Freight Congestion and Delay Study Final Report

A Freight North Texas Study

Prepared by:

North Central Texas Council of Governments

March 2016

FREIGHT NORTH TEXAS

What is NCTCOG?

The North Central Texas Council of Governments is a voluntary association of cities, counties, school districts, and special districts which was established in January 1966 to assist local governments in **planning** for common needs, **cooperating** for mutual benefit, and **coordinating** for sound regional development.

It serves a 16-county metropolitan region centered around the two urban centers of Dallas and Fort Worth. Currently the Council has **234 members**, including 16 counties, 168 cities, 22 independent school districts, and 28 special districts. The area of the region is approximately **12,800 square miles**, which is larger than nine states, and the population of the region is over **6.5 million**, which is larger than 38 states.

NCTCOG's structure is relatively simple; each member government appoints a voting representative from the governing body. These voting representatives make up the **General Assembly** which annually elects a 15-member Executive Board. The **Executive Board** is supported by policy development, technical advisory, and study committees, as well as a professional staff of 324.

NCTCOG's offices are located in Arlington in the Centerpoint Two Building at 616 Six Flags Drive (approximately one-half mile south of the main entrance to Six Flags Over Texas).

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NCTCOG's Department of Transportation

Since 1974 NCTCOG has served as the Metropolitan Planning Organization (MPO) for transportation for the Dallas-Fort Worth area. NCTCOG's Department of Transportation is responsible for the regional planning process for all modes of transportation. The department provides technical support and staff assistance to the Regional Transportation Council and its technical committees, which compose the MPO policy-making structure. In addition, the department provides technical assistance to the local governments of North Central Texas in planning, coordinating, and implementing transportation decisions.

Prepared in cooperation with the Texas Department of Transportation and the US Department of Transportation, Federal Highway Administration, and Federal Transit Administration.

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1.0 INTRODUCTION

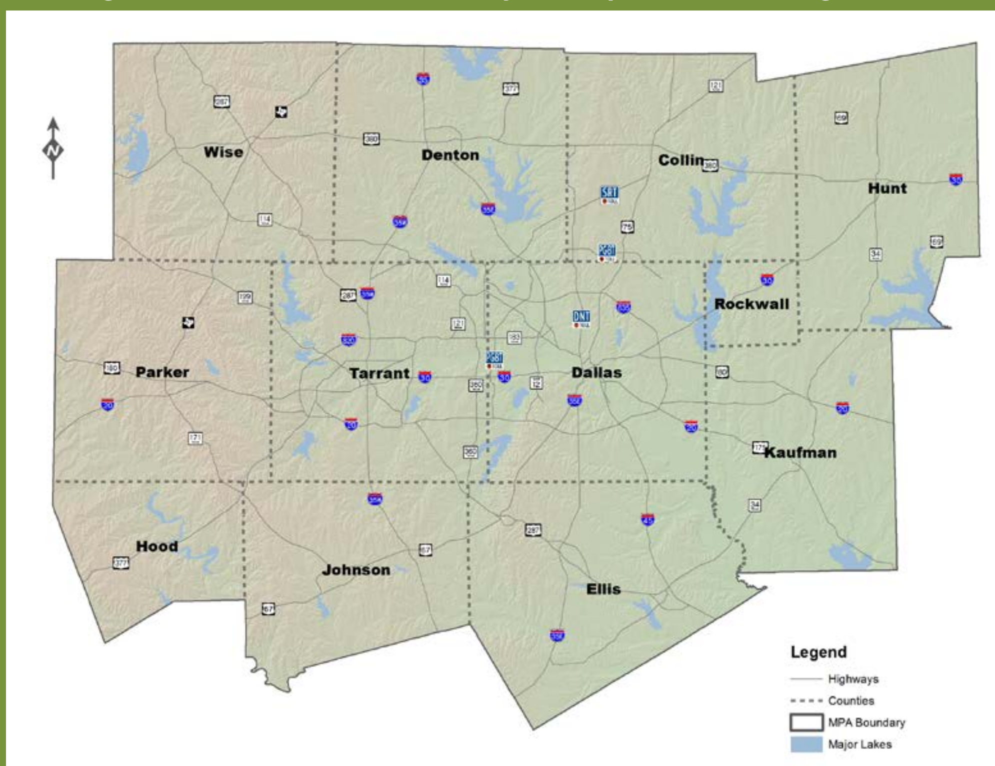
The North Central Texas region is a national leader and innovator in transportation policies, programs, and projects. The North Central Texas Council of Governments (NCTCOG) oversees freight system planning in the NCTCOG 12-county Metropolitan Planning Area (MPA), shown in Figure 1-1. This 12-county region covers approximately 9,500 square miles and more than 170 municipalities.

1.1 Freight Relevance

Transporting freight is a key component in the Texas and regional economies. In 2010, the North Central Texas region accounted for 34 percent of Texas' Gross Domestic Product (GDP). The efficient movement of goods and services is deemed to be vital to the North Central Texas economy and overall growth. To improve freight movement efficiency, NCTCOG created a program focused toward minimizing freight inefficiencies.

Figure 1-1

Figure 1-1: NCTCOG 12-County Metropolitan Planning Area



Source: NCTCOG 2014

1.2 Freight North Texas

Freight North Texas is an ongoing program led by NCTCOG to enhance the safety, mobility, and air quality associated with freight movements within the Dallas-Fort Worth region. A primary input source for the Freight North Texas effort is the Regional Freight Advisory Committee (RFAC). RFAC consists of private sector freight professionals and other government agency staff representatives with intimate knowledge regarding the movement of goods and services. The guiding document for Freight North Texas is *Freight North Texas: The North Central Texas Regional Freight System Inventory*, published in May 2013. This document highlights policies, programs, and projects needed to improve freight planning and operations in North Central Texas. Several follow up studies were recommended in *Freight North Texas*:

- Freight Congestion and Delay Study
- Regional Truck Parking Study
- Economic Impact of Freight on the Region
- Freight Project Evaluation System
- Land-Use Compatibility Analysis

1.3 Freight Congestion and Delay Study

Initial study data collection efforts centered on obtaining input through personal contact with freight industry professionals. The outreach effort was conducted to learn about and share best practices for avoiding or minimizing delay from the system user perspective. Nineteen meetings with private sector freight industry professionals were conducted. Results from this effort did not provide sufficient information for the study. As such, a revision in study methodology was warranted.

After soliciting input from the Regional Freight Advisory Committee on data collection efforts and study methodology, the study shifted focus from a broad regional analysis to four distinct freight-oriented focus areas. Traditional transportation analysis tools were employed, leading to recommendations for policies, programs, and projects designed to mitigate freight delay efficiently and effectively.

