each road network link were calculated using the DFWRTM. The demographic, travel behavior, and transportation infrastructure data for each scenario were used as model input. The volume of each link was multiplied by the length of each link to determine the network VMT. The VMT typically increase for scenarios that include adding lanes to the roadway system. However, new roadways will help to reduce travel distances between origins and destinations, which will reduce the total number of miles traveled.

Vehicle Hours of Travel

Vehicle hours traveled is the regional total time spent on the transportation network during an average day. It is the total travel time of every vehicle trip in the DFWRTM. The travel time includes delay due to congestion.

Delay

Delay is a transportation indicator that estimates the number of hours spent in congestion by drivers. Delay is measured and calculated by the DFWRTM as the total travel time that is needed to complete a trip at free-flow speeds. Free-flow speeds are designated for each roadway link in the DFWRTM based on roadway functional classification.

Emissions

In order to minimize the growing air pollution problem, the Environmental Protection Agency (EPA) sets concentration standards known as National Ambient Air Quality Standards (NAAQS) for six pollutants: ozone, particulate matter, carbon monoxide (CO), sulfur dioxide, nitrogen oxides and lead. Ozone receives the primary focus in North Central Texas due to the region's inability to meet EPA's set standard for this pollutant. The reaction of volatile organic compounds (VOCs) and oxides of nitrogen (NOx) causes the formation of ozone. Carbon monoxide (CO) was also projected as part of this analysis.

Daily emissions of NOx, VOC and CO for base year 2007, 2030 Build and 2030 No-Build scenarios were based on the results determined by NCTCOG as part of the transportation conformity analysis for the DFW region. Transportation conformity is demonstrated when projected vehicle emissions created by improvement plans fall within set motor vehicle emission budgets (MVEB) as identified in the 2007 State Implementation Plan (SIP). NCTCOG uses the DFWRTM to predict regional vehicle activity and an emissions model developed by the EPA to estimate vehicle emission rates. The emissions rates developed by the EPA vary by year. Due to increasingly

cleaner vehicle technology, the EPA has determined the emission rates for year 2030 are lower than 2007.

Vehicle emissions are projected with a set of formulas that utilize factors such as VMT, congested speed, and emission rates. The product of the vehicle activity and emission rates produced total vehicle emissions in terms of NOx, CO and VOCs. As NCTCOG performed all required emission modeling for the region, they provided all emission results for this study.

Excess Fuel Consumption

Increased fuel consumption is due to travel in congestion rather than in free-flow conditions. Therefore, the formula to calculate excess fuel consumption took into account the level of delay for the region. Based on The 2007 Urban Mobility Report by the Texas Transportation Institute, an average traveler in the Dallas-Fort Worth Metroplex would endure 58 hours of delay and consume an additional 40 gallons of gas per year due to congestion. Therefore, a ratio of 40 gallons of gas consumed for each 58 hours of delay was applied to the total delay projected from the DFWRTM to calculate the excess fuel consumption.

Total Cost Savings

Cost savings analysis compared the 2030 No-Build and 2030 Build scenarios in terms of delay, emissions, and fuel consumption. The cost of daily delay was based on the calculated daily delay for the region and a standard hourly cost of time for the average driver as set by TxDOT in 2008. Based on the annual Consumer Price Index (CPI) for 2007, the value of time used was $19.35 per vehicle hour.

The emissions cost was calculated using the projected vehicle emissions in terms of tons of NOx, CO and VOC and costs per ton for NOx, CO and VOC of $2,765/ton, $2,040/ton and $50/ton, respectively. A current national fuel cost of $2.10 per gallon was used to calculate the excess fuel consumption cost.

Percentages of Truck Traffic

The interaction of truck traffic with passenger cars can be quantified through the percentage of trucks on a roadway. The truck percentages have an impact on the level of congestion on these roadways. Therefore, it was important to determine roadway segments that have the highest percentage of trucks now and in the future. Figures 3-18 and 3-19 show 2007 and 2030 truck percentages for the roadways in the Dallas-Fort Worth Metroplex.

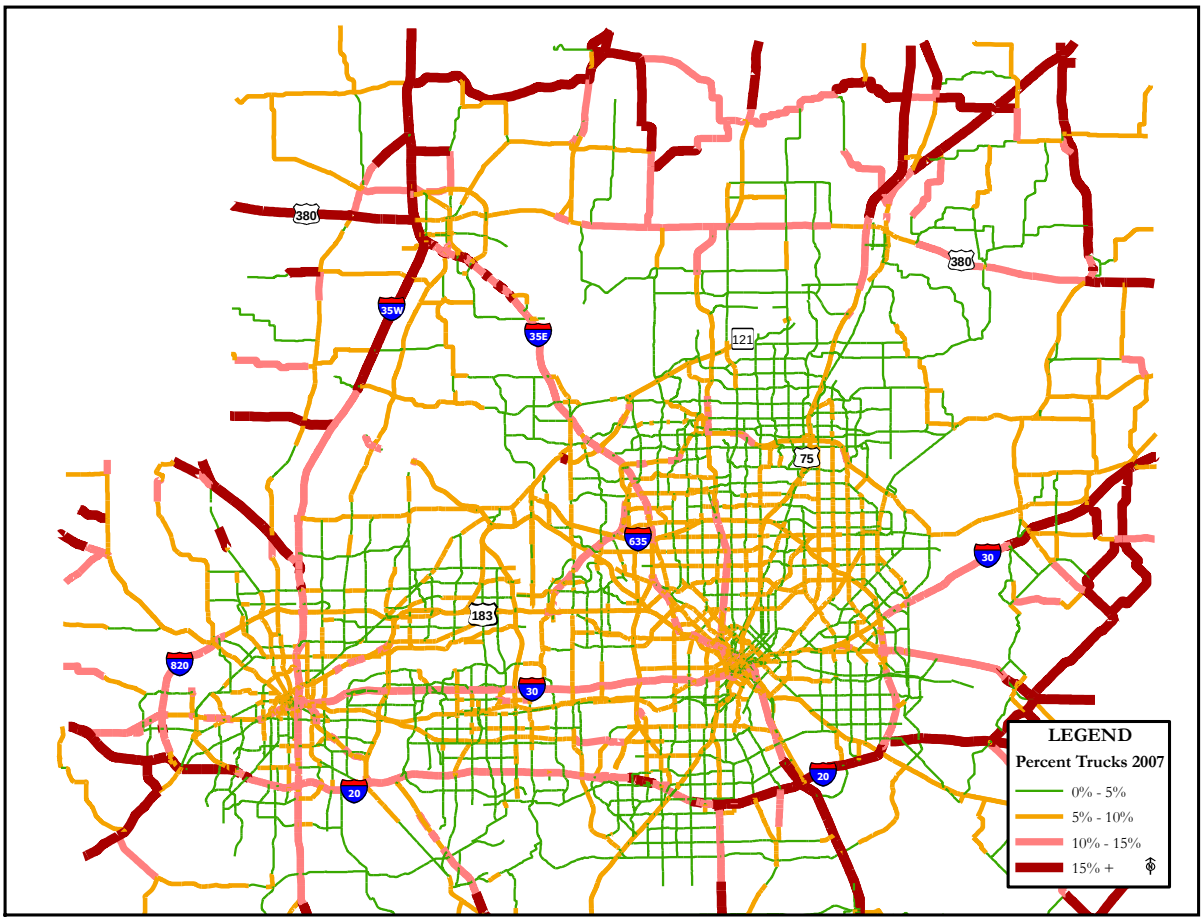


Figure 3-18: Truck Percentages in the Dallas-Fort Worth Metroplex (2007)

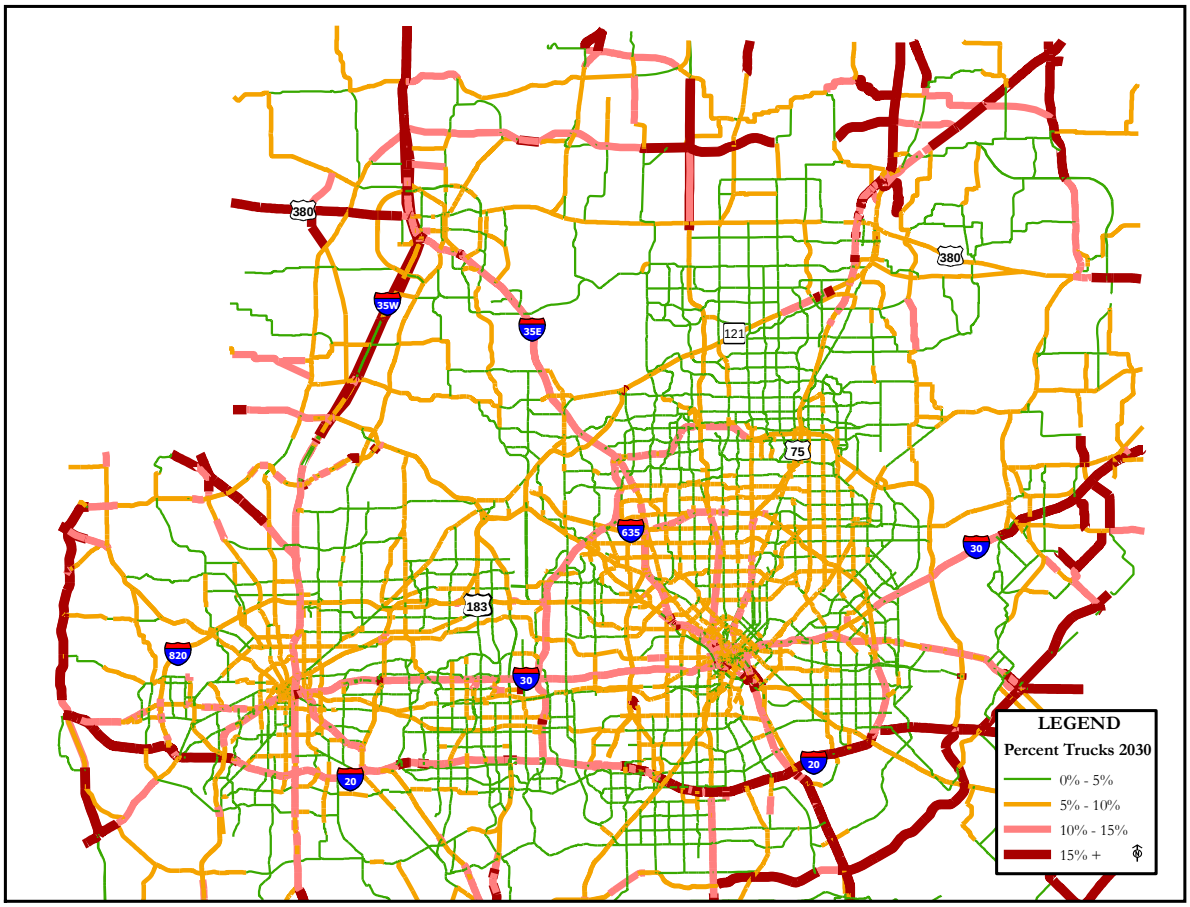


Figure 3-19: Truck Percentages in the Dallas-Fort Worth Metroplex (2030)

The truck percentages for 2007 and 2030 as derived from the DFWRTM reveal truck volume growth in several areas. The interstate highways within and through the Metroplex show truck percentages consistently greater than 10 percent for 2007 and 2030. Sections of I-30, I-20, I-35, I-820, and I-635 show roadway segments with truck percentages greater than 15 percent in base year and future year scenarios. I-35 serves as a major north-south truck route that accommodates traffic to and from Mexico. Designated as a hazardous cargo route, I-20 is a major east-west interstate that currently accommodates over 15 percent trucks. Truck facilities, airports, and intermodal terminals such as the Dallas Logistics Hub located in southern Dallas County will continue to encourage truck traffic within and through the Metroplex.

Roadway Congestion

Once the truck volumes were established, vehicular traffic was added and congestion levels were calculated using a volume-to-capacity ratio (V/C). The V/C ratio is a measure of the volume of vehicles divided by the capacity of the roadway and defines whether or not a roadway can fulfill assigned demand. V/C ratios are used to broadly define problem areas on major arterials and highways while allowing decision makers to make operational decisions at intersections and on-ramps. A roadway with more congestion will have a higher V/C ratio than a roadway with less

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

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

Roadway segments that resulted in a V/C of over 0.75 were considered congested. Analyses were performed at the district and metroplex levels as the DFWRTM did not cover the entire area for the Dallas and Fort Worth Districts. Therefore, the SAM was used to project congestion for the Dallas and Fort Worth Districts and the DFWRTM provided congestion detail within the Dallas-Fort Worth Metroplex. The level of detail for the SAM is not such that the V/C can be accurately determined for specific roadways. As a result, it was necessary to divide the District into smaller traffic analysis zones that can be used to determine an average V/C. While it would be desirable to improve all areas that have any congestion, it is not always feasible due to economic considerations. Therefore, identifying areas with a V/C over 0.75 seemed a reasonable approach, especially if there was also a presence of a high percentage of truck traffic.

Figures 3-20 and 3-21 show the areas of congestion within the Dallas-Fort Worth Districts for years 1998 and 2030 as modeled in the SAM. As expected, the majority of the congestion occurs within the Dallas-Fort Worth Metroplex. In addition, the projected 2030 traffic volumes show congestion spreading further into Collin, Denton, Ellis, Johnson, Parker, Tarrant, and Wise Counties. Figures 3-22 and 3-23 highlight the roadway congestion for base year 2007 and 2030 as determined from the DFWRTM.

The model incorporated the planned roadway improvements according to the *2030 Mobility: The Metropolitan Transportation Plan for the Dallas-Fort Worth Metropolitan Area.* The figures show that the congestion for the area will continue to grow despite the planned roadway improvements. As truck volumes increase along with the overall traffic volumes, congestion for the area will continue to increase.

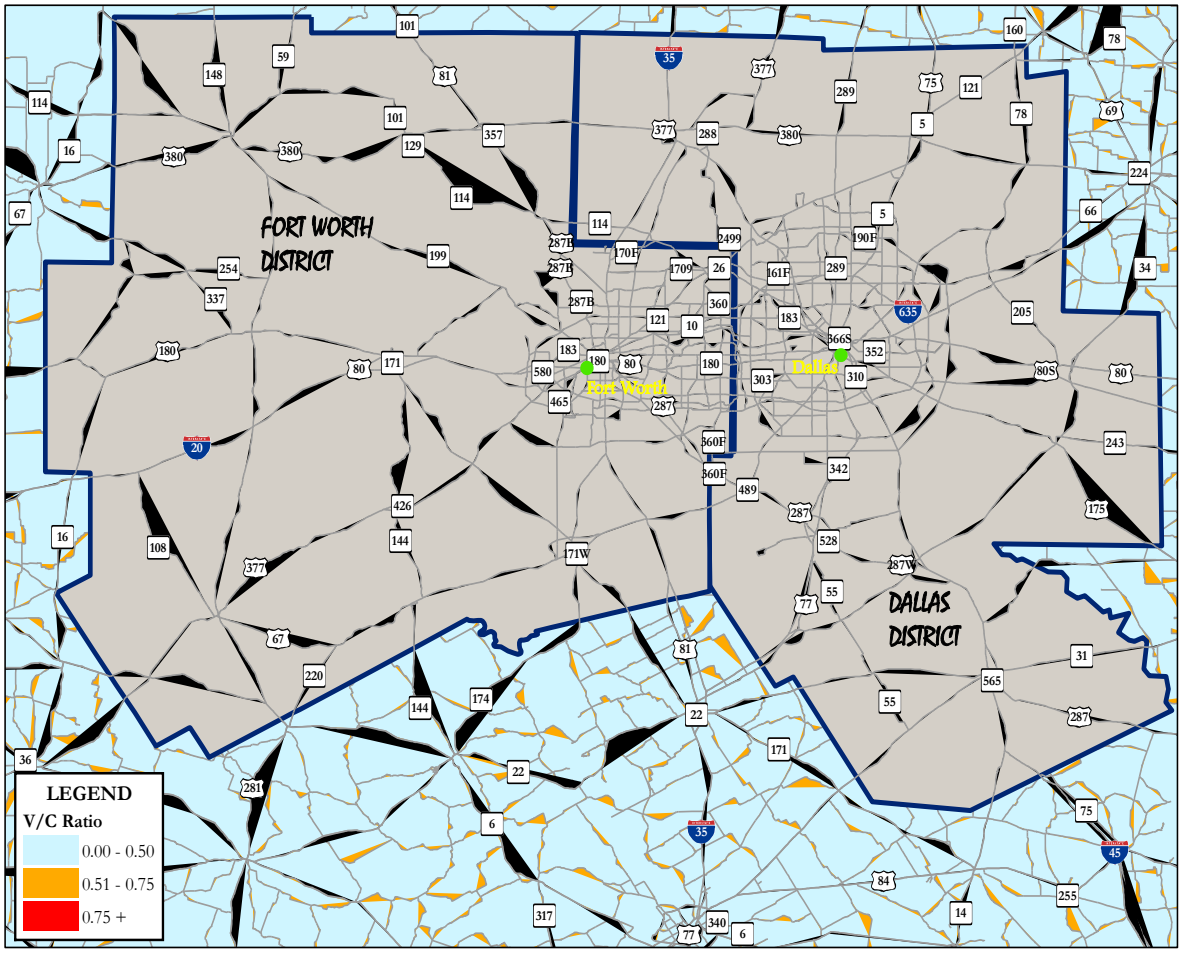


Figure 3-20: 1998 Congestion for Dallas-Fort Worth Districts

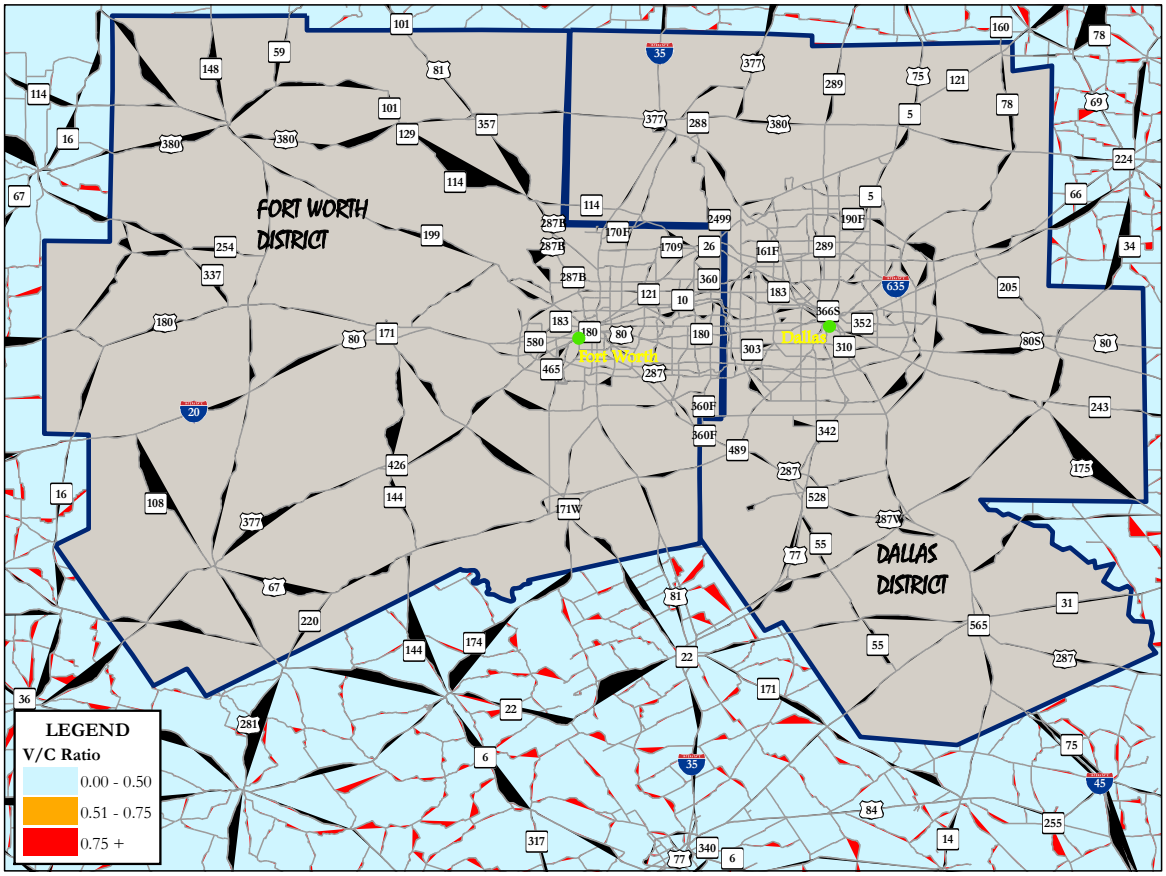


Figure 3-21: 2025 Congestion for Dallas-Fort Worth Districts

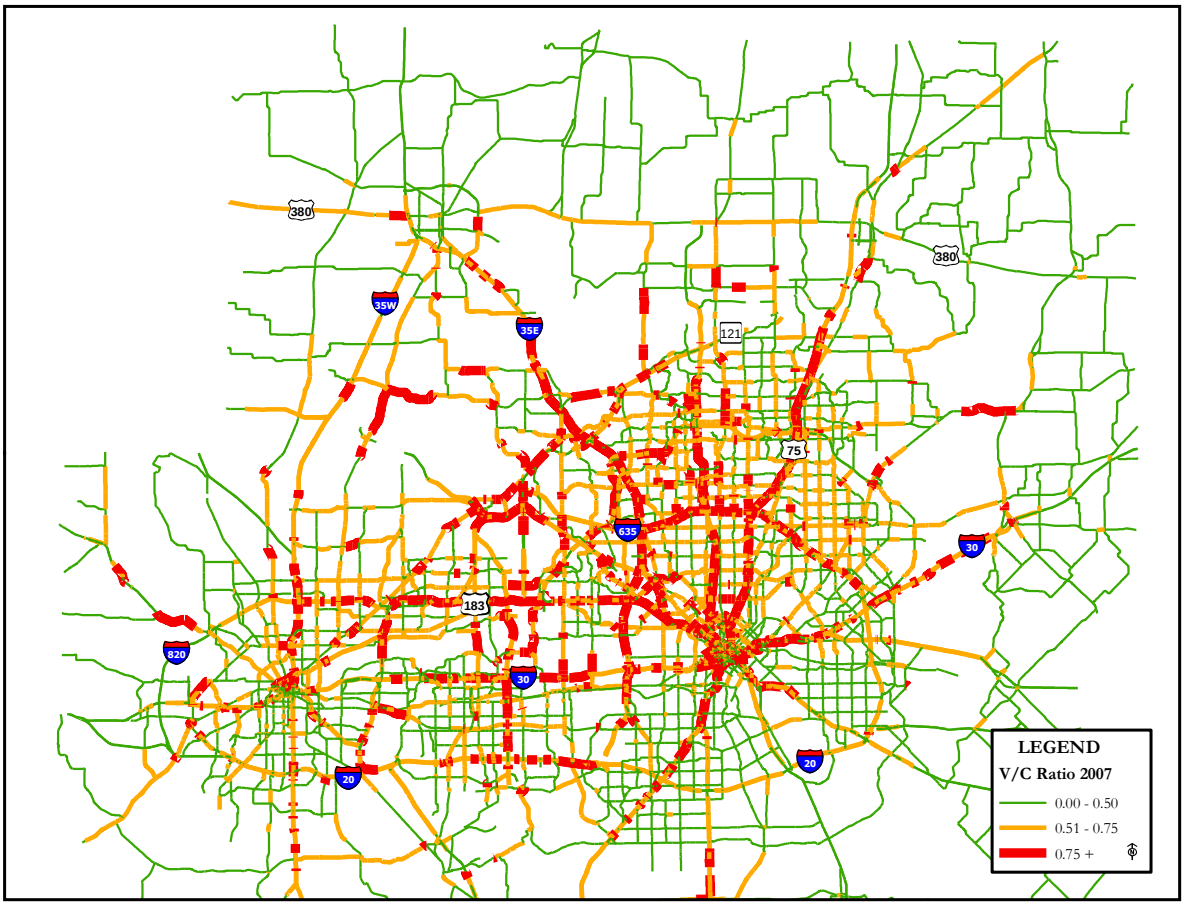


Figure 3-22: 2007 Congestion for Dallas-Fort Worth Metroplex

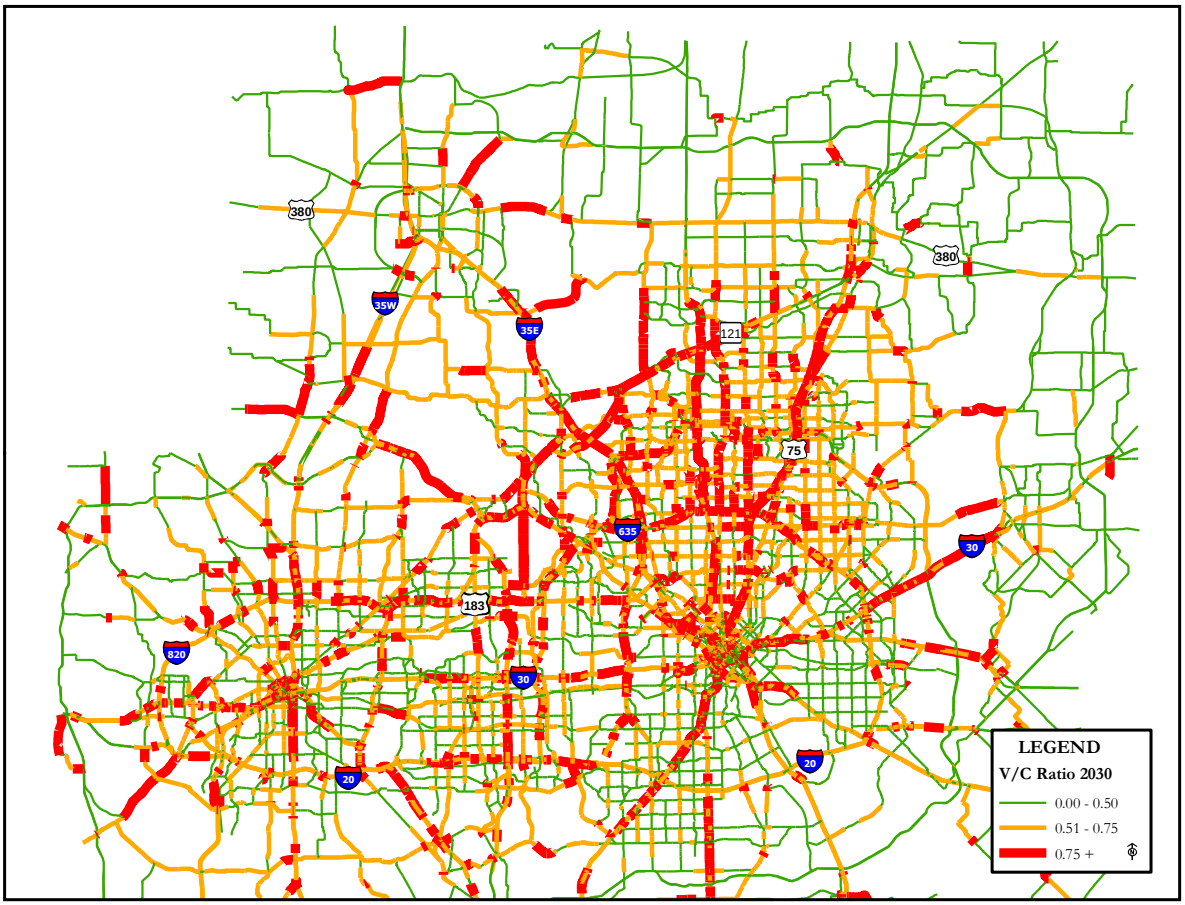


Figure 3-23: 2030 Congestion for Dallas-Fort Worth Metroplex

Improvement Analysis

The DFWRTM analysis shows that a large portion of the major roadways within the Dallas-Fort Worth Metroplex would be impacted by severe congestion by future year 2030. With the expected congestion and the need to continue efficient movement of goods throughout the state, improvements to the area's transportation system are needed.

Heavy trucks will continue to serve a much needed purpose for both local and regional service. A number of intermodal facilities located within the area use trucks to ship goods to local businesses and warehouses as well as regional locations. Therefore, it is important to attempt to make local roadway capacity improvements so that these trucks can move more efficiently.

Roadway capacity improvements can come through operational or geometric means. Operational improvements can occur through more efficient signal timing, signing, striping or the use of intelligent transportation systems. Operational improvements typically are considered lower cost options and do not require additional right-of-way. Geometric improvements can include additional lanes for through or turning traffic as well as using channelization methods that will encourage increased traffic flow. The planned roadway capacity improvements and new

location roadways for the Dallas-Fort Worth region were developed from the *Mobility 2030: The Metropolitan Transportation Plan for the Dallas – Fort Worth Area* (MTP). The roadway capacity upgrades described in the MTP were applied to the 2030 roadway network.

The analysis of alternatives was determined through an evaluation that included a comparison of mobility measures of effectiveness (MOE). The MOE's that were used in this evaluation were vehicle-miles of travel (VMT), delay, and vehicle hours of travel (VHT). The following alternatives were analyzed and compared:

- 2007 No-build;
- 2030 No-build;
- 2030 Build.

The base case for the analysis was assumed to be the existing roadway network with the projected 2030 traffic volumes (2030 No-build). The planned improvements proposed in the 2030 MTP include a combination of roadway capacity upgrades and new location roadways. Tables 3-6 through 3-8 and Figures 3-24 through 3-29 show the comparison of results for the alternatives in each of the measures of effectiveness (vehicle-miles of travel, total delay, vehicle hours of travel) as compared to the No-build scenario. These results show a comparison by county for the DFW region. The largest benefits would be located in Dallas, Tarrant, Collin, Denton, and Rockwall Counties. As a result, all other counties in the study area were grouped into the category "other" in the following figures.

Implementing the planned roadway improvements for the DFW region identified in the 2030 MTP resulted in a reduction in the daily hours of delay, fuel consumption, and vehicle hours traveled. Based on a standard hourly cost of time for the average driver, a cost per gallon of fuel, and an associated cost for emissions, it was estimated that the planned roadway improvements for the DFW region would save the traveling public approximately $47.5 million daily. As shown in Figures 3-29 and 3-30, Dallas and Tarrant Counties compose 67 percent of the total daily cost savings associated with the planned improvements since the majority of the congestion and delay is located in those counties.

The roadway improvements are projected to reduce the daily hours of delay and associated gallons of fuel consumption by more than 57 percent from the No-Build. Additionally, the planned improvements are projected to reduce the daily vehicle hours traveled by nearly 26 percent from the No-Build scenario. However, the number of vehicle miles traveled and emissions are slightly increased due to the additional lane-miles associated with the planned improvements. Without the planned improvements, the daily hours of delay are projected to nearly quadruple by 2030.

Scenario	Daily Delay Hours	Daily Fuel Consumption Due to Delay (Gallons)*	Daily Emissions			Vehicle Miles Traveled	Vehicle Hours Traveled
			NOx (tons)	VOC (tons)	CO (tons)		
2007	1,026,961	707,576	199.15	102.64	1,276.36	151,392,421	3,000,839
2030 No Build	3,981,274	2,743,098	36.90	52.10	893.47	256,438,113	7,109,742
2030Build	1,697,274	1,169,422	38.13	49.77	932.12	265,687,500	5,266,350

*Calculation based on TTI's 2007 Urban Mobility Report

Table 3-6: Measures of Effectiveness (MOE)

Scenario	Daily Delay Cost	Daily Fuel Consumption Due to Delay Cost*	Daily Emissions Cost	**Total Daily Cost Savings
2007	$19,871,695	$1,485,910	$823,853	N/A
2030 No Build	$77,037,646	$5,760,505	$252,997	N/A
2030Build	$32,842,259	$2,455,786	$253,566	$47,499,536

*Calculation based on TTI's 2007 Urban Mobility Report

**Savings compared 2030 Build and 2030 No-Build

Table 3-7: Daily Costs

Scenario	*Daily Emissions (tons)			
	NOx	VOC	CO	Cost
2007 Motor Vehicle Emissions Budget	201.32	104.14	1,276.36	$832,913
2007	199.15	102.64	1276.36	$823,853
2030 No Build	36.90	52.10	893.47	$252,997
2030 Build	38.13	49.77	932.12	$253,566

*VOC and NOx emissions comparison is between 2007 Motor Vehicle Emissions Budget (MVEB) and 2030 projected emissions. CO does not have an established MVEB.

Table 3-8: Daily Emissions

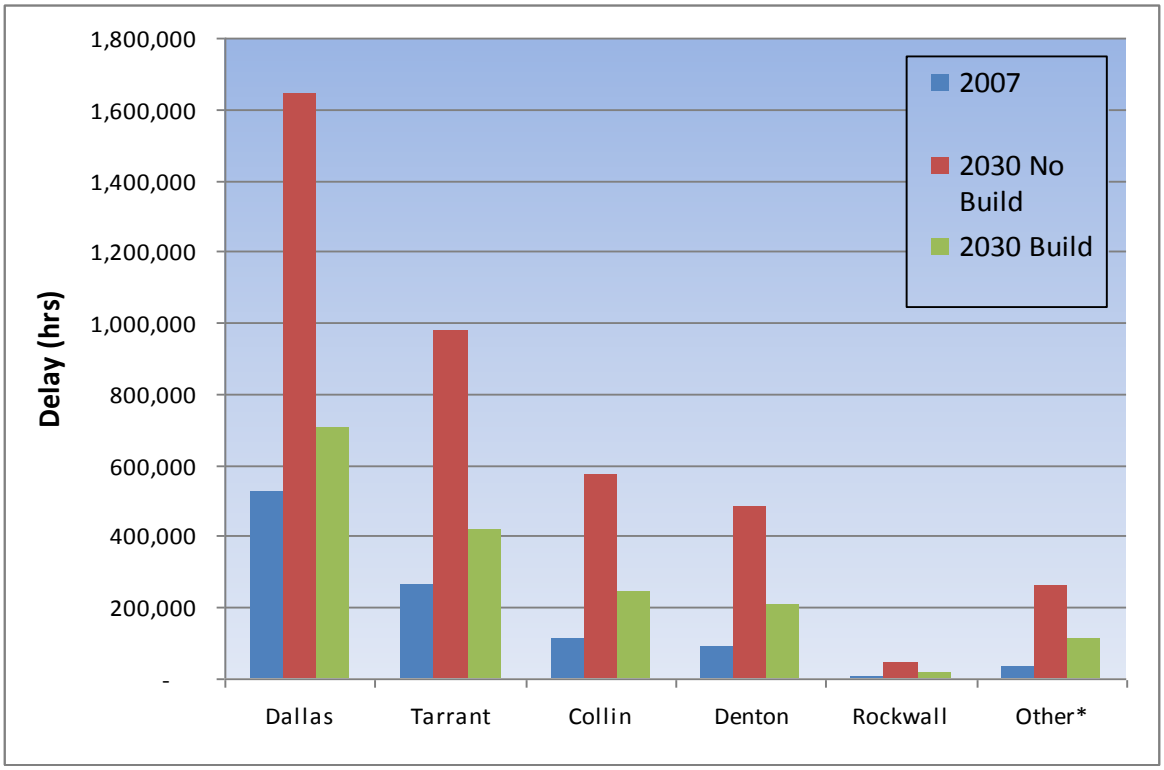


Figure 3-24: Daily Hours of Delay
(*Other counties include Ellis, Johnson, and Kaufman Counties)

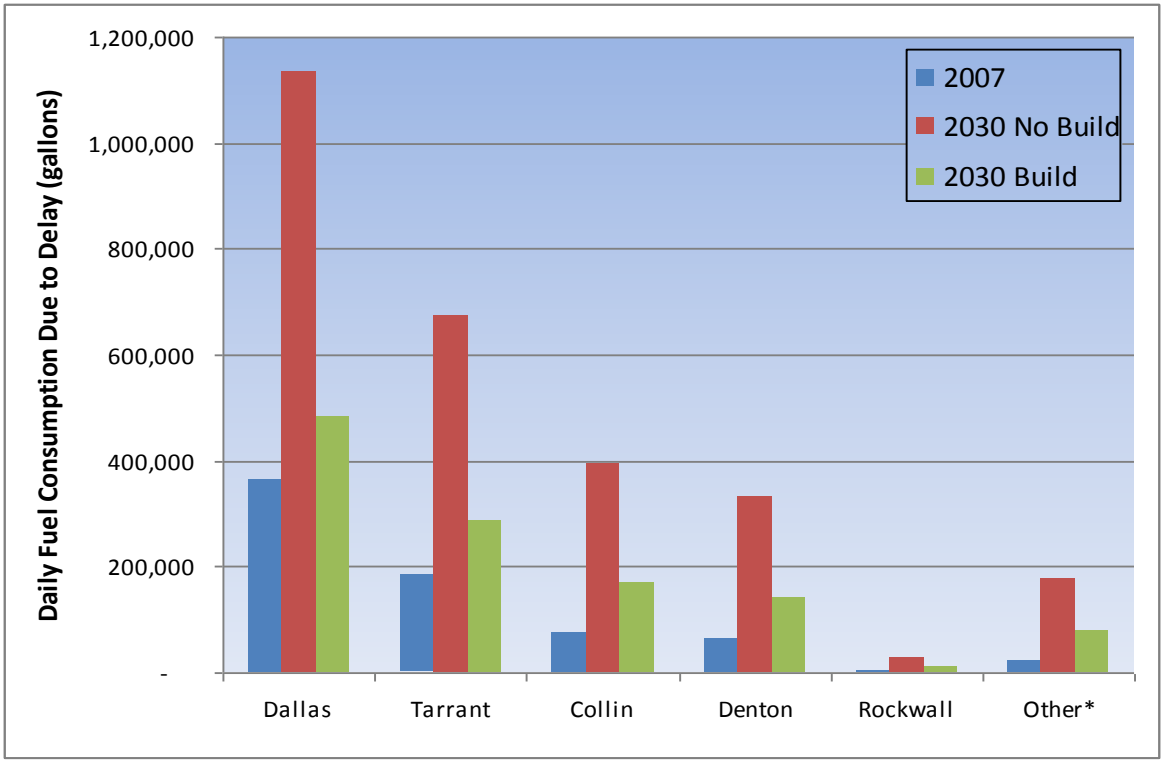


Figure 3-25: Daily Fuel Consumption Due to Delay (gallons)
(*Other counties include Ellis, Johnson, and Kaufman Counties)

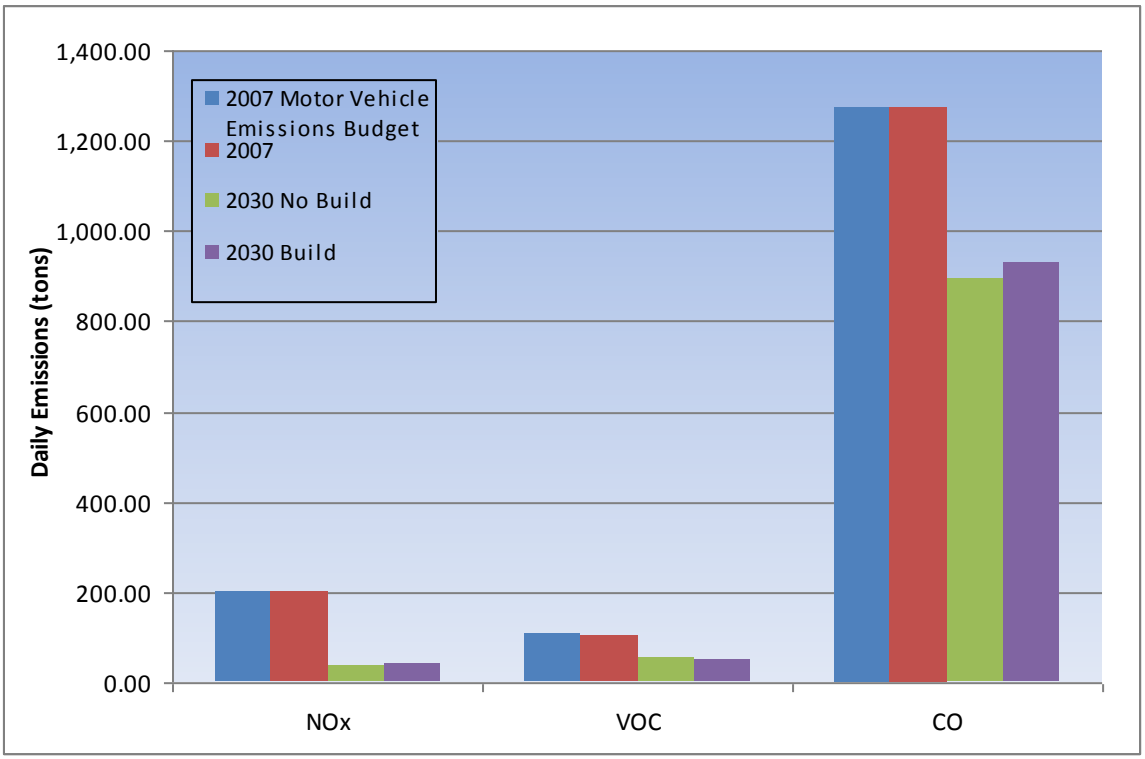


Figure 3-26: Daily Emissions

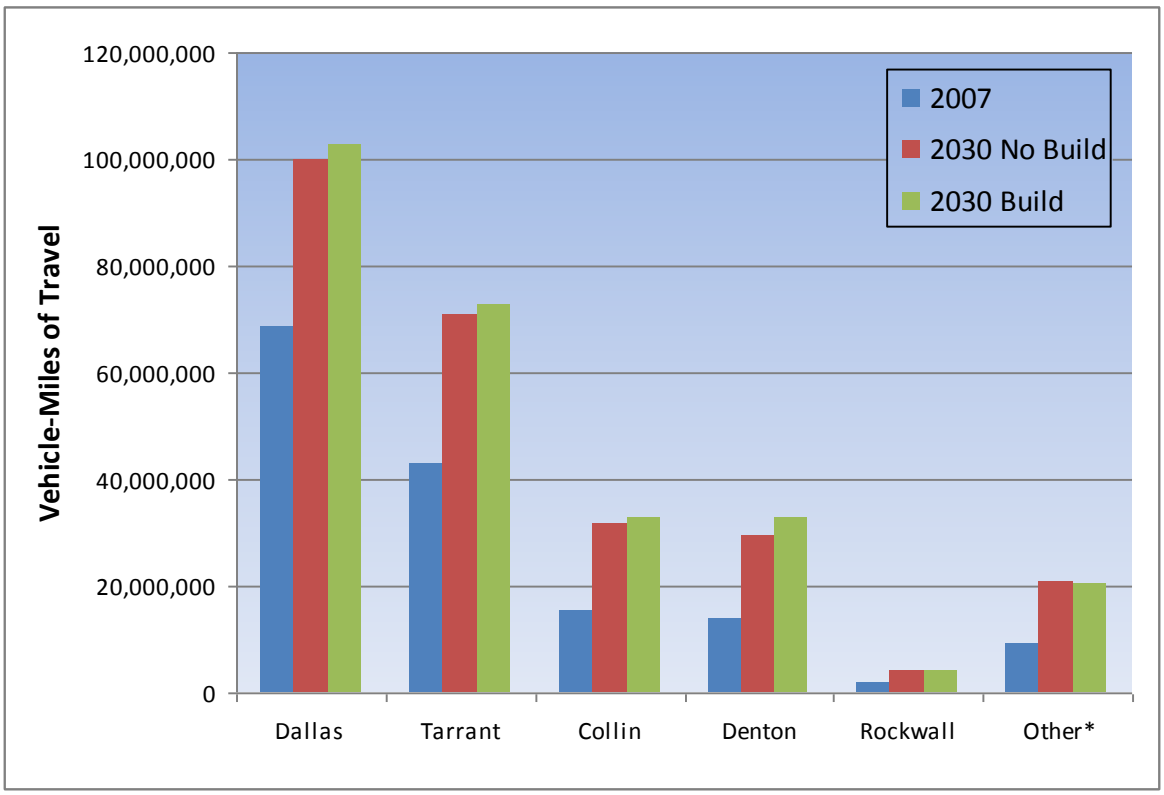


Figure 3-27: Vehicle Miles of Travel (VMT)
(*Other counties include Ellis, Johnson, and Kaufman Counties)