1.3.1 Focus Area Identification

Staff began this study from a region-wide perspective. A variety of factors related to freight-specific delay were investigated, including recurring, non-recurring, and non-transportation related delay. A variety of data sources were also reviewed, including:

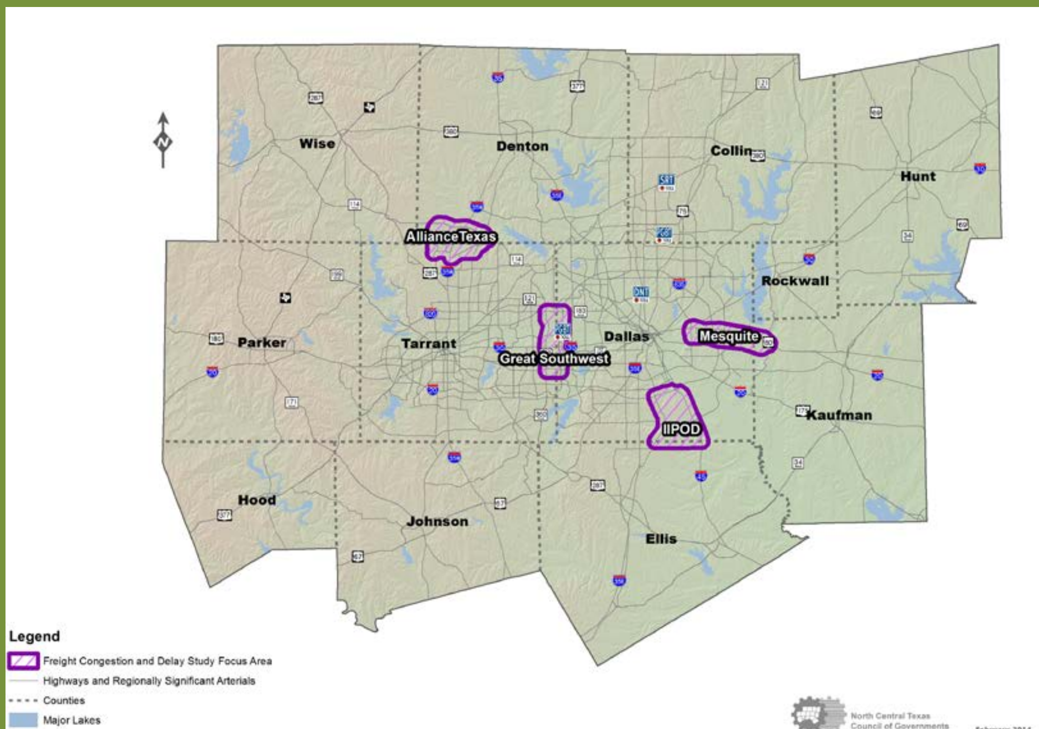
- Truck volumes on regional facilities
- Regional truck congestion
- Traffic control delay
- Locations for reported truck-involved crashes

Additionally, staff set out to collect data on locations of delay specific to freight traffic, from drivers and managers of freight facilities. While staff had RFAC support and assistance, this data collection effort did not produce the intended results. Using the information obtained and input from RFAC members, staff determined a regional approach was too large for the scope of this study and elected to analyze smaller focus areas.

Staff selected the following focus areas shown in Figure 1-2:

- Alliance Texas
- Great Southwest Industrial Park
- Intermodal Inland Port of Dallas
- Mesquite Intermodal Hub

Figure 1-2



Source: NCTCOG 2014

The focus areas represent diversity in regional freight facilities:

- Master-planned logistics hub/inland port, currently in operation (Alliance)
- Older industrial park/warehouse area (Great Southwest Industrial Park)
- Master-planned logistics hub/inland port, currently in operation with Phases I and II complete (IIPOD)
- Older intermodal hub (Mesquite Intermodal Hub)

1.3.2 Focus Area Assessment

The Freight Congestion and Delay Study focuses on roadway movements, utilizing data from various sources to identify specific causes of congestion and delay. The study examines the impacts of three types of delay on freight movement:

Recurring – Delays exhibiting predictable patterns typically caused by high traffic volume, traffic signals, speed limits, regularly occurring bottlenecks, or major construction projects. This delay can be described as generally occurring daily and in consistent locations. Recurring congestion and delay is typically created by transportation system deficiencies.

Non-Recurring – Delays due to unpredictable or highly variable sources such as traffic incidents, inclement weather, special events, or maintenance closures. This delay is best described as random. Non-recurring congestion is generally created by unforeseen circumstances and is typically not a product of transportation system deficiencies.

Non-Transportation – Delays stemming from sources unrelated to the transportation system, including wait times to load/unload, staffing levels, equipment maintenance, or documentation/regulatory compliance. This delay can be both recurring and non-recurring. Non-transportation congestion is generally produced by both private- and public-sector entities.

Each delay type requires a different approach to mitigate congestion and identify policies, programs, and projects intended to increase the efficiency of freight transportation. Recurring congestion is the easiest to identify and address proactively through long-term planning efforts. Non-recurring delay is, by definition, more difficult to address due to its random qualities. Strategies to reduce non-recurring delay include initiatives to increase incident responsiveness, encourage communication, and implementation of technological solutions. Non-transportation delay is the most difficult to address. Non-transportation delay is included in the study to encourage partnerships designed to minimize these less visible sources of inefficiency and ineffectiveness.

The four focus areas were evaluated based on the three congestion categories described above. In addition, the analysis incorporated the following components:

- Truck Traffic Forecasts
- Traffic Signal Assessment
- Truck-Involved Crashes
- Truck Route Assessment
- Roadway/Railroad Crossing Assessment

The results of the analysis led to recommendations for each focus area. Implementing the recommendations is intended to relieve regional congestion by alleviating congestion and delay causes within the “last/first” mile of a freight trip located within the focus areas. The methodology for assessing freight congestion and delay is described in more detail in Appendix B.

2.0 REGIONAL CONDITIONS

Freight is constantly moving through, to, and from the Dallas-Fort Worth region. Goods are moved, transferred, and distributed to destinations across the United States and around the world via truck, train, and aircraft. Planning for freight movement is crucial to the region's economy and is a vital element to consider in multimodal transportation planning.

2.1 Regional Overview

Locally-defined freight performance measures are specific data sets collected by planning agencies to determine the effectiveness of various freight policies, programs, or projects. In general, freight performance measures are mode-specific, although some, such as the freight industry's economic impact, can be applied to all modes. These measures were applied for this analysis.

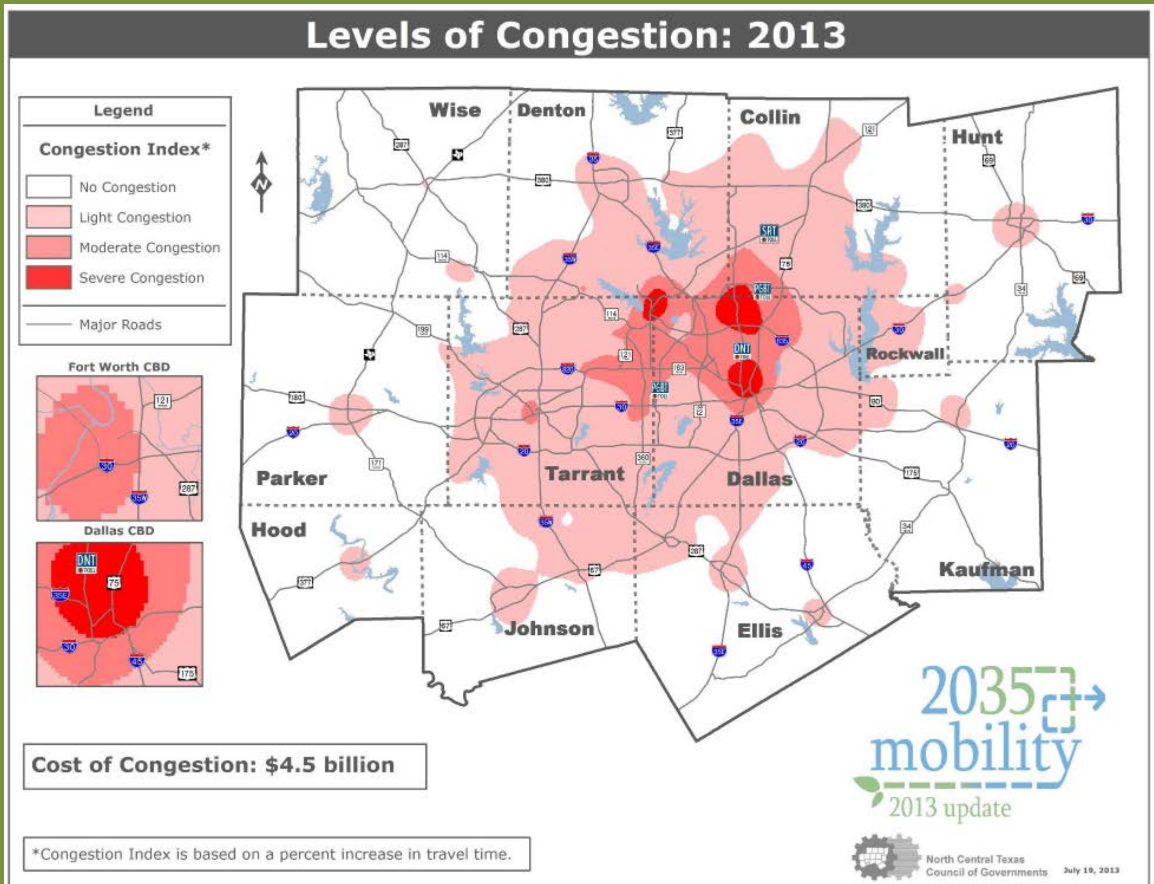
Figure 2-1 identifies current average weekday congestion levels throughout the region. As the figure shows, the most severe congestion levels are near downtown Dallas, the City of Addison, and north of Dallas-Fort Worth (DFW) International Airport. Only recurring sources of congestion, such as commuter congestion and traffic control delays, are accounted for in the travel demand modeling process. Additional delay from vehicle crashes and other non-recurring sources of delay only intensifies the levels of congestion shown in Figure 2-1.

2.2 Regional Truck Traffic

Estimates of current truck traffic throughout the Dallas-Fort Worth region, based on travel demand model forecasting, were developed for *Mobility 2035 – 2014 Amendment*.

Figure 2-1

Figure 2-1: Current Congestion Levels



Source: *Mobility 2035 – 2013 Update* (Appendix F, Page 3)

The Dallas-Fort Worth Regional Travel Demand Model for the Expanded Area (DFX) provides the most comprehensive estimate of truck movements through the region. A more detailed methodology description for assessing regional freight congestion and delay is included in Appendix A. This estimating process was used for the focus areas as well (see Appendix B).

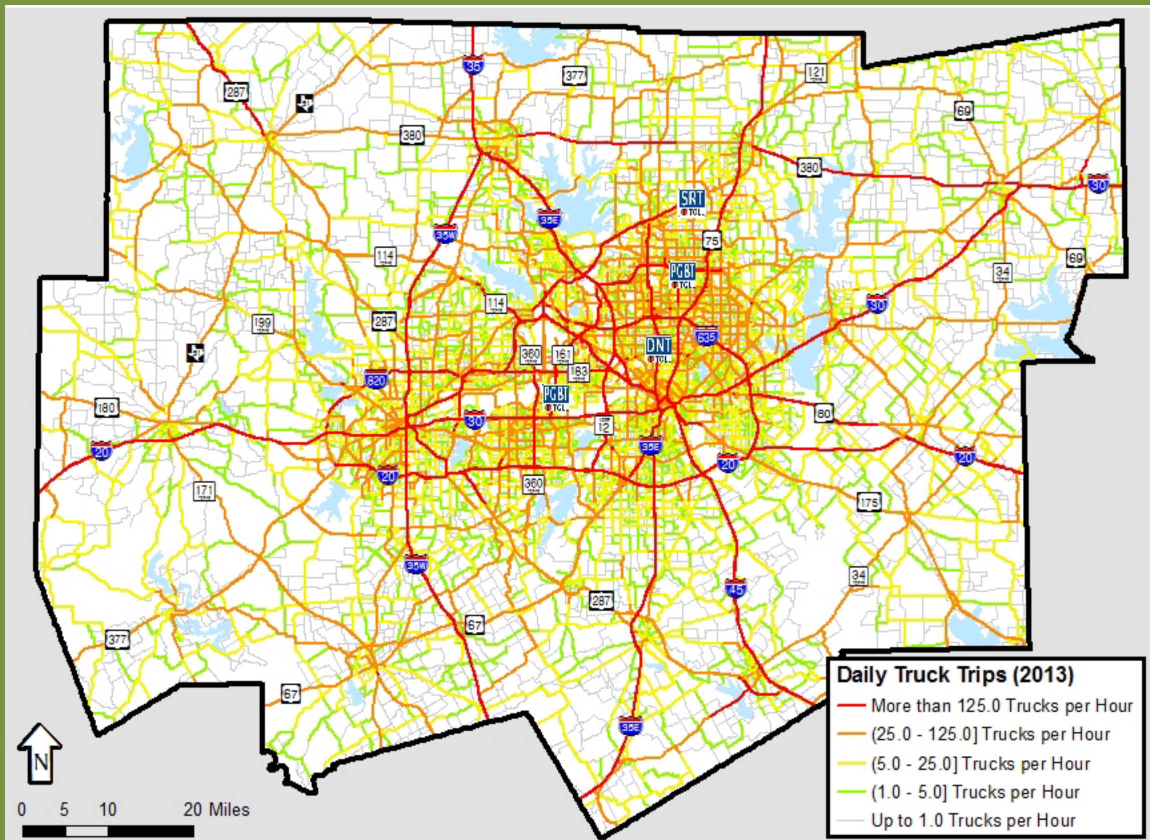
Figure 2-2 shows the distribution of truck trips within the Dallas-Fort Worth region. Most truck trips are concentrated on the limited access highway and tollway systems. Most regional highways have more than 125 trucks passing each hour.

2.3 Regional Truck Congestion

Nearly all freight professionals surveyed listed roadway congestion as the primary obstacle to timely freight movement. The estimated impact of roadway congestion to freight movements was developed based on the daily truck trips shown in Figure 2-2.