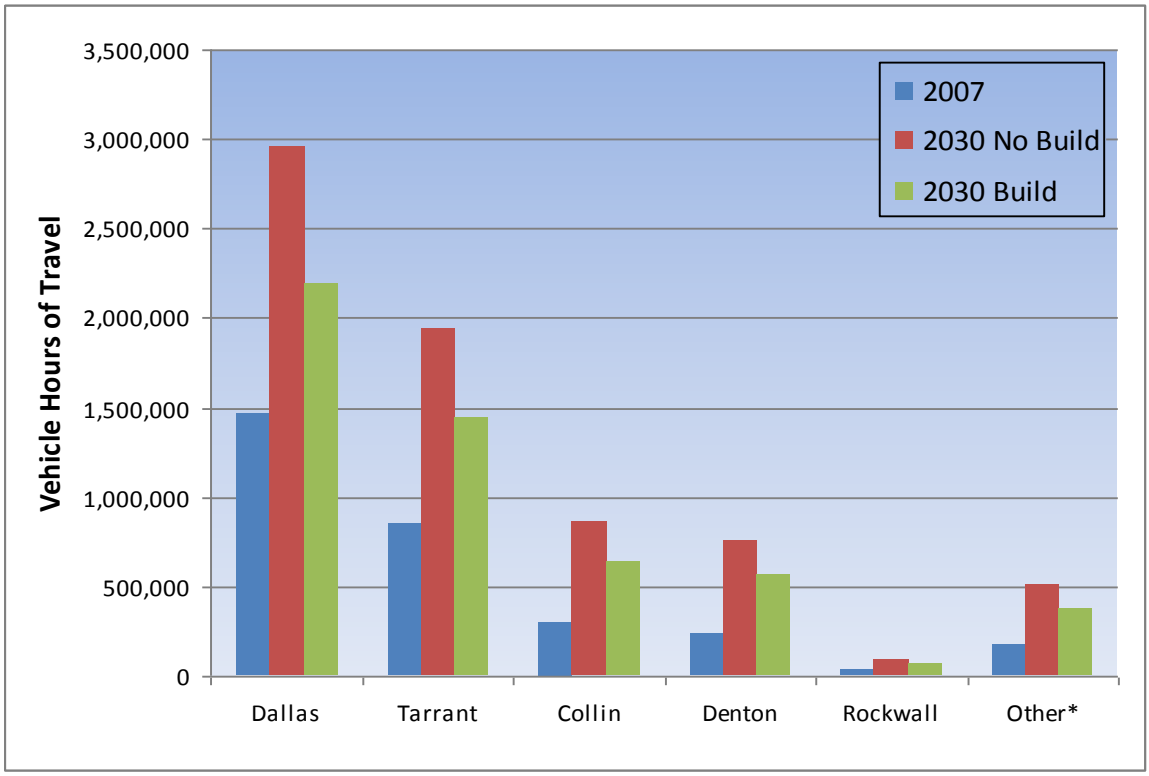


Figure 3-28: Vehicle Hours of Travel (VHT)
(*Other counties include Ellis, Johnson, and Kaufman Counties)

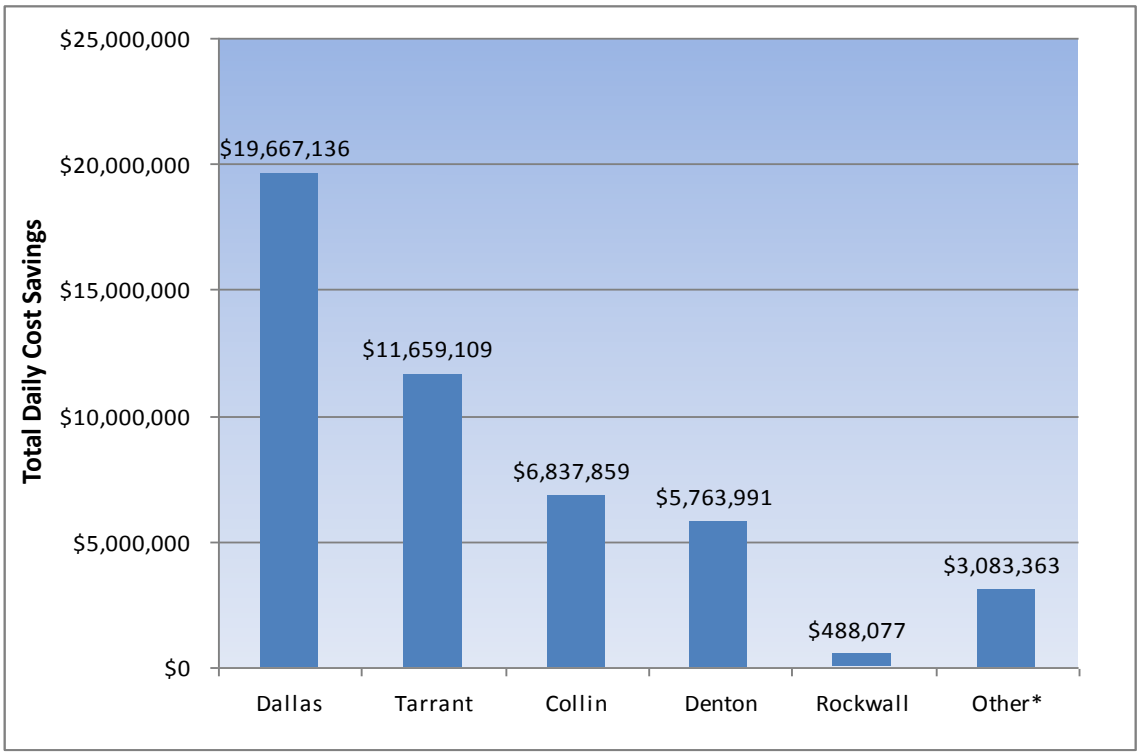


Figure 3-29: Total Daily Cost Savings of 2030 MTP Planned Improvements
(*Other counties include Ellis, Johnson, and Kaufman Counties)

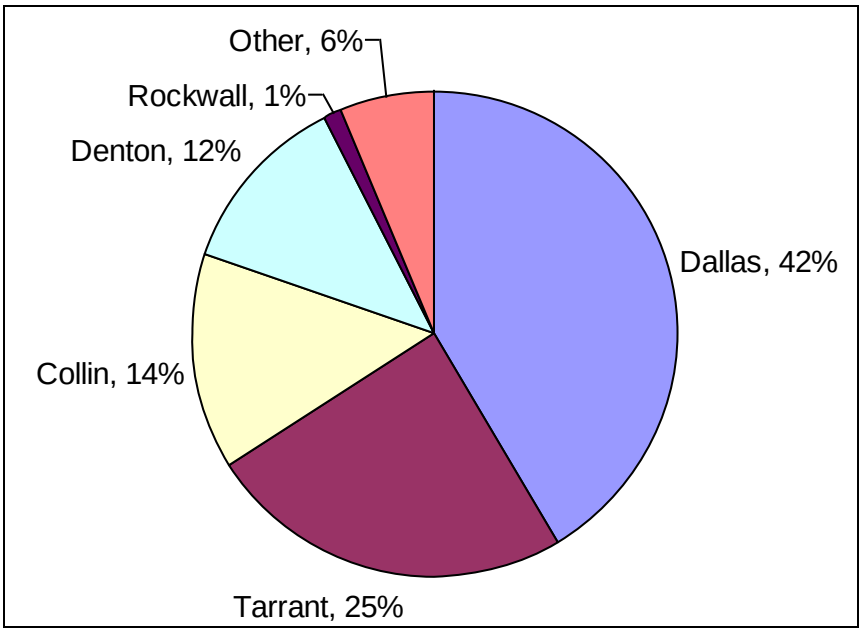


Figure 3-30: Total Daily Cost Savings of 2030 MTP Planned Improvements by County

Dallas-Fort Worth Region Summary

Given the projected growth in commodities moved by both rail and trucks, the economic outlook for the Dallas-Fort Worth Region is positive. The analysis projected that commodities moved by both trucks between 1998 and 2025 and rail between 2004 and 2025 would more than double. The majority of tonnage moved by truck is composed of:

- Building materials
- Food
- Wood
- Secondary products
- Chemical/petroleum

Building materials compose more than 25 percent of the total commodities moved by truck, while food constitutes approximately 21 percent. While the growth of chemical/petroleum products between 1998 and 2025 is estimated to be relatively small, the overall movement of these products is significant.

The majority of tonnage moved by rail into, out of, and through the Dallas-Fort Worth Region is composed of raw materials and secondary products. Raw materials are projected to account for nearly 30 percent of the total tonnage movements by rail, while secondary products are expected to be approximately 27.5 percent of the total rail tonnage. As the amount of these commodities continues to grow at a rapid pace, infrastructure improvements and additions will need to be evaluated.

The traffic analysis identified existing and future congestion levels for the region, which occur in the Dallas-Fort Worth Metroplex and surrounding area. With fairly consistent commodity percentages between 1998 and 2025, it can be concluded that a consistent use of trucks will be utilized, unless a benefit can be found to shifting truck cargo to rail cars. With the expected congestion and the need to continue efficient movement of goods throughout the State, improvements to the Districts' transportation system are needed. A number of alternatives could be included in a list of recommended capacity improvements that include, but are not limited to, the following concepts:

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

Trucks will continue to serve a much needed purpose for both local and regional service. A number of intermodal facilities located within the Dallas and Fort Worth Districts use trucks to ship goods to local businesses and warehouses (drayage) as well as regional locations. New industries may encourage freight movement growth into, out of, and through the region. As such, it is important to attempt to make local roadway capacity improvements so that these trucks can move efficiently. In recent years, timely and efficient movement of goods has become vital to private industry and can be evidenced by the increase in logistical analysis.

One way to encourage timely and efficient truck flows is through dedicated truck lanes. The interaction of trucks and passenger cars can often decrease the capacity of a roadway. By separating truck traffic from passenger cars, the roadways could operate more efficiently and result in safer driving conditions.

Another strategy that could be implemented to improve truck flow on the Districts' roadways is to reduce the number of trucks needed on the roadway by relying more on trains to move cargo. By using the railroad system to ship regional cargo, the number of trucks that need to be on local roadways could be reduced. The future of goods movement may be impacted by the movement of a significant percentage of truck freight to rail cars and planning, building, and enhancing the rail infrastructure to compete with trucks. As new freight movement infrastructure is added, the time and cost of the delivery of goods will be affected accordingly. This time and cost will be evaluated by commodity group and applied to a percentage shift goal.

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

SECTION 4: EXISTING RAIL SYSTEM INVENTORY

Most of the original railroads in the Dallas-Fort Worth region were built in the 1800's and are now owned and operated by three Class I railroads and several shortline railroads. More than 1,300 miles of mainline tracks make up the rail network inside the TxDOT Dallas and Fort Worth District boundaries. The region is home to the BNSF headquarters and Network Operations Center (NOC), BNSF Intermodal and Carload Transportation Center at Alliance Airport, UP Centennial Yard, which is one of UP's largest freight classification facilities, the UP Arlington Auto Facility, which serves General Motors, the UP Mesquite Auto Facility, which serves Chrysler, Ford, and Nissan, the UP Miller Yard, which handles traffic from the Port of Houston, and many other large rail yards and facilities. The Class I railroads serving the region consist of the UP, BNSF, and the KCS. The shortline and commuter railroads serving the region include the Dallas Area Rapid Transit (DART), the Dallas, Garland, and Northeastern Railroad (DGNO), the Fort Worth and Western Railroad (FWWR), and the Trinity Railway Express (TRE). Each of the railroad subdivisions are listed as follows and shown in Figure 4-1:

- Class I Railroads
  - UP
    - Baird Subdivision
    - Choctaw Subdivision
    - Corsicana Subdivision
    - Dallas Subdivision
    - Duncan Subdivision
    - Ennis Subdivision
    - Everman Industrial Lead
    - Fort Worth Subdivision
    - Midlothian Subdivision
  - BNSF
    - DFW Subdivision
    - Fort Worth Subdivision
    - Madill Subdivision
    - Venus Subdivision
    - Ward Industrial Spur
    - Wichita Falls Subdivision
  - KCS
    - Alliance Subdivision
    - Dallas Subdivision
    - Greenville Subdivision
    - White Rock Subdivision
- Shortline and Commuter Railroads:
  - DART
  - DGNO
  - FWWR
  - TRE

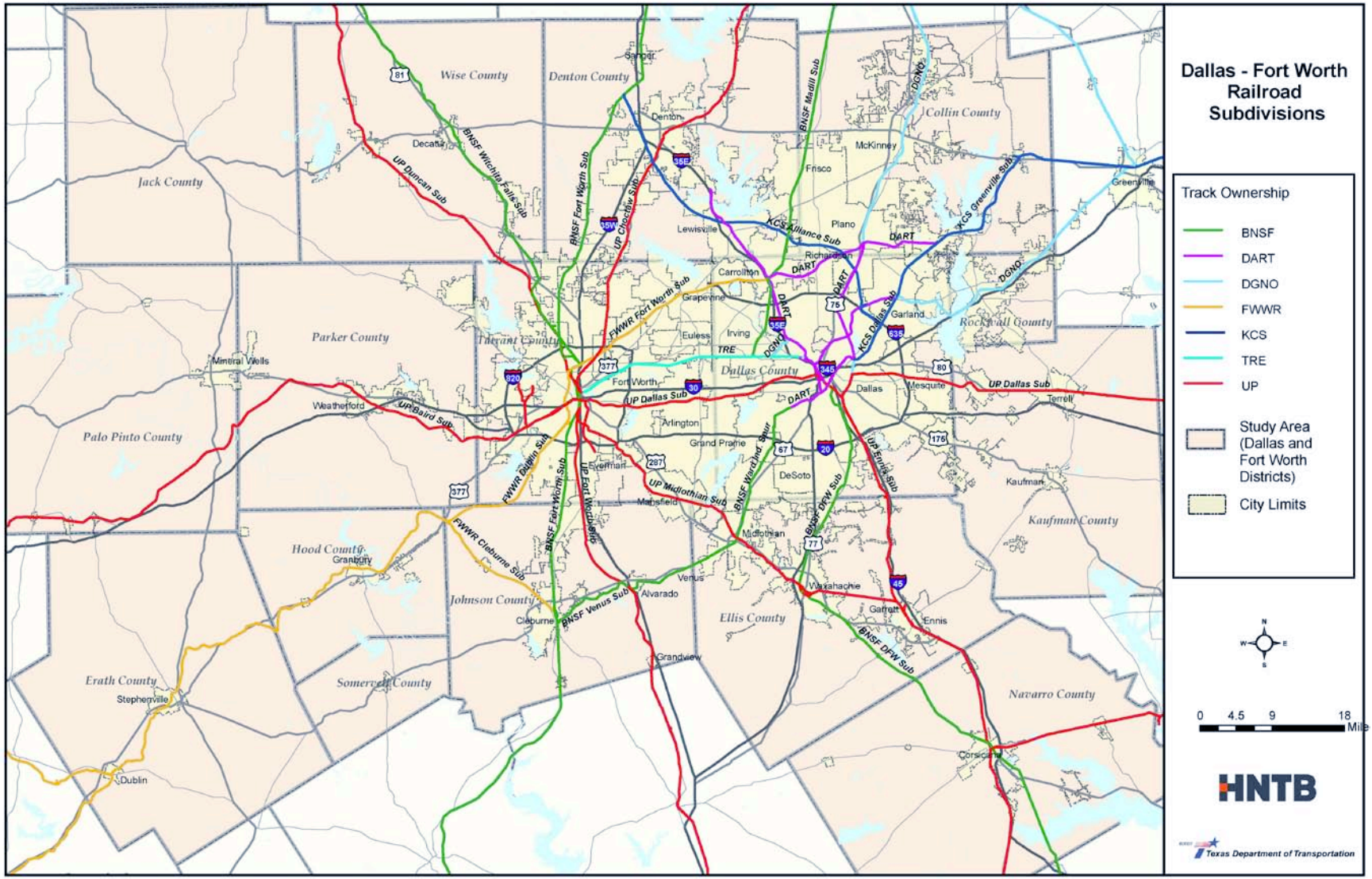


Figure 4-1: DFW Region Railroad Subdivisions

The physical characteristics of each subdivision will be summarized in this section, with detailed inventories for the track, bridges, and roadway-railroad crossings included in Appendix B of this report. Table 4-1 summarizes the mileage data for mainline, double track, and siding tracks in the DFW region. Figure 4-2 shows the major rail yards located in the Dallas and Fort Worth metropolitan areas.

Railroad Subdivision:	**Miles of Mainline Track:**	**Miles of Double Mainline Track:**	**Miles of Siding Track:**	**Total Miles (ML & Sidings):**
UP				
Baird	80	0	12	92
Choctaw	56	0	11	67
Corsicana	21	0	3	24
Dallas	79	34	11	124
Duncan	62	0	4	66
Ennis	71	0	10	81
Everman	7	0	0	7
Fort Worth	43	0	5	48
Midlothian	50	0	2	52
Subtotal:	*470*	*34*	*58*	*561*
BNSF				
DFW	77	0	14	92
Fort Worth	97	8	30	134
Madill	32	0	5	37
Venus	19	0	0	19
Ward	26	0	0	27
Wichita Falls	66	8	9	83
Subtotal:	*317*	*16*	*58*	*391*
KCS				
Alliance	38	0	2	40
Dallas	25	0	1	25
Greenville	21	0	3	24
White Rock	11	0	0	11
Subtotal:	*94*	*0*	*6*	*100*
Short Line and Commuter Railroads				
DGNO/ DART	250	0	25	275
FWWR	160	0	14	174
TRE	34	0	6	40
Subtotal:	*444*	*0*	*45*	*489*
Total:	**1324**	**49**	**168**	**1542**

Table 4-1: DFW Region Track Inventory Summary

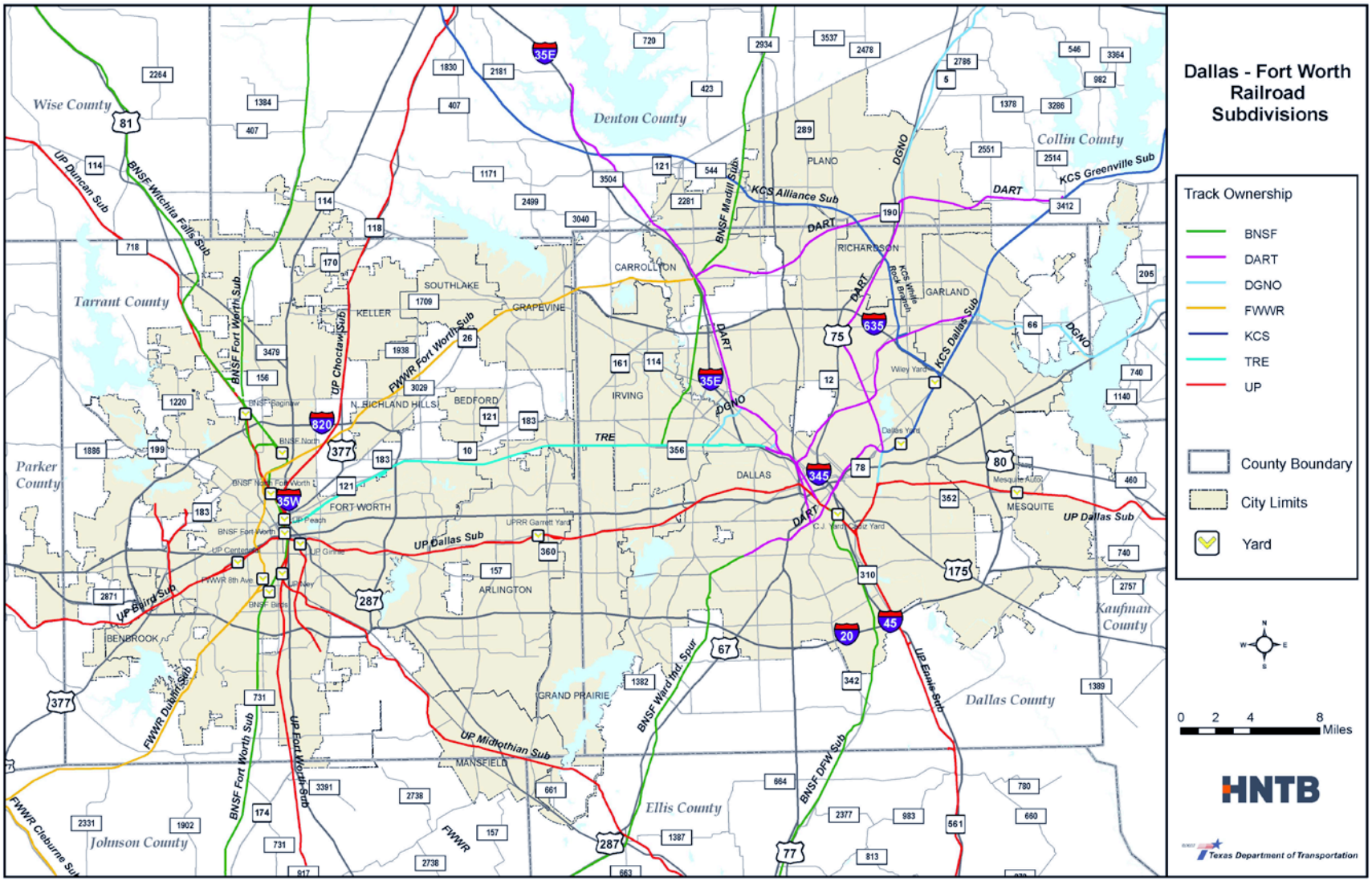


Figure 4-2: DFW Metroplex Railroad Subdivisions

UP Baird Subdivision

The Baird Subdivision was constructed in 1880 by the Texas and Pacific Railway and is owned and operated today by the UP with trackage rights granted to the BNSF. Predominately a single track railroad with limited sidings, rail traffic on the Baird Subdivision is bidirectional with an average daily train count of 20 to 25 trains within the study area.

The UP Baird Subdivision originates at Centennial Yard in Fort Worth at its meeting point with the UP Dallas Subdivision and terminates in Sweetwater, Texas at its meeting point with the UP Toyah Subdivision for a total distance of more than 198 miles, only 80 of which are within the limits of the DFW study area. Within the study area, the Baird Subdivision crosses through Tarrant, Parker, and Palo Pinto Counties and runs through the towns of Bomber, Benbrook, Iona, Aledo, Earls, Weatherford, Preble, Bennett, Brazos, Santo, Judd, and Strawn. The UP Bomber Spur originates off of the Baird Subdivision approximately two miles east of Loop 820.

Table 4-2 displays the locations and lengths of major bridges on the Baird Subdivision, while Table 4-3 summarizes the track mileage data for the subdivision by county, and Figure 4-4 shows the location of the subdivision. A complete listing of structures and roadway-railroad crossings for the Baird Subdivision can be found in Appendix B.

Milepost:	Location Description:	County:
300.00	Brazos River Bridge (793')	Palo Pinto
306.8	Little Sunday Creek Bridge (316')	Palo Pinto
323.20	Palo Pinto Creek Bridge (369')	Palo Pinto

Table 4-2: UP Baird Subdivision Major Bridge Inventory

County:	Miles of Mainline Track:	Miles of Double Mainline Track:	Miles of Siding Track:	Total Miles:
TxDOT Fort Worth District				
Tarrant	8.84	0.00	1.18	10.02
Parker	34.97	0.00	6.44	41.41
Palo Pinto	36.48	0.00	4.27	40.75
Total:	**80.29**	**0.00**	**11.89**	**92.18**

Table 4-3: UP Baird Subdivision Track Inventory Summary

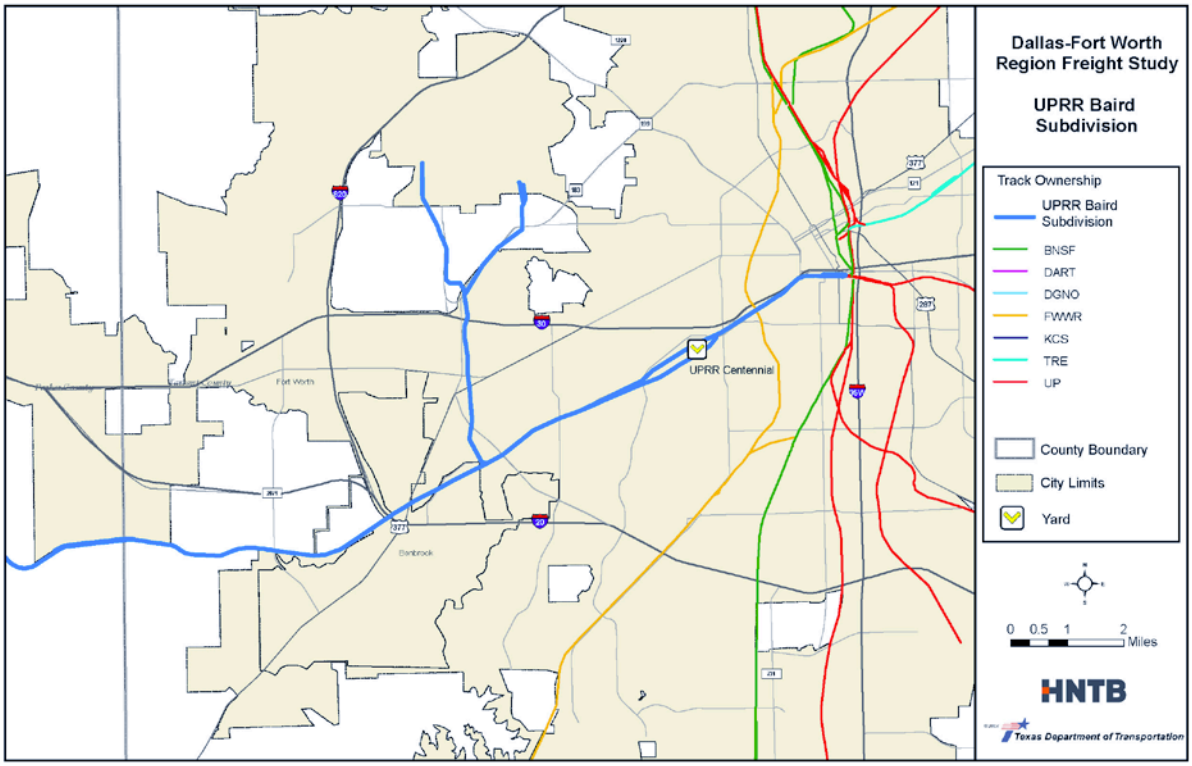


Figure 4-4: Map of UP Baird Subdivision in the Metropolitan Area

UP Choctaw Subdivision

The Choctaw Subdivision was constructed in 1873 by the Texas and Pacific Railway and is owned and operated today by the UP. The subdivision originates in McAlester, Oklahoma at its meeting point with the UP Cherokee Subdivision and terminates at Tower 55 in Fort Worth for a total distance of nearly 190 miles, only approximately 56 of which are within the limits of this study. Predominately a single track railroad with limited sidings, rail traffic on the Choctaw Subdivision is bidirectional with an average daily train count of 30 to 35 trains within the study limits.

Within the study area, the Choctaw Subdivision crosses Denton and Tarrant Counties and runs through the towns of Pilot Point, Aubrey, Mingo, Pillsbury, Denton, Argyle, Roanoke, Keller, and Hodge before reaching Fort Worth. The subdivision crosses the KCS Alliance Subdivision in Tarrant County near the town of Argyle and meets at the crossing of the UP Dallas Subdivision, UP Midlothian Subdivision, UP Fort Worth Subdivision, BNSF Fort Worth Subdivision, BNSF Wichita Falls Subdivision, and UP Duncan Subdivision at Tower 55 in Fort Worth.

Table 4-4 displays the locations and lengths of major bridges on the Choctaw Subdivision, while Table 4-5 summarizes the track mileage data for the subdivision by county, and Figure 4-5 shows the location of the subdivision. A complete listing of structures and roadway-railroad crossings for the Choctaw Subdivision can be found in Appendix B.

Milepost:	Location Description:	County:
713.30	Big Elm Creek Bridge (1253')	Denton
732.10	Denton Creek Bridge (540')	Denton
736.40	Hwy 170/ Alliance Blvd Crossing (516')	Tarrant
751.90	12th Street/ Northside Dr Crossing (1158')	Tarrant

Table 4-4: UP Choctaw Subdivision Major Bridge Inventory

County:	Miles of Mainline Track:	Miles of Double Mainline Track:	Miles of Siding Track:	Total Miles:
TxDOT Dallas District				
Denton	36.75	0.00	4.77	41.52
TxDOT Fort Worth District				
Tarrant	18.89	0.00	6.38	25.27
Total:	**55.64**	**0.00**	**11.15**	**66.79**

Table 4-5: UP Choctaw Subdivision Track Inventory Summary

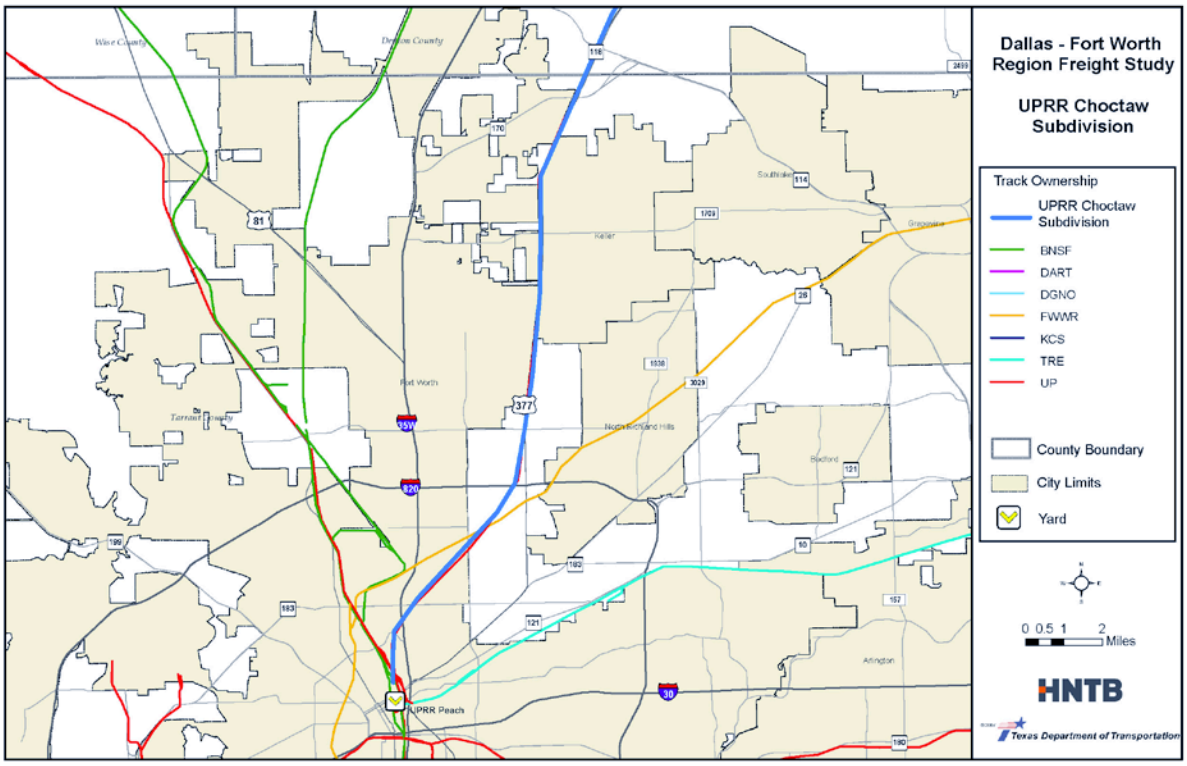


Figure 4-5: Map of UP Choctaw Subdivision in the Metropolitan Area

UP Corsicana Subdivision

The Corsicana Subdivision was constructed in 1881 by the Texas and St. Louis Railway and is owned and operated today by the UP. The subdivision originates in Big Sandy, Texas and terminates in Corsicana, Texas for a total distance of 96 miles, only approximately 21 of which are within the limits of this study.

Within the study area, the Corsicana Subdivision enters Navarro County and runs through the towns of Kerens and Hill Yard before reaching Corsicana, where the subdivision meets with the UP Ennis Subdivision crosses the BNSF DFW Subdivision.

Table 4-6 displays the locations and lengths of major bridges on the Corsicana Subdivision, while Table 4-7 summarizes the track mileage data for the subdivision by county, and Figure 4-6 shows the location of the subdivision. A complete listing of structures and roadway-railroad crossings for the Corsicana Subdivision can be found in Appendix B.

Milepost:	Location Description:	County:
614.85	(832')	Navarro
615.25	(632')	Navarro
615.66	Chambers Creek (505')	Navarro

Table 4-6: Corsicana Subdivision Major Bridge Inventory

County:	Miles of Mainline Track:	Miles of Double Mainline Track:	Miles of Siding Track:	Total Miles:
TxDOT Dallas District				
Navarro	21.20	0.00	2.76	23.96
Total:	**21.20**	**0.00**	**2.76**	**23.96**

Table 4-7: Corsicana Subdivision Track Inventory Summary

Figure 4-6: UP Corsicana Subdivision Map

UP Dallas Subdivision

The Dallas Subdivision was constructed in 1880 by the Texas and Pacific Railway and is owned and operated today by the UP with trackage rights granted to BNSF on portions of the line. The subdivision originates in Longview, Texas and terminates at Centennial Yard in Fort Worth for a total distance of 162 miles, only approximately 79 of which are within the limits of this study. The Dallas Subdivision has two mainline tracks from Centennial Yard in Fort Worth to the Miller Crossover in Dallas, for a distance of approximately 34 miles and is a single track railroad with sidings from Miller Crossover to Longview. Rail traffic on the Dallas Subdivision is bidirectional with an average daily train count of more than 100 trains within the study limits.

Within the study area, the Dallas Subdivision crosses Tarrant, Dallas, and Kaufman Counties and runs through the cities of Fort Worth, Arlington, Grand Prairie, Dallas, Mesquite, and Marith before leaving the study limits at the Kaufman/Van Zandt county line. The Dallas Subdivision crosses the FWWR approximately two miles west of Tower 55, the UP Choctaw Subdivision, UP Midlothian Subdivision, UP Fort Worth Subdivision, BNSF Fort Worth Subdivision, BNSF Wichita Falls Subdivision, and UP Duncan Subdivision at Tower 55 in Fort Worth, and DART and the DGNO in Dallas. Additionally, the Everman Industrial Lead originates from the Dallas Subdivision approximately ½ mile east of Tower 55. Major rail yards located on the Dallas Subdivision include the Centennial Yard and Ginnie Yard in Fort Worth,

Garrett Yard in Arlington, C.J. Yard, Cadiz Yard, and Union Terminal in Dallas, and the Mesquite Auto and Intermodal Facility in Mesquite.

Table 4-7 displays the locations and lengths of major bridges on the Dallas Subdivision, while Table 4-8 summarizes the track mileage data for the subdivision by county, and Figure 4-7 shows the location of the subdivision. A complete listing of structures and roadway-railroad crossings for the Dallas Subdivision can be found in Appendix B.

Milepost:	Location Description:	County:
196.60	E. Fork Trinity River (895')	Kaufman
197.00	(704')	Kaufman
200.50	Waterway (303')	Dallas
215.20	Trinity River (2020')	Dallas
221.00	Loop 12/I-30 Crossing (315')	Dallas
221.60	(1170')	Dallas
223.00	(320')	Dallas
245.38	I-30/I-35 Crossing (351')	Tarrant
248.00	Trinity River (407')	Tarrant

Table 4-7: UP Dallas Subdivision Major Bridge Inventory

County:	Miles of Mainline Track:	Miles of Double Mainline Track:	Miles of Siding Track:	Total Miles:
TxDOT Dallas District				
Kaufman	26.58	0.00	4.02	30.6
Dallas	31.04	15.11	7.06	53.21
TxDOT Fort Worth District				
Tarrant	21.31	18.70	0.00	40.01
Total:	**78.93**	**33.81**	**11.08**	**123.82**

Table 4-8: UP Dallas Subdivision Track Inventory Summary

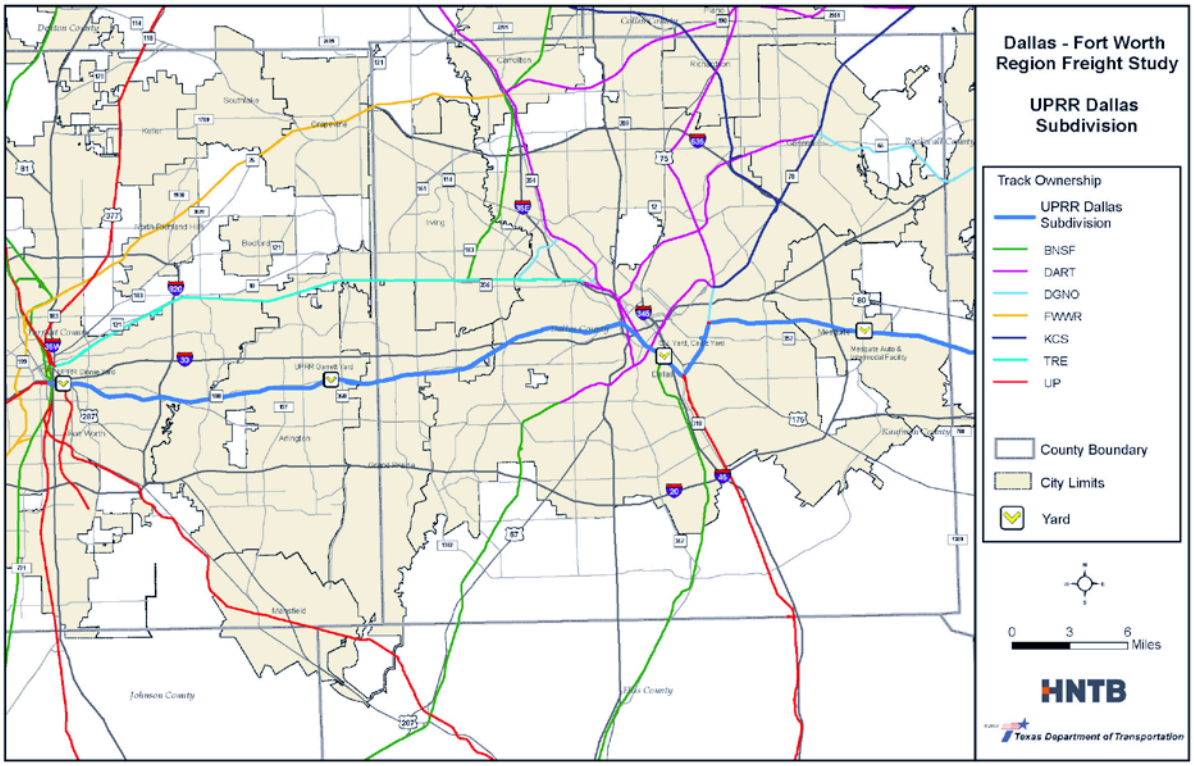


Figure 4-7: Map of UP Dallas Subdivision in the Metropolitan Area

UP Duncan Subdivision

The Duncan Subdivision was constructed in 1894 by the Chicago, Rock Island, and Texas Railroad and is owned and operated today by the UP. The subdivision originates in Chickasha, Oklahoma and terminates at Tower 55 in Fort Worth for a total distance of nearly 177 miles, only approximately 62 of which are within the limits of this study. Predominately a single track railroad with limited sidings, rail traffic on the Duncan Subdivision is bidirectional with an average daily train count of 60 to 65 trains within the study limits.

Within the study area, the Duncan Subdivision crosses Tarrant and Wise Counties and runs through the cities of Fort Worth, Saginaw, Hicks, Boyd, Paradise, Bridgeport, Lone Star and Chico before leaving the study limits at the Wise/Montague county line. The Duncan Subdivision crosses the UP Choctaw Subdivision, UP Midlothian Subdivision, UP Fort Worth Subdivision, BNSF Fort Worth Subdivision, BNSF Wichita Falls Subdivision, and UP Dallas Subdivision at Tower 55 in Fort Worth and the FWWR and BNSF Fort Worth Subdivisions at Tower 60, which is approximately three miles north of Tower 55. Major rail yards located on the Duncan Subdivision include the Peach Street Yard located approximately one mile north of Tower 55 in Fort Worth.

Table 4-9 displays the locations and lengths of major bridges on the Duncan Subdivision, while Table 4-10 summarizes the track mileage data for the subdivision by county, and Figure 4-8 shows the location of the subdivision. A complete listing

of structures and roadway-railroad crossings for the Duncan Subdivision can be found in Appendix B.

Milepost:	Location Description:	County:
586.80	W. Fork Trinity River (639')	Wise
610.00	(357')	Tarrant
610.10	(396')	Tarrant

Table 4-9: Duncan Subdivision Major Bridge Inventory

County:	Miles of Mainline Track:	Miles of Double Mainline Track:	Miles of Siding Track:	Total Miles:
TxDOT Fort Worth District				
Wise	39.71	0.00	3.75	43.46
Tarrant	22.63	0.00	0.00	22.63
Total:	**62.34**	**0.00**	**3.75**	**66.09**

Table 4-10: Duncan Subdivision Track Inventory Summary

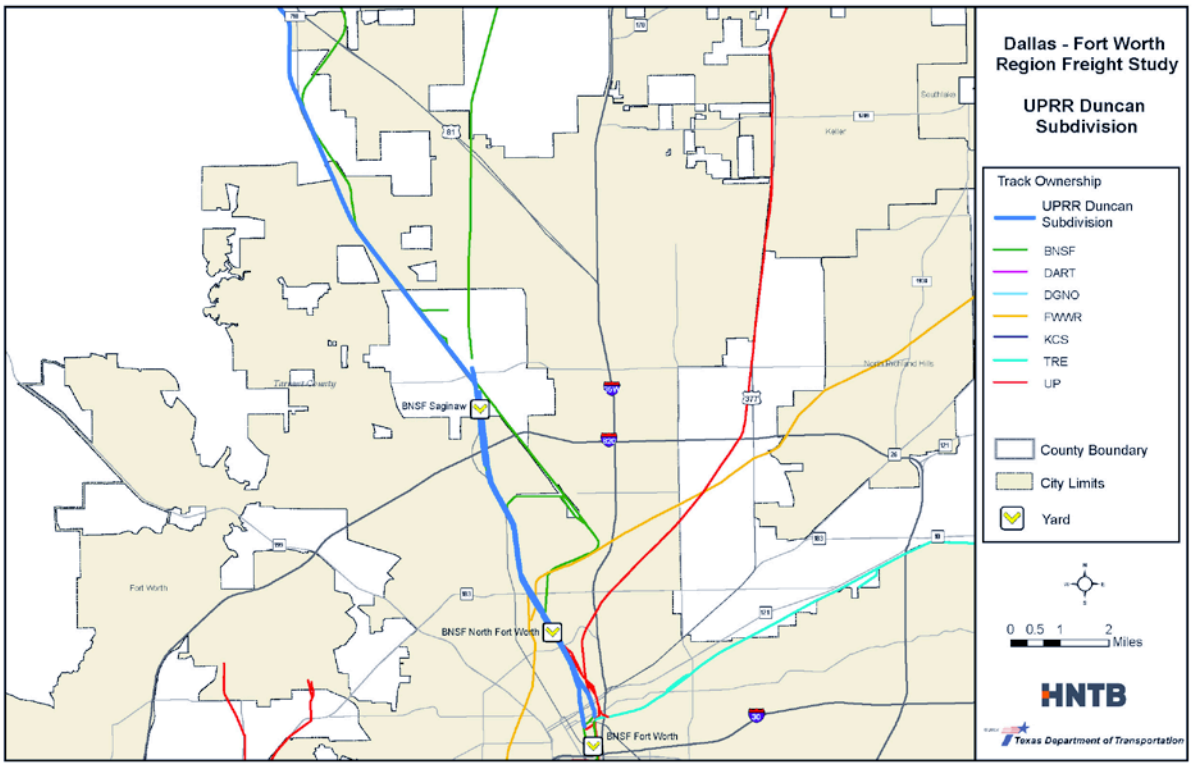


Figure 4-8: Map of UP Duncan Subdivision in the Metropolitan Area

UP Ennis Subdivision

The Ennis Subdivision was constructed in 1870 by the Houston and Texas Central Railroad and is owned and operated today by the UP. The subdivision originates in Hearne, Texas and terminates at Ennis Junction in Dallas for a total distance of approximately 92 miles, approximately 71 of which are within the limits of this study. Predominately a single track railroad with limited sidings, rail traffic on the Ennis Subdivision is bidirectional with an average daily train count of 25 to 30 trains within the study limits.