Figure 2-2

Figure 2-2: Regional Truck Traffic

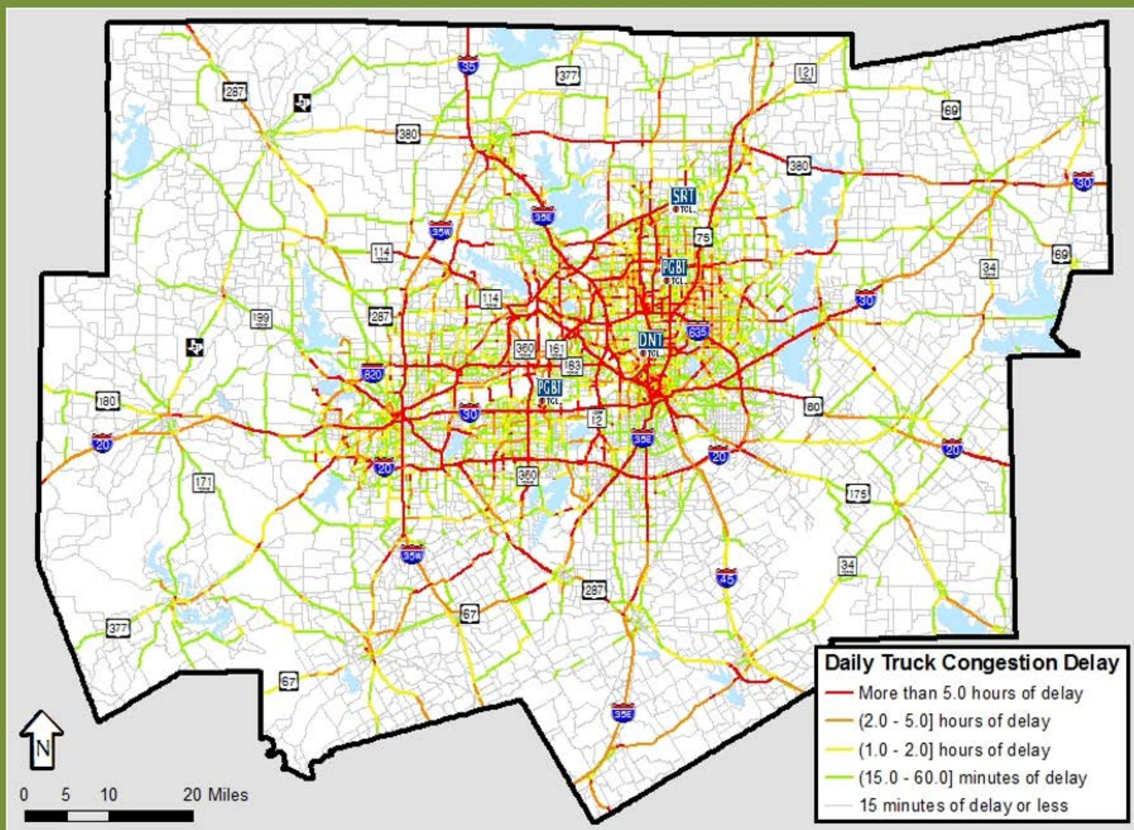


Source: NCTCOG 2014

The daily freight congestion delay is shown in Figure 2-3. This highlights the regional nature of congestion delay. All major highways and toll facilities experience major truck trip congestion delay. The sheer volume of truck trip congestion delay in the region contributed to the decisions to analyze specific areas. The focus area approach is used to better identify where travel congestion is most problematic for last mile connections.

Figure 2-3

Figure 2-3: Regional Truck Congestion Delay



Source: NCTCOG 2014

Freight movements on IH 35W, US 287 and IH 45, to or from outside the MPA, are less impacted by daily commuter congestion as these facilities are more rural. Whenever possible, trips serving or passing through the Dallas-Fort Worth region are scheduled to avoid peak morning and evening commuter periods.

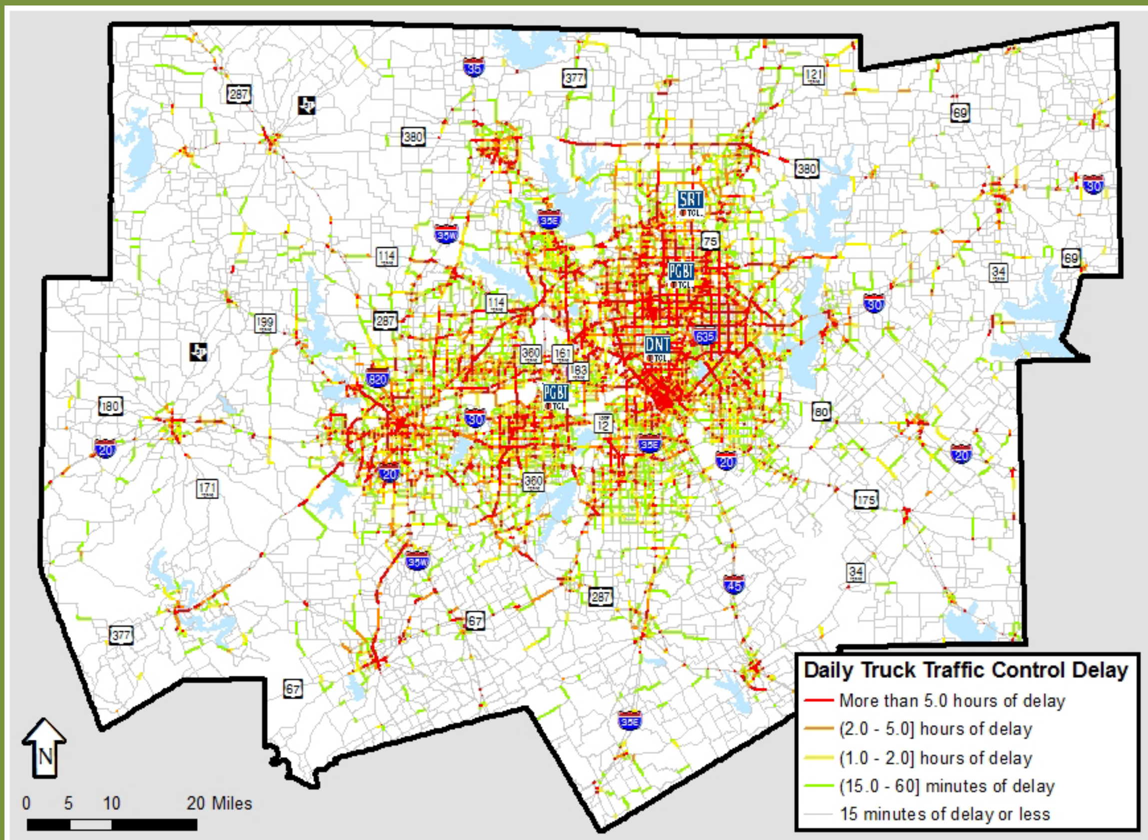
2.4 Regional Traffic Control

Traffic control devices are another major source of recurring delay on roadways. Figure 2-4 shows areas with substantial traffic control delay based on current truck traffic estimates. Some traffic control delay is necessary and appropriate. Traffic signals, stop signs, yield signs, and speed limits are all causes of recurring delay. These devices, and the enforcement measures taken to encourage compliance, increase the overall transportation system safety and efficiency.

Most traffic control delay occurs on arterial and collector streets. Operational characteristics of heavy vehicles can make them particularly susceptible to this type of delay. Traffic signals can be especially problematic on arterial and collector street truck routes where timing plans do not include truck acceleration and deceleration rates.

Figure 2-4

Figure 2-4: Regional Truck Traffic Control Delay



Source: NCTCOG 2014

Traffic control delay is an issue throughout the region. With most traffic control delay occurring within the first or last mile, the benefits of optimizing traffic control systems are much more localized.

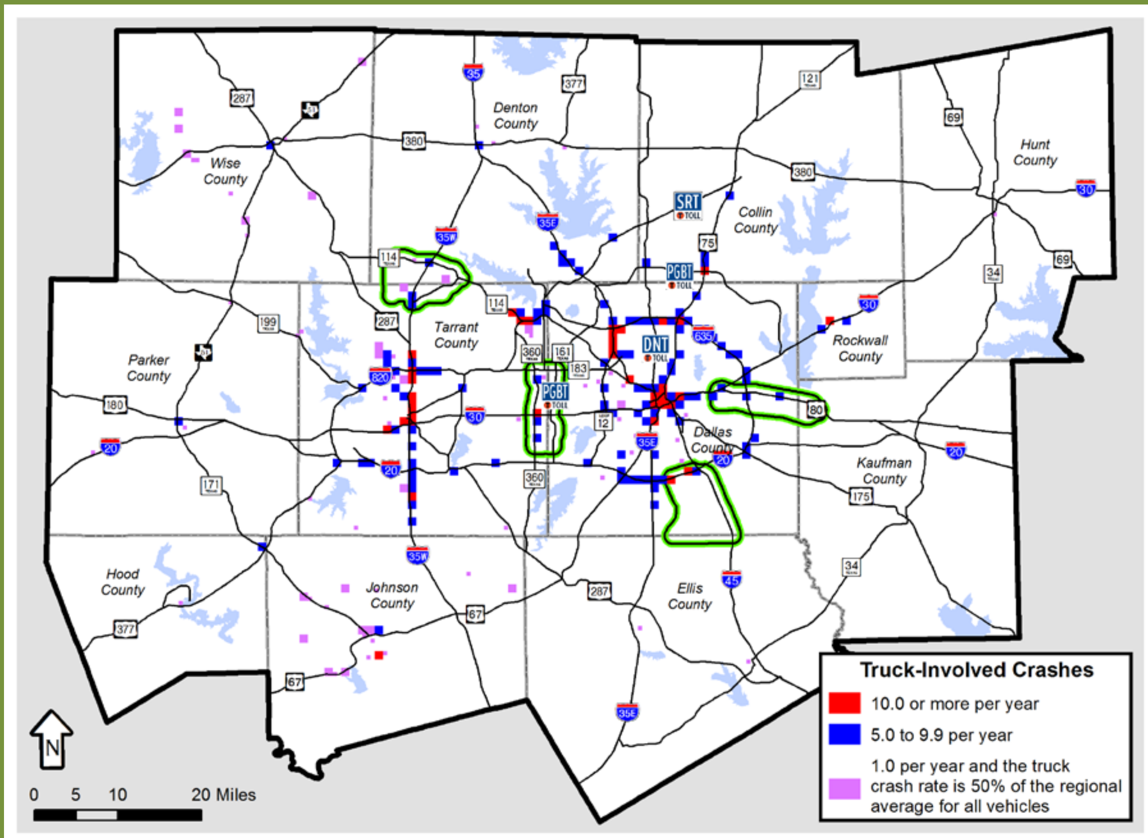
2.5 Regional Travel Crashes

Non-recurring congestion delays are more difficult to assess and address. The most common non-recurring congestion type is caused by traffic incidents. Even relatively minor crashes can cause delays for many transportation system users if the vehicles involved obstruct travel lanes. Because of the amount of fuel most trucks carry during normal operations, crashes involving trucks are often treated as HAZMAT incidents. The time required to assess potential hazards, document damage, and clear the incident all increases delay. Figure 2-5 illustrates areas with truck involved crashes in the region.

Truck-involved crashes are focused on the limited access roads. IH 35W through downtown Ft. Worth and downtown Dallas have the highest concentration of crashes. Other high crash areas include SH 114 near the DFW Airport, IH 35E and IH 635 on the north side of Dallas, and IH 20 on the south side of Dallas.

Figure 2-5

Figure 2-5: Regional Truck-Involved Crashes



Source: NCTCOG 2014

2.6 Policies and Programs

As stated above, freight is constantly moving through the DFW region. Making accommodations and planning for freight is crucial to the region's economy and is a vital element to consider in multimodal transportation planning. Alleviating freight congestion is important to the region's planning and growth. The figures in the previous sections illustrate how freight is impacted by congestion across the entire region.

2.6.1 Policies

Policies are meant to guide freight decisions for the region and are based on the congestion and delay analyses. They are the starting point of all programs and projects. Taken collectively, policies identify the freight goal for the region. Table 2-1 identifies the recommended regional policies for improving freight movement.

Table 2-1: Policy Recommendations

Policy	Issues	Policy Description
Safety	Improve at-grade rail crossing safety. Minimize truck crashes.	Create safer truck routes and conditions for freight movement.
Efficiency	Improve at-grade rail crossing efficiency. Eliminate truck route discontinuity. Improve "first/last mile" network access.	Ensure continuous truck routes between municipalities allowing freight to move efficiently to designated facilities. Improve access to the "first/last mile" using designated truck routes. Follow appropriate heavy truck design standards, including turning radius. Retime traffic signals to minimize delays.
Comprehensive	Ensure project continuity. Identify Local Freight Network.	To be eligible for funding, the project must be on a freight network (Primary, Secondary, or Local).

2.6.2 Programs

Programs are policies in action. They are more focused ideas based on the policies. The programs encompass the entire region to help meet policy goals. The programs are based on the congestion and delay analyses. Table 2-2 identifies the recommended regional programs for improving freight movement.

Table 2-2: Program Recommendations

Program	Base Policy	Program Description
Truck Route Network Continuity	Efficiency	Coordinate with local municipalities to designate appropriate truck route facilities allowing for efficient connected truck routes.
Local Government Freight Education	Efficiency and Comprehensive	Create and administer freight education program for local governments.
Intersection Improvements	Efficiency	Periodically review traffic signals for optimal freight conditions on designated truck routes. Geometric improvements to truck routes to improve freight movement.
Access/Egress To/From Freight Facilities	Efficiency	Enhance freight facilities access/egress to the to/from the various freight networks.
Data Collection	Comprehensive	Improve quantity and quality of data using public and private sources.
Local Government/Railroad Partnerships	Efficiency and Safety	Encourage local governments and railroads to cooperate on the best outcome for improving rail crossings.
Safe Driver	Safety	Identify and promote safety programs.

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3.0 STUDY FOCUS AREAS

Planning and oversight regarding freight movement safety and efficiency between metropolitan areas, states, and nations is addressed through state and federal government agencies. Proactive design standards and planning techniques are in place to ensure freight movement is accommodated on the national and state highway system. The advantage of looking at freight transportation from a focus area perspective is the ability to effectively analyze the "last mile" between interstate highways, railway lines, airports, and pick-up or delivery sites.

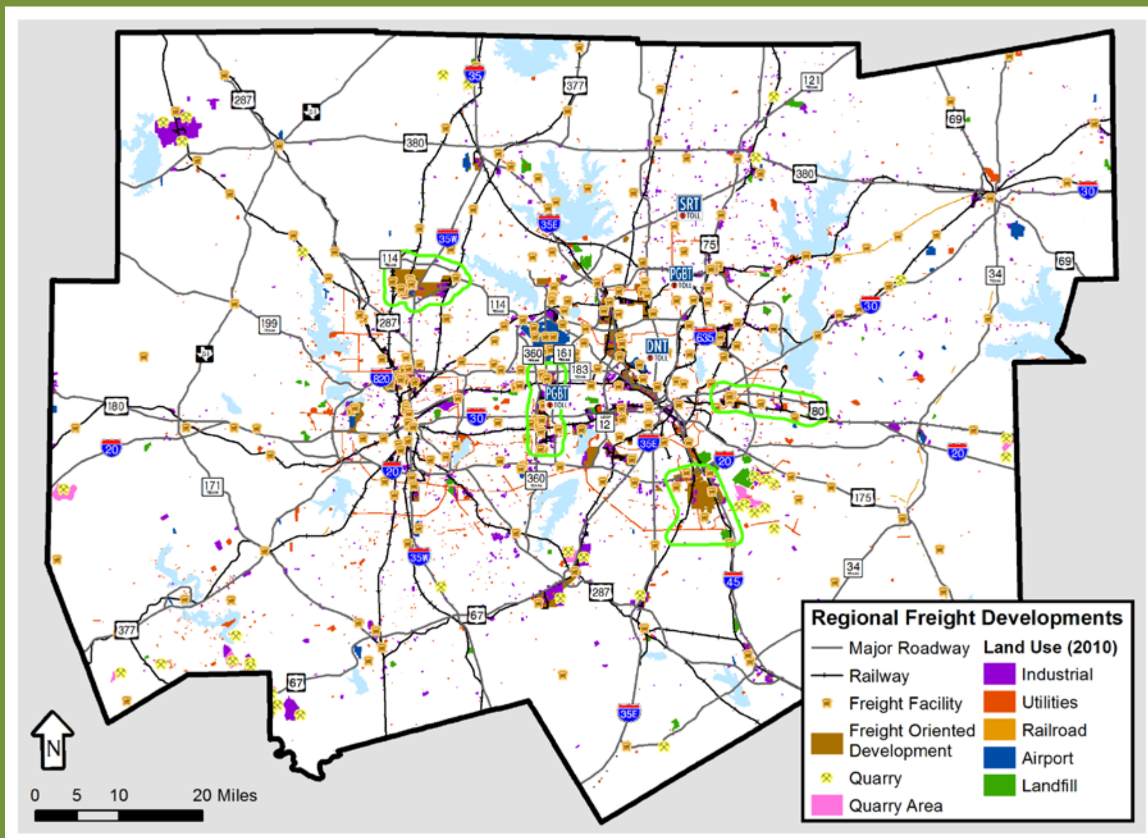
3.1 Freight-Oriented Transportation Facilities