Within the study area, the Ennis Subdivision crosses Dallas, Navarro, and Ellis Counties and runs through the cities of Dallas, Hutchins, Wilmer, Ferris, Ennis, Rice, Corsicana, and Angus, before leaving the study limits at the Navarro/Freestone county line. The Ennis Subdivision meets the UP Dallas Subdivision at Ennis Junction, and crosses the BNSF DFW Subdivision and the UP Corsicana Subdivision in Miller Yard located approximately two miles south of Ennis Junction and Ennis Yard located in Ennis.

Table 4-11 displays the locations and lengths of major bridges on the Ennis Subdivision, while Table 4-12 summarizes the track mileage data for the subdivision by county, and Figure 4-9 shows the location of the subdivision. A complete listing of structures and roadway-railroad crossings for the Ennis Subdivision can be found in Appendix B.

Milepost:	Location Description:	County:
199.17	Creek (428')	Navarro
199.76	Richland Creek (418')	Navarro
215.39	Chambers Creek (1138')	Navarro
241.18	Brushy Creek (375')	Ellis
255.94	Five Mile Creek (1020')	Dallas
261.20	Trinity River (2921')	Dallas

Table 4-11: Ennis Subdivision Major Bridge Inventory

County:	Miles of Mainline Track:	Miles of Double Mainline Track:	Miles of Siding Track:	Total Miles:
TxDOT Dallas District				
Navarro	32.01	0.00	5.38	37.39
Ellis	24.09	0.00	2.6	26.69
Dallas	15.04	0.00	2.37	17.41
Total:	**71.14**	**0.00**	**10.35**	**81.49**

Table 4-12: Ennis Subdivision Track Inventory Summary

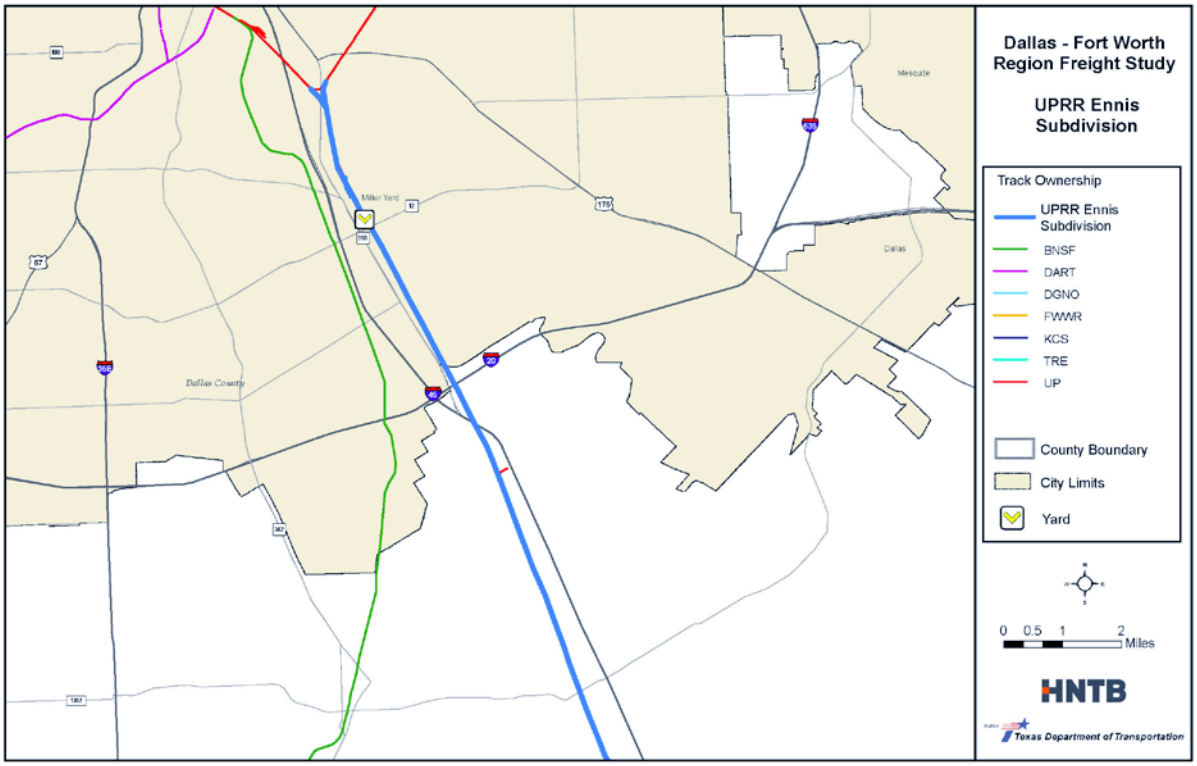


Figure 4-9: Map of UP Ennis Subdivision in the Metropolitan Area

UP Everman Industrial Lead

The Everman Industrial Lead was constructed in 1902 by the International and Great Northern Railroad and is owned and operated today by the UP. The lead originates from the UP Dallas Subdivision just east of Tower 55 in Fort Worth and terminates more than a mile north of the town of Everman for a total distance of nearly 7 miles, all of which are within the limits of this study. A single track railroad with no significant sidings, rail traffic on the lead consists of one average daily train.

The Everman Industrial Lead runs within Tarrant County and runs through the cities of Fort Worth and Mara before approaching the end of line near Everman. The lead crosses the UP Midlothian Subdivision.

Table 4-13 summarizes the track mileage data for the subdivision by county and Figure 4-10 shows the location of the subdivision. While there are no large bridges on this line, a complete listing of structures and roadway-railroad crossings for the Everman Industrial Lead can be found in Appendix B.

County:	Miles of Mainline Track:	Miles of Double Mainline Track:	Miles of Siding Track:	Total Miles:
TxDOT Fort Worth District				
Tarrant	6.92	0.00	0.00	6.92
Total:	**6.92**	**0.00**	**0.00**	**6.92**

Table 4-13: Everman Industrial Lead Track Inventory Summary

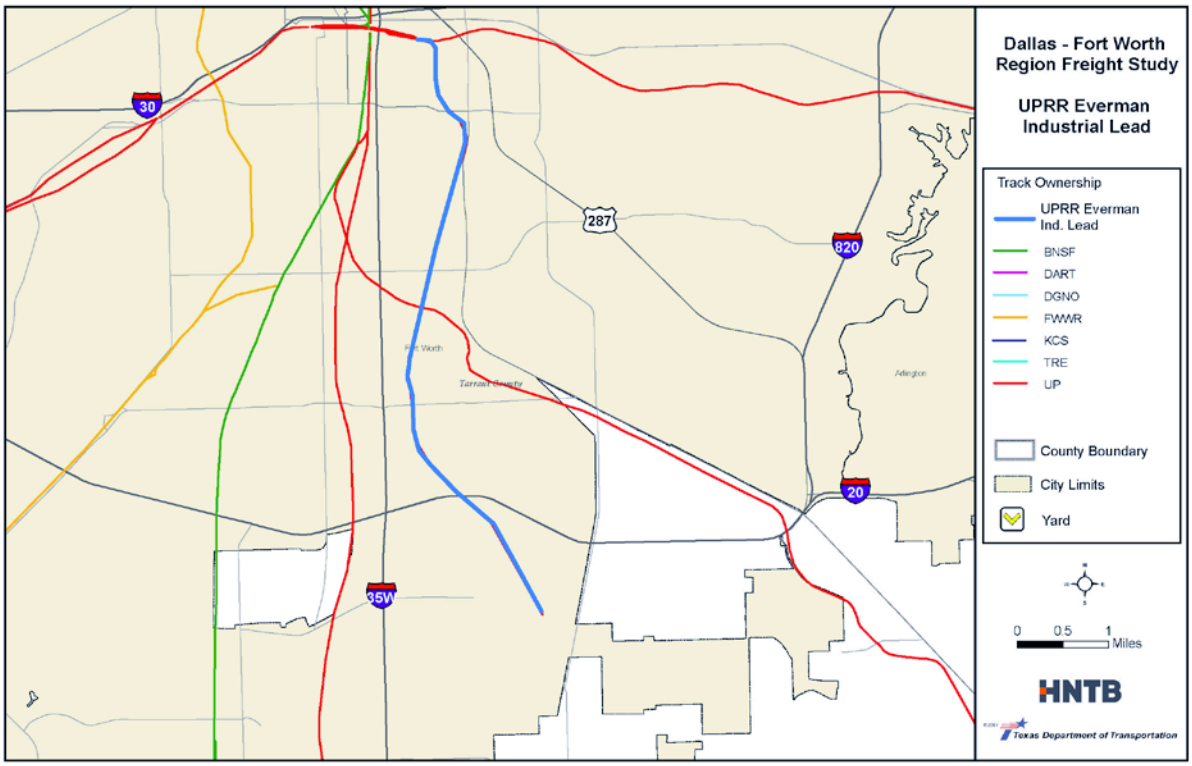


Figure 4-10: UP Everman Industrial Lead Map

UP Fort Worth Subdivision

The Fort Worth Subdivision was constructed in 1881 by the Missouri, Kansas, and Texas Railway and is owned and operated today by the UP. The subdivision originates in Valley Junction and terminates at Tower 55 in Fort Worth for a total distance of approximately 150 miles, only approximately 43 of which are within the limits of this study. Predominately a single track railroad with limited sidings, rail traffic on the Fort Worth Subdivision is bidirectional with an average daily train count of approximately 45 to 50 trains within the study limits.

Within the study area, the Fort Worth Subdivision crosses Tarrant and Johnson Counties and runs through the cities of Fort Worth, Ney, Wrenn, Burleson, Egan, Alvarado, and Grandview before leaving the study limits at the Johnson/Hill county line. The Fort Worth Subdivision crosses the UP Choctaw Subdivision, UP Midlothian Subdivision, UP Duncan Subdivision, BNSF Fort Worth Subdivision, BNSF Wichita Falls Subdivision, and UP Dallas Subdivision at Tower 55 in Fort Worth, the UP Midlothian Subdivision approximately two miles south of Tower 55, and the BNSF Venus Subdivision in Johnson County. Major rail yards located on the Fort Worth Subdivision include the Ney Yard located approximately two miles south of Tower 55 in Fort Worth.

Table 4-14 summarizes the track mileage data for the subdivision by county and Figure 4-11 shows the location of the subdivision. The only large bridge on the subdivision within the study limits is located at milepost 245.40 at the Loop 820 crossing for a length of 576 feet. A complete listing of structures and roadway-railroad crossings for the Fort Worth Subdivision can be found in Appendix B.

County:	Miles of Mainline Track:	Miles of Double Mainline Track:	Miles of Siding Track:	Total Miles:
TxDOT Fort Worth District				
Tarrant	18.41	0.00	1.58	19.99
Johnson	24.58	0.00	3.73	28.31
Total:	**42.99**	**0.00**	**5.31**	**48.3**

Table 4-14: UP Fort Worth Subdivision Track Inventory Summary

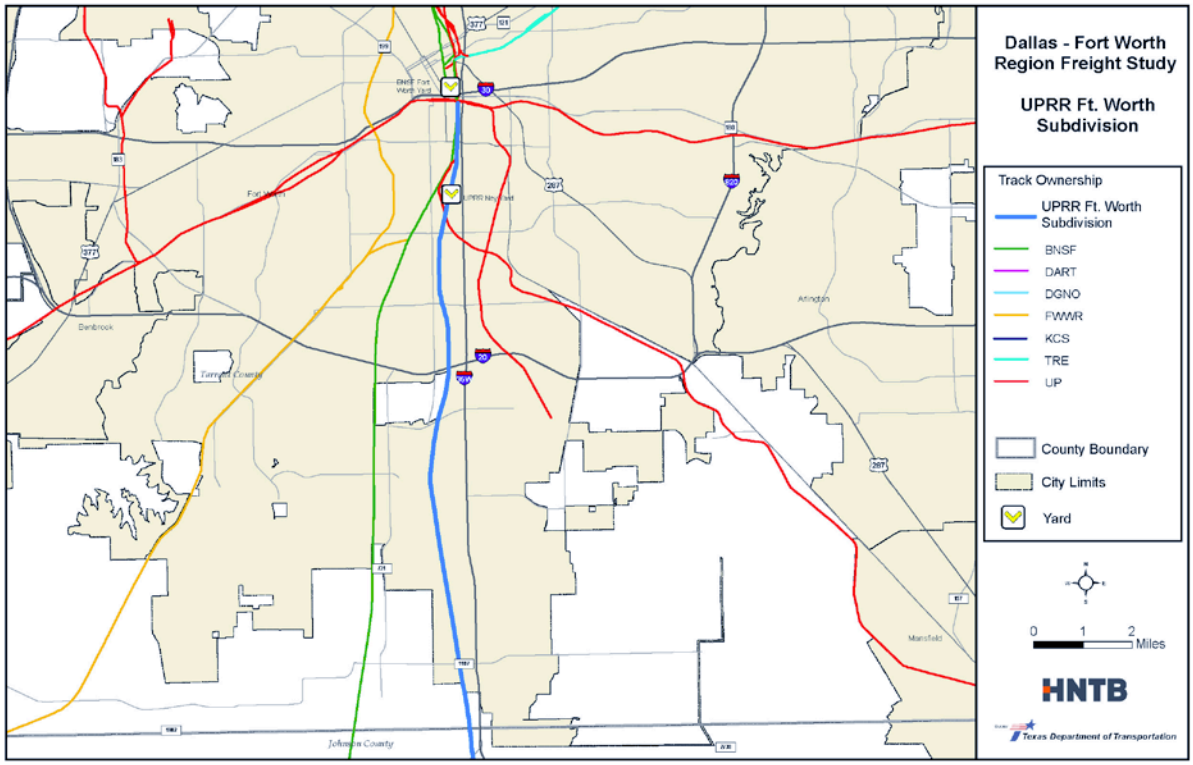


Figure 4-10: Map of UP Fort Worth Subdivision in the Metropolitan Area

UP Midlothian Subdivision

The Midlothian Subdivision was constructed in 1878 by the West Texas Railroad and is owned and operated today by the UP. The subdivision originates in Garrett, Texas and terminates at Tower 55 in Fort Worth for a total distance of approximately 50 miles, all of which are within the limits of this study. A single track railroad with limited sidings, rail traffic on the Midlothian Subdivision is bidirectional with an average daily train count of 15 to 20 trains.

The Midlothian Subdivision crosses Tarrant and Ellis Counties and runs through the cities of Fort Worth, Forest Hill, Bisbee, Mansfield, Midlothian, Waxahachie and Garrett. The Midlothian Subdivision crosses the UP Choctaw Subdivision, UP Duncan Subdivision, UP Fort Worth Subdivision, BNSF Fort Worth Subdivision, BNSF Wichita Falls Subdivision, and UP Dallas Subdivision at Tower 55 in Fort Worth and the BNSF Ward Industrial Spur and BNSF DFW Subdivision in Ellis County.

Table 4-15 displays the locations and lengths of major bridges on the Midlothian Subdivision, while Table 4-16 summarizes the track mileage data for the subdivision by county, and Figure 4-11 shows the location of the subdivision. A complete listing of structures and roadway-railroad crossings for the Midlothian Subdivision can be found in Appendix B.

Milepost:	**Location Description:**	**County:**
14.15	Waxahachie Creek (488')	Ellis
28.96	Mountain Creek (585')	Ellis
43.41	Village Creek (352.17')	Tarrant
48.51	Sycamore Creek (303')	Tarrant
49.50	I-35 Crossing (344')	Tarrant

Table 4-15: Midlothian Subdivision Major Bridge Inventory

County:	**Miles of Mainline Track:**	**Miles of Double Mainline Track:**	**Miles of Siding Track:**	**Total Miles:**
TxDOT Dallas District				
Ellis	29.40	0.00	0.00	29.40
TxDOT Fort Worth District				
Tarrant	20.74	0.00	1.74	22.48
Total:	**50.14**	**0.00**	**1.74**	**51.88**

Table 4-16: Midlothian Subdivision Track Inventory Summary

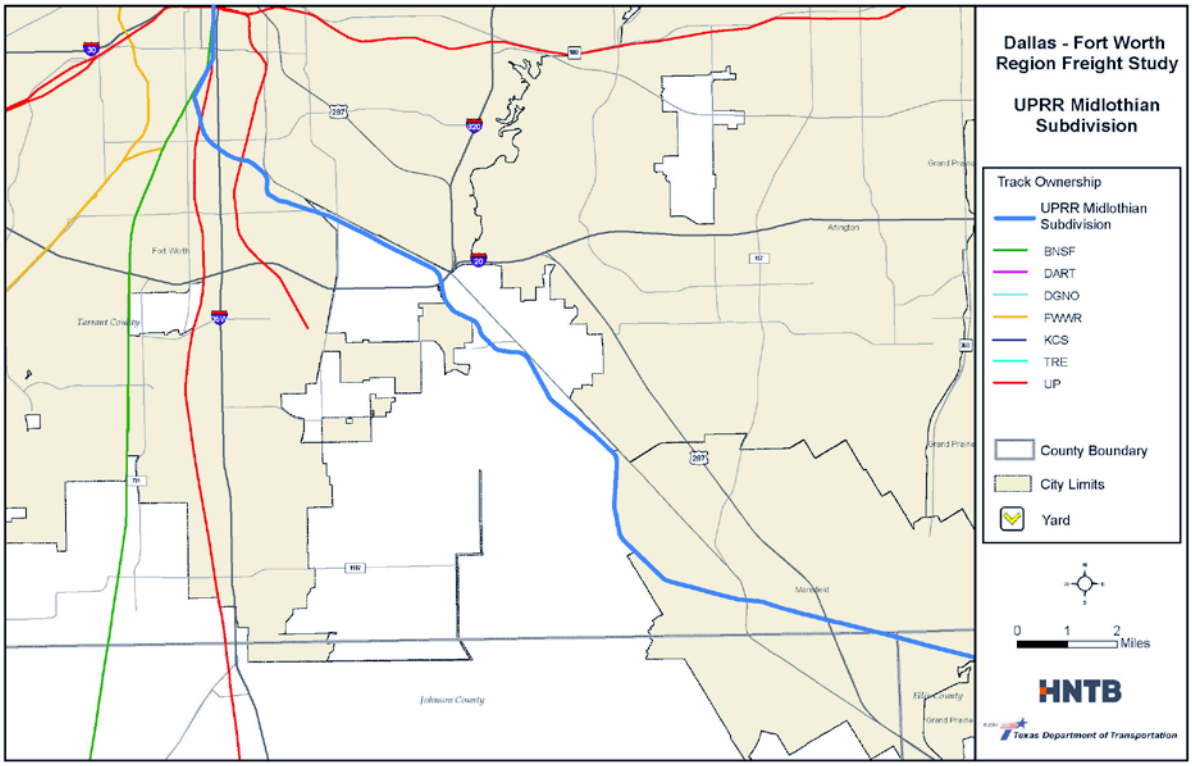


Figure 4-11: Map of UP Midlothian Subdivision in the Metropolitan Area

BNSF DFW Subdivision

The DFW Subdivision was constructed by the Chicago, Rock Island, and Pacific Railroad and is owned and operated today by the BNSF. BNSF track ownership on the DFW Subdivision runs from Teague, Texas to Dallas, at which point the BNSF continues toward Fort Worth with trackage rights on DART and UP lines to North Yard in Fort Worth. Predominately a single track railroad with limited sidings, rail traffic on the DFW Subdivision is bidirectional with an average daily train count of approximately 15 to 20 trains within the study limits.

Within the study area, the DFW Subdivision track ownership crosses Navarro, Ellis, and Dallas Counties and runs through the cities of Dallas, Sargent, Lancaster, Red Oak, Sterret, Waxahachie, Bardwell, Corsicana, Meridian Rock, and Streetman before leaving the study limits at the Navarro/Freestone county line. The DFW Subdivision crosses the UP Midlothian Subdivision approximately two miles north of Waxahachie and the UP Ennis and Corsicana Subdivisions in Corsicana.

Table 4-17 lists the locations and lengths of major bridges on the subdivision, while Table 4-18 summarizes the track data for the subdivision by county, and Figure 4-12 shows the location of the subdivision. A complete listing of structures and roadway-railroad crossings for the DFW Subdivision can be found in Appendix B.

Milepost:	Location Description:	County:
226.14	(444')	Navarro
226.70	Pinoak Creek (504')	Navarro
226.93	Richland Creek (338')	Navarro
227.18	(1039')	Navarro
252.72	(398')	Navarro
253.12	(420')	Ellis
254.21	(532')	Ellis
262.31	(399')	Ellis
263.01	Waxahachie Creek (639')	Ellis
782.62	Ten Mile Creek (321')	Dallas
770.06	(1218')	Dallas
769.88	Trinity River (323')	Dallas

Table 4-17: DFW Subdivision Major Bridge Inventory

County:	Miles of Mainline Track:	Miles of Double Mainline Track:	Miles of Siding Track:	Total Miles:
TxDOT Dallas District				
Dallas	16.54	0.00	1.30	17.84
Ellis	30.30	0.00	9.20	39.5
Navarro	30.38	0.00	3.91	34.29
Total:	**77.14**	**0.00**	**14.41**	**91.55**

Table 4-18: DFW Subdivision Track Inventory Summary

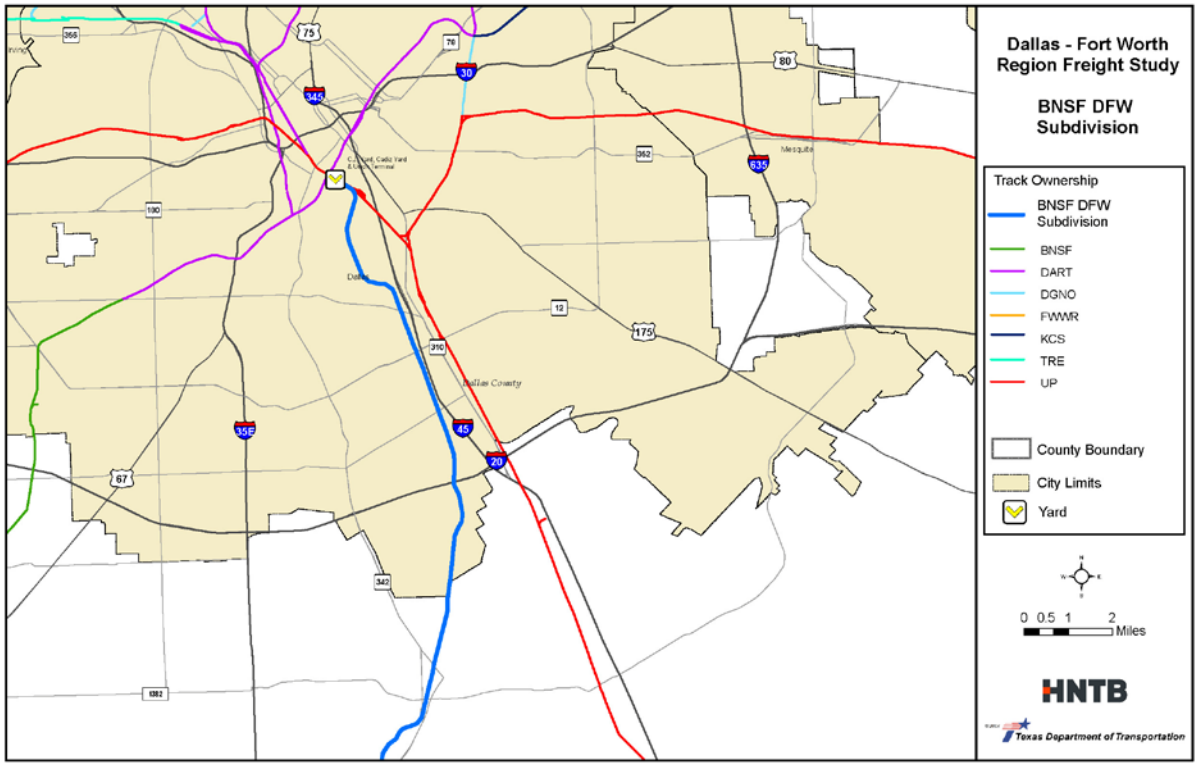


Figure 4-12: Map of BNSF DFW Subdivision in the Metropolitan Area

BNSF Fort Worth Subdivision

The BNSF Fort Worth Subdivision was constructed by the Atchison, Topeka, and Santa Fe Railroad and is owned and operated today by the BNSF. The subdivision originates in Temple, Texas and terminates in Gainesville, Texas for a total distance of approximately 193 miles, only 97 of which are within the limits of this study. The subdivision is predominately a single track railroad with sidings, although a portion of the line from Haslet to Lambert, located north of Fort Worth, is double track for a distance of nearly eight miles. Rail traffic on the Fort Worth Subdivision is bidirectional with an average daily train count of 85 to 90 trains within the study limits.

Within the study area, the BNSF Fort Worth Subdivision crosses Johnson, Tarrant and Denton Counties and runs through the cities of Rio Vista, Cleburne, Joshua, Crowley, Birds, Fort Worth, Saginaw, Alliance, Haslet, Lambert, Justin, Ponder, Krum, and Sanger. The Fort Worth Subdivision crosses the BNSF Venus Subdivision and the FWWR in Cleburne and the UP Choctaw Subdivision, UP Midlothian Subdivision, UP Fort Worth Subdivision, UP Duncan Subdivision, BNSF Wichita Falls Subdivision, and UP Dallas Subdivision at Tower 55 in Fort Worth. Major rail yards located on the BNSF Fort Worth Subdivision include the Cleburne Yard, Birds Yard, Fort Worth Yard, North Fort Worth Yard, Saginaw Yard, and Alliance Yard and Auto Facility.

Table 4-19 lists major bridges on the Fort Worth Subdivision, while Table 4-20 summarizes the track mileage data for the subdivision by county, and Figure 4-13 shows the location of the subdivision. A complete listing of structures and roadway-railroad crossings for the Fort Worth Subdivision can be found in Appendix B.

Milepost:	Location Description:	County:
348.33	(392')	Tarrant
348.50	Trinity River (658')	Tarrant
372.70	Denton Creek (613')	Denton
389.33	Duck Drive (340')	Denton

Table 4-19: Fort Worth Subdivision Major Bridge Inventory

County:	Miles of Mainline Track:	Miles of Double Mainline Track:	Miles of Siding Track:	Total Miles:
TxDOT Dallas District				
Denton	38.47	4.97	6.51	50.55
TxDOT Fort Worth District				
Tarrant	33.68	2.8	15.27	51.07
Johnson	24.43	0.00	7.93	32.36
Total:	**96.58**	**7.77**	**29.71**	**133.98**

Table 4-20: Fort Worth Subdivision Track Inventory Summary

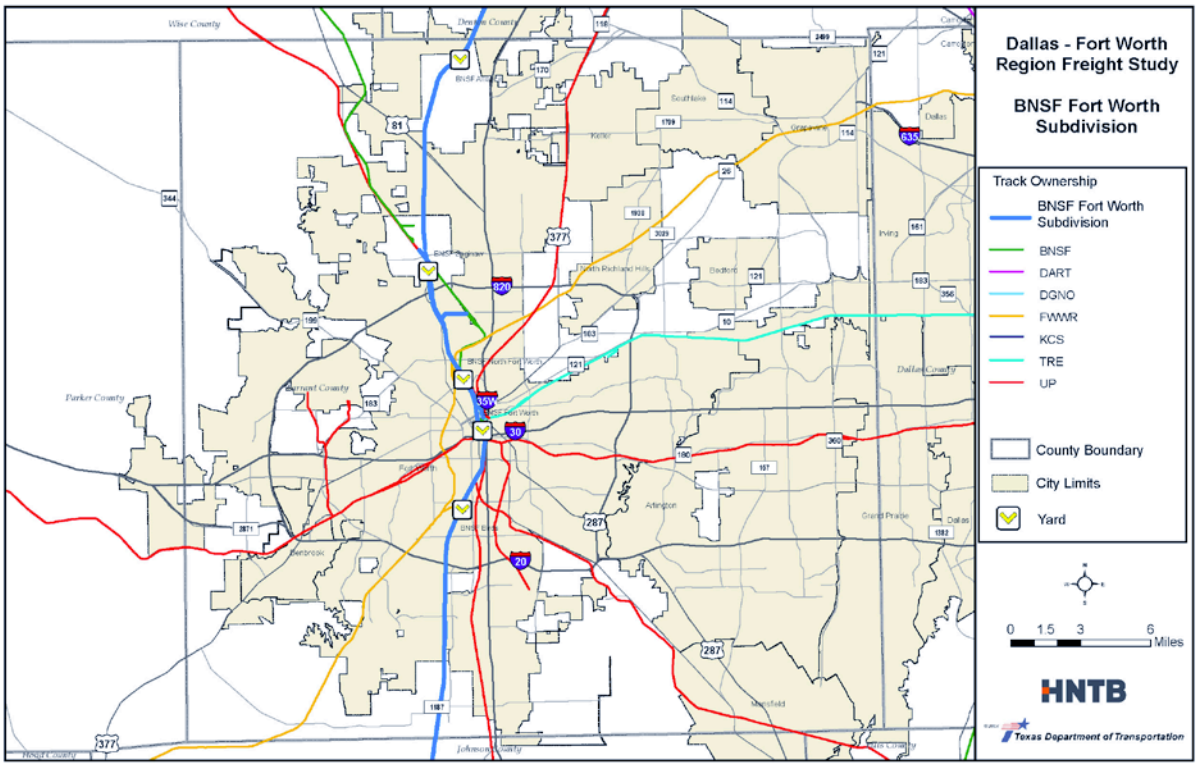


Figure 4-12: Map of BNSF Fort Worth Subdivision in the Metropolitan Area

BNSF Madill Subdivision

The Madill Subdivision was constructed by the St. Louis-San Francisco Railroad and is owned and operated today by the BNSF. The subdivision originates in Madill, Oklahoma and terminates in Irving, Texas for a total distance of approximately 106 miles, only approximately 32 of which are within the limits of this study. Predominately a single track railroad with limited sidings, rail traffic on the Madill Subdivision is bidirectional with an average daily train count of 5 to 10 trains within the study limits.

Within the study area, the Madill Subdivision crosses Collin, Denton, and Dallas Counties and runs through the cities of Irving, Gribble, Carrollton, Bliss, Hebron, Camey, Frisco, Collin, Prosper, and Celina before leaving the study limits at the Collin/Grayson county line. The Madill Subdivision crosses DART and the FWWR near Carrollton and the KCS Alliance Subdivision approximately three miles north of the Dallas/Denton County line.

Table 4-21 summarizes the track mileage data for the subdivision by county and Figure 4-14 shows the location of the subdivision. The longest bridge on the Madill Subdivision is located near the town of Collin for a length of 340 feet. A complete listing of structures and roadway-railroad crossings for the Madill Subdivision can be found in Appendix B.

County:	Miles of Mainline Track:	Miles of Double Mainline Track:	Miles of Siding Track:	Total Miles:
TxDOT Dallas District				
Collin	19.51	0.00	2.52	22.03
Dallas	2.64	0.00	.27	2.91
Denton	9.97	0.00	1.81	11.78
Total:	**32.12**	**0.00**	**4.60**	**36.72**

Table 4-21: Madill Subdivision Track Inventory Summary

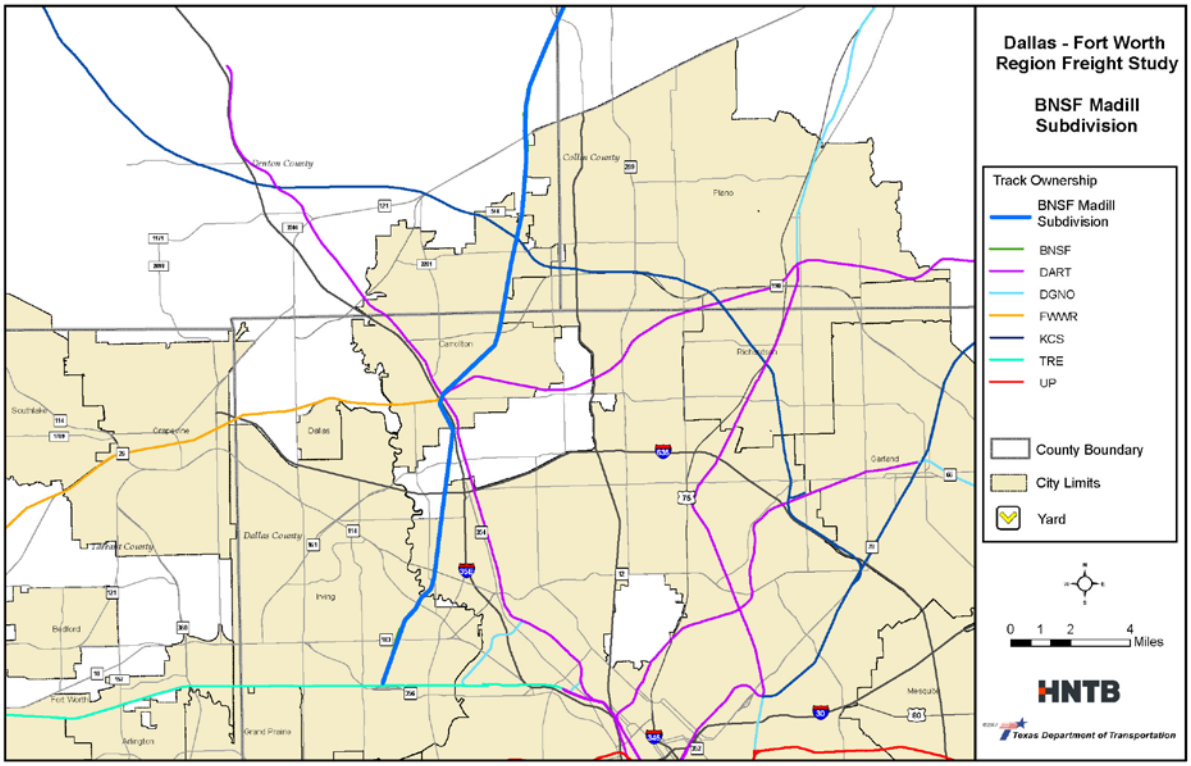


Figure 4-14: Map of BNSF Madill Subdivision in the Metropolitan Area

BNSF Venus Subdivision

The Venus Subdivision was constructed by the Atchison, Topeka, and Santa Fe Railroad and is owned and operated today by the BNSF. The subdivision originates in Cleburne, Texas and terminates in Venus, Texas for a total distance of 19 miles, all of which are within the limits of this study. A single track railroad with limited sidings, rail traffic on the Venus Subdivision is bidirectional with an average daily train count of 3 trains.

The Venus Subdivision runs within Johnson County and runs through the towns of Cleburne, Alvarado, and Venus. The Venus Subdivision meets the BNSF Fort Worth Subdivision in Cleburne and turns into the BNSF Ward Industrial Spur in Venus.

Table 4-22 summarizes the track mileage data for the subdivision by county and Figure 4-15 shows the location of the subdivision. The longest bridge on the Venus Subdivision is located near the town of Alvarado for a length of 441 feet over a crossing with I-35. A complete listing of structures and roadway-railroad crossings for the Venus Subdivision can be found in Appendix B.

County:	Miles of Mainline Track:	Miles of Double Mainline Track:	Miles of Siding Track:	Total Miles:
TxDOT Fort Worth District				
Johnson	19.00	0.00	0.00	19.00
Total:	**19.00**	**0.00**	**0.00**	**19.00**

Table 4-22: Venus Subdivision Track Inventory Summary

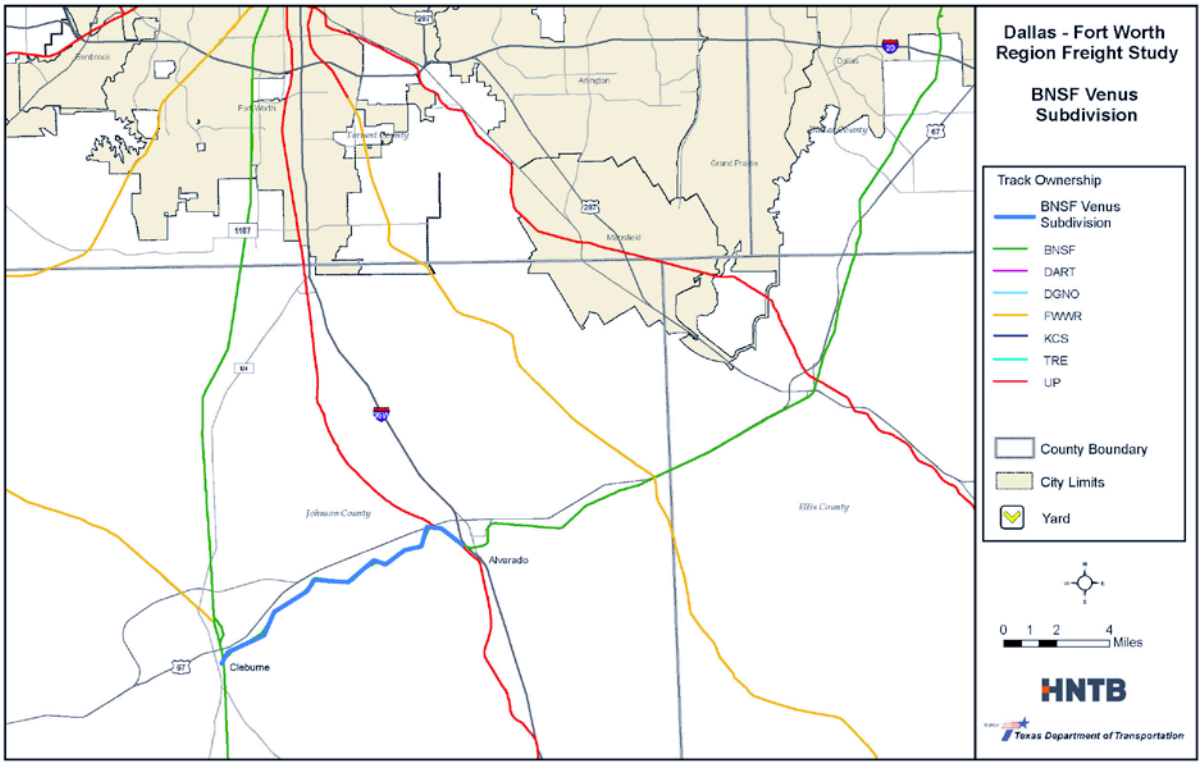


Figure 4-15: BNSF Venus Subdivision Map

BNSF Ward Industrial Spur

The Ward Industrial Spur was constructed by the Atchison, Topeka, and Santa Fe Railroad and is owned and operated today by the BNSF. The subdivision originates in Venus, Texas and terminates in Hale, Texas for a total distance of approximately 26 miles, all of which are within the limits of this study. A single track railroad with limited sidings, rail traffic on the Ward Industrial Spur consists of local switching moves.

The Ward Industrial Spur crosses Johnson, Ellis, and Dallas Counties and runs through the towns of Venus, Midlothian, Cedar Hill, Duncanville, Maglab, and Hale. The spur turns into the BNSF Venus Subdivision west of Venus, crosses the UP Midlothian Subdivision in Midlothian, and turns into a DART line at Hale running into Dallas.

Table 4-23 summarizes the track mileage data for the spur by county and Figure 4-16 shows the location of the spur. While there are no large bridges on the subdivision, a complete listing of structures and roadway-railroad crossings for the Ward Industrial Spur can be found in Appendix B.

County:	Miles of Mainline Track:	Miles of Double Mainline Track:	Miles of Siding Track:	Total Miles:
TxDOT Dallas District				
Dallas	13.88	0.00	0.42	14.30
Ellis	10.84	0.00	0.00	10.84
TxDOT Fort Worth District				
Johnson	1.69	0.00	0.00	1.69
Total:	**26.41**	**0.00**	**0.42**	**26.83**

Table 4-23: BNSF Ward Industrial Spur Track Inventory Summary

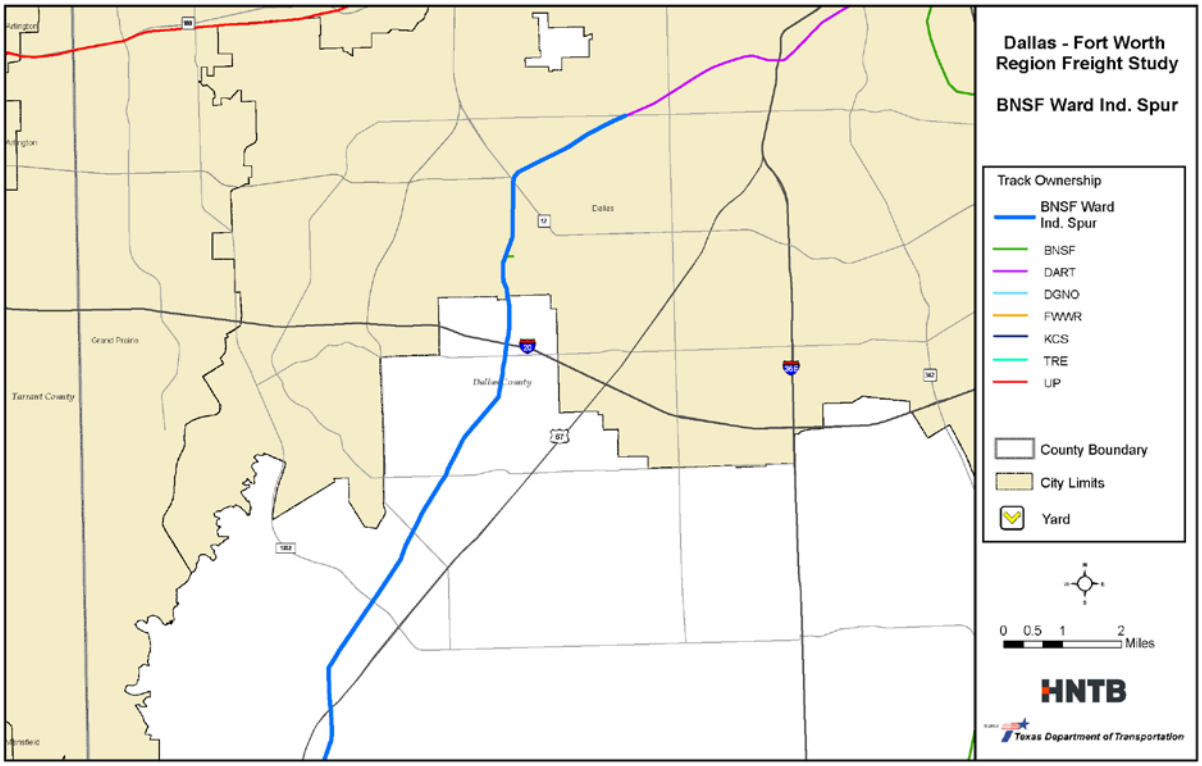


Figure 4-16: Map of BNSF Ward Industrial Spur in the Metropolitan Area

BNSF Wichita Falls Subdivision

The Wichita Falls Subdivision was constructed by the Fort Worth and Denver Railroad and is owned and operated today by the BNSF. The subdivision originates at Tower 55 in Fort Worth and terminates in Valley Junction, Texas for a total distance of approximately 118 miles, only approximately 66 of which are within the limits of this study. The subdivision is predominately a single track railroad with limited sidings, although it has two locations of double track in Tarrant County for a total distance of approximately eight miles. Rail traffic on the Wichita Falls Subdivision is bidirectional with an average daily train count of 40 to 45 trains within the study limits.

Within the study area, the Wichita Falls Subdivision crosses Tarrant and Wise Counties and runs through the cities of Fort Worth, Hodge, Saginaw, Avondale, Herman, Decatur, and Alvord before leaving the study limits at the Wise/Montague county line. The Wichita Falls Subdivision crosses the UP Choctaw Subdivision, UP Midlothian Subdivision, UP Fort Worth Subdivision, BNSF Fort Worth Subdivision, UP Duncan Subdivision, and UP Dallas Subdivision at Tower 55 in Fort Worth. Major rail yards located on the Wichita Falls Subdivision include the Fort Worth Yard, North Fort Worth Yard, North Yard, and Saginaw Yard.

Table 4-24 summarizes the track mileage data for the subdivision by county and Figure 4-17 shows the location of the subdivision. The longest bridge on the Venus Subdivision is located near the North Fort Worth Yard for a length of 385 feet over a crossing with the Trinity River. A complete listing of structures and roadway-railroad crossings for the Wichita Falls Subdivision can be found in Appendix B.