Many facilities and land uses produce or attract above average freight activity. Figure 3-1 shows freight intensive areas in the region. Freight facilities range in complexity from truck stops to intermodal terminals. A freight oriented development (FOD) is defined as an area where manufacturing, warehousing, distribution, and freight forwarding operations may be consolidated with ready access to a multimodal transportation network. Freight-oriented development land uses depending heavily on freight transportation services include industrial, utilities, and landfills. Quarries also generate substantial freight traffic.

The freight transportation industry is most efficient where participants can choose between several competing transportation alternatives. Some commodities and products are limited predominantly to one mode. Even mode-limited freight shippers benefit from multi-modal competition because the relative overall demand and cost for each mode is then governed by market decisions.

Figure 3-1

Figure 3-1: Regional Freight Developments



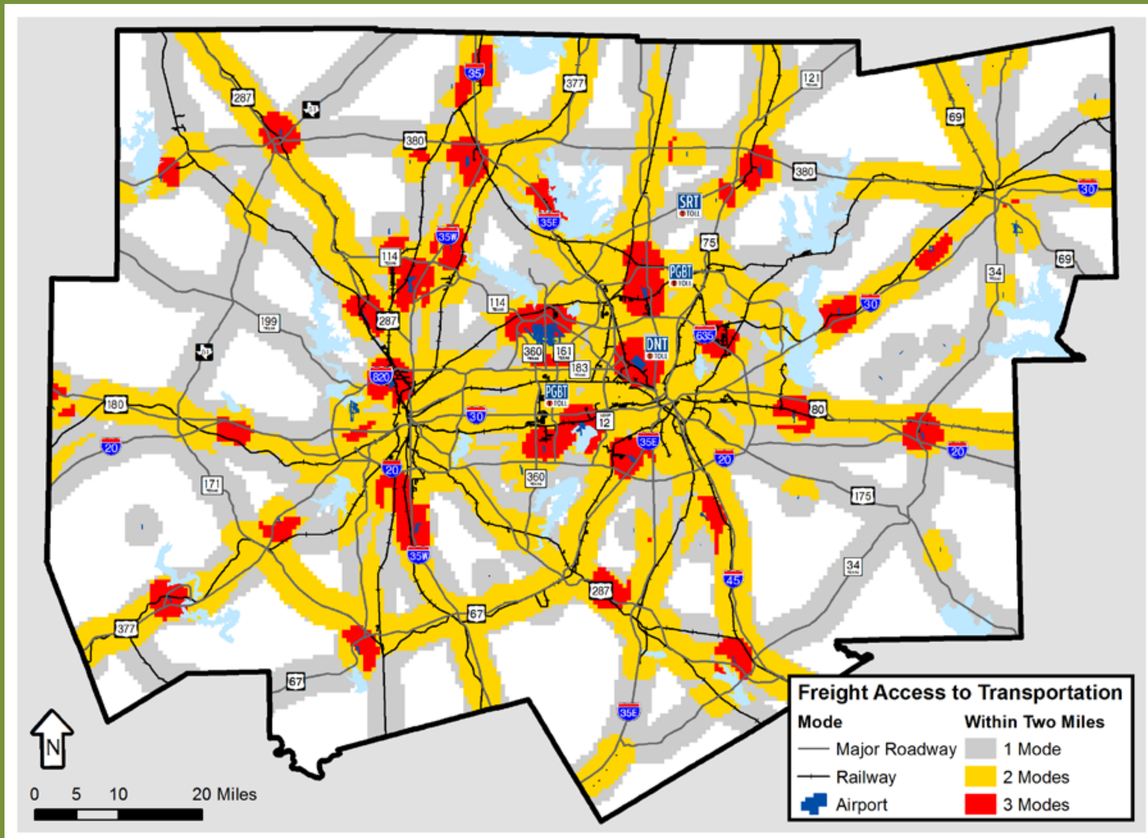
Source: NCTCOG 2014

As the largest inland region without access to a seaport in the United States, freight transportation within and through the Dallas-Fort Worth region relies heavily on roadways, railways, and airports. Figure 3-2 highlights the areas within two miles of one or more transportation modes. Areas with access to all three modes have the widest variety of transportation services available.

The freight transportation industry is most efficient where participants can choose between several competing transportation alternatives. Some commodities and products are limited predominantly to one mode. Even mode-limited freight shippers benefit from multi-modal competition because the relative overall demand and cost for each mode is then governed by market decisions.

Figure 3-2

Figure 3-2: Multi-Modal Transportation Corridors



Source: NCTCOG 2014

3.2 Freight Land Use Density

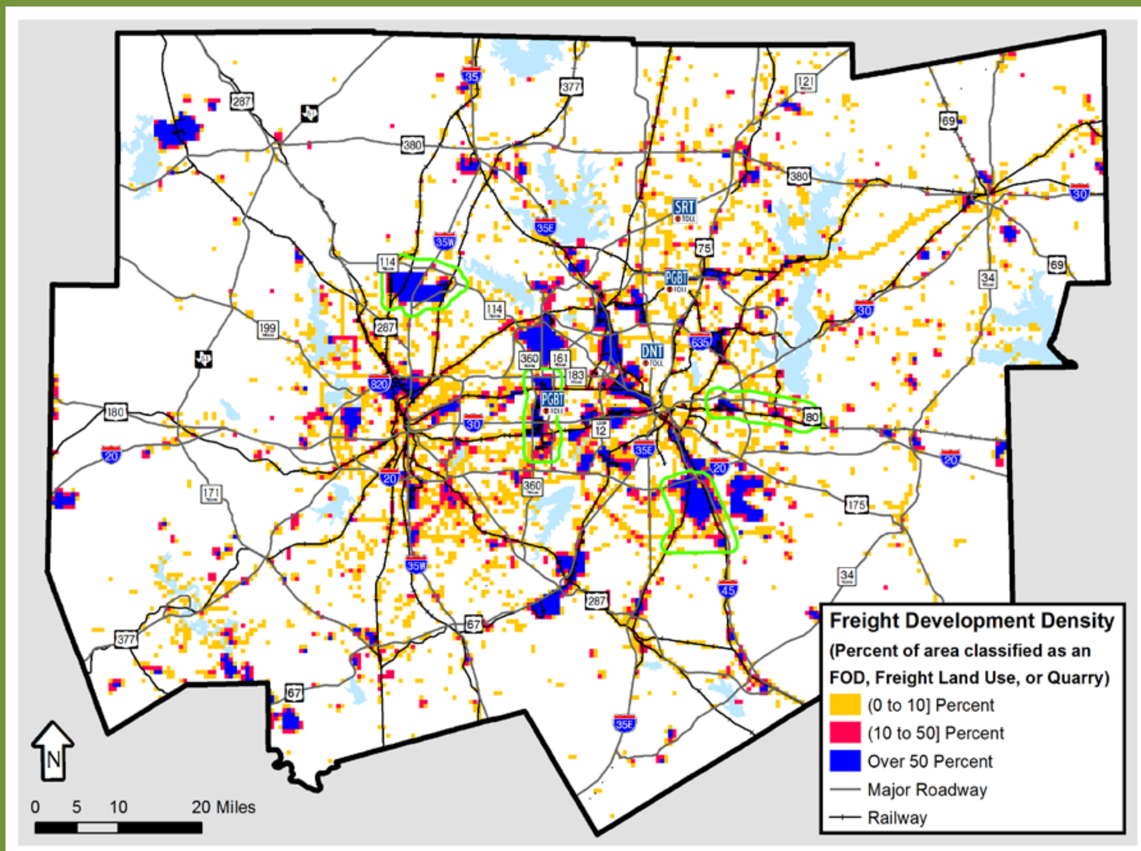
The relative density of freight intensive land uses throughout the region is shown in Figure 3-3. Dark blue areas indicate clustered freight land use locations. The expected benefits of improved "last mile" connectivity and operations would be highest in these areas with highly concentrated freight activity.

Major freight activity centers include:

- Fort Worth Alliance Airport and BNSF Intermodal Terminal near IH 35W and SH 114
- Dallas-Fort Worth International Airport north of SH 183
- UP Intermodal Terminal near IH 20 and IH 45
- Upper and Lower Stemmons along IH 35E
- Midlothian RailPort Business Park and quarries near US 67
- Great Southwest Industrial District south of SH 183 between SH 360 and the PGBT
- Business parks in Fort Worth near IH 35W and IH 820

Figure 3-3

Figure 3-3: Regional Freight Development Density



Source: NCTCOG 2014

4.0 ALLIANCE FOCUS AREA

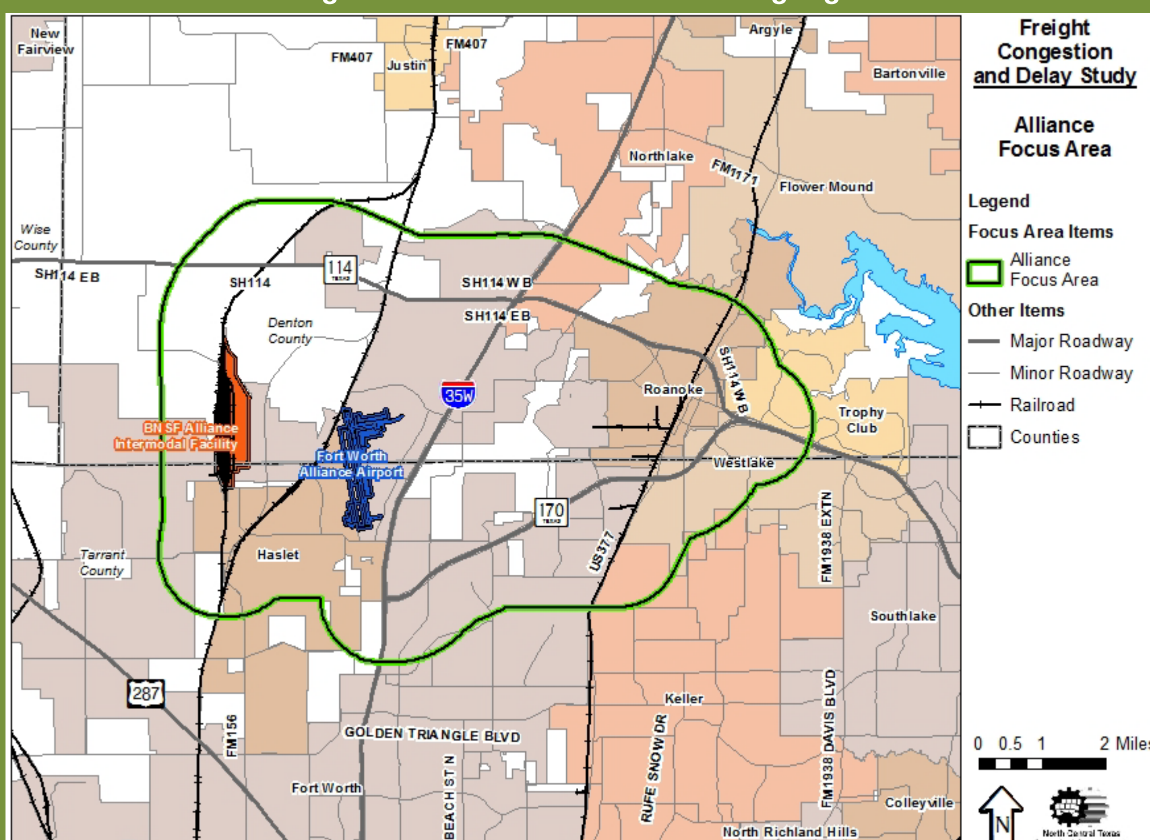
The Alliance focus area was chosen for analysis in this study as a modern freight-orientated development. Much of the area was conceived and constructed to be compatible with freight needs.

4.1 Introduction

For this study, the Alliance focus area is a one-mile buffer surrounding the area bounded by SH 114, SH 170, Alliance Airport, and the BNSF rail line. The area shown in Figure 4-1 includes portions of the Cities of Fort Worth, Haslet, Roanoke, Northlake, Westlake, Keller, and Trophy Club. The Union Pacific Railroad (UPRR) Choctaw Subdivision, and Burlington Northern Santa Fe (BNSF) Fort Worth Subdivision, both run north-south through the focus area. The limited access roadway facilities in the focus area include IH 35W and SH 114, east of US 377 to the end of the focus area. The BNSF Alliance Intermodal Facility and the Alliance Airport are the dominant facilities.