County:	Miles of Mainline Track:	Miles of Double Mainline Track:	Miles of Siding Track:	Total Miles:
TxDOT Fort Worth District				
Tarrant	27.76	7.83	4.55	40.14
Wise	38.19	0.00	4.26	42.45
Total:	**65.95**	**7.83**	**8.81**	**82.59**

Table 4-24: Wichita Falls Subdivision Track Inventory Summary

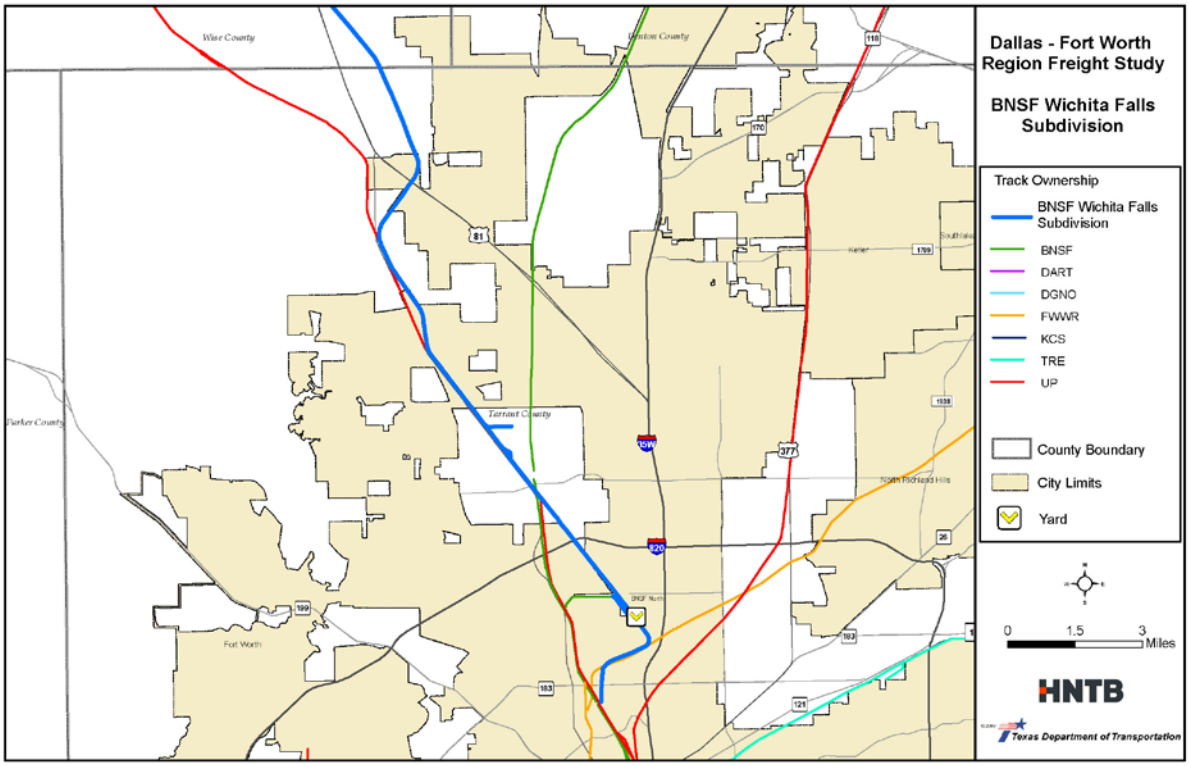


Figure 4-17: Map of BNSF Wichita Falls Subdivision in the Metropolitan Area

KCS Alliance Subdivision

The Alliance Subdivision was constructed by the Atchison, Topeka, and Santa Fe Railroad and is owned and operated today by the KCS. The subdivision originates at White Rock Junction located south west of Plano, Texas and terminates at Metro Junction located northwest of Denton for a total distance of approximately 38 miles, all of which are within the limits of this study. A single track railroad with limited sidings, rail traffic on the Alliance Subdivision is bidirectional with an average daily train count of 5 to 10 trains.

The Alliance Subdivision crosses Collin and Denton Counties and runs through the cities of Cowley, Lewisville, Minchin, and Denton. The Alliance Subdivision meets the KCS White Rock Branch and crosses DART at White Rock Junction and crosses the BNSF Madill Subdivision, DART, and the UP Choctaw Subdivision in Denton County.

Table 4-25 displays the locations and lengths of major bridges on the Alliance Subdivision, while Table 4-26 summarizes the track mileage data for the subdivision by county, and Figure 4-18 shows the location of the subdivision. A complete listing of structures and roadway-railroad crossings for the Alliance Subdivision can be found in Appendix B.

Milepost:	Location Description:	County:
73.50	Waterview Blvd (300')	Collin
84.88	(546')	Denton
89.40	Cowan Ave (442')	Denton
90.10	(469')	Denton
97.75	Alton Rd (350')	Denton
98.85	Hickory Creek (445')	Denton

Table 4-25: Alliance Subdivision Major Bridge Inventory

County:	Miles of Mainline Track:	Miles of Double Mainline Track:	Miles of Siding Track:	Total Miles:
TxDOT Dallas District				
Collin	5.90	0.00	1.24	7.14
Denton	31.80	0.00	0.81	32.61
Total:	**37.70**	**0.00**	**2.05**	**39.75**

Table 4-26: Alliance Subdivision Track Inventory Summary

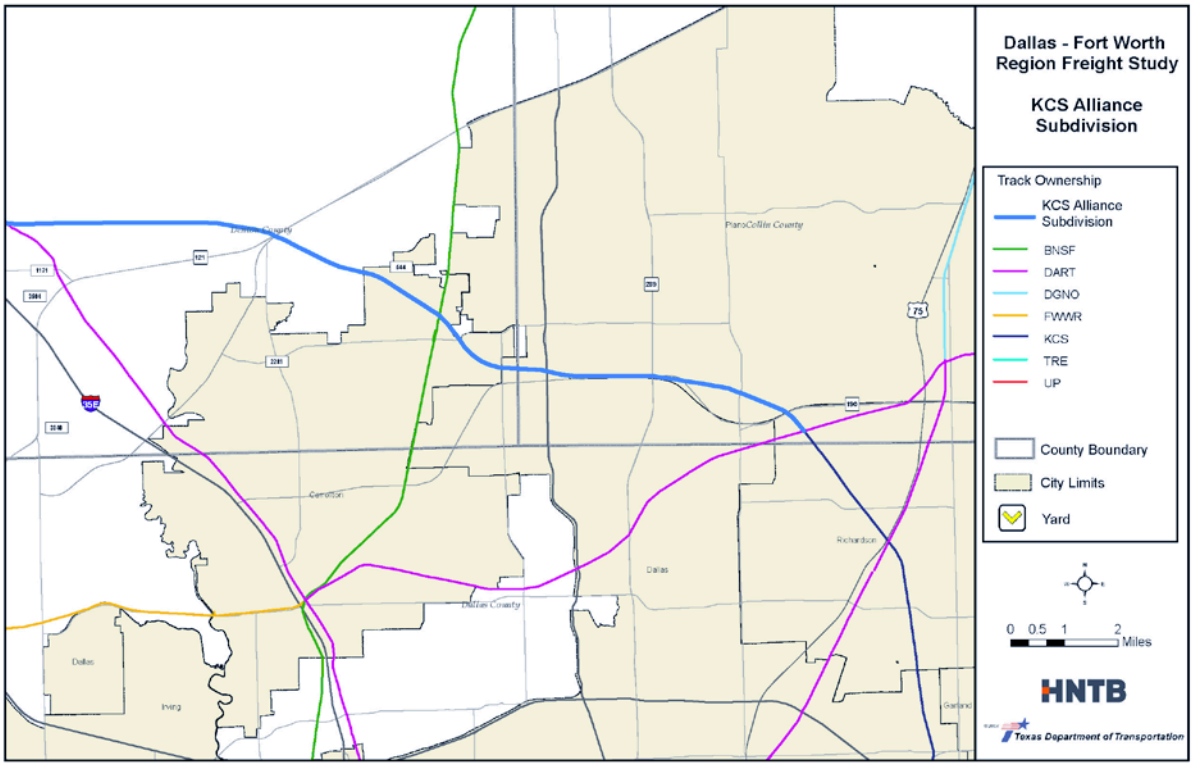


Figure 4-18: Map of KCS Alliance Subdivision in the Metropolitan Area

KCS Dallas Subdivision

The KCS Dallas Subdivision was constructed by the Atchison, Topeka, and Santa Fe Railroad and is owned and operated today by the KCS. The subdivision originates at Alliance Junction and terminates in Dallas for a total distance of approximately 25 miles, all of which are within the limits of this study. A single track railroad with limited sidings, rail traffic on the Dallas Subdivision is bidirectional with an average daily train count of 10 to 15 trains within the study limits.

The Dallas Subdivision crosses Collin and Dallas Counties and runs through the cities of Sachse, Garland, Reinhardt, Tennison, and Dallas. The Dallas Subdivision crosses the DGNO and DART in Garland, the KCS White Rock Branch at Dallas Junction located approximately five miles south of Garland, turns into a DART line in Dallas. Major rail yards located on the Dallas Subdivision include an intermodal facility at Dallas Junction and Dallas Yard located approximately two miles north of Tennison.

Table 4-27 displays the locations and lengths of major bridges on the Duncan Subdivision, while Table 4-28 summarizes the track mileage data for the subdivision by county, and Figure 4-19 shows the location of the subdivision. A complete listing of structures and roadway-railroad crossings for the Duncan Subdivision can be found in Appendix B.

Milepost:	Location Description:	County:
203.10	Muddy Creek (375')	Collin
207.21	(320')	Dallas
220.01	(708')	Dallas
225.78	(1800')	Dallas
226.18	(825')	Dallas

Table 4-27: KCS Dallas Subdivision Major Bridge Inventory

County:	Miles of Mainline Track:	Miles of Double Mainline Track:	Miles of Siding Track:	Total Miles:
TxDOT Dallas District				
Collin	2.89	0.00	0.00	2.89
Dallas	21.61	0.00	0.80	22.41
Total:	**24.50**	**0.00**	**0.80**	**25.30**

Table 4-28: KCS Dallas Subdivision Track Inventory Summary

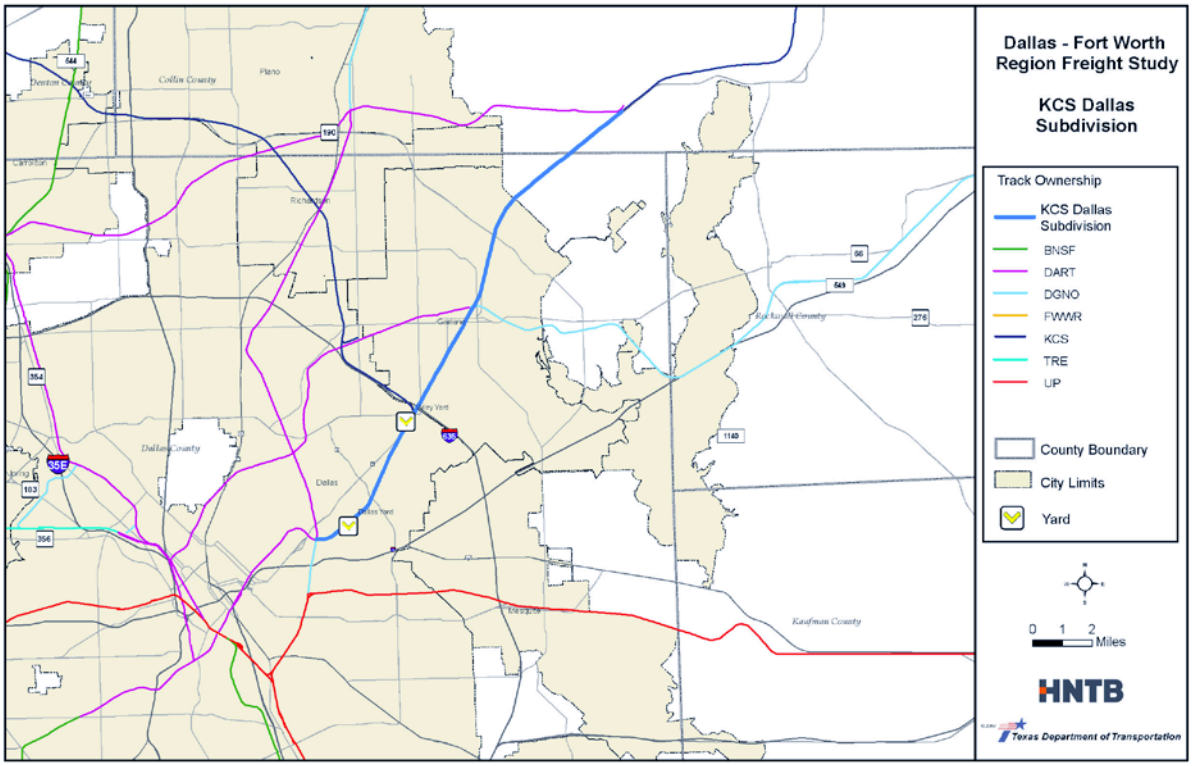


Figure 4-19: Map of KCS Dallas Subdivision

KCS Greenville Subdivision

The Greenville Subdivision was constructed in 1871 by the East Line and Red River Railroad and is owned and operated today by the KCS. The subdivision originates in Blanchard, Louisiana and terminates at Alliance Junction in Wylie, Texas for a total distance of approximately 200 miles, only approximately 21 of which are within the limits of this study. Predominately a single track railroad with limited sidings, rail traffic on the Greenville Subdivision is bidirectional with an average daily train count of 20 to 25 trains within the study limits.

Within the study area, the Greenville Subdivision crosses Collin County and runs through the cities of Wylie, Lavon, Copeville, and Farmersville before leaving the study limits at the Collin/Hunt county line. The Greenville Subdivision meets with a DART line and the KCS Dallas Subdivision at Alliance Junction. Major rail yards located on the Greenville Subdivision include Wylie Yard located near Alliance Junction.

Table 4-29 displays the locations and lengths of major bridges on the Greenville Subdivision, while Table 4-30 summarizes the track mileage data for the subdivision by county, and Figure 4-20 shows the location of the subdivision. A complete listing of structures and roadway-railroad crossings for the Greenville Subdivision can be found in Appendix B.

Milepost:	Location Description:	County:
190.17	(300')	Collin
194.56	(319')	Collin
197.73	(750')	Collin

Table 4-29: Greenville Subdivision Major Bridge Inventory

County:	Miles of Mainline Track:	Miles of Double Mainline Track:	Miles of Siding Track:	Total Miles:
TxDOT Dallas District				
Collin	20.61	0.00	3.30	23.91
Total:	**20.61**	**0.00**	**3.30**	**23.91**

Table 4-30: Greenville Subdivision Track Inventory Summary

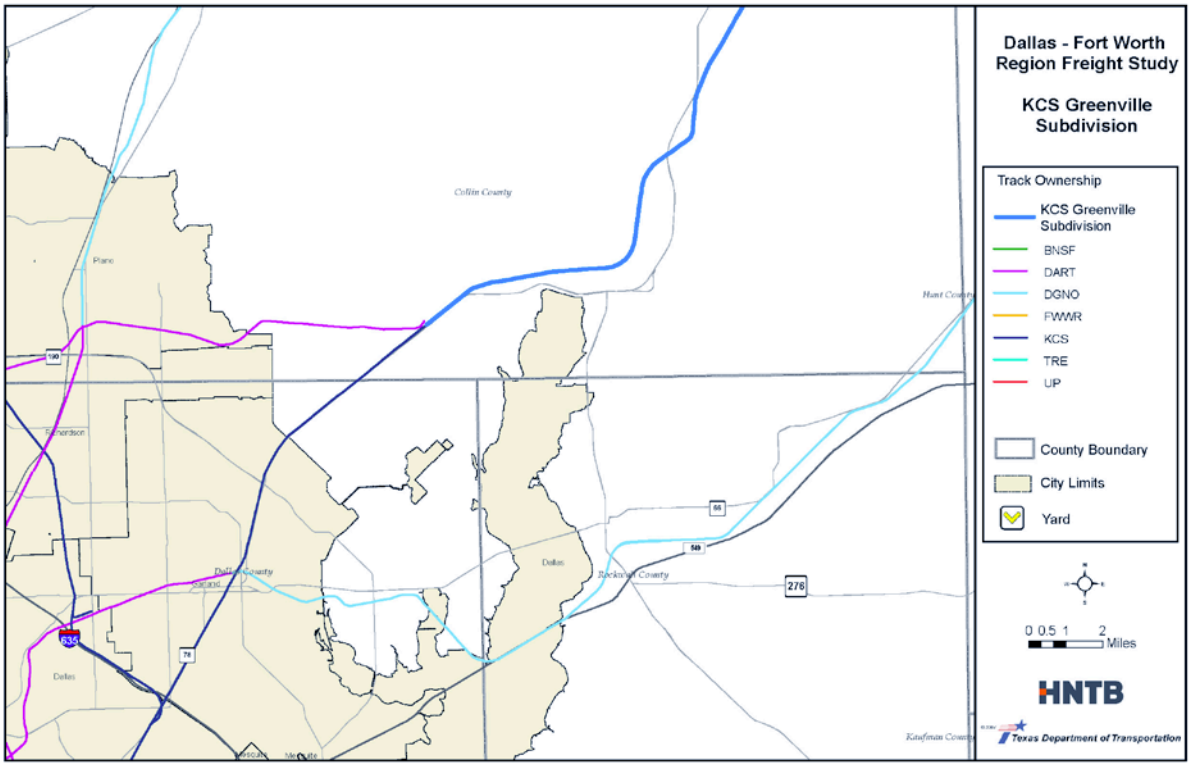


Figure 4-20: Map of KCS Greenville Subdivision in the Metropolitan Area

KCS White Rock Branch

The White Rock Branch was constructed in 1956 by the Atchison, Topeka, and Santa Fe Railroad and is owned and operated today by the KCS. The subdivision originates at Dallas Junction located approximately 1 ½ miles south of White Rock, Texas and terminates at White Rock Junction located approximately 1 ½ miles south of Cowley, Texas for a total distance of approximately 11 miles, all of which are within the limits of this study.

The White Rock Branch crosses Dallas and Collin Counties and runs through the towns of White Rock and Richardson. The White Rock Branch meets with the KCS Dallas Subdivision at Dallas Junction and turns into the KCS Alliance Subdivision at White Rock Junction.

Table 4-31 displays the locations and lengths of major bridges on the White Rock Branch, while Table 4-32 summarizes the track mileage data for the subdivision by county, and Figure 4-21 shows the location of the subdivision. A complete listing of structures and roadway-railroad crossings for the White Rock Branch can be found in Appendix B.

Milepost:	Location Description:	County:
66.06	Private Crossing (257')	Dallas
70.86	US 75 Crossing (590')	Dallas
71.47	(255')	Collin

Table 4-31: White Rock Branch Major Bridge Inventory

County:	Miles of Mainline Track:	Miles of Double Mainline Track:	Miles of Siding Track:	Total Miles:
TxDOT Dallas District				
Dallas	9.92	0.00	0.23	10.15
Collin	0.98	0.00	0.00	0.98
Total:	**10.9**	**0.00**	**0.23**	**11.13**

Table 4-32: White Rock Branch Track Inventory Summary

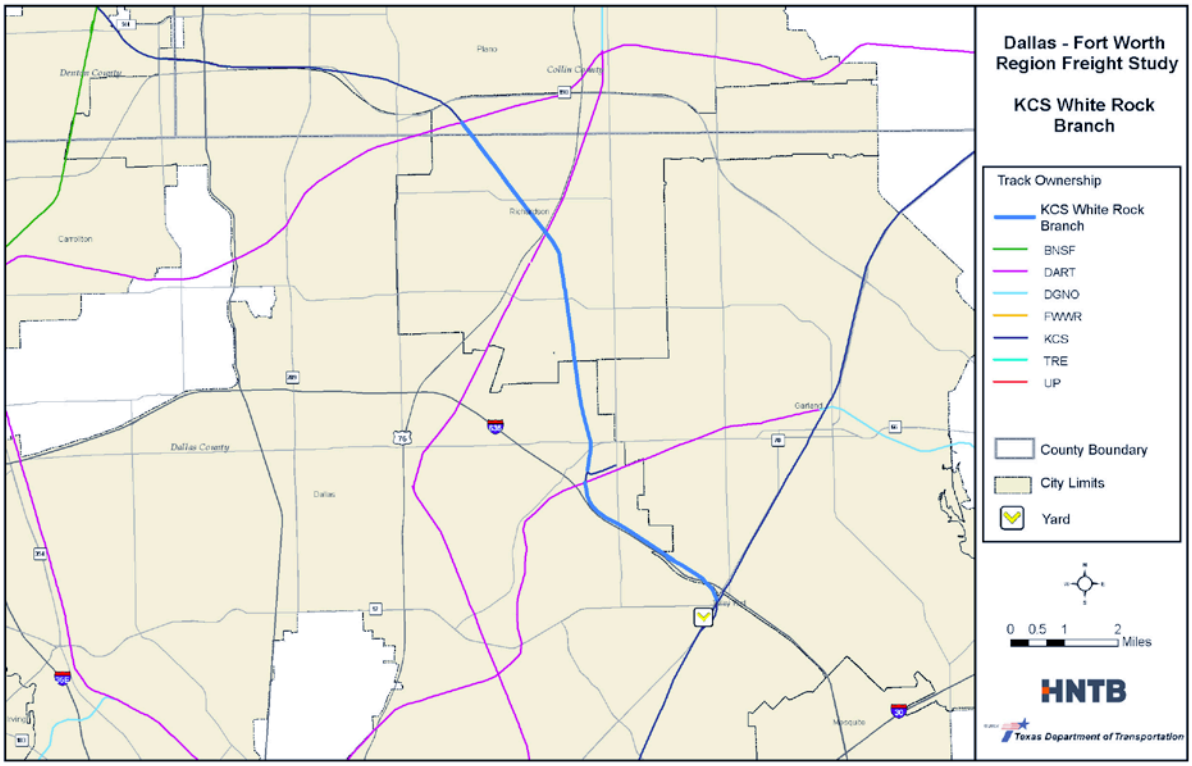


Figure 4-21: Map of KCS White Rock Branch

Dallas, Garland & Northeastern Railroad (DGNO)

The DGNO, a subsidiary of RailAmerica, operates over a combination of owned and leased rail lines approximately 200 miles, including industrial leads. A line extends from Trenton, Texas through Greenville to Garland, Texas, then from Garland to Dallas via trackage rights over KCS and UP. DGNO also operates from Sherman to McKinney, from Carrollton to Murphy, and from Dallas through Carrollton to Lake Dallas. DGNO leases and operates an 11-mile UP rail line between Center Point, Texas and Mockingbird Yard. Of the total mileage operated by DGNO, more than 50 are leased from DART and nearly 130 are leased from UP.

Table 4-33 displays the locations and lengths of major bridges on the DGNO, while Table 4-34 summarizes the track mileage data for the railroad by county, and Figure 4-22 shows the location of the railroad. The track mileage shown in Table 4-33 represents the DGNO Denton, Murphy to Coppell, and Greenville lines and does not include other track leased by the railroad. A complete listing of structures and roadway-railroad crossings for the DGNO can be found in Appendix B.

Milepost:	Location Description:	County:
741.39	East Fork Trinity River (473')	Rockwall
742.22	(546')	Rockwall
744.85	Woody Creek (310')	Dallas
748.17	(376')	Dallas

Table 4-33: DGNO Major Bridge Inventory

County:	Miles of Mainline Track:	Miles of Double Mainline Track:	Miles of Siding Track:	Total Miles:
TxDOT Dallas District				
Collin	16.60	0.00	2.13	18.73
Dallas	44.51	0.00	5.13	49.64
Denton	11.87	0.00	0.67	12.54
Rockwall	14.04	0.00	0.30	14.34
Total:	**87.02**	**0.00**	**8.23**	**95.25**

Table 4-34: DGNO Track Inventory Summary

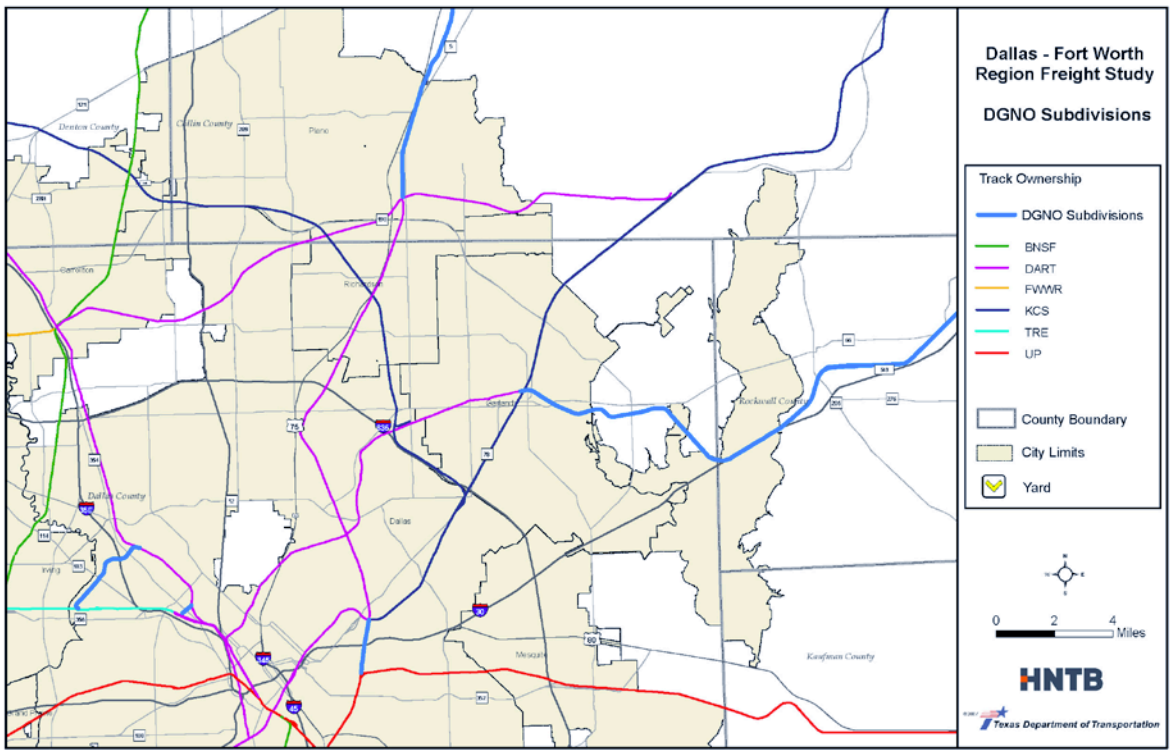


Figure 4-22: Map of DGNO

Fort Worth and Western Railroad (FWWR)

The FWWR is a shortline railroad that operates over 276 miles, both owned and leased, primarily between Carrollton and San Angelo Junction. The FWWR Subdivision runs from Fort Worth northeast to Carrollton, while the Dublin Subdivision runs from Fort Worth southwest to Dublin. Both subdivisions are bidirectional, single track lines with sidings and carry an average of approximately 5 to 10 daily trains.

Table 4-35 displays the locations and lengths of major bridges on the FWWR, while Table 4-36 summarizes the track mileage data for the railroad by county, and Figure

4-23 shows the location of the railroad. A complete listing of structures and roadway-railroad crossings for the FWWR can be found in Appendix B.

Milepost:	Location Description:	County:
605.4	(1140')	Dallas
605.91	(975')	Dallas
35.2	(846')	Hood
n/a	(576')	Tarrant
3	(504')	Tarrant
604.55	(480')	Dallas
70.4	(365')	Erath

Table 4-35: FWWR Major Bridge Inventory

County:	Miles of Mainline Track:	Miles of Double Mainline Track:	Miles of Siding Track:	Total Miles:
TxDOT Fort Worth District				
Erath	37.84	0.00	4.51	42.35
Hood	31.57	0.00	4.88	36.45
Johnson	22.33	0.00	0.00	22.33
Parker	0.23	0.00	0.00	0.23
Tarrant	41.23	0.00	1.72	42.95
TxDOT Dallas District				
Dallas	7.34	0.00	1.75	9.09
Total:	**140.54**	**0.00**	**12.86**	**153.40**

Table 4-36: FWWR Track Inventory Summary

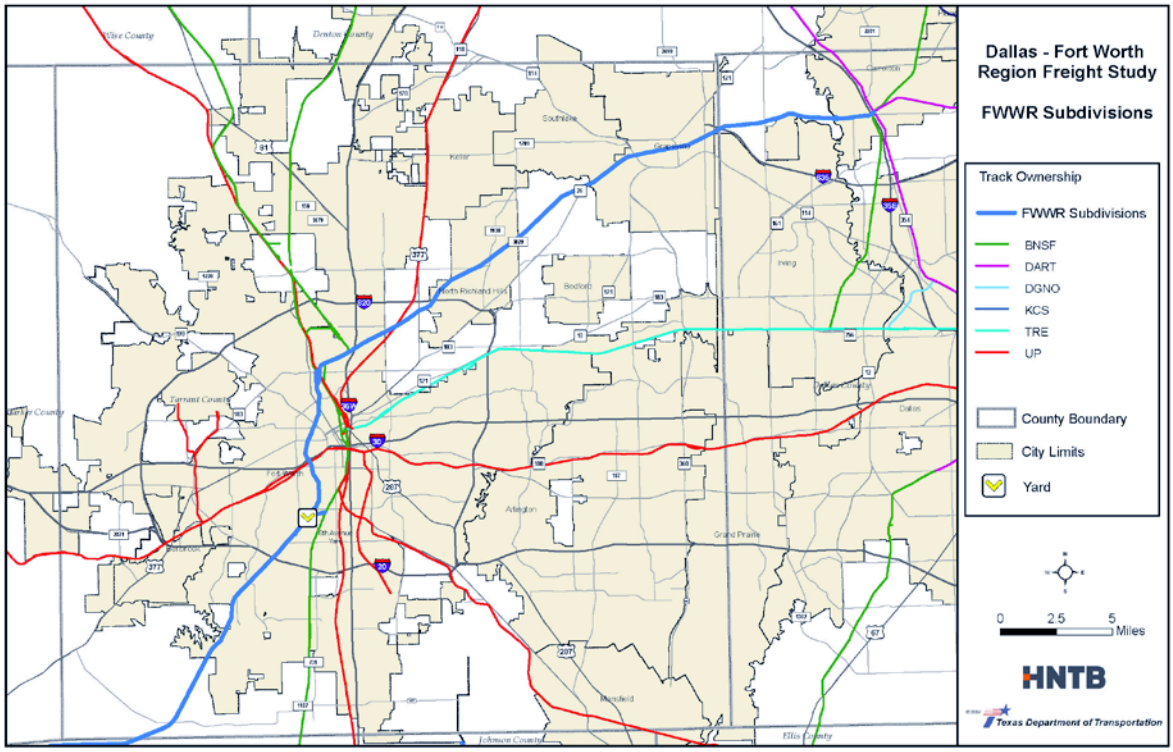


Figure 4-23: Map of FWWR

Trinity Railway Express (TRE)

The TRE is a regional commuter line between Dallas and Fort Worth jointly owned by DART and the Fort Worth Transit Authority (The T). The eastern terminus of the line is located in Downtown Dallas at Dallas Union Station and the western terminus is located in Fort Worth at T&P Station. The line includes nine commuter stops and passes through Irving, the DFW Airport, Hurst, and Richland Hills. UP and BNSF operate freight on the commuter line through track right agreements with the TRE. Predominately a single track railroad with limited sidings, rail traffic on the TRE is bidirectional with an average daily train count of 55 to 60 trains, of which nearly 50 are passenger trains.

Table 4-37 displays the locations and lengths of major bridges on the TRE, while Table 4-38 summarizes the track mileage data for the railroad by county, and Figure 4-24 shows the location of the railroad. A complete listing of structures and roadway-railroad crossings for the TRE can be found in Appendix B.

Milepost:	Location Description:	County:
612.44	West Fork Trinity River (800')	Tarrant
617.57	Midway-Big Fossil Creek (300')	Tarrant
637.00	Trinity River/ Elm Fork (1560')	Dallas

Table 4-37: TRE Major Bridge Inventory

County:	Miles of Mainline Track:	Miles of Double Mainline Track:	Miles of Siding Track:	Total Miles:
TxDOT Dallas District				
Dallas	14.58	0.00	1.20	15.78
TxDOT Fort Worth District				
Tarrant	19.22	0.00	5.27	24.49
Total:	**33.80**	**0.00**	**6.47**	**40.27**

Table 4-38: TRE Track Inventory Summary

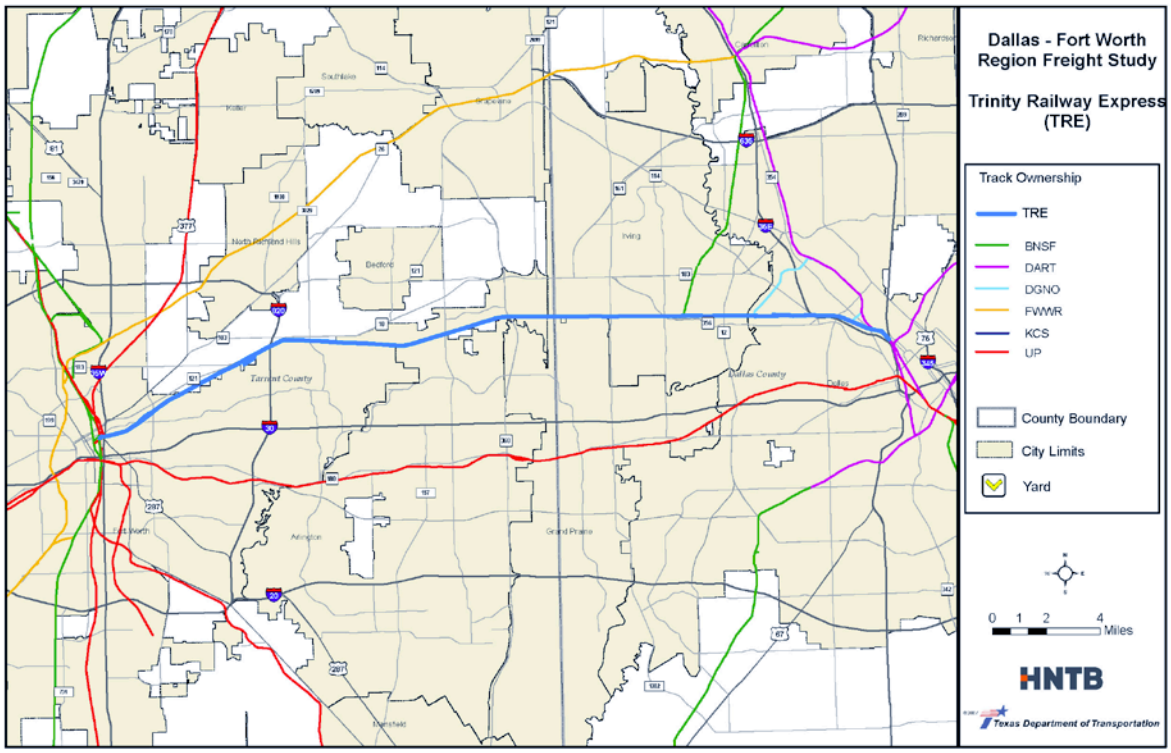


Figure 4-24: Map of TRE

SECTION 5: FREIGHT RAIL OPERATIONS MODEL

Rail Traffic Controller

Rail Traffic Controller (RTC) is a powerful 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 (make-up of a train by types of cars and their contents) 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. All Class I carriers involved in this study (BNSF, KCS, and UP) use the model, are familiar with the methodology, and accept the model's results when it is used to their standards.

Dispatching Simulation

RTC 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 6 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: 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. No two days in the real world are identical, and 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. However, the RTC dispatcher is resolving conflicts with the full knowledge of all trains on the territory and with the look-ahead capability available to a powerful computer program. Unless a train is significantly delayed, or the crew is nearing the federally-mandated 12-hours-of-continuous-service limit, both the 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 human dispatchers make their 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 vexing series of conflicts, the model, like its human counterparts, 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 sign that what is being attempted is not practical or sustainable, which means that the rail demand being placed on the network exceeds the practical capacity of that network.

All other factors being equal, the model will generally minimize the total cost of delay to the trains involved in a conflict. The model dispatcher will do this for all trains involved in any conflict or series of conflicts. Sometimes 25 or 30 trains may be 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 effects; RTC sorts through the effects 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 human dispatchers. The RTC decisions are analyzed, and if they are realistic or have no significant impact, then they are left standing. Others are rejected in the case “resolution” process, which is the RTC user (or the Chief Dispatcher, in railroad terms) intervening to change an initial RTC decision for a better or more realistic one.

In the real world, the human dispatchers make decisions in real time, without the more perfect knowledge possessed by RTC. The RTC model has the luxury of revising its decisions until the delay cost is minimized; the human dispatcher cannot do the same. The difference between reality and the model does not invalidate the model; it simply means that RTC solutions may be more optimistic than can be expected in real life. In practice, RTC base cases (the ones that are 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. That process – validating the model – is an important part of ensuring that model outputs in planning cases are credible.

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; however, for all practical purposes, the measures used are time-related. 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: trains that do not complete their entire run within the measured week are excluded from the statistics, lest they 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 is delay, and it varies. A higher number indicates worse conditions. The denominator does not change within a case, since it is the irreducible minimum amount of time that it would take to run the railroad. The ratio is one measure of "normalized" delay and allows comparison of performance between simulation cases, or between segments of the railroad network, where the train counts are not the same. The expected, sustainable train performance increases with lower delay ratios.

- *Delay Hours/Day* – This is the absolute number of train-hours per calendar day lost to congestion related delay. Since a "train-hour" can take a value, it is a useful measure: reduce the delay hours, reduce the costs. A freight-train hour, however, is one train, either sitting still or running, for one hour. In reality, not all trains are equal, and the value of one hour lost by a train with 100 loaded cars of time-sensitive freight is different from the value of one hour lost by a local yard switching 20 cars a shift. However, the absolute values are needed. 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 far. Similarly, 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 cannot 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.

Railroad dispatching systems capture only part of the total rail activity. Rail movements in and around yards and terminals seldom appear in the dispatching data with enough detail to be described to a simulation model. These trains and engines have to be described by local operating personnel who know the operation first hand. Consequently, personnel at the UP, BNSF, KCS, and FWWR railroads were interviewed to capture this detail.

The Dallas-Fort Worth District Base Case has 3,920 miles of railroad track and over 2,100 trains per week. The network includes all principal rail lines and yards between Temple, Waco, and Corsicana on the south; Dublin and Abilene on the west; Wichita Falls and Waurika on the northwest; Gainesville and Denison/Sherman on the north; and Hughes Springs and Big Sandy on the east. All the major yards within the Fort Worth and Dallas terminals and the principal industrial switching zones are included.

Inside the Dallas-Fort Worth terminals, the model includes all of the key trackage owned, operated, or used by trains of BNSF, KCS, UP, TRE, FWWR, and DGNO. There are 15 significant switching yards within the Dallas-Fort Worth terminal area and 3 more included in the simulation outside the immediate terminal. The railcar classification activity at these yards is a major part of the exercise since the yard-related activity is a significant factor in the congestion around the Tower 55 interlocking, and three of the major yards lie in close proximity to Tower 55 along with three smaller ones.

The base case simulation network was constructed largely from railroad "track charts" supplied by the railroads. These schematic maps show the physical plant in sections (often in sheets showing roughly 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 from records and data received from the railroads. The railroads keep records of through-train movements, which are taken from the dispatching system and include the identity of the train, its consist, its route, and the day and clock time when it passed certain key recording points. The Dallas-Fort Worth study began with data supplied by all the carriers for a sample period in August 2007. The files created from this data were then updated in March 2008 and in October 2008 to reflect ongoing changes to the local train operations.

Railroad dispatching systems capture only part of the total rail activity. Rail movements in and around yards and terminals seldom appear in the dispatching data with enough detail to be described to a simulation model. These trains and engines have to be described by local operating personnel who know the operation first hand. Consequently, railroads personnel were interviewed to capture this detail.

The Base Case now includes the following trains by carrier:

- Amtrak – 32
- BNSF – 505
- KCS – 213
- FWWR – 53
- DGNO – 12
- TRE – 331
- UP – 989

Of these 2,135 trains, nearly 1,600 freight trains and 360 passenger trains complete their run during the simulation period and are included in the performance measurement summary. In the Base Case, for example, the 1,595 freight trains that complete their run during the simulation week include:

- Intermodal – 313
- Manifest – 430
- Grain – 90
- Coal – 118
- Other Unit (sulphur, potash, steel, coke) – 108
- Autos and Auto Parts – 59
- Locals – 220
- Yard Engines – 241
- Work Trains and Light Engines – 16

This distribution by train type is a significant pattern in the operation: about 70% of all the trains in the study are through trains, and a third of those through trains (23% of all trains) are "expedited", which are intermodal and vehicle trains that carry time-sensitive cargo. This mix of trains with different relative priorities contributes to the pressure on capacity, especially around Towers 55 and 60.

Consequently, in Dallas-Fort Worth – unlike Houston, where virtually all trains originate or terminate, and where most of the freight is heavy, bulk cargo – the physical plant handles approximately 1,500 trains per week through an adjoining set of level crossings, with a mixture of trains having significantly different priorities. Many of those trains only need a clear route to another destination and do not need (or want) to stop at Tower 55 and frequently do not have a clear route through Tower 55.

Base Case Results

Table 5-1 below summarizes the Base Case freight train performance for the entire RTC network (all track and all freight trains) for a one-week period for 12 selected railroad subdivisions that are of particular interest to the study.

Subdivision	Trains	Average Speed (mph)	Delay Ratio	Delay Hrs/Day	Delay Mins/ 100 TM
Network	1595	22.7	28.2%	297	50.1
BNSF DFW	72	24.2	8.3%	1.1	18.1
BNSF Fort Worth	580	20.9	26.6%	34	53
BNSF Madill	58	18.6	4.6%	1	10.8
BNSF Wichita Falls	288	22.4	24.3%	16.8	43.7
FWWR Fort Worth	45	4.3	24.4%	7.5	149
KCS Alliance	44	27.1	17.2%	1.6	30.3
KCS Dallas	74	19.2	26.2%	5.4	64.8
UP Choctaw	227	27.2	24.6%	16.1	41.4
UP Dallas	697	21.9	20.7%	28.4	37.1
UP Duncan	219	13.9	30.7%	8.4	78.6
UP Fort Worth	306	20.3	35.8%	18.3	59.3
UP Midlothian	126	29.4	4.3%	1	7.6

Table 5-1: RTC Base Case Results

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 mainline subdivision also cause concern. Inside terminals, delays per 100 train-miles are a bit misleading because trains do not travel long distances under the best of circumstances, creating a small denominator in the equation.

The base case results show that subdivisions that intersect either or both Towers 55 and 60 have the higher delay ratios and the higher numbers of delay hours. Thus, the BNSF Fort Worth Subdivision and the UP Choctaw, Dallas, Duncan, and Fort

Worth Subdivisions account for approximately 40 percent of the total network delay. Most of those 105 hours of daily delay are directly attributable to delays at the two interlockings (Towers 55 and 60). Outside of the terminal, train operations across all these subdivisions are relatively fluid in the model. The modeling simulation has not identified any important line segments where there is a shortage of sidings or a lack of capacity in the signal or train dispatching system. In fact, average speeds outside the Metroplex are fairly high, which is why the RTC average speeds for most of the railroad subdivisions are relatively good.

The Base Case shows some congestion between Tower 55 and Browder, on the UP Dallas Subdivision, due to pick-ups, set-outs, and yard work at Arlington and Browder Yard; and the model resolves a large number of meets between opposing trains on the single-track sections of the BNSF Fort Worth Subdivision between Gainesville and Temple. But neither the simulation performance numbers nor a review of the animation suggests that either of those two lines are saturated (at or above capacity). Outside of the territory bounded by Alliance Yard on the north, Davidson yard on the west, Ney Yard on the south, and CJ/Cadiz Yards on the east, the network models well, and generally seems adequate to current demand.

Findings from the Base Case

The Base Case results suggest most of the Dallas-Fort Worth congestion problem is the effect of the level crossings at Towers 55 and 60, as most of the region's freight trains have to cross one if not both of these points. The delays at Tower 55 are increased by movements on diverging routes through the plant (e.g. from Davidson Yard north to the Duncan or Choctaw Subdivisions or from Ney Yard east toward Dallas, or from Davidson south toward the Midlothian Subdivision). Delays are also increased by the twice-daily reverse move that Amtrak trains must make in the Tower 55 interlocking, as well as those trains' diverging moves to/from Dallas. Train crew changes near the Tower 55 crossing also use track capacity, especially on the main tracks and Bypass at Ney Yard, but there are currently not many options away from the Tower where trains can be held for crews.

The Base Case also suggests that adapting some of the alternate routes that might ease the pressure on Towers 55 and 60 have their own issues. For example, the old St. Louis-San Francisco route from Tower 60 through White Settlement, then under the UP east of Davidson Yard to Belt Junction has a steep grade and no readily available connections on the south end to the rest of the north-south network. The piece of former Rock Island track between Sixth Street Junction and Dalwor/Purina Junction is restricted at Hole-in-the-Wall, and is used by all of TRE's Fort Worth passenger trains. Consequently, freight trains using this short piece of track model with some of the worst individual delays in the entire case.

The better strategies to relieve congestion around Towers 55 and 60 address the configuration of the interlockings and testing (in the model) alternative designs for the plant at Tower 55. Those tests are the subject of the next set of planning cases, as discussed in section 7.

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

Safety hazards involving freight rail operations include rail-roadway crossing accidents, trespasser casualties, train accidents and derailments, and hazardous material spills. Such accidents are reported by the railroads to the Federal Railroad Administration (FRA) and, in some cases, to state and/or local agencies such as the Departments of Transportation. The following section provides reported annual safety statistics such as the number of incidents, resulting injuries and fatalities, and, in some cases, estimated damages as reported by the railroads over the past five years.

Roadway-Rail At-Grade Crossing Accidents

Approximately 1,600 at-grade roadway-rail crossings are located in the 16-county Dallas-Fort Worth region. Table 6-1 depicts the number of public at-grade crossings, sorted by type of warning device, for the United States, the State of Texas, and the DFW region. The crossings listed for the DFW region only include crossings with the mainline tracks and exclude crossings at industry tracks and sidings. Table 6-2 shows the number of public and private roadway-rail at-grade crossings in the DFW region, sorted by county, and includes crossings at mainline, industry, and siding tracks.

Number of Public At-Grade Crossings by Warning Device					
United States 2003		**Texas 2003**		**DFW Region* 2006**	
Crossbucks (passive)	68,834	Crossbucks (passive)	5,244	Crossbucks (passive)	670
Lights only (active)	25,656	Lights only (active)	1,362	Lights only (active)	181
Gates (active)	36,410	Gates (active)	3,728	Gates (active)	773
Stop Signs	9,905	Stop Signs	270	Stop Signs	40
Special Warning	3,209	Special Warning	93	Special Warning	8
Hwy. Traffic Signal	1,269	Hwy. Traffic Signal	74	Hwy. Traffic Signal	0
Other (passive & active)	618	Other (passive & active)	7	Other (passive & active)	115
Unknown	4,843	Unknown	458	Unknown	0
Source: Federal Railroad Administration					
* Mainline tracks only					

Table 6-1: Public At-Grade Crossings for the U.S., Texas, and the DFW Region

Total At-Grade Roadway-Rail Crossings for DFW Region								
County	Total		Pedestrian		Private Vehicle		Public	
	Count	%	Count	%	Count	%	Count	%
Collin	169	6.7%	1	0.0%	45	1.8%	123	4.8%
Dallas	781	30.8%	7	0.3%	156	6.1%	618	24.4%
Denton	222	8.8%	1	0.0%	94	3.7%	127	5.0%
Ellis	167	6.6%	0	0.0%	51	2.0%	116	4.6%
Erath	104	4.1%	0	0.0%	61	2.4%	43	1.7%
Hood	63	2.5%	0	0.0%	40	1.6%	23	0.9%
Johnson	137	5.4%	0	0.0%	36	1.4%	101	4.0%
Kaufman	81	3.2%	0	0.0%	47	1.9%	34	1.3%
Navarro	134	5.3%	0	0.0%	28	1.1%	106	4.2%
Palo Pinto	31	1.2%	0	0.0%	14	0.6%	17	0.7%
Parker	41	1.6%	0	0.0%	23	0.9%	18	0.7%
Rockwall	21	0.8%	0	0.0%	5	0.2%	16	0.6%
Somervell	1	0.0%	0	0.0%	1	0.0%	0	0.0%
Tarrant	482	19.0%	4	0.2%	90	3.5%	388	15.3%
Wise	103	4.1%	0	0.0%	46	1.8%	57	2.2%
Total:	2537	100.0%	13	0.5%	737	29.1%	1787	70.4%

Table 6-2: Total At-Grade Roadway-Rail Crossings for DFW Region

As shown in Table 6-3, during the five-year period from January 2002 through December 2006, the 16-county DFW region experienced 274 roadway-rail at-grade crossing accidents, including 31 fatalities and 90 injuries. Table 6-4 lists, by county within the region, the number of incidents annually from 2002 through 2006. In comparison, the entire State of Texas experienced 1,564 incidents in which there were 166 fatalities and 635 reported injuries during the same period of time. Figure 6-1 depicts the number of roadway-rail incidents in the State of Texas for the January 2002 through December 2006 time period.

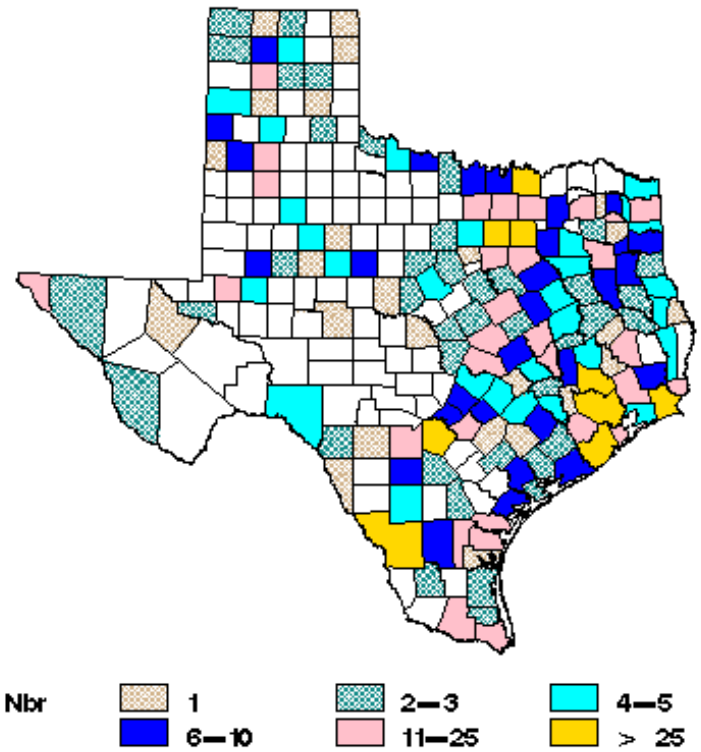


Figure 6-1: Roadway-Rail Incidents for Texas, January 2002 to December 2006

The roadway-rail incidents which occurred in Dallas and Tarrant Counties in the 2002 through 2006 timeframe accounted for nearly 60 percent of the total roadway-rail incidents in the 16-county DFW region[1].

In reference to the following tables, the 'Cnt' value displays the number of accidents, while the 'Kld' and 'Inj' values display the number of people killed and injured in those accidents, respectively.

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

Roadway-Rail Incidents for the DFW Region (2002-2006)															
County	Totals			At Public Crossing						At Private Crossing					
				Motor Vehicle			Other			Motor Vehicle			Other		
	Cnt	Kld	Inj	Cnt	Kld	Inj	Cnt	Kld	Inj	Cnt	Kld	Inj	Cnt	Kld	Inj
Collin	17	-	3	17	-	3	-	-	-	-	-	-	-	-	-
Dallas	70	9	22	65	8	20	1	-	-	3	-	1	1	1	1
Denton	24	6	14	22	6	12	1	-	2	1	-	-	-	-	-
Ellis	20	4	9	20	4	9	-	-	-	-	-	-	-	-	-
Erath	2	-	1	1	-	-	-	-	-	1	-	1	-	-	-
Hood	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-
Johnson	12	-	8	11	-	7	-	-	-	1	-	1	-	-	-
Kaufman	9	1	3	7	1	3	-	-	-	2	-	-	-	-	-
Navarro	9	1	1	9	1	1	-	-	-	-	-	-	-	-	-
Palo Pinto	2	-	-	2	-	-	-	-	-	-	-	-	-	-	-
Parker	4	1	1	4	1	1	-	-	-	-	-	-	-	-	-
Tarrant	93	4	22	89	4	22	-	-	-	4	-	-	-	-	-
Wise	11	5	6	8	4	2	-	-	-	3	1	4	-	-	-
Total:	274	31	90	256	29	80	2	0	2	15	1	7	1	1	1
* - Cnt = Incident Count, Kld = Fatalities, Inj = Injuries															

Table 6-3: Roadway-Rail Incidents for DFW Region, by County (2002-2006)

Annual Roadway-Rail Incidents for DFW Region (2002-2006)																		
County	2002 Totals			2003 Totals			2004 Totals			2005 Totals			2006 Totals			2000 - 2005 Totals		
	Cnt	Kld	Inj	Cnt	Kld	Inj	Cnt	Kld	Inj	Cnt	Kld	Inj	Cnt	Kld	Inj	Cnt	Kld	Inj
Collin	2	0	0	5	0	1	4	0	0	4	0	0	2	0	2	17	0	3
Dallas	13	0	2	16	2	5	16	1	6	13	4	7	12	2	2	70	9	22
Denton	5	2	6	3	0	0	6	1	1	5	1	5	5	2	2	24	6	14
Ellis	1	0	0	3	0	1	3	1	1	5	0	3	8	3	4	20	4	9
Erath	0	0	0	1	0	0	0	0	0	1	0	1	0	0	0	2	0	1
Hood	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0
Johnson	3	0	5	2	0	1	4	0	2	2	0	0	1	0	0	12	0	8
Kaufman	2	0	0	2	0	0	3	1	0	1	0	0	1	0	3	9	1	3
Navarro	4	1	1	1	0	0	1	0	0	1	0	0	2	0	0	9	1	1
Palo Pinto	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	2	0	0
Parker	1	0	1	1	1	0	0	0	0	1	0	0	1	0	0	4	1	1
Tarrant	15	1	2	20	0	3	16	0	6	20	0	5	22	3	6	93	4	22
Wise	3	1	3	4	3	2	1	0	0	0	0	0	3	1	1	11	5	6
Total:	49	5	20	60	6	13	55	4	16	53	5	21	57	11	20	274	31	90
* - Cnt = Incident Count, Kld = Fatalities, Inj = Injuries																		

Table 6-4: Annual Roadway-Rail Incidents for DFW Region (2002-2006)

Trespasser Incidents

Lastly, a total of 79 trespasser incidents occurred in the DFW region from 2002 through 2006, 62 of which occurred in Dallas and Tarrant Counties as shown in Table 6-5. Trespasser incidents within Dallas and Tarrant Counties between 2002 and 2006 are tabulated in Tables 6-6 and 6-7. 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 DFW Region (2002 through 2006)							
County	Total		Total Year Counts				
	Cases	% of Total	2002	2003	2004	2005	2006
Collin	1	1.3%	1	0	0	0	0
Dallas	25	31.6%	5	4	5	4	7
Denton	5	6.3%	1	1	2	1	0
Ellis	1	1.3%	0	0	0	0	1
Erath	0	0.0%	0	0	0	0	0
Johnson	3	3.8%	1	0	2	0	0
Kaufman	0	0.0%	0	0	0	0	0
Navarro	4	5.1%	4	0	0	0	0
Palo Pinto	0	0.0%	0	0	0	0	0
Parker	0	0.0%	0	0	0	0	0
Rockwall	0	0.0%	0	0	0	0	0
Tarrant	37	46.8%	12	7	2	9	7
Wise	3	3.8%	1	1	1	0	0
Total:	79	100%	25	13	12	14	15

Table 6-5: DFW Region Trespasser Incidents (2002 – 2006) per County

Trespasser Casualties (deaths and injuries) in Dallas and Tarrant Counties (2002 through 2006)							
Railroad	Total						
	Cases	% of Total	2002	2003	2004	2005	2006
Union Pacific RR Co. (UPRR)	39	62.9%	14	5	3	9	8
BNSF Rwy Co. (BNSF)	11	17.7%	2	2	1	3	3
Kansas City Southern Rwy Co. (KCS)	1	1.6%	0	0	1	0	0
Trinity Rwy Express (TREX)	5	8.1%	0	2	2	0	1
Dallas, Garland & Northeastern (DGNO)	3	4.8%	0	1	0	0	2
Amtrak (ATK)	2	3.2%	1	0	0	1	0
Fort Worth & Western (FWWR)	1	1.6%	0	1	0	0	0
TOTAL:	62	100%	17	11	7	13	14

Table 6-6: Dallas and Tarrant Counties Trespasser Incidents (2002 – 2006) per Railroad

Trespasser Casualties in Dallas and Tarrant Counties (2002 through 2006)							
Event	Total		Incidents per Year				
	Cnt	% of Total	2002	2003	2004	2005	2006
Struck by on-track equipment	51	78.5%	14	9	4	12	12
Thrill seeking	0	0.0%	0	0	0	0	0
Lost balance	4	6.2%	3	0	1	0	0
Ran into on-track equipment	0	0.0%	0	0	0	0	0
Struck by object	0	0.0%	0	0	0	0	0
Slipped, fell, stumbled, other	7	10.8%	0	2	2	1	2
TOTAL:	62	95.4%	17	11	7	13	14

Table 6-7: Dallas and Tarrant Counties Trespasser Incidents (2002 – 2006) by Event

Train Accidents

There were 309 reported train accidents, which include derailments and train collisions, within the DFW region from 2002 through 2006[2]. Data provided by the railroads to the Federal Railroad Administration (FRA) shows the accumulative cost of equipment and infrastructure damage was more than $26 million. Table 6-8 provides a summary of the train accident damage statistics in the DFW region from January 2002 through December 2006.

Train Accidents (2002-2006)							
County	Totals				Type of Accident		
	Accidents	Killed	Injured	Reportable Damage	Collisions	Derailments	Other
Collin	10	0	0	$1,116,747	-	8	2
Dallas	59	0	5	$4,415,742	2	43	14
Denton	12	0	1	$1,121,005	1	8	3
Ellis	20	0	0	$1,667,614	1	17	2
Erath	3	0	0	$1,192,852	-	2	1
Hood	2	0	0	$194,342	-	1	1
Johnson	12	0	0	$851,729	-	10	2
Kaufman	2	0	1	$108,724	-	2	-
Navarro	2	0	0	$48,187	-	1	1
Palo Pinto	3	0	0	$1,355,652	-	3	-
Parker	2	0	0	$195,215	-	2	-
Rockwall	1	0	0	$11,239	-	1	-
Tarrant	173	0	5	$10,215,615	12	123	38
Wise	8	0	0	$3,962,527	1	7	-
Total:	309	0	12	$26,457,190	17	228	64

Table 6-8: Train Accidents in DFW Region by County (2000 - 2005)

Table 6-9 lists the number of train accidents involving the transport of hazardous material, the number of rail cars carrying the hazardous material that were damaged or released any of the material, and the number of people that were evacuated, if any, resulting from the accident for Dallas and Tarrant Counties. The train accidents listed in Table 6-9 include train collisions, derailments, and roadway-rail accidents.

[2] Federal Railroad Administration safety statistics

Train accidents involving hazardous materials are not required to be reported to the FRA; therefore, the following data as listed in Table 6-6 may not include all incidents.

Train Accidents (Collisions, Derailments, and Highway-rail accidents) Involving Hazardous Materials in Dallas and Tarrant Counties (January 2000-June 2007)								
Year	Totals				Number of			
	Accidents	Involving HM Cars Damaged	Involving HM Cars Releasing	Involving an Evacuation	Cars Carrying	Cars Damaged	Cars Releasing	People Evacuated
2000	6	2	0	0	61	4	0	0
2001	8	6	0	0	17	9	0	0
2002	8	6	0	0	82	11	0	0
2003	4	2	1	0	19	2	1	0
2004	10	8	1	0	51	23	2	0
2005	6	3	0	0	29	7	0	0
2006	10	4	0	0	86	5	0	0
2007	4	2	0	0	18	5	0	0
Total:	56	33	2	0	363	66	3	0

Table 6-9: Train Accidents in Dallas and Tarrant Counties Involving Hazardous Materials (January 2000 – June 2007)

Figure 6-2 depicts the number of train accidents, not including roadway-rail incidents, in the State of Texas for the January 2002 through December 2006 time period.

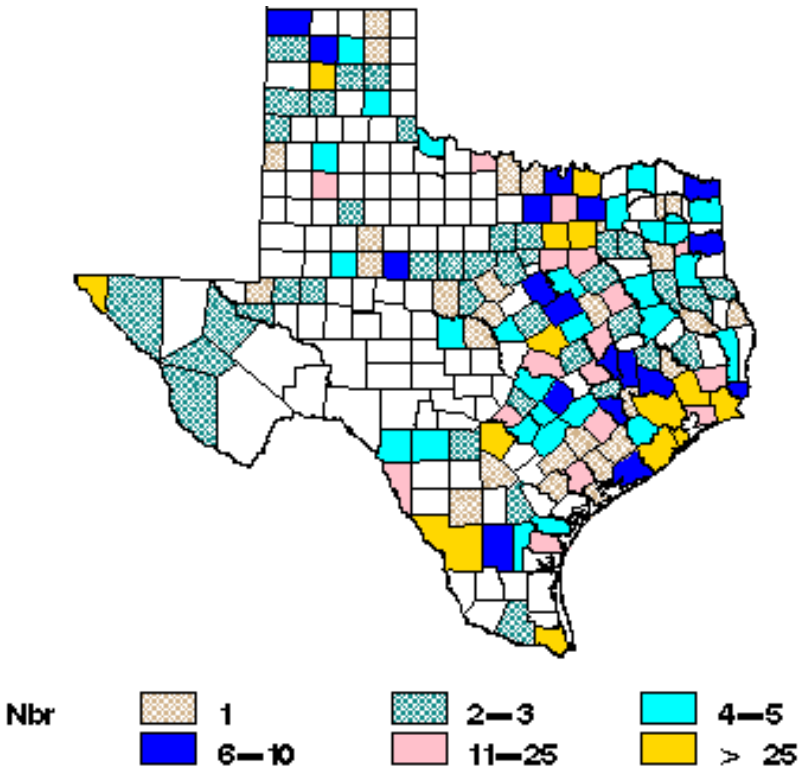


Figure 6-2: Train Accidents for Texas, January 2002 through December 2006

Class of Track

Table 6-10 lists the maximum allowable train speed for freight rail service according to each FRA track class. 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.

This table also lists the FRA-compiled accident rates for each track class in terms of cars derailed per billion freight car miles traveled.[3] 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 roadway-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 4-1 according to FRA track class and associated maximum track speed. Table 4-1 represents statistics collected nationwide and does not provide any indication of when or where an accident involving a derailment will actually occur.

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

Table 6-10: Relationship of Track Speed and Derailment Rate to FRA Track Class

Figure 6-3 shows the FRA-designated class of track for the Dallas-Fort Worth Metroplex.

[3] 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.

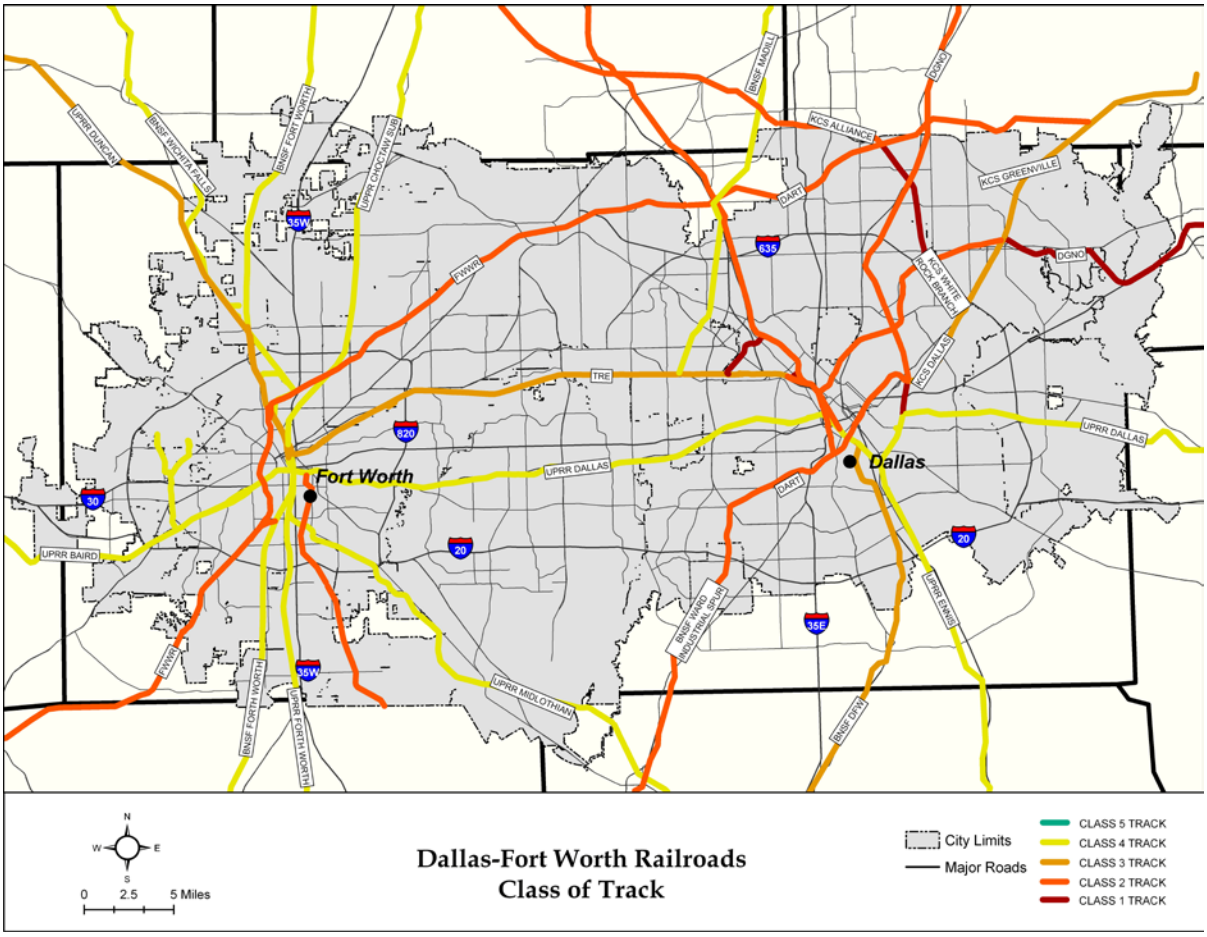


Figure 6-3: DFW Metroplex Class of Track

Safety Mitigation

The partnerships developed between the federal government, State of Texas, the Texas Department of Transportation, and the DFW region, along with the Cities of Dallas and Fort Worth, and the railroads are working for the collective good of the freight industry and the traveling public to continue striving for a safer community.

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.

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 hazards associated with the movement of freight.

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[4].

The Cities of Dallas and Fort Worth, in cooperation with local emergency response agencies, and the Federal Emergency Management Agency (FEMA) have developed Emergency Operations Plans to mitigate, prepare for, and respond to emergency situations. 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.

Policies and practices for emergency response to train accidents and/or derailments require the proper training of emergency response and railroad personnel. Key elements to any emergency response plan include clear resources for communication, personal protective equipment for emergency response personnel, and accurate identification of the emergency situation. For example, in the case of a hazardous material accident, the emergency response actions differ for each type of hazardous material that may be exposed.

Additionally, the federal government passed the Rail Safety Improvement Act of 2008 (H.R. 2095/ S. 1889) in October 2008. This legislation addresses rail worker training standards, requires conductor certification, and mandates the installation of positive train control (PTC) on freight lines that carry hazardous materials as well as passenger traffic by the year 2015. PTC is a technology that uses global positioning system (GPS) tracking to monitor the location of trains and control train movements in order to provide increased safety. PTC technology is intended to prevent train collisions, such as the deadly Metrolink collision with a freight train in California in September 2008.

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

SECTION 7: ALTERNATIVES ANALYSIS

This report summarizes an analysis of the Dallas and Fort Worth regions' freight network (roads, railroads, and intermodal facilities) and the process to develop ways to accommodate and capitalize on future freight movements. It identifies improvements that may provide relief to residents and the traveling public adversely affected by delays, interruptions, and noise attributed to the movement of freight within the region. This report is intended to provide the DFW region with an examination of the constraints within the region and a list of potential solutions from which the local governing agencies may choose to analyze in greater detail or move forward towards implementation.

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

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

The improvements selected to be analyzed were compiled from information produced from previous studies such as the NCTCOG Tower 55 Reliever Study as well as the UP and BNSF application proposal for Texas Emissions Reduction Plan (TERP) funding, meetings and independent discussions with the operating railroads in the region, as well as the results from the regional freight rail operations modeling (RTC) and the Statewide Analysis Model (SAM).

Improvements identified for the DFW region, comprised of Collin, Dallas, Denton, Ellis, Erath, Hood, Jack, Johnson, Kaufman, Navarro, Palo Pinto, Parker, Rockwall, Somervell, Tarrant, and Wise Counties, are categorized as:

- Grade Separations (bridges to separate the railroad from streets)
- Grade Crossing Closures (closing and rerouting the street at the intersection with the railroad)
- Improvements to Existing Railroad Infrastructure (improving capacity and connectivity on existing rail lines)
- Modifications to Existing Railroad Operations (changing routes)

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

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

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

The estimated implementation timeframe (near-term, mid-range, or long-range) for each improvement was determined based on the additional analysis, engineering design, environmental mitigation, and funding required prior to the implementation of an improvement. The rail improvements analyzed in this study were all determined to be either mid- or long-range improvements, while the grade crossing improvements may vary greatly depending on local priorities and available funding.

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

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

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

The net present value (NPV) shown as the public benefit is the cumulative projected cost-burden over a 20-year period. The NPV is a standard method for financial evaluation of long-term projects and is the value of the improvements projected 20 years into the future in terms of today’s dollars. This can be assessed as the savings associated with a grade separation, crossing closure, or other identified improvements that change traffic volumes (roadway and/or rail) at roadway-rail

crossings. An explanation of the public benefit calculations as well as the estimated public costs associated with each at-grade crossing can be found in Appendix F.

Benefits that may be realized by the railroad companies (private benefits) were calculated for the identified rail improvements modeled in the planning cases described later in this section. The grade separations and crossing closures primarily provide benefit to the public in the form of reduced delays and improved safety, but also may provide a limited benefit to the railroads at certain locations where rail cars would otherwise have to be de-coupled in order to prevent trains from blocking grade crossings.

Grade Separations

Grade separations consist of bridges that separate the vehicular traffic from the train traffic at roadway-rail interfaces. In general, roadway overpasses and underpasses allow the train to travel under or over, respectively, the roadway traffic. This separation of traffic increases safety by eliminating the conflict point between trains and cars and decreases delay associated with train impedance.

Locations identified for potential grade separation were determined based on the estimated public costs associated with the at-grade crossings as well as traffic data analysis (average traffic volumes of vehicles and trains) and RTC modeling results. In addition to the locations with the highest associated public costs due to delay, emissions, and safety, locations with reported AADT volumes of at least 10,000 vehicles per day and at least 10 trains per day were analyzed for potential grade separation.

A list of roadways identified as potential grade separations is provided in Table 7-1 along with the estimated costs, 20-year public benefits, and AADT volumes associated with each crossing. The potential grade separations are discussed individually in further detail in Section 8 with exhibits shown in Appendix E. Table 7-1 lists the potential grade separations in descending order of the estimated 20-year public benefit.

Street	City	ADT	RR Subdivision	Estimated Cost	Estimated 20-Year Public Benefit	Benefit/ Cost Ratio
Sycamore School Rd	Fort Worth	22940	BNSF Fort Worth	$6,380,000	$70,750,000	11.09
SH 114	Boyd	12000	UPRR Duncan	$5,310,000	$53,020,000	9.98
Main St (FM 1187)	Crowley	15900	BNSF Fort Worth	$5,710,000	$55,850,000	9.78
Ball St	Grapevine	44440	FWWR Fort Worth	$6,200,000	$49,120,000	7.92
President George Bush Turnpike EB/WB Frtg Rd	Carrollton	37550	BNSF Madill	$7,700,000	$59,960,000	7.79
FM 157/ Collins St	Arlington	28000	UPRR Dallas	$8,230,000	$53,990,000	6.56
Cooper St	Arlington	29530	UPRR Dallas	$7,780,000	$49,910,000	6.42
Seminary Dr	Fort Worth	13800	BNSF Fort Worth	$5,750,000	$36,760,000	6.39
Blue Mound Rd	Saginaw	10600	BNSF Wichita Falls	$4,640,000	$26,100,000	5.63
Jim Miller Rd	Dallas	26510	UPRR Dallas	$7,770,000	$43,510,000	5.60
Galloway Ave	Mesquite	23860	UPRR Dallas	$7,970,000	$43,080,000	5.41
Sycamore School Rd	Fort Worth	18520	UPRR Fort Worth	$7,077,000	$36,080,000	5.10
Hemphill St	Fort Worth	15710	BNSF Fort Worth	$8,590,000	$43,010,000	5.01
Renfro St	Burleson	14700	UPRR Fort Worth	$6,220,000	$26,360,000	4.24
Bowen Rd	Arlington	21550	UPRR Dallas	$9,120,000	$37,670,000	4.13
Center St	Arlington	11480	UPRR Dallas	$5,080,000	$20,770,000	4.09
Denton Tap Rd	Coppell	34740	FWWR Fort Worth	$7,070,000	$26,510,000	3.75
Miller Ave/Oakland Blvd	Fort Worth	12300	UPRR Dallas	$5,040,000	$18,670,000	3.70
Rufe Snow Rd	Grapevine	38510	FWWR Fort Worth	$8,280,000	$30,380,000	3.67
SH 352	Dallas	19000	UPRR Dallas	$8,030,000	$28,760,000	3.58
Great Southwest Pkwy	Grand Prairie	13940	UPRR Dallas	$6,150,000	$21,920,000	3.56
SH 34	Terrell	16500	UPRR Dallas	$7,560,000	$26,700,000	3.53
Stadium Dr	Arlington	11770	UPRR Dallas	$5,710,000	$19,600,000	3.43
SH 31	Corsicana	19000	UPRR Ennis	$4,850,000	$16,220,000	3.34
Westmoreland Rd	Dallas	22890	UPRR Dallas	$15,590,000	$47,410,000	3.04
Buckner Blvd	Dallas	24000	UPRR Ennis	$6,800,000	$20,410,000	3.00
Northside Dr	Fort Worth	24470	FWWR Fort Worth	$7,020,000	$19,530,000	2.78
7th St	Fort Worth	23710	FWWR Fort Worth	$6,040,000	$16,370,000	2.71
SH 199/Jacksboro Hwy	Fort Worth	27000	FWWR Fort Worth	$8,550,000	$22,300,000	2.61
MacArthur Ln	Coppell	26250	FWWR Fort Worth	$8,090,000	$20,970,000	2.59
Big Town Blvd/ Prairie Creek Rd	Dallas	17130	UPRR Dallas	$9,960,000	$25,530,000	2.56
Davis Blvd	Grapevine	30000	FWWR Fort Worth	$9,060,000	$21,850,000	2.41
Davis Dr	Arlington	14470	UPRR Dallas	$9,500,000	$22,830,000	2.40
Avenue B/Avenue D	Garland	58000	KCS Dallas	$10,360,000	$22,780,000	2.20
Belt Line Rd	Irving	50250	TRE	$6,660,000	$14,050,000	2.11
Berry St	Fort Worth	37540	FWWR Fort Worth	$14,850,000	$29,430,000	1.98
FM 148	Terrell	13400	UPRR Dallas	$12,210,000	$20,870,000	1.71
Main St	Grapevine	13500	FWWR Fort Worth	$5,330,000	$9,110,000	1.71
Basswood Blvd/ Hightower Dr	Watauga	20190	UPRR Choctaw	$9,260,000	$15,060,000	1.63
Beach St	Fort Worth	14880	FWWR Fort Worth	$11,860,000	$19,090,000	1.61
Beach St	Fort Worth	14880	UPRR Choctaw	see FWWR Fort Worth Subdivision		
Shiloh Rd	Garland	20410	KCS Dallas	$6,330,000	$9,850,000	1.56
Story Rd	Irving	29460	TRE	$6,210,000	$9,270,000	1.49
McKinney St	Denton	14200	UPRR Choctaw	$6,480,000	$9,620,000	1.48
Watauga Rd	Watauga	14060	UPRR Choctaw	$8,910,000	$9,890,000	1.11

Table 7-1: Potential Grade Separations

Grade Crossing Closures

Crossing closures consist of the closure of a roadway at the point where the roadway crosses the railroad, requiring an alternate route for vehicular traffic. These safety improvements minimize conflict points between trains and cars by closing

crossings and encouraging motorists to use grade-separated roadways or alternate streets which have better safety systems in place.

Potential crossing closures for the purposes of this study only include those in the Tower 55 area that may be included in quiet zones currently being planned by the City of Fort Worth as well as those that would re-route traffic over a grade-separated roadway. Other criteria used in determining potential crossing closures include an analysis of the required rerouting distance and evaluation of traffic volumes at the roadway-rail interface. The cost estimated to implement a crossing closure was estimated to be $50,000, which only includes the placement of traffic barriers, minor street signage, and removal of the existing crossing material.

A list of crossings identified for potential closure is provided in Table 7-2 along with associated estimated costs, 20-year public benefits, and AADT volumes at each crossing. Table 7-2 lists the crossing closures in descending order of the benefit-to-cost ratio. The potential reroutes of the crossing closures are discussed in further detail in Section 8.

Street	City	ADT	RR Subdivision	Estimated Cost	Estimated 20-Year Public Benefit	Benefit/ Cost Ratio
N.E. 29th St	Fort Worth	1200	UPRR Duncan	$50,000	$4,090,000	81.80
Peach St	Fort Worth	1740	BNSF Fort Worth	$50,000	$3,870,000	77.40
Winnie St	Fort Worth	1880	UPRR Dallas	$50,000	$3,240,000	64.80
W Kellis St	Fort Worth	1630	UPRR Fort Worth	$50,000	$2,500,000	50.00
Wilson St	Boyd	330	UPRR Duncan	$50,000	$2,380,000	47.60
Florence St	Mesquite	1380	UPRR Dallas	$50,000	$2,330,000	46.60
Hughes Ave	Fort Worth	1640	UPRR Dallas	$50,000	$2,130,000	42.60
Frame St	Denton	1880	UPRR Choctaw	$50,000	$1,860,000	37.20
Urban Ave	Dallas	1380	UPRR Dallas	$50,000	$1,780,000	35.60
Hickory St	Denton	2710	UPRR Choctaw	$50,000	$1,710,000	34.20
Hitt St	Boyd	290	UPRR Duncan	$50,000	$1,550,000	31.00
Vilbig Rd	Dallas	1110	UPRR Dallas	$50,000	$1,540,000	30.80
Manila Rd	Dallas	720	UPRR Dallas	$50,000	$1,440,000	28.80
Delphine St	Terrell	1180	UPRR Dallas	$50,000	$1,430,000	28.60
Hines Rd	Cleburne	700	BNSF Fort Worth	$50,000	$1,410,000	28.20
Allen St	Boyd	230	UPRR Duncan	$50,000	$1,270,000	25.40
Sunday St	Dallas	270	UPRR Dallas	$50,000	$1,250,000	25.00
Gardner	Terrell	760	UPRR Dallas	$50,000	$1,060,000	21.20
W Mustang St	Crowley	310	BNSF Fort Worth	$50,000	$1,050,000	21.00
Page Ave	Fort Worth	310	BNSF Fort Worth	$50,000	$1,020,000	20.40
N.E. 29th St	Fort Worth	1380	FWWR Fort Worth	$50,000	$830,000	16.60
Rogers St	Waxahachie	2660	BNSF DFW	$50,000	$780,000	15.60
Bowie St	Fort Worth	1150	FWWR Fort Worth	$50,000	$710,000	14.20
Sycamore St	Denton	901	UPRR Choctaw	$50,000	$710,000	14.20
Peach St	Fort Worth	270	UPRR Choctaw	$50,000	$700,000	14.00
Peach St	Fort Worth	270	BNSF Wichita Falls	see UPRR Choctaw Subdivision		
Stanley Ave	Fort Worth	1150	FWWR Fort Worth	$50,000	$700,000	14.00
W Bowie St	Fort Worth	490	UPRR Fort Worth	$50,000	$610,000	12.20
Avenue F	Garland	1720	KCS Dallas	$50,000	$600,000	12.00
Prairie St	Denton	270	UPRR Choctaw	$50,000	$540,000	10.80
1st St	Fort Worth	270	UPRR Choctaw	$50,000	$450,000	9.00
1st St	Fort Worth	270	BNSF Wichita Falls	see UPRR Choctaw Subdivision		
Magnolia Ave	Fort Worth	300	BNSF Fort Worth	$50,000	$450,000	9.00
Magnolia Ave	Fort Worth	300	UPRR Ney Bypass	see BNSF Fort Worth Subdivision		
Chambers St	Cleburne	410	BNSF Fort Worth	$50,000	$420,000	8.40
Mariposa Dr	Dallas	970	KCS Dallas	$50,000	$360,000	7.20
1st St	Fort Worth	460	BNSF Fort Worth	$50,000	$340,000	6.80
Magnolia Ave	Fort Worth	300	UPRR Fort Worth	$50,000	$260,000	5.20
Spears St	Alvarado	400	BNSF Venus	$50,000	$130,000	2.60
Baugh St	Alvarado	283	BNSF Venus	$50,000	$90,000	1.80
Capps St	Rio Vista	460	BNSF Fort Worth	$50,000	n/a	n/a
Ramsey St	Fort Worth	270	UPRR Fort Worth	$50,000	n/a	n/a

Table 7-2: Potential Crossing Closures

Improvements to Existing Roadway and Rail Infrastructure

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

Roadway Improvements

Examples of roadway capacity enhancements are listed as follows:

- Adding lanes to existing roadways

- Upgrading the roadway facility (e.g. convert highway with traffic signals to freeway)
- Improving roadway interchanges (adding capacity and improving roadway connectivity)

A list of potential roadway improvements as included in the NCTCOG's *Mobility 2030: The Metropolitan Transportation Plan for the Dallas – Fort Worth Area* (2030 MTP) is provided in Appendix G. The impacts and benefits associated with the roadway improvements contained in the 2030 MTP were analyzed and discussed in section 3.

Railroad Improvements

Improvements to the existing railway infrastructure have been identified to increase the efficiency of through-freight rail operations and improve roadway user mobility and safety within the region. In special circumstances, the elimination of train delay also discourages pedestrians from moving near or around parked trains. The identified improvements would reduce delays, increase average train speeds, and in some cases reduce roadway crossing blockage times in the DFW region. Examples of rail capacity enhancements are listed as follows:

- Adding a mainline track
- Adding or improving switches and passing sidings at strategic locations to allow trains to pass one another or to idle without causing delays
- Expanding rail yard capacity
- Constructing connections from one rail line to another to improve rail traffic mobility
- Relocating train movements onto alternate routes
- Upgrading the class of track to increase the maximum allowable train speed

Rail infrastructure enhancements geared toward accommodating the existing as well as future increases in train volumes in the vicinity of Tower 55 have been identified by the railroads. The UP and BNSF jointly proposed at-grade infrastructure improvement projects for Tower 55. The projects analyzed in this study and modeled in Planning Case 2 as discussed later in this section of the report, therefore, are inclusive of the joint UP/ BNSF proposal and have been referenced in various funding applications such as the Texas Commission on Environmental Quality (TCEQ) for TERP funding, the High Speed Intercity Passenger Rail (HSIPR) Program application for the Tower 55 At-Grade Improvement Project and the TIGER Grant application for the Tower 55 At-Grade Improvement Project.

Descriptions of the individual improvements included in the Tower 55 At-Grade Improvement Project are included in the discussion of Planning Case 2. The estimated total project cost for the Tower 55 At-Grade Improvement Project is approximately $93.7 million[1].

[1] High Speed Intercity Passenger Rail (HSIPR) Program application for the Tower 55 At-Grade Improvement Project.

Funding Applications

The TERP was established in 2001 by the 77th Texas Legislature, funded in 2003 by the 78th Texas Legislature and has been extended through fiscal year 2013. The TERP lists Texas counties, located in the Austin, Houston, Beaumont-Port Arthur, Dallas-Fort Worth, San Antonio, and Tyler-Longview areas, eligible for funding for projects including rail relocation and improvement. Eligible improvements include relocation of rail lines that reduce the number of grade crossings, improvements at rail intersections, and improvements that directly reduce locomotive and/or vehicle engine idling at rail intersections.

The TERP application outlined the identified improvements' impacts in terms of the following:

- Reducing emissions from slower moving trains/locomotives in the vicinity of Tower 55 crossing since fluidity will be enhanced by streamlining the Tower 55 intersection
- Reducing emissions from idling locomotives caused by Tower 55 capacity issues
- Reducing emissions from vehicles waiting at grade crossings due to Tower 55 capacity issues
- Avoiding increased emissions that occur when trains are diverted to other North Texas rail lines as a result of Tower 55 capacity issues
- Avoiding increased emissions that would occur when rail freight is diverted to trucks as a result of Tower 55 capacity issues

The TERP application showed that the project would reduce NOx emissions by at least 2,304 tons versus the no-build scenario over a 15-year period. The TERP application also listed the following potential ancillary benefits of the project:

- Reduction of public fiscal burden
  - Reduced highway maintenance
  - Railroads are privately maintained and pay taxes on their property
- Expedited Capacity
  - Faster Project implementation than comparable highway projects
  - Reduced construction timing and cost risk
  - Lower impact to public during construction
- Economic Development
  - Ability to support growth of regional logistics hubs such as Alliance and South Dallas
  - Connectivity for trade
  - Direct impact on jobs
  - Reduced shipping costs puts dollars back into the community/state/nation
- Shipper Benefits
  - Reliability
  - Velocity
  - Reduced cost of doing business
- Congestion Relief

  - Highway congestion
  - One intermodal train is the equivalent of 280 trucks
  - One manifest train is the equivalent of 500 trucks
  - Rapid military mobilization / demobilization in time of war
  - Potential for improved Amtrak rail movements through Tower 55
  - Avoiding the need to interfere with TRE by diverting BNSF freight traffic over the DFW Subdivision due to future capacity constraints
- Fuel Efficiency
  - A train can move one ton of freight 423 miles on one gallon of fuel

Although the railroads initially identified a portion of the project cost to be potentially funded through the TERP, UP and BNSF have since withdrawn their application for TERP funding due to a lack of concurrence with the TCEQ over the calculation of emissions reduction.

The UP and BNSF, however, plan to move forward with implementing the at-grade improvement projects, although this implementation may be spread out over a longer timeframe dependent on railroad capital improvement allocations. In addition, the railroads, in partnership with TxDOT and NCTCOG, submitted Tower 55 funding applications. The $93.7 million Tower 55 At-Grade Rail Improvement Project, as referenced in the HSIPR Program application, is currently planned to be funded by three primary sources:

- $30.0 million - HSIPR funding
- $30.9 million - TIGER Grant funding
- $32.8 million - Private match funding by BNSF and UPRR

The HSIPR application lists the following benefits of the Tower 55 At-Grade Rail Improvement Project:

- Heartland Flyer travelers will save a projected 10 minutes of lost travel time per trip, while Texas Eagle travelers will save 12 minutes of projected lost travel time per trip.
- For the projected 20 year life of this project the following emissions benefits are projected: 1,992,761 million metric tons of CO2, 617 metric tons of HC, 5.4 metric tons of CO, 366 metric tons of PMx, and 15,238 metric tons of NOx.
- The improvements will provide an estimated 40% increase in Tower 55's capacity to accommodate train movements versus 2009 traffic levels.

The improvements identified by UP and BNSF for the Tower 55 improvement project, as previously described, have been included in the analysis of this study and modeled with RTC in the rail improvement planning cases discussed in further detail later in this section of the report. The benefits of the modeled improvements have been analyzed independently in this study from the funding applications previously discussed.

The UP and BNSF at-grade Tower 55 improvements have also been included in the NCTCOG Tower 55 Rail Reliever Study along with additional modifications to Tower 55 such as grade separated (flyover or trench) connections between the crossing rail lines, modified operational routings, and alternate bypass alignments as listed in Table 7-3, sorted by stage.

Stage	Scope of Work Options
1. Immediate	At-grade capacity and operational improvements
2. Future	Grade Separation at Tower 55 • North/south BNSF trench • East/west UP flyover or trench
3. Long-Term	Rail Freight Bypass West of Fort Worth

Table 7-3: NCTCOG Tower 55 Rail Reliever Study Improvements
(Source: TCEQ Emissions Reduction Incentive Grant Application submitted by BNSF and UP)

The at-grade Tower 55 improvements identified by UP and BNSF are included in the proposed Stage 1 (immediate) improvements as analyzed in the Tower 55 Rail Reliever Study. The improvements from the Tower 55 Rail Reliever Study that have been identified by the NCTCOG, in addition to those identified by UP and BNSF are summarized as follows with costs listed as reported by the NCTCOG[2]:

- Relocate Amtrak to operate on the TRE line
  - Double track TRE between East Richland Hills (MP 618.67) and West Hurst (MP 621.1) - $12 million
  - Power turnout and signal from Amtrak station track into TRE track at Fort Worth ITC - $1.5 million
  - Extend Sylvania Siding - $9.3 Million
- Build second main track between Hodge Yard and FWWR Junction - $18.4 million
  - Sylvania Street grade separation
- Flyover at FWWR Junction - $26.5 Million
- Build connection track between Duncan Subdivision and Choctaw Subdivision - $19.4 million
- Build second main track between Hodge Yard and North Side Station - $12.7 million
- Build additional track between Hodge Yard and North Side Station (to connect to new second main) - $5.8 million
- Close Peach Street at BNSF Fort Worth Subdivision crossing - $TBD
- Close First Street at BNSF Fort Worth Subdivision crossing - $TBD
- Reconstruct (increase horizontal and vertical clearances) Gounah Street Underpass at BNSF - $TBD
- Close Cold Springs Road at BNSF Wichita Falls/ Choctaw 1 Subdivision - $TBD
- Grade Separation at Tower 55 (trench or flyover option)

[2] (Source: *Tower 55 Rail Reliever Study Progress Report,* Technical Advisory Group Meeting Presentation, August 2008)

- Rail freight bypass west of Fort Worth

Dallas-Fort Worth Region Freight Study Alternatives

The UP and BNSF identified at-grade improvements at Tower 55, the potential relocation of Amtrak trains to the TRE, and the roadway improvements at Peach and First Streets have been analyzed in further detail in this study with respect to estimated costs and benefits. The remaining projects as identified in the NCTCOG Tower 55 Rail Reliever Study are not included in this report.

As discussed in section 5, the RTC Base Case model results show that railroad subdivisions that intersect either or both Towers 55 and 60 account for approximately 40 percent of the total network delay, most of which is directly attributable to delays at the two interlockings (Towers 55 and 60). Outside of the terminal, train operations are relatively fluid in the model with fairly high average train speeds.

The only improvement identified in addition to those discussed above that have been identified in the Tower 55 Reliever Study is the addition of a second mainline on the TRE and modifications to the track geometry in order to increase the maximum allowable train speed on the line from Fort Worth to Dallas.

A list of potential improvements to the existing rail network that have been analyzed in this study, including the Tower 55 At-Grade Improvement Projects jointly proposed by UP and BNSF and some of the projects in the Tower 55 Reliever Study, is provided in Table 7-4, along with estimated costs and identified improvement classifications (near-, mid-, or long-range). The improvements are targeted at improving the operation of train traffic, with forecasted growth, and may have long lasting effects on the movement of freight through the region. These improvements only cover the area within the Dallas-Fort Worth study area and do not include potential improvements outside of the study area.

Improvement	Improvement Classification	Estimated Cost
Upgrade TRE to Class 5 Track and Add Second Mainline (not a planning case)	Long-Range	$68,450,000
Relocate Amtrak to operate on the TRE line; Includes Power turnout and signal from Amtrak station track into TRE track at Fort Worth ITC (Planning Case 1)	Mid-Range	$3,000,000
UP and BNSF at-grade Tower 55 improvements (Planning Case 2)	Mid-Range	$93,700,000

Table 7-4: Potential Rail Improvements

Improvements related to the relocation of Amtrak onto the TRE line (Planning Case 1) and related to the UP/BNSF at-grade Tower 55 improvements (Planning Case 2), listed in Table 7-4, were analyzed using RTC simulation in order to estimate associated public and private benefits. The benefits of Planning Case 1 are

presented in Table 7-8 on page 7-17, and the benefits of Planning Case 2 are presented in Table 7-10 on page 7-19.

Upgrade of TRE to Class 5 track with a second mainline was not included as a planning case in this study. The existing TRE railroad is predominantly a single mainline between Fort Worth and Dallas with limited sidings. A potential improvement to expand the TRE to a continuous double track section by adding the second mainline to connect the sidings would increase capacity and train speeds on the TRE. The existing mainline would also be upgraded to Class 5 Track where necessary as part of the double track improvements. An order-of-magnitude cost estimate of the improvement is included in Appendix D.

Potential benefits that may be realized by the freight railroads as a result of the modeled improvements may include reduced exposure to roadway-rail crossings and improved train operating efficiency, such as reduced train delays and improved train run-times. Benefits to the private sector are based on the degree to which operational performance measures such as train mileage, run time, and delay time for each improvement change relative to those of the no-build scenario. Performance measures for passenger operations are excluded from the private benefit analysis. Each performance measure for the freight railroads has been translated to an economic value using the following unit costs:

- Train mileage = $76.55/mile
- Run time = $683/ hour
- Delay time = $320/hour

The train mileage cost of $76.55 per mile is a representative industry cost that reflects rail operating expenses per train mile. The run and delay time costs per hour assume a 7:93 ratio of yard-to-line haul operating times within the study area, where expected yard operating expenses are $320 per hour and line haul operating expenses are $683 per hour. An explanation of private benefit calculations can be found in Appendix F.

Investments in infrastructure that contribute to substantial economic growth in the DFW region must capitalize on transformations in the freight operations and logistics planning of private industry if significant economic expansion is to occur. Infrastructure is generally a facilitator of economic growth rather than the driver of economic growth. While the construction of transportation facilities can certainly influence which land areas appreciate in value, new growth comes from the need for more manufactured goods and supportive services, and from the freeing of investment capital by minimizing current costs. In this respect, the type of infrastructure capable of contributing the most to the economy will be greatly influenced by the business models of the private sector. Consequently, factors such as lowering transportation costs, the demand for consumer goods, and evolving logistics strategies are all relevant to the type of infrastructure that will be needed.

Rail Infrastructure Improvement Planning Cases

The identified potential rail improvements (listed in Table 7-4) were used to develop planning cases, as discussed in the following section, and modeled in RTC. Planning cases, representing improvements and/or relocations, were investigated with the ultimate goal of improving train mobility and efficiency as well as addressing the areas of greatest congestion within the network. As the tables following each RTC planning case will show, a comparison of the performance measures listed below is made between the Base Case and the potential improvements included in the planning cases.

Operating performance of trains is measured by the following:

- Total Run Time
- Stop/Delay Time
- Delay Percentage
- Delay per 100 Train Miles
- Average Train Speed

The total run time is the average daily hours of train operation in each part of the network. This time includes dwell time for train make-up, en route switching, crew changes, fueling, or other activities. Stop or delay time also is shown as average daily hours. A delay percentage is calculated as the stop time as a share of total run time. For the respective segments, the stop time represents the total time that trains are stopped awaiting meets with other trains or because of track congestion ahead. It does not include acceleration and deceleration times associated with train stop time because that time may be split between segments. However, stop time for the total network does include acceleration and deceleration times as part of the overall measure of delay, so the resulting delay percentage calculations for the individual segments are not directly comparable with the delay percent for the total network. The tabulated RTC results for each planning case include the minutes of delay per 100 train miles, the average speed of all trains operated in each segment as well as on the full network, fuel in gallons, and gallons consumed per mile.

Base Case

Existing railroad infrastructure and operations were analyzed to develop an RTC Base Case model for comparison to potential alternatives and improvements. The RTC model was run for each case (Base Case and planning cases) for a seven day simulation period, which accounts for day to day variances in operations. The Base Case for measurement of the impact or benefit of proposed capacity improvements is the performance of the current network as shown in the simulation results listed in Table 7-5. The average daily train counts on each subdivision for the RTC Base Case is listed in Table 7-6. The modeling results for the Base Case are discussed in further detail in section 5 of this report.

RTC Performance Measure	Base Case Results
Trains Operated (7 days)	1,593
Train Miles (7 Days)	248,964
Total Run Time Hours (Avg per day)	1,568
Delay Time Hours (Avg per day)	297.0
Delay Percentage	28.21%
Delay Minutes/100 Train Miles	50.13
Average Speed (mph)	22.68
Fuel (gallons)	2,214,666
Gallons/Train Mile	8.9

Table 7-5: RTC Base Case Summary

Railroad Subdivision	Avg Daily Trains
	Base
Network	228
KCS Alliance	7
UPRR Baird	23
UPRR Choctaw	22
DGNO Dallas	0
KCS Dallas	3
UPRR Dallas	29
BNSF DFW	2
FWWR Dublin	5
UPRR Duncan	8
UPRR Ennis	21
BNSF Fort Worth	26
FWWR Fort Worth	6
UPRR Fort Worth	20
KCS Greenville	13
BNSF Madill	6
UPRR Midlothian	17
Trinity Rail	58
BNSF Venus	3
BNSF Wichita Falls	19

Table 7-6: RTC Base Case Average Daily Train Counts

Planning Cases

The Planning Cases test identified improvements intended to improve railroad operating efficiency and performance in the region.

- Planning Case 1 (PC 1) – Amtrak Trains 21 and 22 rerouted to operate over TRE
- Planning Case 2 (PC 2) – At-grade improvements at Tower 55 as identified by UP and BNSF
- Saturation Analysis - At-grade improvements at Tower 55 (PC 2) with growth scenario applied

Planning Case 1 – Amtrak Rerouting

In Planning Case 1, the Dallas-Fort Worth rail network was simulated with Amtrak trains 21 and 22 rerouted to operate via the TRE line instead of the UP Dallas Subdivision. The changes made to the previously validated Base Case in order to accommodate this alternative are listed as follows:

- A controlled siding was added to the TRE line at Richland Park with a station platform assumed to be between the siding and the existing main, so that TRE trains can stop off either the main or the siding.
- A new connection was added between the TRE main at Fort Worth ITC and the passenger depot tracks used by Amtrak. A new crossover between the two Union Depot tracks was also added at the north end of the station, so that Amtrak trains 21, 22, 821, and 822 can use either track at any time and still have access to either the ex-Santa Fe main track to/from Gainesville or the TRE main east to/from 6th Street Junction.
- Amtrak trains 21 and 22 have both been re-directed to the TRE in both directions for all trips and have been prohibited in the RTXC model from operating via the UP Dallas Subdivision or over any part of the UP Fort Worth Subdivision.

The estimated cost of the Planning Case 1 improvements is approximately $3 million. A breakdown of the cost estimate is provided in Appendix D.

Operating Amtrak trains 21 and 22 via the TRE improved both passenger and freight train performances relative to the Base Case. The adverse impact measured in RTC as a result of the current operation of Amtrak trains 21 and 22 is due to the reverse move through Tower 55, and the consequent locking out of the UP northward and southward trains on the Fort Worth Subdivision during the time Amtrak trains 21 and 22 occupy the Tower 55 area. As a result, the improvement in freight train performance due to the rerouting of the Amtrak trains is located primarily on the UP Fort Worth Subdivision. Additionally, rerouting Amtrak trains 21 and 22 had minimal impacts to freight operations on the UP Dallas Subdivision and on the BNSF Fort Worth Subdivision in the model.

Table 7-7 compares system (the entire network) performance and performance of the UP Fort Worth Subdivision and TRE between the two cases.

	Train Type	Trains (7-days)		Delay Hours/Week		Delay %	
		Base	PC 1	Base	PC 1	Base	PC 1
Network	Passenger	359	359	57.00	53.00	17.51	16.63
	Expedited	372	372	432.00	445.00	18.58	19.13
	Freight	1223	1223	1685.00	1645.00	33.2	32.41
UPRR Fort Worth Subdivision	Passenger	14	0	0	0	4.33	0
	Expedited	23	23	5	0.9	23.31	4.06
	Freight	300	298	133	108	43.52	35.58
TRE	Passenger	345	345	23	22	9.37	8.56

Table 7-7: Planning Case 1 RTC Performance Comparison

The passenger train counts across the TRE do not increase in the RTC model when Amtrak trains 21 and 22 are re-routed because those trains currently use part of the TRE line at Dallas Union Station, and so are counted in both the Base Case and Planning Case 1. The number of passenger train miles, however, increases from 8,100 per week in the Base Case to 8,500 per week in Planning Case 1 with the rerouting.

Rerouting Amtrak trains 21 and 22 to operate via the TRE has no measurable adverse impact on TRE's commuter trains since the model gives the TRE trains preference at meets with Amtrak trains 21 and 22, just as the TRE dispatchers would likely do. The Amtrak trains do take short delays meeting TRE trains, but the time saved not making reverse moves through Tower 55 more than offsets the time lost in meets on the TRE.

Benefit Analysis

The estimated 20-year private and public benefits associated with the improvements modeled in Planning Case 1 are summarized in Table 7-8. The estimated public benefit of the modified operating route for the Amtrak trains resulting from the reduction in public burden associated with the at-grade roadway-railroad crossings was estimated to be more than **$71 million**, as shown in Table 7-8. Planning Case 1 also provides performance benefits compared with the base case estimated to be more than **$5 million** associated with reduced hours of delay for the modeled network.

	Planning Case 1
Public Sector Benefits	
Grade Crossing Impedance (Delay, Emissions, Fuel)	$66,060,000
Grade Crossing Safety	$5,760,000
Subtotal	$71,820,000
Private Sector Benefits	
Run Time	$0
Delay Time	$5,250,000
Subtotal	$5,250,000
Total (Public + Private)	**$77,070,000**

Table 7-8: Public and Private Benefits for Planning Case 1

These estimated private and public benefits include only those benefits associated with the general public in terms of air quality improvements, emissions reductions, grade crossing delay reductions, and at-grade crossing safety enhancements. Other benefits which may be applicable but have not been quantified for this analysis may include:

- Reduction in transportation costs due to avoidance of future rail diversion to longer route,
- Reduction in inventory costs due to avoidance of future rail diversion to longer route,

- Reduction in environmental costs due to avoidance of future rail diversion to longer route,
- Reduction in transportation costs due to reduced train delay,
- Reduction in inventory costs due to reduced train delay, and
- Reduction in environmental costs due to reduced train delay.

These benefits were not included as part of the scope of services for this project.

Planning Case 2 – Tower 55 At-Grade Improvements

Planning Case 2 (PC 2) tested the at-grade Tower 55 improvements identified by UP and BNSF as discussed previously in this report and listed individually below. The estimated cost of the at-grade Tower 55 improvements is approximately **$93.7 million**[3].

The UP identified improvements consist of several at-grade capacity and operational improvements such as shifted tracks alignments, track extensions, rebuilt crossover and connection tracks, and signaling modifications. The BNSF improvements include a new second mainline track extending approximately 9,000 feet in both the north and south directions from Tower 55. The improvements are generally described as follows:

- BNSF:
  - Add second main track on BNSF Fort Worth Subdivision from MP 347.98 (south of the Trinity River) to MP 345.7 (North Tower 55)
  - Add connection at South Tower 55 between extended UP Main 1 and BNSF main tracks
  - Add second main track from South Tower 55 and MP 343.77, north of Birds siding
  - Rebuild and relocate BNSF Wichita Falls Subdivision main tracks between Ninth Street and North Fort Worth; add crossovers north of Ninth Street to UP Choctaw Subdivision main tracks (see also Joint Track, below); extend two main tracks north to Trinity River using existing Gauntlet siding
- UP:
  - Extend second main track on UP Choctaw Subdivision north from MP 752.18 (North Fort Worth) to MP 752.83 (south of Hodge)
  - Reconfigure second main track on UP Choctaw Subdivision south from MP 754.2 (North Tower 55) across UP Dallas Subdivision and connect to Tower 55 (north end of Ney Bypass)
- Joint UP/ BNSF Track:
  - Relocate and rebuild UP Duncan Subdivision main track between Sixth Street Junction and North Tower 55; add new crossover to extended BNSF Fort Worth Subdivision main track at BNSF Fort Worth Yard; retire one of two existing former Rock Island tracks (UP Duncan Subdivision) between Ninth Street and Sixth Street Junction

[3] HSIPR Program application for the Tower 55 At-Grade Improvement Project.

- o Utilize four main tracks (two BNSF Wichita Falls mains and two UP Choctaw Subdivision main tracks) as joint facility between North Tower 55 and North Fort Worth

Two versions of PC 2 were modeled in RTC, each with the same RTC network and train files. The difference between the two versions of PC 2 lies in how RTC is instructed to handle long dwells related to crew changes on through trains. Each version of PC 2 includes 86 UP trains (26 coal, 31 grain, 10 manifest, and 19 others, which are mostly unit rock trains) that change crews in close proximity to Tower 55 and may incur long dwells. These long dwells range from 2 1/2 to over 4 hours and may only be isolated incidents.

In the first iteration of PC 2 (PC 2a), the UP and BNSF through train crew changes were not modified from the Base Case. In the second version of PC 2 (PC 2b), two sets of alternate routing scenarios were created specifically for the UP trains operating in either direction between the Duncan and/or Choctaw Subdivisions, and the UP Fort Worth and/or Midlothian Subdivisions. These alternate routing scenarios assume that crew changes and train dwellings will occur on the Ney Bypass, on Katy 2 just south of the Tower 55 interlocking limits (and north of Midlothian Junction), or on the former FW&D main tracks south of Cold Springs Road that are integrated with the four-track joint facility built into the at-grade improvements north of Tower 55 through North Fort Worth.

The modified version of PC 2 (PC 2b) does not allow BNSF trains to dwell on the UP south of Tower 55. BNSF trains that change crews at North Fort Worth still operate on BNSF trackage in PC 2b. There would be an additional associated cost with the modified crew change locations analyzed in this planning case.

In addition to the total network analyses of PC 2a and PC 2b, analyses were performed that measure performance under the PC 2a and PC 2b planning cases over that part of the network closest to Towers 55 and 60. These cases (Tower 55 – PC 2a and Tower 55 – PC 2b) also include the effects of eliminating delays resulting from trains meeting opposing trains near locations such as Big Sandy, Abilene, Cleburne, and Gainesville. The limits for the Tower 55 planning cases include:

- UP Dallas Sub –MP 225.75, Grand Prairie to MP 251.60, West Fort Worth
- UP Baird Sub –MP 251.60, West Fort Worth to MP 278.23, Weatherford
- UP Duncan Sub –Tower 55 to MP 586.68, Trinity River
- TRE DFW Sub – included in its entirety
- UP Fort Worth Sub –MP 248.59, Midlothian Junction to Tower 55
- UP Choctaw Sub –Tower 55 to MP 715.31, Mingo
- UP Midlothian Sub –MP 50.2, Midlothian Junction
- BNSF Fort Worth Sub –MP 332.58, Crowley to MP 362 .51, Haslet
- BNSF Madill Sub –Irving to MP 693.12, Hebron
- BNSF Wichita Falls Sub –Tower 55 to MP 35.21, Herman

Table 7-9 lists the performance measures related to both the entire network and the Tower 55 analyses for Base, PC 2a, and PC 2b cases.

Subdivision	Trains	Avg. Speed	Delay Ratio	Delay Hours/Day	Delay Mins/100 TM
Network -- Base	1595	22.7 mph	28.20%	297	50.1
Network – PC 2a	1595	23.0 mph	26.60%	279.3	47
Network – PC 2b	1595	23.1 mph	26.00%	273.6	46
Tower 55 -- Base	1165	13.8 mph	39.70%	77	94.4
Tower 55 – PC 2a	1165	15.0 mph	28.50%	55.6	65.9
Tower 55 – PC 2b	1165	14.9 mph	27.10%	52	63

Table 7-9: Planning Case 2 RTC Performance Comparison

In the Tower 55 analyses, delay time excludes acceleration and deceleration, whereas the network analyses include all time lost for any conflict resolution. Consequently, direct comparisons of delay time can only be made between the Base Case and the respective PC 2a and PC2b cases for either the network or the Tower 55 analyses.

Comparing the different stop delay figures for the three cases suggests that the at-grade improvements modeled in PC 2 reduce Tower 55-related delay by about 28% if crew changes and hold-points are unchanged, and by over 32% if the modified plant can also be configured so that carryalls with relief crews can reach trains held north of Tower 55 in North Fort Worth.

Benefit Analysis

The estimated 20-year private and public benefits associated with the improvements modeled in Planning Case 2a are summarized in Table 7-10. The estimated public benefit of the at-grade improvements at Tower 55 resulting from the reduction in public burden associated with the at-grade roadway-railroad crossings was estimated to be approximately **$364 million**. Planning Case 2a also provides performance benefits compared with the base case estimated to be nearly **$55 million** associated with reduced run time and hours of delay for the modeled network.

	Planning Case 2a
Public Sector Benefits	
Grade Crossing Impedance (Delay, Emissions, Fuel)	$357,850,000
Grade Crossing Safety	$6,150,000
Subtotal	$364,000,000
Private Sector Benefits	
Run Time	$23,920,000
Delay Time	$30,760,000
Subtotal	$54,680,000
Total (Public + Private)	**$418,680,000**

Table 7-10: Public and Private Benefits for Planning Case 2a

These estimated private and public benefits include only those benefits associated with the general public in terms of air quality improvements, emissions reductions, grade crossing delay reductions, and at-grade crossing safety enhancements. Other benefits which may be applicable but have not been quantified for this analysis may include:

- Reduction in transportation costs due to avoidance of future rail diversion to longer route,
- Reduction in inventory costs due to avoidance of future rail diversion to longer route,
- Reduction in environmental costs due to avoidance of future rail diversion to longer route,
- Reduction in transportation costs due to reduced train delay,
- Reduction in inventory costs due to reduced train delay, and
- Reduction in environmental costs due to reduced train delay.

These benefits were not included as part of the scope of services for this project.

Saturation Analysis

An alternative analysis has been prepared as part of this report to determine the conditions under which the rail network returns to a state of saturation after Planning Case 2 has been implemented. This saturation point has been defined as the point at which the congestion delay (i.e., the delay ratio) observed in RTC simulation of the planning case, caused by the addition of trains to the network, is restored to the level of congestion delay under existing conditions as measured in the Base Case. The result of this analysis provides an indication of how many additional train movements the Tower 55 area can be absorbed before once again becoming saturated and determines the effect that implementing the Tower 55 at-grade improvements has on the Fort Worth area rail network.

The saturation analysis involved an iterative process in which new trains were added to the RTC model in proportions relative to the train types and routes that exist within the Tower 55 interlocking limits. This process insured that the addition of trains reflected the mix of trains and relative frequencies between origin-destination pairs that exist in the Base Case. Consequently, this approach does not assume future trends that would deviate from existing rail operations.

The Base Case includes an average of 96 train movements per day through the Tower 55 interlocking limits, which increases to an average of 114 trains per day at saturation. Consequently, implementation of the Tower 55 At-Grade Improvements modeled in Planning Case 2 will lead to rail operating conditions capable of supporting 18 additional train movements per day, equal to a nearly 20 percent improvement in capacity. The analysis also found that this capacity could increase further if selective enhancements are made along lines that feed into Tower 55, such as providing directional flow between Tower 60 and Saginaw or making adjustments to crew change locations within the Fort Worth terminal. Immediately upon

implementing Planning Case 2, delay is reduced near Tower 55 by 23 to 24 percent, with these reductions slowly diminishing thereafter as saturation is re-established.

Summary of Results

	Planning Case 1 (Amtrak)	Planning Case 2a
Total Estimated Cost	$ 3,000,000	$ 93,700,000
20-Year Benefit/Cost Analysis		
Total Estimated NPV Private Benefit (over Base Case)	$ 5,250,000	$ 54,680,000
Total Estimated NPV Public Benefit (over Base Case)	$ 71,820,000	$ 364,000,000
Benefit (Private + Public)/Cost Ratio	25.69	4.47

Table 7-11: Summary of Public and Private Benefits

SECTION 8: IDENTIFIED GRADE CROSSING IMPROVEMENTS

The following section lists the improvements identified in this study to improve safety at rail-roadway interfaces in the region. The potential improvements are organized by subdivision with descriptions, estimated costs, and estimated benefits. A preliminary list of potential environmental constraints is provided for each identified grade separation. Average daily traffic volumes used for analysis and in this report are based on the 2004 Texas Railroad Crossing Inventory. Preliminary layouts with adjacent land uses of the identified grade separation alternatives as well as alternate routes and associated distances for potential crossing closures are included in the figures in Appendix E.

The potential improvements identified in this study, as discussed in section 7, consist of roadway crossing and rail infrastructure improvements. The potential rail improvements that were modeled in the RTC planning cases impact multiple subdivisions, and, as a result, could not be organized with costs and benefits by subdivision. Those rail improvements are described with the planning cases in section 1. The only rail improvement not tested in the planning cases is described in further detail in this section with the Trinity Railway Express.

BNSF DFW Subdivision

The DFW Subdivision runs from Teague, Texas to Dallas, at which point the BNSF continues to Fort Worth with trackage rights on DART and UP lines ending at North Yard in Fort Worth. It is a bidirectional, predominantly single track railroad with limited sidings and an average daily train count of approximately 10 trains within the study limits.

Improvement/ Street Name	City	ADT	Estimated Cost	Estimated 20-Year Public Benefit	Benefit/ Cost Ratio
Crossing Closures					
Rogers St	Waxahachie	2,660	$50,000	$780,000	15.6
		Total	**$50,000**	**$780,000**	**n/a**

Table 8-1: BNSF DFW Subdivision Improvements

Crossing Closures

Crossing Closure of Rogers Street on the BNSF DFW Subdivision

Rogers Street is currently a two-lane roadway with an average daily traffic volume of 2,660 vehicles that crosses the BNSF DFW Subdivision in the city of Waxahachie in Ellis County. Rogers Street provides access to and from primarily commercial areas on both sides of the railroads.

The vehicular traffic along Rogers Street could be rerouted to cross the railroad on the existing Elm Street overpass. Traffic north of the railroad could be rerouted to travel north on Rogers Street and then west on Madison Street to the Elm Street overpass. Traffic south of the railroad could be rerouted to travel south on Rogers Street and then west on Howard Street to Elm Street to cross the railroad. Closing the Rogers Street crossing would increase the travel distance to cross the railroad by approximately 0.7 miles.

The crossing closure is estimated to cost $50,000 with an estimated public benefit of $780,000, which is over fifteen times greater than the estimated cost to implement the crossing closure.

BNSF Fort Worth Subdivision

The Fort Worth Subdivision originates in Temple, Texas and terminates in Gainesville, Texas for a total distance of approximately 193 miles, only 97 of which are within the limits of this study. It is a bidirectional, predominately single track railroad with sidings, although a portion of the line from Haslet to Lambert, located north of Fort Worth, is double track for a distance of nearly eight miles. The Fort Worth Subdivision has an average daily train count of 55 to 60 trains within the study limits.

Improvement/ Street Name	City	ADT	Estimated Cost	Estimated 20-Year Public Benefit	Benefit/ Cost Ratio
Grade Separations					
Hemphill St	Fort Worth	15,710	$8,590,000	$43,010,000	5.0
Main St (formerly FM 1187)	Crowley	15,900	$5,710,000	$55,850,000	9.8
Seminary Dr	Fort Worth	13,800	$5,750,000	$36,760,000	6.4
Sycamore School Rd	Fort Worth	22,940	$6,380,000	$70,750,000	11.1
Crossing Closures					
1st St	Fort Worth	460	$50,000	$340,000	6.8
Capps St	Fort Worth	460	$50,000	n/a	n/a
Chambers St	Cleburne	410	$50,000	$420,000	8.4
Magnolia Ave	Fort Worth	300	$50,000	$450,000	9.0
Hines Rd	Cleburne	700	$50,000	$1,410,000	28.2
Page Ave	Fort Worth	310	$50,000	$1,020,000	20.4
Peach St	Fort Worth	1,740	$50,000	$3,870,000	77.4
W Mustang St	Crowley	310	$50,000	$1,050,000	21.0
		Total	**$26,830,000**	**$214,930,000**	**n/a**

Table 8-2: BNSF Fort Worth Subdivision Improvements

Grade Separations

Grade Separation of Hemphill Street on the BNSF Fort Worth Subdivision

Hemphill Street is currently a four-lane roadway that crosses the railroad at-grade in Tarrant County in Fort Worth. An average daily traffic volume of 15,710 vehicles crosses the BNSF railroad at this location. The identified four-lane roadway underpass would separate vehicular traffic from the BNSF Fort Worth Subdivision.

Roadway closures required due to the grade separation are located at Mulkey Street and Page Avenue. Multiple businesses south of the railroad along the grade separation would need to be acquired due to access restrictions. Access to other properties adjacent to the grade separation would be maintained via side streets. Roadway adjustments would be constructed at Morningside Drive and Jessamine Street and would also include driveways and roadway closures along the grade separation. A rail bridge would also be constructed over Hemphill Street and a pump station may be needed for drainage purposes.

Project constraints include schools and a church, all of which are located north of the railroad and west of Hemphill Street, as well as potentially-historic buildings near the railroad along Hemphill Street.

The grade separation of Hemphill Street is estimated to cost $8,590,000 with an estimated public benefit of $43,010,000 over a twenty-year period, which is five times greater than the estimated cost of construction.

Grade Separation of Main Street on the BNSF Fort Worth Subdivision

Main Street is currently a two-lane roadway that crosses the railroad at-grade in Tarrant County near Crowley. An average daily traffic volume of 15,900 vehicles crosses the BNSF railroad at this location. The identified two-lane roadway overpass would separate vehicular traffic from the BNSF Fort Worth Subdivision.

Roadway closures required due to the grade separation are located at Texas Street as well as a private drive. Additionally, the connectivity between Magnolia Street and Main Street would be eliminated. Hampton Road would also have a change of access due to the grade separation and u-turn. Access to Magnolia Street would be rerouted via Tarrant Street to Pecan Street. Access to other properties adjacent to the grade separation would be maintained through a u-turn east of the railroad and through existing driveways. Roadway adjustments would be constructed for the u-turn east of the railroad and would also include connections to existing streets, driveways, and roadway closures along the grade separation.

Project constraints include a fire department building and church, both of which are located north of Main Street on Hampton Road; a police station, which is located on Texas Street at Pecan Street; and a learning center, which is located south of Main Street at Texas Street.

The grade separation of Main Street is estimated to cost $5,710,000 with an estimated public benefit of $55,850,000 over a twenty-year period, which is nearly ten times greater than the estimated cost of construction.

Grade Separation of Seminary Drive on the BNSF Fort Worth Subdivision

Seminary Drive is currently a four-lane roadway that crosses the railroad at-grade in Tarrant County in Fort Worth. An average daily traffic volume of 13,800 vehicles crosses the BNSF railroad at this location. The identified four-lane roadway overpass would separate vehicular traffic from the BNSF Fort Worth Subdivision.

Roadway closures required due to the grade separation are located at Wayside Avenue and Fleming Court. Additionally, the connectivity between Frazier Avenue and Seminary Drive would be eliminated. Certain businesses along the grade separation may need to be acquired due to access restrictions. Access to Wayside Avenue would be rerouted via McCart Avenue to Flint Street; access to Fleming Court would be rerouted through Ferguson Street and James Avenue. Access to other properties adjacent to the grade separation would be maintained via existing streets and driveways. Roadway adjustments would be constructed for driveways and the roadway closures along the grade separation.

Project constraints include a seminary, which is located south of the grade separation at Fleming Court, and a church, which is located at Seminary Drive and Sandage Avenue.

The grade separation of Seminary Drive is estimated to cost $5,750,000 with an estimated public benefit of $36,760,000 over a twenty-year period, which is over six times greater than the estimated cost of construction.

Grade Separation of Sycamore School Road on the BNSF Fort Worth Subdivision

Sycamore School Road is currently a six-lane roadway that crosses the railroad at-grade in Tarrant County near Fort Worth. An average daily traffic volume of 22,940 vehicles crosses the BNSF railroad at this location. The identified six-lane roadway overpass would separate vehicular traffic from the BNSF Fort Worth Subdivision.

Roadway closures required due to the grade separation are located at Ranger Way and Samantha Drive. Certain businesses along the grade separation would need to be acquired due to access restrictions. Access to Ranger Way would be rerouted via Ashbourne Way and Roaring Fork Drive; access to Samantha Drive would be rerouted through Crowley Road and Shane Avenue. Access to other properties adjacent to the grade separation would be maintained via side streets. Roadway adjustments would be constructed at the Ashbourne Way intersection and would also include roadway closures along the grade separation.

Project constraints include a church and school, which are located at the northwest corner of the intersection of Sycamore School Road and Crowley Road.

The grade separation of Sycamore School Road is estimated to cost $6,380,000 with an estimated public benefit of $70,750,000 over a twenty-year period, which is over eleven times greater than the estimated cost of construction.

Crossing Closures

Crossing Closure of 1st Street on the BNSF Fort Worth Subdivision

1st Street is currently a two-lane roadway with an average daily traffic volume of 460 vehicles where it crosses the BNSF railroad in downtown Fort Worth. 1st Street provides access to and from residential and commercial areas.
The crossing is located just north of railroad Tower 55, which is one of the busiest rail intersections in the country. As a result, trains are frequently blocking the crossing in this area while waiting to pass through Tower 55. The closure of 1st Street at the BNSF Fort Worth Subdivision is a part of the planned BNSF Tower 55 improvements.

The vehicular traffic along 1st Street could be rerouted to cross the BNSF tracks on the existing Weatherford Street or Belknap Street overpass. Closing the crossing would increase the travel distance to cross the railroad from 1st Street by less than one mile.

The crossing closure is estimated to cost $50,000 with an estimated public benefit of $340,000, which is nearly seven times greater than the estimated cost to implement the crossing closure.

Crossing Closure of Capps Street on the BNSF Fort Worth Subdivision

Capps Street is currently a two-lane roadway with an average daily traffic volume of 460 vehicles that crosses the BNSF Fort Worth Subdivision just south of downtown Fort Worth in Tarrant County. Capps Street provides access to and from residential areas on both sides and to Hemphill Street, an arterial street with businesses.

The vehicular traffic along Capps Street could be rerouted to cross the BNSF tracks on the potential Hemphill Street underpass or the at-grade crossing at Lipscomb Street. Lipscomb Street and Capps Street are part of a quiet zone currently being planned and designed by the City of Fort Worth. The quiet zone plans include operating a one-way section of Capps Street from an alley east of the railroad to Lipscomb Street. Closing the Capps Street crossing would increase the travel distance to cross the railroad by up to one mile.

The crossing closure is estimated to cost $50,000. The estimated public benefit for the closure of Capps Street is not included in this report since traffic may be rerouted to other at-grade crossings. However, there is a public benefit associated rerouting traffic to crossings with better safety systems in place such as those in designated quiet zone areas.

Crossing Closure of Chambers Street on the BNSF Fort Worth Subdivision

Chambers Street is currently a two-lane roadway with an average daily traffic volume of 410 vehicles that crosses the BNSF Fort Worth Subdivision in the city of Cleburne in Johnson County. The street provides access to and from residential and commercial areas on both sides of the railroad.

The vehicular traffic along Chambers Street could be rerouted to cross the railroad over the existing Henderson Street overpass, which would increase the travel distance to cross the railroad by up to 0.9 miles. Traffic west of the railroad could be rerouted from the closure to travel west on Chambers Street, south on Wilhite Street, west on James Street, north on Robinson Street, and then east on Henderson Street to the existing overpass. Traffic east of the railroad could travel east on Chambers Street, north on Brazos Avenue, and then west on Henderson Street to the existing overpass.

The crossing closure is estimated to cost $50,000 with an estimated public benefit of $420,000, which is over eight times greater than the estimated cost to implement the crossing closure.

Crossing Closures of Magnolia Avenue on the BNSF Fort Worth Subdivision

Magnolia Avenue is currently a two-lane roadway with an average daily traffic volume of 300 vehicles that crosses the BNSF Fort Worth Subdivision and the UP Ney Bypass just south of downtown Fort Worth. Magnolia Avenue provides access to and from primarily commercial areas west of the railroads and primarily residential areas east of the railroads.

The vehicular traffic along Magnolia Avenue could be rerouted to cross the BNSF and UP railroads on Rosedale Street or Allen Avenue, which are both existing grade separations. Magnolia Avenue is part of a quiet zone currently being planned and designed by the City of Fort Worth. The quiet zone plans include closing Magnolia Avenue and providing emergency access to properties that would be losing roadway access via Magnolia Avenue. Magnolia Avenue is also within the limits of the planned BNSF Tower 55 Improvements. Closing the crossings would increase the travel distance to cross the railroad by up to 1.1 miles.

The crossing closure is estimated to cost $50,000 with an estimated public benefit of $450,000, which is nine times greater than the estimated cost to implement the crossing closure.

Crossing Closure of Hines Road on the BNSF Fort Worth Subdivision

Hines Road is currently a two-lane roadway with average daily traffic volume of 700 vehicles that crosses the BNSF Fort Worth Subdivision in the city of Cleburne in Johnson County. The street provides access to and from commercial areas on both sides of the railroad.

The vehicular traffic along Hines Road could be rerouted to cross the railroad on the existing SH 171 underpass, which would increase the travel distance to cross the railroad by up to one mile. Traffic west of the railroad could be rerouted from the Hines Road closure to travel west on Hines Road, south on SH 174, and then east on SH 171 to the existing underpass. Traffic east of the railroad could travel east on Hines Road, and then west on SH 171 to the existing underpass.

The crossing closure is estimated to cost $50,000 with an estimated public benefit of $1,410,000, which is over twenty-eight times greater than the estimated cost to implement the crossing closure.

Crossing Closure of Page Avenue on the BNSF Fort Worth Subdivision

Page Avenue is currently a two-lane roadway with an average daily traffic volume of 310 vehicles that crosses BNSF Fort Worth Subdivision just south of downtown Fort Worth. Page Avenue provides access to and from residential and commercial areas west of the railroads.

The vehicular traffic along Page Avenue could be rerouted to cross the BNSF tracks on the potential Hemphill Street underpass. Page Avenue, as well as Hemphill Street, is currently part of a quiet zone being planned and designed by the City of Fort Worth. The quiet zone plans include operating a one-way section of Page Avenue from Hemphill Street to east of the railroad and implementing median improvements at the Hemphill Street crossing. Closing the crossing would increase the travel distance to cross the railroad by approximately one mile.

The crossing closure is estimated to each cost $50,000. The estimated public benefit for the closure of the Page Avenue crossing is $1,020,000, which is over twenty times greater than the estimated cost to implement the crossing closure.

Crossing Closure of Peach Street on the BNSF Fort Worth Subdivision

Peach Street is currently a two-lane roadway with an average daily traffic volume of 1,740 vehicles that crosses the BNSF railroad in downtown Fort Worth. Peach Street provides access to and from primarily residential areas on both sides of the railroad tracks. The crossing is located just north of railroad Tower 55, which is one of the busiest rail intersections in the country. As a result, trains are frequently blocking the crossing in this area while waiting to pass through Tower 55.

The vehicular traffic along Peach Street could be rerouted to cross the BNSF tracks on the existing Gounah Street underpass. Eastbound traffic could be rerouted from Peach Street to travel north on Samuels Avenue to Gounah Street. Westbound traffic could travel north on Nichols Street to Gounah Street. Closing the crossing would increase the travel distance to cross the railroad from Peach Street by up to 0.6 miles.

Peach Street is part of a quiet zone currently being planned and designed by the City of Fort Worth. The quiet zone plans include closing Peach Street at the BNSF

Fort Worth Subdivision crossing. Also, the planned BNSF Tower 55 Improvements may also include reconstructing the Gounah Street underpass to include a pedestrian walkway as well as increased vertical and horizontal clearances.

The crossing closure is estimated to cost $50,000 with an estimated public benefit of $3,870,000, which is over seventy-seven times greater than the estimated cost to implement the crossing closure.

Crossing Closure of W Mustang Street on the BNSF Fort Worth Subdivision

W Mustang Street is currently a two-lane roadway with average daily traffic volume of 310 vehicles that crosses the BNSF Fort Worth Subdivision in the city of Crowley in Tarrant County. The street provides access to and from residential and commercial areas on both sides of the railroad.

The vehicular traffic along W Mustang Street could be rerouted to cross the railroad over the potential Main Street overpass, which would increase the travel distance to cross the railroad by up to one mile. Traffic west of the railroad could be rerouted from the Mustang Street closure to travel west on Mustang Street, south on Magnolia Street, west on Mission Street, south on Beverly Street, and then east on Main Street to the potential overpass. Traffic east of the railroad could travel east on Mustang Street, south on Hampton Road, east on Mission Street, south on Roberts Street, and then west on Main Street to the potential overpass.

The crossing closure is estimated to cost $50,000 with an estimated public benefit of $1,050,000, which is twenty-one times greater than the estimated cost to implement the crossing closure.

BNSF Madill Subdivision

The Madill Subdivision originates in Madill, Oklahoma and terminates in Irving, Texas for a total distance of approximately 106 miles, only approximately 32 of which are within the limits of this study. It is a bidirectional, predominately single track railroad with limited sidings and an average daily train count of 5 to 10 trains within the study limits.

Improvement/ Street Name	City	ADT	Estimated Cost	Estimated 20-Year Public Benefit	Benefit/ Cost Ratio
Grade Separations					
President George Bush Turnpike EB/WB Frtg Rd	Carrollton	37,550	$7,700,000	$59,960,000	7.8
		Total	**$7,700,000**	**$59,960,000**	**n/a**

Table 8-3: BNSF Madill Subdivision Improvements

Grade Separations

Grade Separation of President George Bush Turnpike Frontage Road on the BNSF Madill Subdivision

The President George Bush Turnpike frontage roads are currently each three-lane one-way roadways that cross the railroad at-grade in Dallas County near Carrollton. An average daily traffic volume of 37,550 vehicles crosses the BNSF railroad at these locations. The identified three-lane one-way roadway overpasses would separate vehicular traffic from the BNSF Madill Subdivision.

A roadway closure required due to the grade separations is located at Old Mill Road. At least one business along the eastbound grade separation may need to be acquired due to access restrictions. Access to Old Mill Road would be rerouted via Scott Mill Road to other side streets. Access to other properties adjacent to the grade separations would be maintained via existing streets and driveways. Roadway adjustments would be constructed for connections to an apartment complex and would also include driveways and the roadway closure along the grade separations.

Project constraints include a Jewish place of worship, which is located on the eastbound frontage road east of the railroad.

The grade separation of the President George Bush Turnpike frontage roads is estimated to cost $7,700,000 with an estimated public benefit of $59,960,000 over a twenty-year period, which is nearly eight times greater than the estimated cost of construction.

BNSF Venus Subdivision

The Venus Subdivision originates in Cleburne, Texas and terminates in Venus, Texas for a total distance of 19 miles, all of which are within the limits of this study. It is a bidirectional, single track railroad with limited sidings and an average daily train count of approximately 1 to 2 trains within the study limits.

Improvement/ Street Name	City	ADT	Estimated Cost	Estimated 20-Year Public Benefit	Benefit/ Cost Ratio
Crossing Closures					
Baugh St	Alvarado	283	$50,000	$90,000	1.8
Spears St	Alvarado	400	$50,000	$130,000	2.6
		Total	**$100,000**	**$220,000**	**n/a**

Table 8-4: BNSF Venus Subdivision Improvements

Crossing Closures

Crossing Closures of Spears Street and Baugh Street on the BNSF Venus Subdivision

Spears Street and Baugh Street are currently two-lane roadways with average daily traffic volumes of 400 and 283 vehicles, respectively, that cross the BNSF Venus Subdivision in the city of Alvarado in Johnson County. The streets provide access to and from residential and commercial areas on both sides of the railroad.

The vehicular traffic along Spears Street could be rerouted to cross the railroad on the existing Sparks Street overpass, which would increase the travel distance to cross the railroad by up to 0.5 miles. Traffic north of the railroad could be rerouted from the Spears Street closure to travel north on Spears Street, north on Friou Street, east on Cotter Avenue, and then south on Sparks Street to the existing overpass. Traffic south of the railroad could travel south on Spears Street, west on Bishop Street, and then north on Sparks Street to the existing overpass.

The vehicular traffic along Baugh Street could be rerouted to cross the railroad on the existing Sparks Street overpass, which would increase the travel distance to cross the railroad by up to 0.6 miles. Traffic north of the railroad could be rerouted from the Baugh Street closure to travel north on Baugh Street, west on Cotter Avenue, and then south on Sparks Street to the existing overpass. Traffic south of the railroad could travel south on Baugh Street, and then north on Sparks Street to the existing overpass.

The crossing closures are each estimated to cost $50,000. The estimated public benefit for the closure of Spears Street is $130,000, which is over two times greater than the estimated cost to implement the crossing closure. The estimated public benefit for the closure of Baugh Street is $90,000, which is nearly two times greater than the estimated cost to implement the crossing closure.

BNSF Wichita Falls Subdivision

The Wichita Falls Subdivision originates at Tower 55 in Fort Worth and terminates in Valley Junction, Texas for a total distance of approximately 118 miles, only approximately 66 of which are within the limits of this study. It is a bidirectional, predominately single track railroad with limited sidings, although it has two locations of double track in Tarrant County for a total distance of approximately eight miles. The Wichita Falls Subdivision has an average daily train count of 40 to 45 trains within the study limits.

Improvement/ Street Name	City	ADT	Estimated Cost	Estimated 20-Year Public Benefit	Benefit/ Cost Ratio
Grade Separations					
Blue Mound Rd	Saginaw	10,600	$4,640,000	$26,100,000	5.6
Crossing Closures					
1st St	Fort Worth	270	See UP Choctaw Subdivision		
Peach St	Fort Worth	270	See UP Choctaw Subdivision		
		Total	**$4,640,000**	**$26,100,000**	**n/a**

Table 8-5: BNSF Wichita Subdivision Improvements

Grade Separations

Grade Separation of Blue Mound Road on the BNSF Wichita Falls Subdivision

Blue Mound Road is currently a two-lane roadway that crosses the railroad at-grade in Tarrant County near Saginaw. An average daily traffic volume of 10,600 vehicles crosses the BNSF railroad at this location. The identified two-lane roadway overpass would separate vehicular traffic from the BNSF Wichita Falls Subdivision.

Roadway closures required along the grade separation include Northeast Parkway north of the railroad and Railhead Road south of the railroad. Access to Northeast Parkway would be rerouted via Lone Star Boulevard and to Railhead Road via Meacham Boulevard and Gold Spike Drive. At least two driveways along Blue Mound Road would need to be adjusted or closed due to the grade separation.

There were not any project constraints identified within a preliminary review.

The grade separation of Blue Mound Road is estimated to cost $4,640,000 with an estimated public benefit of $26,100,000 over a twenty-year period, which is over five times greater than the estimated cost of construction.

Crossing Closures

Crossing Closures of 1st Street and Peach Street on the BNSF Wichita Falls Subdivision

See description listed under UP Choctaw Subdivision.

FWWR Fort Worth Subdivision

The FWWR Fort Worth Subdivision runs from Carrollton, Texas to Fort Worth and connects to the FWWR Dublin Subdivision. It is a bidirectional, predominately single track railroad with limited sidings and an average daily train count of approximately 5 to 10 trains within the study limits.

Improvement/ Street Name	City	ADT	Estimated Cost	Estimated 20-Year Public Benefit	Benefit/ Cost Ratio
Grade Separations					
7th St	Fort Worth	23,710	$6,040,000	$16,370,000	2.7
Ball St	Grapevine	44,440	$6,200,000	$49,120,000	7.9
Beach St	Fort Worth	14,880	$11,860,000	$19,090,000	1.6
Berry St	Fort Worth	37,540	$14,850,000	$29,430,000	2.0
Davis Blvd	Grapevine	30,000	$9,060,000	$21,850,000	2.4
Denton Tap Rd	Coppell	34,740	$7,070,000	$26,510,000	3.7
SH 199 (Jacksborro Hwy)	Fort Worth	27,000	$8,550,000	$22,300,000	2.6
MacArthur Ln	Coppell	26,250	$8,090,000	$20,970,000	2.6
Northside Dr	Fort Worth	24,470	$7,020,000	$19,530,000	2.8
Main St	Grapevine	13,500	$5,330,000	$9,110,000	1.7
Rufe Snow Dr	Grapevine	38,510	$8,280,000	$30,380,000	3.7
Crossing Closures					
NE 29th St	Fort Worth	1,380	$50,000	$830,000	16.6
Bowie St	Fort Worth	1,150	$50,000	$710,000	14.2
Stanley Ave	Fort Worth	1,150	$50,000	$700,000	14.0
		Total	**$92,500,000**	**$266,900,000**	**n/a**

Table 8-6: FWWR Fort Worth Subdivision Improvements

Grade Separations

Grade Separation of 7th Street on the FWWR Fort Worth Subdivision

7th Street is currently a six-lane roadway that crosses the railroad at-grade in Tarrant County west of downtown Fort Worth. An average daily traffic volume of 23,170 vehicles crosses the FWWR railroad at this location. The identified six-lane roadway overpass would separate vehicular traffic from the FWWR Fort Worth Subdivision.

Roadway closures required along the grade separation include Trinity Park Drive and Stayton Street, both east of the railroad, as well as a driveway for a retail shopping area and an apartment complex exit driveway. The retail shopping area north of 7th Street and west of the railroad would retain access along Carroll Street. Access to other properties adjacent to the grade separation would be maintained via side streets. Roadway adjustments would be constructed at Carroll Street and the apartment complex main entrance, both east of the railroad.

Project constraints include Trinity Park, which is located south of 7th Street and east of the railroad along Trinity Park Drive.

The grade separation of 7th Street is estimated to cost $6,040,000 with an estimated public benefit of $16,370,000 over a twenty-year period, which is over two times greater than the estimated cost of construction.

Grade Separation of Ball Street on the FWWR Fort Worth Subdivision

Ball Street is currently a four-lane roadway that crosses the railroad at-grade in Tarrant County near Grapevine. An average daily traffic volume of 44,440 vehicles crosses the FWWR railroad at this location. The identified four-lane roadway overpass would separate vehicular traffic from the FWWR Fort Worth Subdivision.

A roadway closure required due to the Ball Street grade separation would be Homestead Lane as well as multiple driveways south of the railroad. At least one business north of the railroad would need to be acquired because of access restrictions. Access to other properties adjacent to the grade separation as well as access to Homestead Lane would be maintained via side streets. Roadway adjustments include a connection between Ball Street and SH 26 and multiple driveway adjustments.

Project constraints include a daycare facility north of the railroad and east of Ball Street.

The grade separation of Ball Street is estimated to cost $6,200,000 with an estimated public benefit of $49,120,000 over a twenty-year period, which is nearly eight times greater than the estimated cost of construction.

Grade Separation of Beach St on the FWWR Fort Worth and UP Choctaw Subdivisions

Beach Street is currently a four-lane roadway that crosses the railroads at-grade in Tarrant County near the neighborhood of Haltom City in Fort Worth, TX. An average daily traffic volume of 14,880 vehicles crosses the FWWR and UP railroads at each of these locations. The identified four-lane roadway overpasses would separate vehicular traffic from the FWWR Fort Worth and UP Choctaw Subdivisions.

None of the existing roadways have been closed; however, multiple driveways would be closed along the grade separations. Certain businesses east and west of the grade separations would be connected by potential driveways to the grade separations. Access to other properties adjacent to the grade separations would be maintained via side streets.

There were not any project constraints identified within a preliminary review.

The grade separations of Beach Street are estimated to cost $11,860,000 with an estimated public benefit of $19,090,000 over a twenty-year period, which is over one-and-a-half times greater than the estimated cost of construction.

Grade Separation of Berry Street on the FWWR Fort Worth Subdivision

Berry Street is currently a six-lane roadway that crosses the railroad at-grade in Tarrant County in Fort Worth. An average daily traffic volume of 37,540 vehicles crosses the FWWR railroad at this location. The identified six-lane roadway

underpass, which also includes a significant length of Cleburne Road, would separate vehicular traffic from the FWWR Fort Worth Subdivision.

Roadway closures required along the underpass include Townsend Drive on both sides of Berry Street, Gordon Avenue on both sides of Berry Street, and Livingston Avenue south of Berry Street. Multiple businesses along the grade separation would need to be acquired due to access restrictions on both sides of the railroad. Access to other properties adjacent to the grade separation would be maintained via side streets. Roadway adjustments would be constructed along Cleburne Road to match the intersections at Berry Street and Stanley Avenue and multiple driveways. A rail bridge would also be constructed over Berry Street and a pump station may be needed for drainage purposes.

Project constraints include Texas Christian University, which is located a few blocks west of the railroad, a senior high school, which is located west of the railroad and north of Berry Street, and multiple churches within the area.

The grade separation of Berry Street is estimated to cost $14,850,000 with an estimated public benefit of $29,430,000 over a twenty-year period, which is two times greater than the estimated cost of construction.

Grade Separation of Davis Boulevard on the FWWR Fort Worth Subdivision

Davis Boulevard is currently a four-lane roadway that crosses the railroad at-grade in Tarrant County near Grapevine. An average daily traffic volume of 30,000 vehicles crosses the FWWR railroad at this location. The identified four-lane roadway overpass would separate vehicular traffic from the FWWR Fort Worth Subdivision.

None of the existing roadways have been closed; however, existing connections between Davis Boulevard and Main Street have been adjusted due to access constraints. Access to properties adjacent to the grade separation would be maintained through u-turns or access ramps. Roadway adjustments would be constructed for connections to Main Street and would also include multiple driveways along the u-turns and access ramps and curb along Main Street.

Project constraints include multiple churches located within the area.

The grade separation of Davis Boulevard is estimated to cost $9,060,000 with an estimated public benefit of $21,850,000 over a twenty-year period, which is over two times greater than the estimated cost of construction.

Grade Separation of Denton Tap Road on the FWWR Fort Worth Subdivision

Denton Tap Road is currently a six-lane roadway that crosses the railroad at-grade in Dallas County northeast of the Dallas – Fort Worth International Airport. An average daily traffic volume of 34,740 vehicles crosses the FWWR railroad at this

location. The identified six-lane roadway overpass would separate vehicular traffic from the FWWR Fort Worth Subdivision.

None of the existing roadways have been closed; however, multiple driveways north of the railroad would be closed along the grade separation. Depending on the joint use of private drives, at least one business north of the railroad along the grade separation may need to be acquired due to access restrictions. Access to properties adjacent to the grade separation and south of the railroad would be maintained through a u-turn connection. Roadway adjustments would be constructed for multiple driveways along the u-turns.

Project constraints include a church, which is located east of Denton Tap Road along Belt Line Road, and a school, which is located west of Denton Tap Road along Belt Line Road.

The grade separation of Denton Tap Road is estimated to cost $7,070,000 with an estimated public benefit of $26,510,000 over a twenty-year period, which is over three times greater than the estimated cost of construction.

Grade Separation of SH 199/Jacksboro Highway on the FWWR Fort Worth Subdivision

SH 199, also known as Jacksboro Highway, is currently a six-lane roadway that crosses the railroad at-grade in Tarrant County south of the West Fork of the Trinity River in Fort Worth. An average daily traffic volume of 27,000 vehicles crosses the FWWR railroad at this location. The identified six-lane roadway overpass would separate vehicular traffic from the FWWR Fort Worth Subdivision.

None of the existing roadways have been closed due to the grade separation. Access to properties adjacent to the grade separation will be maintained via u-turns north and south of the railroad or via private drives. Roadway adjustments include construction of multiple driveways.

There were not any project constraints identified within a preliminary review.

The grade separation of SH 199 is estimated to cost $8,550,000 with an estimated public benefit of $22,300,000 over a twenty-year period, which is over two times greater than the estimated cost of construction.

Grade Separation of MacArthur Lane on the FWWR Fort Worth Subdivision

MacArthur Lane is currently a six-lane roadway that crosses the railroad at-grade in Dallas County east of Coppell. An average daily traffic volume of 26,250 vehicles crosses the FWWR railroad at this location. The identified six-lane roadway overpass would separate vehicular traffic from the FWWR Fort Worth Subdivision.

None of the existing roadways have been closed; however, Belt Line Road would have a change of access due to the grade separation. Depending on the joint use of

private drives, certain businesses north of the railroad along the grade separation may need to be acquired due to access restrictions. Access to other properties adjacent to the grade separation would be maintained through a connection to Belt Line Road as well as through existing driveways. Roadway adjustments would be constructed for the MacArthur Lane – Belt Line Road connection, the intersection at Riverchase Drive, and driveways along the grade separation.

Project constraints include a church and preschool, both of which are located east of the grade separation on Belt Line Road.

The grade separation of MacArthur Lane is estimated to cost $8,090,000 with an estimated public benefit of $20,970,000 over a twenty-year period, which is over two times greater than the estimated cost of construction.

Grade Separation of Northside Drive on the FWWR Fort Worth Subdivision

Northside Drive is currently a four-lane roadway that crosses the railroad at-grade in Tarrant County near Fort Worth. An average daily traffic volume of 24,470 vehicles crosses the FWWR railroad at this location. The identified four-lane roadway overpass would separate vehicular traffic from the FWWR Fort Worth Subdivision.

Roadway closures required due to the grade separation are located at Commerce Street, Calhoun Street, and Jones Street. Certain businesses and residences along the grade separation may need to be acquired due to access restrictions. Access to Commerce Street, Calhoun Street, and Jones Street would be rerouted via Main Street and Central Avenue. Access to other properties adjacent to the grade separation would be maintained via side streets and existing driveways. Roadway adjustments would be constructed for the driveways and roadway closures along the grade separation.

There were not any project constraints identified within a preliminary review.

The grade separation of Northside Drive is estimated to cost $7,020,000 with an estimated public benefit of $19,530,000 over a twenty-year period, which is nearly three times greater than the estimated cost of construction.

Grade Separation of Main Street on the FWWR Fort Worth Subdivision

Main Street is currently a four-lane roadway that crosses the railroad at-grade in Tarrant County in Grapevine. An average daily traffic volume of 13,500 vehicles crosses the FWWR railroad at this location. The identified four-lane roadway overpass would separate vehicular traffic from the FWWR Fort Worth Subdivision.

None of the existing roadways have been closed. However, the connectivity between SH 26 and Ira Woods Avenue with Main Street would be eliminated. Access to other properties adjacent to the grade separation would be maintained via side streets. Roadway adjustments would be constructed for Nash Street, College Street, and multiple driveways.

There were not any project constraints identified within a preliminary review.

The grade separation of Main Street is estimated to cost $5,330,000 with an estimated public benefit of $9,110,000 over a twenty-year period, which is over one-and-a-half times greater than the estimated cost of construction.

Grade Separation of Rufe Snow Drive on the FWWR Fort Worth Subdivision

Rufe Snow Drive is currently a six-lane roadway that crosses the railroad at-grade in Tarrant County near Grapevine. An average daily traffic volume of 38,510 vehicles crosses the FWWR railroad at this location. The identified six-lane roadway overpass would separate vehicular traffic from the FWWR Fort Worth Subdivision.

None of the existing roadways have been closed at the grade separation. Although efforts would be made to access businesses, multiple businesses along the grade separation may need to be acquired due to access restrictions. Access to other properties adjacent to the grade separation would be maintained via side streets, a potential private drive from Iron House Boulevard, and existing driveways. Roadway adjustments would be constructed for Stardust Drive, Iron Horse Boulevard, the potential private drive, and driveways along the grade separation.

There were not any project constraints identified within a preliminary review.

The grade separation of Rufe Snow Drive is estimated to cost $8,280,000 with an estimated public benefit of $30,380,000 over a twenty-year period, which is nearly four times greater than the estimated cost of construction.

Crossing Closures

Crossing Closures of NE 29th Street on the FWWR Fort Worth Subdivision

NE 29th Street is currently a two-lane roadway with an average daily traffic volume of 1,380 vehicles that crosses the FWWR railroad north of downtown Fort Worth. NE 29th Street provides access to and from industrial areas on both sides and residential in between the railroad tracks.

The vehicular traffic along N.E. 29th Street could be rerouted to cross the railroads on the existing 28th Street grade separations. Eastbound traffic could travel east on N.E. 29th Street and then south on Decatur Avenue to the 28th Street underpass beneath the FWWR and BNSF railroads. Closing the crossings would increase the travel distance to cross the railroad from NE 29th Street by up to 0.7 miles. The crossing at the BNSF Wichita Falls Subdivision has not been closed to provide access to the business between the BNSF and FWWR railroads; however, this crossing would only have minimal vehicular traffic to the business.

The crossing closure is estimated to cost $50,000 with an estimated public benefit of $830,000, which is over sixteen times greater than the estimated cost to implement the crossing closure. Although not included within the public benefit for the closure

at the FWWR crossing, there is a benefit to the BNSF crossing by removing through access on NE 29th Street.

Crossing Closures of Bowie and Stanley Streets on the FWWR Fort Worth Subdivision

Bowie and Stanley Streets are currently two-lane roadways that cross the FWWR Fort Worth Subdivision in Fort Worth. The average daily traffic volumes for Bowie and Stanley Streets are 1,150 vehicles for each roadway. The two streets provide access to and from residential and commercial areas on each side of the railroad as well as a school on the west side of the railroad.

The vehicular traffic along Bowie and Stanley Streets could be rerouted to cross the railroad on the potential Berry Street underpass, which would increase the travel distance to cross the railroad by up to one mile. Traffic east of the railroad could be rerouted from the potential closures to travel south along Cleburne Road to Berry Street across the railroad. Traffic west of the railroad could be rerouted from Stanley Street to travel west along Lowden Street, then south on Gordon Avenue, west on Bowie Street, and south on Frazier Street to Berry Street to cross the railroad.

The crossing closures are each estimated to cost $50,000. The estimated public benefit for the closure of Bowie Street is $710,000, which is over fourteen times greater than the estimated cost to implement the crossing closure. The estimated public benefit for the closure of Stanley Street is $700,000, which is over fourteen times greater than the estimated cost to implement the crossing closure.

KCS Dallas Subdivision

The KCS Dallas Subdivision originates at Alliance Junction and terminates in Dallas for a total distance of approximately 25 miles, all of which are within the limits of this study. The subdivision is a bidirectional, single track railroad with limited sidings and an average daily train count of 10 to 15 trains within the study limits.

Improvement/ Street Name	City	ADT	Estimated Cost	Estimated 20-Year Public Benefit	Benefit/ Cost Ratio
Grade Separations					
Avenue B/Avenue D	Garland	58,000	$10,360,000	$22,780,000	2.2
Shiloh Rd	Garland	20,410	$6,330,000	$9,850,000	1.6
Crossing Closures					
Avenue F	Garland	1,720	$50,000	$600,000	12.0
Mariposa Dr	Dallas	970	$50,000	$360,000	7.2
		Total	**$16,790,000**	**$33,590,000**	**n/a**

Table 8-7: KCS Dallas Subdivision Improvements

Grade Separations

Grade Separation of Avenue B/ Avenue D on the KCS Dallas Subdivision

Avenue B and Avenue D, also known as SH 66/SH 78, are four-lane directional roadways that cross the railroad at-grade in Dallas County near Garland. An average daily traffic volume of 29,000 vehicles crosses the KCS railroad at each roadway crossing. The identified four-lane roadway overpasses would separate vehicular traffic from the KCS Dallas Subdivision.

Roadway closures required along the grade separations include 4th Street at Avenue B and 4th Street, Coyle Street, 6th Street, and Santa Fe Street at Avenue D as well as multiple driveways. Certain businesses and residences east of 5th Street along the grade separations may need to be acquired due to access restrictions. Access to other properties adjacent to the grade separation as well as access to 5th Street would be maintained via side streets. Roadway adjustments would be constructed at 7th Street and 3rd Street along the Avenue B overpass and at Glenbrook Drive along the Avenue D overpass.

Project constraints are multiple churches, including a Baptist church in the northwest corner of the Avenue D – Glenbrook Drive intersection and a Methodist Church on the north side of Avenue B between Glenbrook Drive and 9th Street, and a Boy's & Girl's Club at the Avenue D – 5th Street intersection.

The grade separations of Avenue B and Avenue D are estimated to cost $10,360,000 with an estimated public benefit of $22,780,000 over a twenty-year period, which is over two times greater than the estimated cost of construction.

Grade Separation of Shiloh Road on the KCS Dallas Subdivision

Shiloh Road is currently a four-lane roadway that crosses the railroad at-grade in Dallas County in Garland. An average daily traffic volume of 20,410 vehicles crosses the KCS railroad at this location. The identified four-lane roadway overpass would separate vehicular traffic from the KCS Dallas Subdivision.

None of the existing roadways have been closed at the grade separation. However, the connectivity between McCree Road and Shiloh Road would be eliminated. Multiple driveways north and south of the grade separation would also be closed. Certain businesses north of the grade separation would need to be acquired for the potential connector from SH 78 to the grade separation. Access to other properties adjacent to the grade separation will be maintained via side streets. Roadway adjustments would be constructed for the Shiloh Road/SH 78 connector, curb for SH 78 and McCree Road, and multiple driveways.

There were not any project constraints identified within a preliminary review.

The grade separation of Shiloh Road is estimated to cost $6,330,000 with an estimated public benefit of $9,850,000 over a twenty-year period, which is over one-and-a-half times greater than the estimated cost of construction.

Crossing Closures

Crossing Closure of Avenue F on the KCS Dallas Subdivision

Avenue F is currently a two-lane roadway with an average daily traffic volume of 1,720 vehicles that crosses the KCS Dallas Subdivision in the city of Garland in Dallas County. Avenue F provides access to and from residential areas on the east and west sides of the railroad.

The vehicular traffic along Avenue F could be rerouted to cross the railroad over the potential Avenue B and Avenue D overpasses. Avenue B and Avenue D are each one-way roadways with eastbound traffic traveling on Avenue D and westbound traffic on Avenue B. Eastbound traffic could be rerouted from Avenue F to travel north on Glenbrook Drive to Avenue D and then south on 3rd Street to Avenue F. Westbound traffic could travel north on 3rd Street to Avenue B and then south on Glenbrook Drive to Avenue F. Closing the crossing would increase the travel distance to cross the railroad from Avenue F by up to 1.3 miles.

The crossing closure is estimated to cost $50,000 with an estimated public benefit of $600,000, which is twelve times greater than the estimated cost to implement the crossing closure.

Crossing Closure of Mariposa Drive Street on the KCS Dallas Subdivision

Mariposa Drive is currently a two-lane roadway with an average daily traffic volume of 970 vehicles that crosses the KCS Dallas Subdivision northeast of downtown Dallas. Mariposa Drive provides access to and from residential areas on both sides of the railroad as well as a large commercial property east of the railroad.

The vehicular traffic along Mariposa Drive could be rerouted to cross the railroad on the existing Buckner Boulevard underpass. Traffic could be rerouted from Mariposa Drive via either Mercer Drive or Alta Mira Drive to Buckner Boulevard. Closing the Mariposa Drive crossing would increase the travel distance to cross the railroad by approximately 0.9 miles.

The crossing closure is estimated to cost $50,000 with an estimated public benefit of $360,000, which is over seven times greater than the estimated cost to implement the crossing closure.

Trinity Railway Express (TRE)

The TRE is a regional commuter line between Dallas and Fort Worth jointly owned by DART and the Fort Worth Transit Authority (The T). The eastern terminus of the line is located in downtown Dallas at Dallas Union Station and the western terminus is located in Fort Worth at T&P Station. It is a bidirectional, predominately single track railroad with limited sidings and an average daily train count of 55 to 60 trains, of which nearly 50 are passenger trains.

Improvement/ Street Name	City	ADT	Estimated Cost	Estimated 20-Year Public Benefit	Benefit/ Cost Ratio
Grade Separations					
Belt Line Rd	Irving	50,250	$6,660,000	$14,050,000	2.1
Story Rd	Irving	29,460	$6,210,000	$9,270,000	1.5
		Total	**$12,870,000**	**$23,320,000**	**n/a**

Table 8-8: Trinity Railway Express Improvements

Grade Separations

Grade Separation of Belt Line Road on the Trinity Railway Express

Belt Line Road is currently a four-lane roadway that crosses the railroad at-grade in Dallas County south of the Dallas – Fort Worth International Airport. An average daily traffic volume of 50,250 vehicles crosses the TRE at this location. The identified four-lane roadway overpass would separate vehicular traffic from the Trinity Railway Express.

A roadway closure required due to the Belt Line Road grade separation would be Jackson Street as well as multiple driveways along the grade separation. At least one business south of the railroad would need to be acquired because of access restrictions. Access to other properties adjacent to the grade separation as well as access to Jackson Street would be maintained via side streets. Roadway adjustments include construction of roadway closures and multiple driveways.

There were not any project constraints identified within a preliminary review.

The grade separation of Belt Line Road is estimated to cost $6,660,000 with an estimated public benefit of $14,050,000 over a twenty-year period, which is over two times greater than the estimated cost of construction.

Grade Separation of Story Road on the Trinity Railway Express

Story Road is currently a four-lane roadway that crosses the railroad at-grade in Dallas County near Irving. An average daily traffic volume of 29,460 vehicles crosses the Trinity Railway Express at this location. The identified four-lane roadway overpass would separate vehicular traffic from the DART.

Roadway closures required due to the grade separation are located at Olive Drive, Jimmydee Drive, and Patrick Street. Additionally, the connectivity between Parkside Avenue and Rock Island Road with Story Road would be eliminated. Certain businesses along the grade separation would need to be acquired due to access restrictions. Access to Olive Drive would be rerouted via Garden Oaks Drive and Brown Drive; access to Jimmydee Drive and Patrick Street would be rerouted through existing side streets. Access to other properties adjacent to the grade separation would be maintained via existing driveways. Roadway adjustments

would be constructed for the roadway closures along the grade separation and curb along Rock Island Road and Parkside Avenue.

There were not any project constraints identified within a preliminary review.

The grade separation of Story Road is estimated to cost $6,210,000 with an estimated public benefit of $9,270,000 over a twenty-year period, which is one-and-a-half times greater than the estimated cost of construction.

UP Choctaw Subdivision

The UP Choctaw Subdivision originates in McAlester, Oklahoma at its meeting point with the UP Cherokee Subdivision and terminates at Tower 55 in Fort Worth for a total distance of nearly 190 miles, only approximately 56 of which are within the limits of this study. It is a bidirectional, predominately single track railroad with limited sidings and an average daily train count of 15 to 20 trains within the study limits.

Improvement/ Street Name	City	ADT	Estimated Cost	Estimated 20-Year Public Benefit	Benefit/ Cost Ratio
Grade Separations					
Basswood Blvd/Hightower Dr	Watauga	20,190	$9,260,000	$15,060,000	1.6
Beach St	Fort Worth	14,880	See FWWR Fort Worth Subdivision		
McKinney St	Denton	14,200	$6,480,000	$9,620,000	1.5
Watauga Rd	Watauga	14,060	$8,910,000	$9,890,000	1.1
Crossing Closures					
1st St	Fort Worth	270	$50,000	$450,000	9.0
Frame St	Denton	1,880	$50,000	$1,860,000	37.2
Hickory St	Denton	2,710	$50,000	$1,710,000	34.2
Peach St	Fort Worth	270	$50,000	$700,000	14.0
Prairie St	Denton	270	$50,000	$540,000	10.8
Sycamore St	Denton	901	$50,000	$710,000	14.2
		Total	**$24,950,000**	**$40,540,000**	**n/a**

Table 8-9: UP Choctaw Subdivision Improvements

Grade Separations

Grade Separation of Basswood Blvd/Hightower Drive on the UP Choctaw Subdivision

Basswood Boulevard is currently a four-lane roadway that crosses the railroad at-grade in Tarrant County near Watauga and becomes Hightower Drive east of U.S. 377. An average daily traffic volume of 20,190 vehicles crosses the UP railroad at this location. The identified four-lane roadway overpass would separate vehicular traffic from the UP Choctaw Subdivision.

None of the existing roadways have been closed; however, multiple driveways would be closed along the grade separation. Certain businesses along the grade separations just west of the railroad and in the area of the Hightower Drive - U.S. 377 connection may need to be acquired due to access restrictions. Access to other properties adjacent to the grade separation would be maintained via side streets. Roadway adjustments would be constructed at Sherwood Drive and Parkwood Hill Boulevard and would also include the connection between Hightower Drive and U.S. 377.

Project constraints include a Baptist church north of Hightower Drive and east of U.S. 377 and daycare facility east of Parkwood Hill Boulevard and north of Basswood Boulevard.

The grade separation of Basswood Boulevard/Hightower Drive is estimated to cost $9,260,000 with an estimated public benefit of $15,060,000 over a twenty-year period, which is over one-and-a-half times greater than the estimated cost of construction.

Grade Separation of Beach St on the UP Choctaw Subdivision
See description listed under FWWR Fort Worth Subdivision.

Grade Separation of McKinney Street on the UP Choctaw Subdivision
McKinney Street is currently a four-lane roadway that crosses the railroad at-grade in Denton County near Denton. An average daily traffic volume of 14,200 vehicles crosses the UP railroad at this location. The identified four-lane roadway overpass, which also includes a significant length of U.S. 377, would separate vehicular traffic from the UP Choctaw Subdivision.

Roadway closures required due to the grade separation are located at Frame Street, Oak Street, Railroad Avenue, and Bell Place. Certain businesses along the grade separation would need to be acquired due to access restrictions. Access to Oak Street and Railroad Avenue would be rerouted via Hickory Street; access to Frame Street would be rerouted through existing side streets. Access to other properties adjacent to the grade separation would be maintained via existing driveways. Roadway adjustments would be constructed for the intersection at Bell Street and would also include driveways and roadway closures along the grade separation.

Project constraints include a fire department building and station, which are both located at the intersection of Hickory Street and Bell Street.

The grade separation of McKinney Street is estimated to cost $6,480,000 with an estimated public benefit of $9,620,000 over a twenty-year period, which is one-and-a-half times greater than the estimated cost of construction.

Grade Separation of Watuaga Road on the UP Choctaw Subdivision

Watuaga Road is currently a six-lane roadway that crosses the railroad at-grade in Tarrant County in Watauga. An average daily traffic volume of 14,060 vehicles crosses the UP railroad at this location. The identified six-lane roadway overpass would separate vehicular traffic from the UP Choctaw Subdivision.

Roadway closures required due to the grade separation are located at Pine Street and at Huddleston Street. Multiple businesses along the grade separation may need to be acquired due to access restrictions. Access to other properties adjacent to the grade separation would be maintained via side streets. Roadway adjustments would be constructed along U.S. 377, Park Vista Boulevard, roadway closures, and for multiple driveways.

There were not any project constraints identified within a preliminary review.

The grade separation of Watuaga Road is estimated to cost $8,910,000 with an estimated public benefit of $9,890,000 over a twenty-year period, which is greater than the estimated cost of construction.

Crossing Closures

Crossing Closure of 1st Street on the UP Choctaw Subdivision and BNSF Wichita Falls Subdivision

1st Street is currently a two-lane roadway with an average daily traffic volume of 270 vehicles where it crosses the UP and BNSF railroads in downtown Fort Worth. 1st Street provides access to and from residential and commercial areas. The crossings are located just north of railroad Tower 55, which is one of the busiest rail intersections in the country. As a result, trains are frequently blocking the crossings in this area while waiting to pass through Tower 55.

The vehicular traffic along 1st Street could be rerouted to cross the BNSF and UP tracks on the existing 4th Street underpass. This closure would require a new roadway connection between 4th Street and Live Oak Street to provide access to properties east of the railroad. Traffic could be rerouted from 1st Street to travel on Hampton Street and then to Nichols Street, which connects to the 4th Street underpass to cross the railroad, and then to the proposed new Live Oak connecter roadway that would continue to Peach Street. Closing the crossing would increase the travel distance to cross the railroad from 1st Street by approximately 1 mile.

1st Street is part of a quiet zone currently being planned and designed by the City of Fort Worth. The quiet zone plans include closing 1st Street and constructing the connection to Live Oak Street east of the railroad between 4th Street and Peach Street.

The crossing closure is estimated to cost $50,000 with an estimated public benefit of $450,000, which is nine times greater than the estimated cost to implement the crossing closure.

Crossing Closure of Peach Street on the UP Choctaw and BNSF Wichita Falls Subdivisions

Peach Street is currently a two-lane roadway with an average daily traffic volume of 270 vehicles that crosses the UP and BNSF railroads in downtown Fort Worth. Peach Street provides access to and from primarily residential areas on both sides and in between the railroad tracks. The crossings are located just north of railroad Tower 55, which is one of the busiest rail intersections in the country. As a result, trains are frequently blocking the crossings in this area while waiting to pass through Tower 55.

The vehicular traffic along Peach Street could be rerouted to cross the BNSF and UP tracks on the existing 4th Street underpass. This closure would require a new roadway connection between 4th Street and Live Oak Street to provide access to properties east of the railroad. Traffic could be rerouted from Peach Street to travel on Hampton Street and then to Nichols Street, which connects to the 4th Street underpass to cross the railroad, and then to the proposed new Live Oak connecter roadway that would continue to Peach Street. Closing the crossing would increase the travel distance to cross the railroad from Peach Street by approximately 1 mile.

Peach Street is part of a quiet zone currently being planned and designed by the City of Fort Worth. The quiet zone plans include closing Peach Street at both crossings with the railroads and constructing the new Live Oak connector roadway east of the railroad between 4th Street and Peach Street.

The crossing closure is estimated to cost $50,000 with an estimated public benefit of $700,000, which is over fourteen times greater than the estimated cost to implement the crossing closure.

Closures of Prairie, Hickory, and Sycamore Streets on the UP Choctaw Subdivision

Prairie, Hickory, and Sycamore Streets are each currently two-lane roadways that cross the UP Choctaw Subdivision in the city of Denton located in Denton County. The average daily traffic volumes for Hickory, Sycamore, and Prairie Streets are 2,710, 270, and 901 vehicles, respectively. The three streets provide access to and from residential areas on the west side of the railroad and industrial properties on the east side of the railroad.

The vehicular traffic along Prairie Street could be rerouted to cross the railroad using the existing Robertson Street underpass, which would increase the travel distance to cross the railroad by up to 0.6 miles. Traffic west of the railroad could be rerouted from the Prairie Street closure to travel west on Prairie Street, south on Bell Avenue, and then east on Robertson Street to the existing underpass. Traffic east of the

railroad could be rerouted to travel east on Prairie Street, south on Skinner Street, and then west on Robertson Street to the existing underpass.

The vehicular traffic along Hickory and Sycamore Streets could be rerouted to cross the railroad over the potential FM 426 overpass, which would increase the travel distance to cross the railroad by up to 1.1 miles and 1.4 miles, respectively. Traffic west of the railroad could be rerouted from the Hickory Street closure to travel west on Hickory Street, north on Bell Avenue, and then east on FM 426 to the potential overpass. Traffic east of the railroad could be rerouted to travel east on Hickory Street, north on Bradshaw Street, and then west on FM 426 to the potential overpass. Traffic west of the railroad could be rerouted from the Sycamore Street closure to travel west on Sycamore Street, north on Bell Avenue, and then east on FM 426 to the potential overpass. Traffic east of the railroad could be rerouted to travel east on Sycamore Street, north on Exposition Street, east on Hickory Street, north on Bradshaw Street, and then west on FM 426 to the potential overpass.

The crossing closures are each estimated to cost $50,000. The estimated public benefit for the closure of Prairie Street is $540,000, which is over ten times greater than the estimated cost to implement the crossing closure. The estimated public benefit for the closure of Hickory Street is $1,710,000, which is over thirty-four times greater than the estimated cost to implement the crossing closure. The estimated public benefit for the closure of Sycamore Street is $710,000, which is over fourteen times greater than the estimated cost to implement the crossing closure.

Crossing Closure of Frame Street on the UP Choctaw Subdivision

Frame Street is currently a two-lane roadway with average daily traffic volume of 1,880 vehicles that cross the UP Choctaw Subdivision in the city of Denton in Denton County. The street provides access to and from residential and commercial areas on both sides of the railroad.

The vehicular traffic along Frame Street could be rerouted to cross the railroad over the potential McKinney Street overpass, which would increase the travel distance to cross the railroad by up to 1.4 miles. Traffic north of the railroad could be rerouted from the Frame Street closure to travel north on Frame Street, south on Mingo Road, and then east on McKinney Street to the potential overpass. Traffic south of the railroad could travel south on Frame Street, east on Paisley Street, south on Bradshaw Street, and then west on McKinney Street to the potential overpass.

The crossing closure is estimated to cost $50,000 with an estimated public benefit of $1,860,000, which is over thirty-seven times greater than the estimated cost to implement the crossing closure.

UP Dallas Subdivision

The UP Dallas Subdivision originates in Longview, Texas and terminates at Centennial Yard in Fort Worth for a total distance of 162 miles, only approximately 79 of which are within the limits of this study. The Dallas Subdivision has two

mainline tracks from Centennial Yard in Fort Worth to the Miller Crossover in Dallas, for a distance of approximately 34 miles and is a single track railroad with sidings from Miller Crossover to Longview. Rail traffic on the Dallas Subdivision is bidirectional with an average daily train count of 70 to 75 trains within the study limits.

Improvement/ Street Name	City	ADT	Estimated Cost	Estimated 20-Year Public Benefit	Benefit/ Cost Ratio
Grade Separations					
Big Town Blvd/Prairie Creek Rd	Dallas	17,130	$9,960,000	$25,530,000	2.6
Bowen Rd	Arlington	21,550	$9,120,000	$37,670,000	4.1
Center St	Dallas	11,480	$5,080,000	$20,770,000	4.1
Cooper St	Arlington	29,530	$7,780,000	$49,910,000	6.4
Davis Dr	Arlington	14,470	$9,500,000	$22,830,000	2.4
FM 148	Terrell	13,400	$12,210,000	$20,870,000	1.7
FM 157/Collins St	Arlington	28,000	$8,230,000	$53,990,000	6.6
Galloway Ave	Mesquite	23,860	$7,970,000	$43,080,000	5.4
Great Southwest Pkwy	Grand Prairie	13,940	$6,150,000	$21,920,000	3.6
Jim Miller Rd	Dallas	26,510	$7,770,000	$43,510,000	5.6
Miller Ave/Oakland Blvd	Fort Worth	12,300	$6,220,000	$18,670,000	3.0
SH 34	Terrell	16,500	$7,560,000	$26,700,000	3.5
SH 352	Dallas	19,000	$8,030,000	$28,760,000	3.6
Stadium Dr	Arlington	11,770	$5,710,000	$19,600,000	3.4
Westmoreland Rd	Dallas	22,890	$15,590,000	$47,410,000	3.0
Crossing Closures					
Delphine St	Terrell	1,180	$50,000	$1,430,000	28.6
Florence St	Mesquite	1,380	$50,000	$2,330,000	46.6
Gardner St	Terrell	760	$50,000	$1,060,000	21.2
Hughes Ave	Fort Worth	1,640	$50,000	$2,130,000	42.6
Manila Rd	Dallas	720	$50,000	$1,440,000	28.8
Sunday St	Dallas	270	$50,000	$1,250,000	25.0
Urban Ave	Dallas	1,380	$50,000	$1,780,000	35.6
Vilbig Rd	Dallas	1,110	$50,000	$1,540,000	30.8
Winnie St	Fort Worth	1,880	$50,000	$3,240,000	64.8
		Total	**$127,330,000**	**$497,420,000**	**n/a**

Table 8-10: UP Dallas Subdivision Improvements

Grade Separations

Grade Separation of Big Town Boulevard/Prairie Creek Road on the UP Dallas Subdivision

Big Town Boulevard/Prairie Creek Road is currently a six-lane roadway that crosses the railroad at-grade in Dallas County near Mesquite. An average daily traffic volume of 17,130 vehicles crosses the UP railroad at this location. The identified six-lane roadway overpass would separate vehicular traffic from the UP Dallas Subdivision.

None of the existing roadways have been closed at the grade separation. Access to other properties adjacent to the grade separation would be maintained via side streets and existing driveways. Roadway adjustments would be constructed for a potential driveway off of Forney Road and driveway adjustments along the grade separation.

There were not any project constraints identified within a preliminary review.

The grade separation of Big Town Boulevard/Prairie Creek Road is estimated to cost $9,960,000 with an estimated public benefit of $25,530,000 over a twenty-year period, which is over two-and-a-half times greater than the estimated cost of construction.

Grade Separation of Bowen Road on the UP Dallas Subdivision

Bowen Road is currently a four-lane roadway that crosses the railroad at-grade in Tarrant County near Arlington. An average daily traffic volume of 21,550 vehicles crosses the UP railroad at this location. The identified four-lane roadway overpass would separate vehicular traffic from the UP Dallas Subdivision.

None of the existing roadways have been closed; however, multiple driveways would be closed along the grade separation. Certain businesses north of the railroad along the grade separation would need to be acquired due to access restrictions on both sides of the railroad. Access to other properties adjacent to the grade separation would be maintained via driveways or private drives. Roadway adjustments would be constructed along Division Street and Abram Street to match the intersections at the Bowen Road grade separation and would also include multiple driveways.

Project constraints include Bowen Road Day School, which is located at the southeast corner of Bowen Road and Abram Street.

The grade separation of Bowen Road is estimated to cost $9,120,000 with an estimated public benefit of $37,670,000 over a twenty-year period, which is over four times greater than the estimated cost of construction.

Grade Separation of Center Street on the UP Dallas Subdivision

Center Street is currently a two-lane roadway that crosses the railroad at-grade in Tarrant County near Arlington. An average daily traffic volume of 11,480 vehicles

crosses the UP at this location. The identified four-lane roadway overpass would separate vehicular traffic from the UP Dallas Subdivision.

None of the existing roadways have been closed due to the grade separation. However, the connectivity between Main Street and Front Street with Center Street would be eliminated. Businesses along the grade separation may need to be acquired due to access restrictions. Access to other properties adjacent to the grade separation will be maintained via side streets. Roadway adjustments would be constructed for SH 180, Abram Street, curb along Main Street and Front Street, and multiple driveways.

There were not any project constraints identified within a preliminary review.

The grade separation of Center Street is estimated to cost $5,080,000 with an estimated public benefit of $20,770,000 over a twenty-year period, which is over four times greater than the estimated cost of construction.

Grade Separation of Cooper Street on the UP Dallas Subdivision

Cooper Street is currently a six-lane roadway that crosses the railroad at-grade in Tarrant County near Arlington. An average daily traffic volume of 29,530 vehicles crosses the UP railroad at this location. The identified six-lane roadway overpass would separate vehicular traffic from the UP Dallas Subdivision.

A roadway closure required due to the Cooper Street grade separation will be Front Street as well as multiple driveways along the overpass. Depending on the joint use of private drives, multiple businesses between Division Street and Abram Street along the grade separation may need to be acquired due to access restrictions. Access to Main Street from Cooper Street will be rerouted via Abram Street to West Street and access to Front Street from Cooper will be by way of Division Street and West Street. Access to other properties adjacent to the grade separation will be maintained via driveways or private drives. Roadway adjustments will be constructed along Division Street and Abram Street to match the intersection at the Cooper Street grade separation and would also include multiple driveways and curb along Main Street.

Project constraints include a fire department building, which is located east of Cooper Street and south of Division Street.

The grade separation of Cooper Street is estimated to cost $7,780,000 with an estimated public benefit of $49,910,000 over a twenty-year period, which is over six times greater than the estimated cost of construction.

Grade Separation of Davis Drive on the UP Dallas Subdivision

Davis Drive is currently a four-lane roadway that crosses the railroad at-grade in Tarrant County near Arlington. An average daily traffic volume of 14,470 vehicles

crosses the UP railroad at this location. The identified four-lane roadway underpass would separate vehicular traffic from the UP Dallas Subdivision.

A roadway closure required due to the Davis Drive grade separation would be Front Street as well as multiple driveways along the overpass. Certain businesses between Division Street and Main Street along the grade separation may need to be acquired due to access restrictions. Access to other properties adjacent to the grade separation would be maintained via driveways or private drives. Roadway adjustments would be constructed along Division Street and Main Street to match the intersection at the Davis Drive grade separation and would also include multiple driveways along the underpass. A rail bridge would also be constructed over Davis Drive and a pump station may be needed for drainage purposes.

Project constraints include a church, which is located east of Davis Drive and south of Division Street, and a church building, which is located along Davis Drive and south of the railroad.

The grade separation of Davis Drive is estimated to cost $9,500,000 with an estimated public benefit of $22,830,000 over a twenty-year period, which is over two times greater than the estimated cost of construction.

Grade Separation of FM 148 on the UP Dallas Subdivision

FM 148 is currently a four-lane roadway that crosses the railroad at-grade in Kaufman County near of Terrell. An average daily traffic volume of 13,400 vehicles crosses the UP railroad at this location. The identified four-lane roadway overpass, which also includes a significant length of U.S. 80, would separate vehicular traffic from the UP Dallas Subdivision.

Roadway closures required along the grade separation include West End Street and Mellon Street, both east of the grade separation and south of the railroad. Access to both closed streets would be rerouted via Williams Street. Depending on the joint use of private drives, multiple businesses east of FM 148 along the grade separation may need to be acquired due to access restrictions. Access to other properties adjacent to the grade separation would be maintained via driveways or private drives. Roadway adjustments would be constructed along U.S. 80 and Williams Street and for multiple driveways along the grade separation.

Project constraints include churches located along FM 148 north of U.S. 80 and on Mellon Street.

The grade separation of FM 148 is estimated to cost $12,210,000 with an estimated public benefit calculated of $20,870,000 over a twenty-year period, which is nearly two times greater than the estimated cost of construction.

Grade Separation of FM 157/Collins Street on the UP Dallas Subdivision

FM 157, also known as Collins Street, is currently a four-lane roadway that crosses the railroad at-grade in Tarrant County near Arlington. An average daily traffic volume of 28,000 vehicles crosses the UP railroad at this location. The identified four-lane roadway overpass would separate vehicular traffic from the UP Dallas Subdivision.

A roadway closure required due to the Collins Street grade separation would be Harrison Avenue as well as multiple driveways along the overpass. Depending on the joint use of private drives, multiple businesses between Division Street and Abram Street along the grade separation may need to be acquired due to access restrictions. Access to Abram Street from Collins Street would be rerouted via Dugan Street and Ditto Avenue. Access to other properties adjacent to the grade separation would be maintained via driveways or private drives. Roadway adjustments would be constructed along Division Street to match the intersection at the Collins Street grade separation and would also include multiple driveways and curb along Abram Street.

There were not any project constraints identified within a preliminary review.

The grade separation of Collins Street is estimated to cost $8,230,000 with an estimated public benefit of $53,990,000 over a twenty-year period, which is over six times greater than the estimated cost of construction.

Grade Separation of Galloway Avenue on the UP Dallas Subdivision

Galloway Avenue is currently a four-lane roadway that crosses the railroad at-grade in Dallas County near Mesquite. An average daily traffic volume of 23,860 vehicles crosses the UP railroad at this location. The identified four-lane roadway underpass would separate vehicular traffic from the UP Dallas Subdivision.

The preliminary potential grade separation at Galloway Avenue is based on the existing grade separation of Bryan Belt Line Road to the east, leaving a roadway clearance under the railroad of 14’-9”. Roadway closures required due to the grade separation would be Texas Street and Front Street as well as multiple driveways along the underpass. Certain businesses between Kimbrough Street and the railroad along the grade separation may need to be acquired due to access restrictions. Access to other properties adjacent to the grade separation would be maintained via side streets. Roadway adjustments would be constructed for multiple driveways along the grade separation. A rail bridge would also be constructed over Galloway Avenue and a pump station may be needed for drainage purposes.

Project constraints include multiple churches in the area abutting both Galloway Avenue and Main Street.

The grade separation of Galloway Avenue is estimated to cost $7,970,000 with an estimated public benefit of $43,080,000 over a twenty-year period, which is over five times greater than the estimated cost of construction.

Grade Separation of Great Southwest Parkway on the UP Dallas Subdivision

Great Southwest Parkway is currently a four-lane roadway that crosses the railroad at-grade in Dallas County in Grand Prairie. An average daily traffic volume of 13,940 vehicles crosses the UP railroad at this location. The identified four-lane roadway overpass would separate vehicular traffic from the UP Dallas Subdivision.

None of the existing roadways have been closed. However, the connectivity between SH 180 and Abram Street with Great Southwest Parkway would be eliminated. A potential connector off Great Southwest Parkway would move traffic to Abram Street from the grade separation. Businesses along the grade separation may need to be acquired due to access restrictions. Access to other properties adjacent to the grade separation will be maintained via side streets. Roadway adjustments would be constructed along Hines Avenue, for the Great Southwest Parkway – Abram Street connector, curbs along SH 180 and Abram Street, and multiple driveways.

There were not any project constraints identified within a preliminary review.

The grade separation of Great Southwest Parkway is estimated to cost $6,150,000 with an estimated public benefit of $21,920,000 over a twenty-year period, which is over three-and-a-half times greater than the estimated cost of construction.

Grade Separation of Jim Miller Road on the UP Dallas Subdivision

Jim Miller Road is currently a six-lane roadway that crosses the railroad at-grade in Dallas County east of Dallas. An average daily traffic volume of 26,510 vehicles crosses the UP railroad at this location. The identified six-lane roadway overpass would separate vehicular traffic from the UP Dallas Subdivision.

A roadway closure required due to the grade separation is located at Toland Street south of the railroad. Additionally, the connectivity between Lovett Avenue and Red Bud Drive with Jim Miller Road would be eliminated. Multiple residences along the grade separation may need to be acquired due to access restrictions. Access to Red Bud Drive would be rerouted via Forney Road and access to Lovett Avenue via Military Parkway. Access to other properties adjacent to the grade separation would be maintained via side streets and existing driveways. Roadway adjustments would be constructed for the intersection at Forney Road and would also include driveways and roadway closures along the grade separation.

Project constraints include a school, which is located at Jim Miller Road and Military Parkway, and a church, which is located at the southeast corner of Jim Miller Road and Forney Road.

The grade separation of Jim Miller Road is estimated to cost $7,770,000 with an estimated public benefit of $43,510,000 over a twenty-year period, which is over five times greater than the estimated cost of construction.

Grade Separation of Miller Avenue/Oakland Boulevard on the UP Dallas Subdivision
Miller Avenue/Oakland Boulevard is currently a four-lane roadway that crosses the railroad at-grade in Tarrant County in Fort Worth. An average daily traffic volume of 12,300 vehicles crosses the UP at this location. The identified four-lane roadway overpass would separate vehicular traffic from the UP Dallas Subdivision.

None of the existing roadways have been closed. However, the connectivity between Hawlett Street and Miller Avenue/Oakland Boulevard would be eliminated. Certain business south of the railroad would need to be acquired because of access restrictions. Access to other properties adjacent to the grade separation would be maintained via side streets. Roadway adjustments would be constructed along Hampshire Boulevard, Hawlett Street, and multiple driveways.

There were not any project constraints identified within a preliminary review.

The grade separation of Miller Avenue/Oakland Boulevard is estimated to cost $6,220,000 with an estimated public benefit of $18,670,000 over a twenty-year period, which is three times greater than the estimated cost of construction.

Grade Separation of SH 34 on the UP Dallas Subdivision
SH 34, also known as Virginia Street, is currently a four-lane roadway that crosses the railroad at-grade in Kaufman County near Terrell. An average daily traffic volume of 16,500 vehicles crosses the UP railroad at this location. The identified four-lane roadway overpass would separate vehicular traffic from the UP Dallas Subdivision.

Roadway closures required due to the grade separation are located at Nash Street, Delphine Street and Cottage Street. Additionally, the connectivity between Broad Street and Grove Street with SH 34 would be eliminated. Certain businesses along the grade separation would need to be acquired due to access restrictions. Access to other properties adjacent to the grade separation would be maintained via the SH 34 – U.S. 80 connection, side streets, and driveways. Roadway adjustments would be constructed for the SH 34 – U.S. 80 connection, driveways, and roadway closures along the grade separation.

Project constraints include a hospital, which is located east of the grade separation between High Street and Nash Street, and a fire department building, which is located at Nash Street and Adelaide Street.

The grade separation of SH 34 is estimated to cost $7,560,000 with an estimated public benefit of $26,700,000 over a twenty-year period, which is three-and-a-half times greater than the estimated cost of construction.

Grade Separation of SH 352 on the UP Dallas Subdivision

SH 352, also known as Scyene Road, is currently a six-lane roadway that crosses the railroad at-grade in Dallas County near Dallas. An average daily traffic volume of 19,000 vehicles crosses the UP railroad at this location. The identified six-lane roadway overpass, paralleling the future DART line south of the roadway, would separate vehicular traffic from the UP Dallas Subdivision.

A roadway closure required due to the grade separation is located at Lagow Street. Certain businesses along the grade separation may need to be acquired due to access restrictions. Access to other properties adjacent to the grade separation would be maintained via existing side streets, private drives, and driveways. Roadway adjustments would be constructed for a private drive east of the railroad and the roadway closure along the grade separation.

There were not any project constraints identified within a preliminary review.

The grade separation of SH 352 is estimated to cost $8,030,000 with an estimated public benefit of $28,760,000 over a twenty-year period, which is over three times greater than the estimated cost of construction.

Grade Separation of Stadium Drive on the UP Dallas Subdivision

Stadium Drive is currently a four-lane roadway that crosses the railroad at-grade in Dallas County near Arlington. An average daily traffic volume of 11,770 vehicles crosses the UP railroad at this location. The identified four-lane roadway overpass would separate vehicular traffic from the UP Dallas Subdivision.

None of the existing roadways have been closed at the grade separation. Depending on the joint use of private drives, certain businesses south of the railroad along the grade separation may need to be acquired due to access restrictions. Access to properties adjacent to the grade separation would be maintained via private drives and driveways. Roadway adjustments would be constructed for the private drives and driveways along the grade separation.

There were not any project constraints identified within a preliminary review.

The grade separation of Stadium Drive is estimated to cost $5,710,000 with an estimated public benefit of $19,600,000 over a twenty-year period, which is over three times greater than the estimated cost of construction.

Grade Separation of Westmoreland Road on the UP Dallas Subdivision

Westmoreland Road is currently a six-lane roadway that crosses the railroad at-grade in Dallas County west of Dallas. An average daily traffic volume of 22,890 vehicles crosses the UP railroad at this location. The identified six-lane roadway underpass would separate vehicular traffic from the UP Dallas Subdivision as well as the DGNO railroad south of the UP railroad.

None of the existing roadways have been closed. Multiple businesses, in particular those along the grade separation between the UP Dallas Subdivision and the DGNO railroad, would need to be acquired due to access restrictions. Access to other properties adjacent to the grade separation would be maintained via existing driveways. Roadway adjustments would be constructed at the Singleton Boulevard intersection and driveways along the grade separation. Two rail bridges would also be constructed over the Westmoreland Road underpass and a pump station may be needed for drainage purposes.

Project constraints include multiple churches, which are located north of Singleton Boulevard and west of Westmoreland Road, and a school learning center, which is located south of Singleton Boulevard at Kingbridge Street.

The grade separation of Westmoreland Road is estimated to cost $15,590,000 with an estimated public benefit of $47,410,000 over a twenty-year period, which is three times greater than the estimated cost of construction.

Crossing Closures

Crossing Closures of Delphine Street and Gardner Street on the UP Dallas Subdivision

Delphine Street and Gardner Street are currently two-lane roadways that cross the UP Dallas Subdivision in the city of Terrell in Kaufman County. The average daily traffic volumes for Delphine Street and Gardner Street are 1,180 and 760 vehicles, respectively.

The vehicular traffic along Delphine Street and Gardner Street could be rerouted to cross the railroad on the potential SH 34 overpass, which would increase the travel distance to cross the railroad by up to 1.1 miles. Traffic north of the railroad could be rerouted from the potential closures to travel along Moore Avenue, and then west on the connector to SH 34. Traffic south of the Delphine Street closure could be rerouted to travel south along Delphine Street, then west on Rochester Street to SH 34 to cross the railroad. Traffic south of the Gardner Street closure could travel south on Gardner Street, west on Grove Street, south on Delphine Street, west on Rochester Street, and then north on SH 34 to the potential overpass.

The crossing closures are each estimated to cost $50,000 with an estimated public benefit of $1,430,000, which is over twenty-eight times greater than the estimated cost to implement the crossing closure. The estimated public benefit for the closure of Gardner Street is $1,060,000, which is over twenty-one times greater than the estimated cost to implement the crossing closure.

Crossing Closure of Florence Street on the UP Dallas Subdivision

Florence Street is currently a two-lane roadway with an average daily traffic volume of 1,380 vehicles that crosses the UP Dallas Subdivision in the city of Mesquite in

Dallas County. The street provides access to and from residential and commercial areas on both sides of the railroad.

The vehicular traffic along Florence Street could be rerouted to cross the railroad on the existing Bryan Belt Line Road underpass, which would increase the travel distance to cross the railroad by up to 0.6 miles. Traffic north of the railroad could be rerouted from the Florence Street closure to travel north on Florence Street, west on Welch Avenue, north on Perkins Street, west on Kimbrough Street and then south on Bryan Belt Line Road to the existing underpass. Traffic south of the railroad could travel south on Florence Street, west on Main Street, and then north on Bryan Belt Line Road to the existing underpass.

The crossing closure is estimated to cost $50,000 with an estimated public benefit of $2,330,000, which is over forty-six times greater than the estimated cost to implement the crossing closure.

Crossing Closure of Hughes Avenue on the UP Dallas Subdivision

Hughes Avenue is currently a two-lane roadway with an average daily traffic volume of 1,640 vehicles that crosses the UP Dallas Subdivision in the city of Fort Worth in Tarrant County. The street provides access to and from residential and commercial areas on both sides of the railroad.

The vehicular traffic along Hughes Avenue could be rerouted to cross the railroad on the potential Miller Avenue/Oakland Boulevard overpass, which would increase the travel distance to cross the railroad by up to 1.3 mile. Traffic north of the railroad could be rerouted from the Hughes Avenue closure to travel north on Hughes Avenue, west on Hampshire Boulevard, and then south on the potential Miller Avenue/Oakland Boulevard overpass. Traffic south of the railroad could travel south on Hughes Street, west on Rosedale Street, and then north on the potential Miller Avenue/Oakland Boulevard overpass.

The crossing closure is estimated to cost $50,000 with an estimated public benefit of $2,130,000, which is over forty-two times greater than the estimated cost to implement the crossing closure.

Crossing Closure of Manila Road on the UP Dallas Subdivision

Manila Road is currently a two-lane roadway with average daily traffic volume of 720 vehicles that cross the UP Dallas Subdivision in the city of Dallas in Dallas County. The street provides access to and from residential and commercial areas on both sides of the railroad.

The vehicular traffic along Manila Road could be rerouted to cross the railroad over the potential Westmoreland Road underpass, which would increase the travel distance to cross the railroad by up to two miles. Traffic north of the railroad could be rerouted from the Manila Road closure to travel north on Manila Road, west on Singleton Boulevard, and then south on Westmoreland Road to the potential

underpass. Traffic south of the railroad could travel south on Manila Road, west on Commerce Street, and then north on Westmoreland Road to the potential underpass.

The crossing closure is estimated to cost $50,000 with an estimated public benefit of $1,440,000, which is over twenty-eight times greater than the estimated cost to implement the crossing closure.

Crossing Closure of Sunday Street on the UP Dallas Subdivision

Sunday Street is currently a two-lane roadway with average daily traffic volume of 270 vehicles that cross the UP Dallas Subdivision in the city of Dallas. The street provides access to and from residential areas on both sides of the railroad.

The vehicular traffic along Sunday Street could be rerouted to cross the railroad over the existing Municipal Street underpass, which would increase the travel distance to cross the railroad by up to 0.4 miles. Traffic north of the railroad could be rerouted from the Sunday Street closure to travel north on Sunday Street, west on Scott Street, and then south on Municipal Street to the existing underpass. Traffic south of the railroad could travel south on Sunday Street, west on St Clair Street, and north on Municipal Street to the existing underpass.

The crossing closure is estimated to cost $50,000 with an estimated public benefit of $1,250,000, which is twenty-five times greater than the estimated cost to implement the crossing closure.

Crossing Closure of Urban Avenue on the UP Dallas Subdivision

Urban Avenue is currently a two-lane roadway with average daily traffic volume of 1,380 vehicles that cross the UP Dallas Subdivision in the city of Dallas. The street provides access to and from residential areas on both sides of the railroad.

The vehicular traffic along Urban Avenue could be rerouted to cross the railroad over the potential Jim Miller Road overpass, which would increase the travel distance to cross the railroad by up to one mile. Traffic north of the railroad could be rerouted from the Urban Avenue closure to travel north on Urban Avenue, west on Forney Road, and then south on Jim Miller Road to the potential overpass. Traffic south of the railroad could travel south on Urban Avenue, west on Lovett Avenue, south on Peretta Street, west on Benning Avenue, and then north on Jim Miller Road to the potential overpass.

The crossing closure is estimated to cost $50,000 with an estimated public benefit of $1,780,000, which is over thirty-five times greater than the estimated cost to implement the crossing closure.

Crossing Closure of Vilbig Road on the UP Dallas Subdivision

Vilbig Road is currently a two-lane roadway with an average daily traffic volume of 1,110 vehicles that crosses the UP Dallas Subdivision and the DGNO railroad in the

city of Dallas. The street provides access to and from residential and commercial areas on both sides of the railroad.

The vehicular traffic along Vilbig Road could be rerouted to cross the railroad over the existing Hampton Road overpass, which would increase the travel distance to cross the railroad by up to 1.8 miles. Traffic north of the railroad could be rerouted from the Vilbig Road closure to travel north on Vilbig Road, west on Akron Street, north on Harston Street, west on Singleton Boulevard, and then south on Hampton Road to the existing overpass. Traffic south of the railroad could travel south on Vilbig Road, west on Commerce Street, and then north on Hampton Road to the existing overpass.

The crossing closure is estimated to cost $50,000 with an estimated public benefit of $1,540,000, which is over thirty times greater than the estimated cost to implement the crossing closure.

Crossing Closure of Winnie Street on the UP Dallas Subdivision

Winnie Street is currently a two-lane roadway with average daily traffic volume of 1,880 vehicles that cross the UP Dallas Subdivision in the city of Fort Worth. The street provides access to and from residential and commercial areas on both sides of the railroad.

The vehicular traffic along Winnie Street could be rerouted to cross the railroad using the existing Tension Drive underpass, which would increase the travel distance to cross the railroad by up to 1.3 miles. Traffic north of the railroad could be rerouted from the Winnie Street closure to travel north on Winnie Street, east on Old Handley Road, north on Osborne Lane, east on Hampshire Boulevard, south on Canton Drive, and then south on Tension Drive to the existing underpass. Traffic south of the railroad could travel south on Winnie Street, east on Rosedale Drive, and then north on Tension Drive to the existing underpass.

The crossing closure is estimated to cost $50,000 with an estimated public benefit of $3,420,000, which is over sixty-four times greater than the estimated cost to implement the crossing closure.

UP Duncan Subdivision

The UP Duncan Subdivision originates in Chickasha, Oklahoma and terminates at Tower 55 in Fort Worth for a total distance of nearly 177 miles, only approximately 62 of which are within the limits of this study. It is a bidirectional, predominately single track railroad with limited sidings and an average daily train count of 15 to 20 trains within the study limits.

Improvement/ Street Name	City	ADT	Estimated Cost	Estimated 20-Year Public Benefit	Benefit/ Cost Ratio
Grade Separations					
SH 114	Boyd	12,000	$5,310,000	$53,020,000	10.0
Crossing Closures					
NE 29th St	Fort Worth	1,200	$50,000	$4,090,000	81.8
Allen St	Boyd	230	$50,000	$1,270,000	25.4
Hitt St	Boyd	290	$50,000	$1,550,000	31.0
Wilson St	Boyd	330	$50,000	$2,380,000	47.6
		Total	**$5,510,000**	**$62,310,000**	**n/a**

Table 8-11: UP Duncan Subdivision Improvements

Grade Separations

Grade Separation of SH 114 on the UP Duncan Subdivision

SH 114 is currently a two-lane roadway east of the railroad and a four-lane roadway west of the railroad that crosses the railroad at-grade in Wise County near Boyd. An average daily traffic volume of 12,000 vehicles crosses the UP railroad at this location. The identified two-lane roadway overpass would separate vehicular traffic from the UP Duncan Subdivision.

None of the existing roadways have been closed. However, Hitt Street, Atwood Street, and Wilson Street and driveways west of the railroad would have a change of access due to the u-turn along the grade separation. Depending on the joint use of private drives, certain residences east of the railroad along the grade separation may need to be acquired due to access restrictions. Access to other properties adjacent to the grade separation would be maintained via existing streets, existing driveways, and potential driveways. Roadway adjustments would be constructed for the u-turn and its connections and would also include potential driveways along the grade separation.

Project constraints include an elementary school, which is located at the intersection of Wilson Street and Morton Street, and a fire department building, which is located on Wilson Street north of the grade separation.

The grade separation of SH 114 is estimated to cost $5,310,000 with an estimated public benefit of $53,020,000 over a twenty-year period, which is ten times greater than the estimated cost of construction.

Crossing Closures

Crossing Closures of NE 29th Street on the UP Duncan Subdivision

NE 29th Street is currently a two-lane roadway with an average daily traffic volume of 1,200 vehicles that crosses UP railroad north of downtown Fort Worth. NE 29th

Street provides access to and from industrial areas on both sides and residential in between the railroad tracks.

The vehicular traffic along N.E. 29th Street could be rerouted to cross the railroads on the existing 28th Street grade separations. Traffic could travel east on NE 29th Street and then south on Commerce Street to the 28th Street underpass beneath the BNSF and UP railroads. Closing the crossings would increase the travel distance to cross the railroad from NE 29th Street by up to 1.2 miles. The crossing at the BNSF Fort Worth Subdivision has not been closed to provide access to the business between the BNSF and UP railroads; however, this crossing would only have minimal vehicular traffic to the business.

The crossing closure is estimated to cost $50,000 with an estimated public benefit of $4,090,000, which is over eighty-one times greater than the estimated cost to implement the crossing closure. Although not included within the public benefit for the closure at the UP crossing, there is a benefit to the BNSF crossing by removing through access on NE 29th Street.

Crossing Closures of Allen Street, Hitt Street, and Wilson Street on the UP Duncan Subdivision

Allen Street, Hitt Street, and Wilson Street are currently two-lane roadways that cross the UP Duncan Subdivision north of SH 114 in the city of Boyd located in Wise County. The average daily traffic volumes for Allen Street, Hitt Street, and Wilson Street are 230, 290, and 330 vehicles, respectively. The three streets provide access to and from residential areas on the south side of the railroad and industrial properties on the north side of the railroad.

The vehicular traffic along Allen Street, Hitt Street, and Wilson Street could be rerouted to cross the railroad over the potential SH 114 overpass, which would increase the travel distance to cross the railroad by up to 1.5 miles. Traffic north of the railroad could be rerouted from the potential closures to travel east along Lawrence Street and Wilson Street and then south on FM 730 to SH 114 across the railroad. Traffic south of the railroad could be rerouted to access the potential SH 114 overpass from Allen Street.

The crossing closures are each estimated to cost $50,000. The estimated public benefit for the closure of Allen Street is $1,270,000, which is over twenty-five times greater than the estimated cost to implement the crossing closure. The estimated public benefit for the closure of Hitt Street is $1,550,000, which is thirty-one times greater than the estimated cost to implement the crossing closure. The estimated public benefit for the closure of Wilson Street is $2,380,000, which is over forty-seven times greater than the estimated cost to implement the crossing closure.

UP Ennis Subdivision

The UP Ennis Subdivision originates in Hearne, Texas and terminates at Ennis Junction in Dallas for a total distance of approximately 92 miles, approximately 71 of which are within the limits of this study. It is a bidirectional, predominately single track railroad with limited sidings and an average daily train count of 25 to 30 trains within the study limits.

Improvement/ Street Name	City	ADT	Estimated Cost	Estimated 20-Year Public Benefit	Benefit/ Cost Ratio
Grade Separations					
Buckner Blvd	Dallas	24,000	$6,800,000	$20,410,000	3.0
SH 31	Corsicana	19,000	$4,850,000	$16,220,000	3.3
		Total	**$11,650,000**	**$36,630,000**	**n/a**

Table 8-12: UP Ennis Subdivision Improvements

Grade Separations

Grade Separation of Buckner Boulevard on the UP Ennis Subdivision

Buckner Boulevard is currently a four-lane roadway that crosses the railroad at-grade in Dallas County southeast of Dallas. An average daily traffic volume of 24,000 vehicles crosses the UP railroad at this location. The identified four-lane roadway overpass would separate vehicular traffic from the UP Ennis Subdivision.

A roadway closure required due to the Buckner Boulevard grade separation would be Kipling Drive as well as multiple driveways along the overpass. At least one business north of the railroad along the grade separation would need to be acquired due to access restrictions. Access to Kipling Drive would be rerouted via Pleasant Drive to a new extension of Kipling Drive to Pleasant Drive. Access to other properties adjacent to the grade separation would be maintained via the u-turn south of the railroad or private drives. Roadway adjustments would be constructed at Kipling Drive for access and would also include multiple driveways along the grade separation.

There were not any project constraints identified within a preliminary review.

The grade separation of Buckner Boulevard is estimated to cost $6,800,000 with an estimated public benefit of $20,410,000 over a twenty-year period, which is three times greater than the estimated cost of construction.

Grade Separation of SH 31 on the UP Ennis Subdivision

SH 31, also known as 7th Avenue, is currently a four-lane roadway that crosses the railroad at-grade in Navarro County in Corsicana. An average daily traffic volume of 19,000 vehicles crosses the UP railroad at this location. The identified four-lane roadway overpass would separate vehicular traffic from the UP Ennis Subdivision.

Roadway closures required due to the grade separation are located at Beaton Street, 9th Street and 10th Street. Certain businesses along the grade separation may need to be acquired due to access restrictions. Access to other properties adjacent to the grade separation would be maintained via existing streets and driveways. Roadway adjustments would be constructed for driveways and the roadway closures along the grade separation.

There were not any project constraints identified within a preliminary review.

The grade separation of SH 31 is estimated to cost $4,850,000 with an estimated public benefit of $16,220,000 over a twenty-year period, which is over three times greater than the estimated cost of construction.

UP Fort Worth Subdivision

The UP Fort Worth Subdivision originates in Valley Junction and terminates at Tower 55 in Fort Worth for a total distance of approximately 150 miles, only approximately 43 of which are within the limits of this study. It is a bidirectional, predominately single track railroad with limited sidings and an average daily train count of approximately 30 trains within the study limits.

Improvement/ Street Name	City	ADT	Estimated Cost	Estimated 20-Year Public Benefit	Benefit/ Cost Ratio
Grade Separations					
Renfro St	Burleson	14,700	$6,220,000	$26,360,000	4.2
Sycamore School Rd	Fort Worth	18,520	$7,070,000	$36,080,000	5.1
Crossing Closures					
W Bowie St	Fort Worth	490	$50,000	$610,000	12.2
W Kellis St	Fort Worth	1,630	$50,000	$2,500,000	50.0
Magnolia Ave	Fort Worth	300	$50,000	$260,000	5.2
Ramsey St	Fort Worth	270	$50,000	n/a	n/a
		Total	**$13,490,000**	**$65,810,000**	**n/a**

Table 8-13: UP Fort Worth Subdivision Improvements

Grade Separations

Grade Separation of Renfro Street on the UP Fort Worth Subdivision

Renfro Street is currently a four-lane roadway that crosses the railroad at-grade in Johnson County near Burleson. An average daily traffic volume of 14,700 vehicles crosses the UP railroad at this location. The identified four-lane roadway overpass would separate vehicular traffic from the UP Fort Worth Subdivision.

Roadway closures required due to the grade separation are located at Wilson Street and Dobson Street. Additionally, the connectivity between Main Street and

Commerce Street with Renfro Street would be eliminated. Certain businesses along the grade separation would need to be acquired due to access restrictions. Access to Wilson Street would be rerouted via Warren Street; access to Dobson Street would be rerouted through Clark Street. Access to other properties adjacent to the grade separation would be maintained via side streets. Roadway adjustments would be constructed at the Warren Street and Clark Street intersections and would also include roadway closures along the grade separation.

Project constraints include multiple churches east of the railroad and an elementary school, which are located at the intersection of Dobson Street and Ellison Street.

The grade separation of Renfro Street is estimated to cost $6,220,000 with an estimated public benefit of $22,360,000 over a twenty-year period, which is over four times greater than the estimated cost of construction.

Grade Separation of Sycamore School Road on the UP Fort Worth Subdivision

Sycamore School Road is currently a four-lane roadway that crosses the railroad at-grade in Tarrant County near Fort Worth. An average daily traffic volume of 18,520 vehicles crosses the UP railroad at this location. The identified four-lane roadway overpass would separate vehicular traffic from the UP Fort Worth Subdivision.

None of the existing roadways have been closed at the grade separation. However, the Hemphill Street connection to Sycamore School Road would be moved to the west and require a shift in the roadway alignment. Access to the park would also be adjusted to accommodate vehicular traffic. Access to other properties adjacent to the grade separation would be maintained via existing side streets. Roadway adjustments would be constructed at the Pebbleford Road and Hemphill Street intersections and the park entrance and would also include driveways along the grade separation. An additional bridge would be required for the grade separation over the creek east of the railroad and bordering Hallmark Park.

Project constraints include Hallmark Park, which is located north of Sycamore School Road and east of the railroad, and a church, which is located south of Sycamore School Road at Pebbleford Road.

The grade separation of Sycamore School Road is estimated to cost $7,070,000 with an estimated public benefit of $36,080,000 over a twenty-year period, which is over five times greater than the estimated cost of construction.

Crossing Closures

Crossing Closure of W Bowie Street on the UP Fort Worth Subdivision

W Bowie Street is currently a two-lane roadway with average daily traffic volume of 490 vehicles that cross the UP Fort Worth Subdivision in the city of Fort Worth in Tarrant County. The street provides access to and from residential areas on the west side of the railroad and commercial areas on the east side of the railroad.

The vehicular traffic along W Bowie Street could be rerouted to cross the railroad over the existing Berry Street overpass, which would increase the travel distance to cross the railroad by up to 0.9 miles. Traffic west of the railroad could be rerouted from the Bowie Street closure to travel west on Bowie Street, south on Hemphill Street, and then east on Berry Street to the existing overpass. Traffic east of the railroad could travel east on Bowie Street, south on St. Louis Avenue, east on Berry Street access, south on S Main Street, and then west on Berry Street to the existing overpass.

The crossing closure is estimated to cost $50,000 with an estimated public benefit of $610,000, which is over twelve times greater than the estimated cost to implement the crossing closure.

Crossing Closure of W Kellis Street on the UP Fort Worth Subdivision

W Kellis Street is currently a two-lane roadway with average daily traffic volume of 1,630 vehicles that cross the UP Fort Worth Subdivision in the city of Fort Worth in Tarrant County. The street provides access to and from residential and commercial areas on both sides of the railroad.

The vehicular traffic along W Kellis Street could be rerouted to cross the railroad over the existing Seminary Drive underpass, which would increase the travel distance to cross the railroad by up to 0.6 miles. Traffic west of the railroad could be rerouted from the Kellis Street closure to travel west on Kellis Street, north on College Avenue, and then east on Seminary Drive to the existing underpass. Traffic east of the railroad could travel east on Kellis Street, north on Town Center Drive, and then west on Seminary Drive to the existing underpass.

The crossing closure is estimated to cost $50,000 with an estimated public benefit of $2,500,000, which is fifty times greater than the estimated cost to implement the crossing closure.

Crossing Closure of Magnolia Avenue on the UP Fort Worth Subdivision

Magnolia Avenue is currently a two-lane roadway with an average daily traffic volume of 300 vehicles that crosses the UP Subdivision just south of downtown Fort Worth. Magnolia Avenue provides access to and from primarily commercial areas west of the railroads and primarily residential areas east of the railroads.

The vehicular traffic along Magnolia Avenue could be rerouted to cross the BNSF and UP railroads on Rosedale Street or Allen Avenue, which are both existing grade separations. Magnolia Avenue is part of a quiet zone currently being planned and designed by the City of Fort Worth. The quiet zone plans include closing Magnolia Avenue and providing emergency access to properties that would be losing roadway access via Magnolia Avenue. Closing the crossings would increase the travel distance to cross the railroad by up to 1.1 miles.

The crossing closure is estimated to cost $50,000 with an estimated public benefit of $260,000, which is over five times greater than the estimated cost to implement the crossing closure.

Crossing Closure of Ramsey Street on the UP Fort Worth Subdivision

Ramsey Street is currently a two-lane roadway with an average daily traffic volume of 270 vehicles that crosses the UP Fort Worth Subdivision just south of downtown Fort Worth. Ramsey Street provides access to and from primarily commercial and industrial areas on both sides and in between the railroads. The crossing is located just south of railroad Tower 55, in an area where trains are frequently blocking crossings while waiting to pass through Tower 55.

The vehicular traffic along Ramsey Street could be rerouted to cross the railroad on Morningside Drive. Closing the Ramsey Street crossings would increase the travel distance to cross the railroad by approximately 0.8 miles.

The crossing closure is estimated to cost $50,000. The estimated public benefit for the closures of Ramsey Street is not included in this report since traffic may be rerouted to other at-grade crossings. However, there is a public benefit associated with reducing the number of at-grade crossings.

SECTION 9: REGIONAL OUTER LOOP/LOOP 9

The Dallas-Fort Worth metropolitan area is experiencing and continues to experience a relatively large growth in the area's population due to a favorable business climate, attractive tax policies, and an abundance of attractive commercial, industrial, and residential real estate. As part of this growth, much of the area's population lives in the suburban and rural areas of the Metroplex and commute to the business centers; conversely, many businesses are moving to the suburban areas of Dallas-Fort Worth due to more economical land values. Furthermore, the Dallas-Fort Worth metropolitan area is considered by many to be the primary truck, rail, and air cargo center in the southwestern United States and the primary urban gateway for trade between the U.S. and Mexico. All of these factors have contributed and will most likely continue to contribute to congestion within and around the Dallas-Fort Worth area. A solution proposed by the North Central Texas Council of Governments (NCTCOG), the area's Metropolitan Planning Organization (MPO), to relieve this congestion is a Regional Outer Loop around the Dallas-Fort Worth Metroplex.

Regional Outer Loop

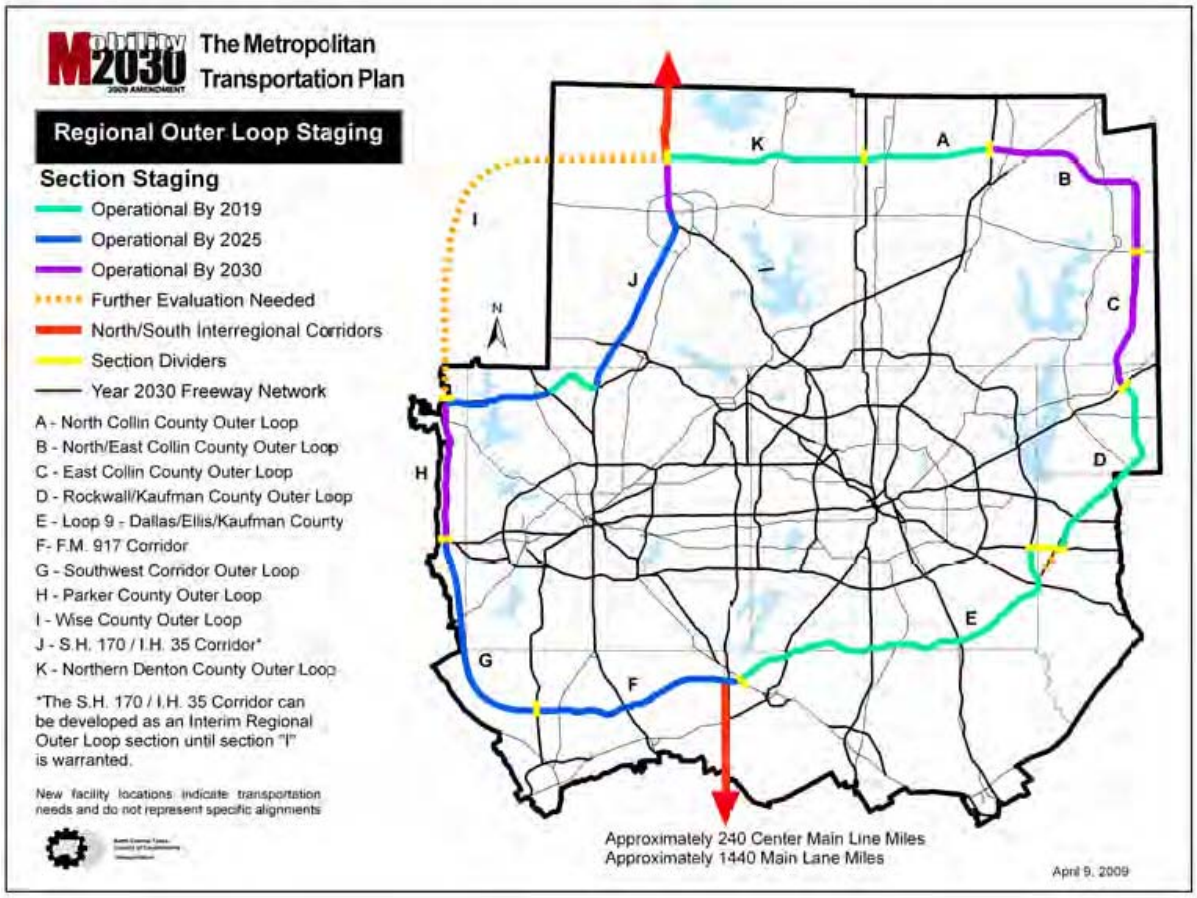
The concept of an outer loop around the Dallas-Fort Worth metropolitan area was first earmarked in 1957 within the Greater Dallas Planning Council's *Regional Transportation Highway Plan*. Since then, the Regional Outer Loop has been, in some capacity, included in the area's transportation plans. The Texas Highway Commission authorized this outer loop around Dallas and designated it as a freeway facility in the latest *Regional Transportation Highway Plan*.

The goals set by the NCTCOG for the design and construction of the Regional Outer Loop (ROL) include:

- Increased mobility and commerce flow with local/regional goals of sustainable development by balancing interactions between land use and transportation
- Improvement of east-west mobility
- Provide a balanced and coordinated transportation system

The Regional Outer Loop is a proposed 240-mile transportation corridor that traverses through portions of nine counties (Dallas, Ellis, Johnson, Parker, Wise, Denton, Collin, Rockwall, and Kaufman) and is part of a long-term multimodal vision for the Dallas-Fort Worth region. In the *Mobility 2030: The Metropolitan Transportation Plan* (MTP) report, the Regional Outer Loop is shown as a tolled facility. This report also proposes phased construction with particular segments. For example, the segments to the southeast and north of the Dallas-Fort Worth Metroplex are anticipated to be in operation by 2019, while additional segment west of Fort Worth are anticipated to be operational by 2025. The Regional Outer Loop's proposed completion date is 2030.

At this time particular alignments have not been determined and right of way has not yet been acquired for the segments of the Regional Outer Loop.



Mobility 2030: 2009 Amendments to Regional Outer Loop Map

The Regional Outer Loop is likely to lessen the impact on a growing population in the Dallas-Fort Worth Metroplex by moving some of the traffic that would normally travel into the city centers to the suburban areas of the cities. In many cases this would provide shorter routes and travel times for through traffic to access major interstate, U.S. highway, and state highway routes. The Regional Outer Loop would likely also be effective for north-south and east-west traffic during peak traffic times in the Dallas-Fort Worth Metroplex.

Loop 9 Southeast

One of the segments proposed to be operational by 2019 as part of the Regional Outer Loop is labeled in the figure above as segment E, which is the proposed Loop 9 Southeast project.

Since 1974 there have been 10 regional transportation plans; Loop 9 has been included in each of these plans. Loop 9 Southeast is, and continues to be, an integral part of the region's long-range MTP. It would provide a direct link from I-20 to U.S. 287 in the eastern region of the Metroplex as well as links to other major

roadways and would serve the residents in the area. The regional MTP recommends Loop 9 Southeast from I-20 to U.S. 287 as a six-lane new location tollway facility. This recommendation is based on NCTCOG travel demand forecasts for the year 2030, in which travel demand needs are in excess of those that can be satisfied by the proposed financially-constrained regional transportation plan.

On November 5, 1991, Dallas County voters approved the 1991 County Bond Program, authorizing over $175,000,000 in bonds for transportation improvements. Included in the bond program was funding for the Loop 9 Feasibility and Route Alignment Study.

Although never finalized, the Loop 9 Feasibility and Route Alignment Study was authorized in 1995. The limits of the study corridor were defined as the proposed extension of SH 360 in Ellis County to I-20 in Mesquite. The NCTCOG initiated a similar effort for the corridor continuing west of SH 360 to beyond I-35W near Crowley. In 1997, study efforts resulted in a "Technically Preferred Alignment" that was approved and/or adopted by many of the cities and agencies involved in the Study. However, study efforts were temporarily suspended before a "Locally Preferred Alignment" was identified. The present day Loop 9 Study picks up where previous study efforts left off, studying the original alignments as well as citizen input, and incorporating new federal guidelines pertaining to the development of environmental impact statement.

Loop 9 Southeast is expected to be a section of tollway to extend from U.S. 287 near Midlothian to I-20 near Mesquite southeast of the Dallas-Fort Worth metropolitan area. Schematic-level engineering drawings show the tollway with three mainlanes in each direction along with non-tolled frontage roads connecting to the existing intersecting side streets. The proposed right of way is currently planned for 450 to 600 feet in width. According to the schematic-level engineering drawings, this section of the Regional Outer Loop would include major interchanges at U.S. 287, U.S. 67, I-35E, I-45, U.S. 175, and I-20.

Currently, the Loop 9 Southeast project is in the environmental impact statement (EIS) review process. Also, two schematic-level alignment locations have been developed that generally follow one alignment but vary in certain sections of the project. These alignments traverse fairly close to the Dallas County/Ellis County and the Dallas County/Kaufman County lines. Updates to the progress of the Loop 9 Southeast project are available at www.loop9.org.

The Loop 9 Southeast will provide an ideal connection for vehicular traffic travelling between I-20 and I-45. This would allow for shorter truck freight movements and would provide a freeway route from I-45 to I-20 in lieu of SH 34.

Freight Rail Bypass

As part of the Regional Outer Loop, NCTCOG has also identified a potential need for a bypass for freight rail operations around the Dallas-Fort Worth Metroplex. This

freight rail bypass would generally follow the alignment for the Regional Outer Loop and, according to the October 2007 presentation by the NCTCOG, would be evaluated from the UPRR Duncan Subdivision south and east to the UPRR Dallas Subdivision with potential evaluations to the UPRR Choctaw and KCS Greenville Subdivisions.

A freight rail bypass has advantages for the Dallas-Fort Worth metroplex pending approval by the user railroads, funding, and alternative and environmental analysis. Through the bypass, trains that would currently travel along the UPRR Dallas Subdivision through Fort Worth, Arlington, Grand Prairie, and Dallas would have the opportunity to avoid these town centers and likely travel at higher speeds with less vehicular traffic at roadway-rail crossings and likely fewer roadway-rail crossings; this would likely provide a decrease in roadway-rail incidents as well as decreased public transportation delays due to train traffic. Further, the bypass may shorten travel times for through freight trains connecting from the UPRR Dallas Subdivision to the UPRR Ennis and UPRR Fort Worth Subdivisions by the potential to provide wye connections from the bypass to these tracks. Also, opportunities for the development of passenger rail should increase through removal of the majority of through trains on the UPRR Dallas Subdivision.

However, the use of the freight rail bypass by the railroads would inherently need the approval of the major carriers in the region, and the bypass would lengthen train travel if used in lieu of the UPRR Dallas Subdivision. Rail yards also exist inside of the freight rail bypass limits; therefore, access to these yards may require use of the existing rail lines instead of the bypass or replacement yards may need to be incorporated in the bypass concept.

The freight rail bypass currently has not undergone operational analysis to determine the potential effectiveness to shift through-trains from the Dallas-Fort Worth Metroplex to the bypass as well as public and private costs and benefits, and order-of-magnitude cost estimates.