Figure 4-1

Figure 4-1: Alliance Focus Area Highlight



Source: NCTCOG 2014

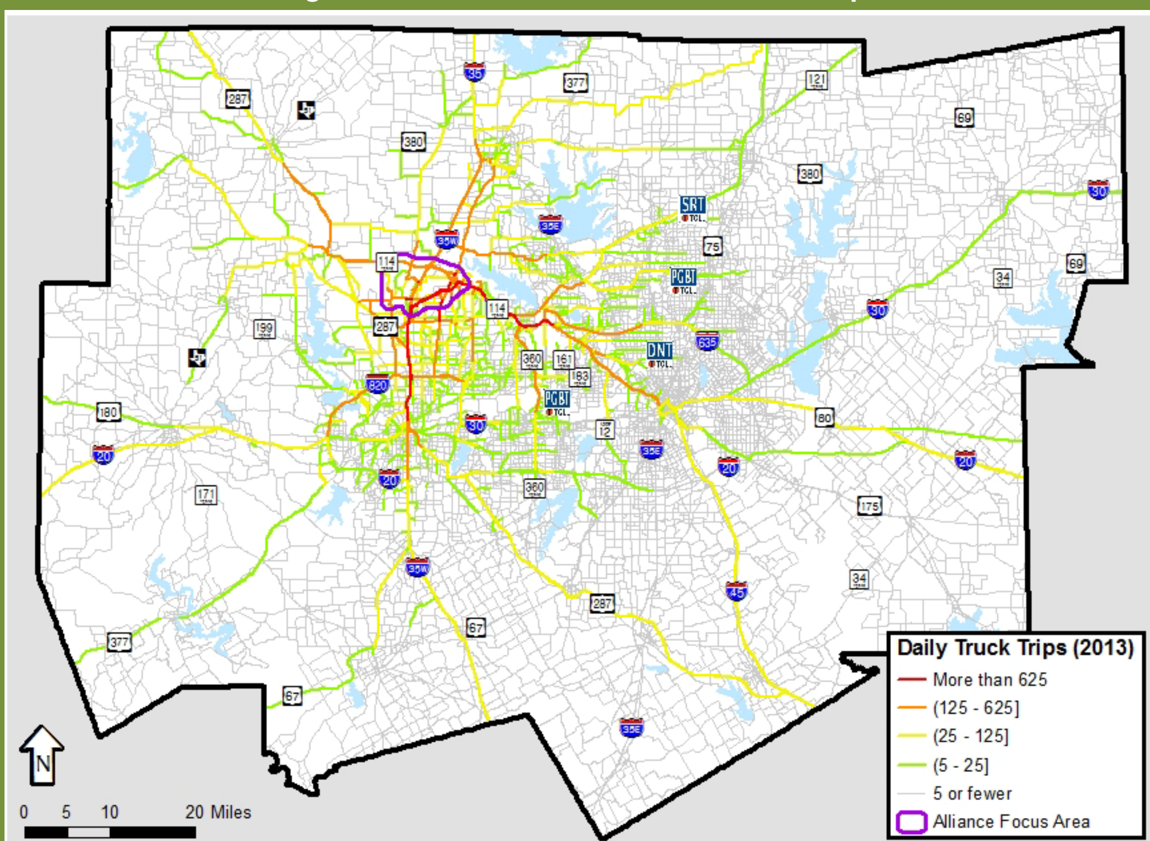
4.2 Truck Trips

The current year transportation network adopted in *Mobility 2035 – 2014 Amendment* was used to estimate daily truck trips to and from the focus area, shown in Figure 4-2. These are trips originating from or destined to the focus area. As expected, most of these trips occur on major limited access facilities. Estimated truck movements associated with the Alliance focus area show the highest volumes on IH 35W, SH 170, and SH 114. Many truck trips also use US 287, SH 360, and IH 635. Freight movements to or from the Alliance focus area from outside the region are concentrated on IH 45 and IH 35W. Other notable out-of-region movements to and from the area use IH 20 and US 377.

Total daily estimated truck Vehicle Miles Traveled (VMT) to and from the Alliance focus area is approximately 245,000. Sixty-one percent were estimated to be travelled on limited access facilities. Many of these truck trips continue to out-of-region destinations, increasing total daily truck VMT from the Alliance focus area.

Figure 4-2

Figure 4-2: Alliance Focus Area Truck Trips



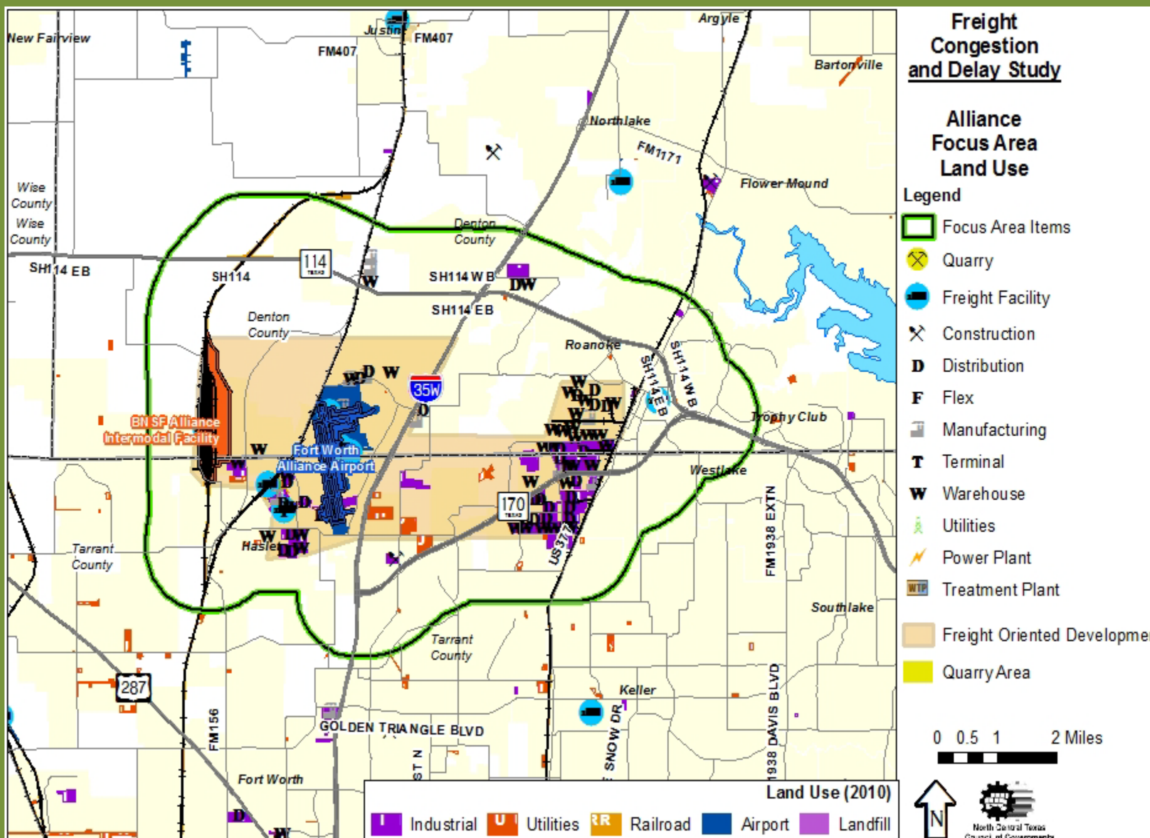
Source: NCTCOG 2014

4.3 Land Use

Freight intensive facilities and land uses in the focus area are shown in figure 4-3. The freight oriented development is massed in the center of the focus area with more than150 freight oriented facilities. In the area around Alliance airport there are several freight facilities. The area between the airport and the BNSF facility has a few warehouses and distribution centers. In the eastern portion of the focus area there is a higher volume of warehouses and distribution centers.

Figure 4-3

Figure 4-3: Alliance Focus Area Land Use



Source: NCTCOG 2014

4.4 Recurring Congestion and Delay

Recurring congestion and delay is delay exhibiting predictable patterns typically caused by high traffic volume, traffic signals, speed limits, regularly occurring bottlenecks, or major construction projects. This delay can be described as generally occurring daily and in consistent locations. Recurring congestion and delay is typically created by transportation system deficiencies.

4.4.1 Daily Delay

The estimated impact of roadway congestion to freight movements was developed based on the daily truck trips shown in Figure 4-2. The daily congestion delay for truck trips is shown in Figure 4-4. Estimated congestion delay within the Alliance focus area includes: IH 35W, US 377, SH 170, and SH 114. The heaviest congestion on arterials and collectors includes

Westport Parkway/Keller Haslet Road, Eagle Parkway, Liberty Way, and Independence Parkway.

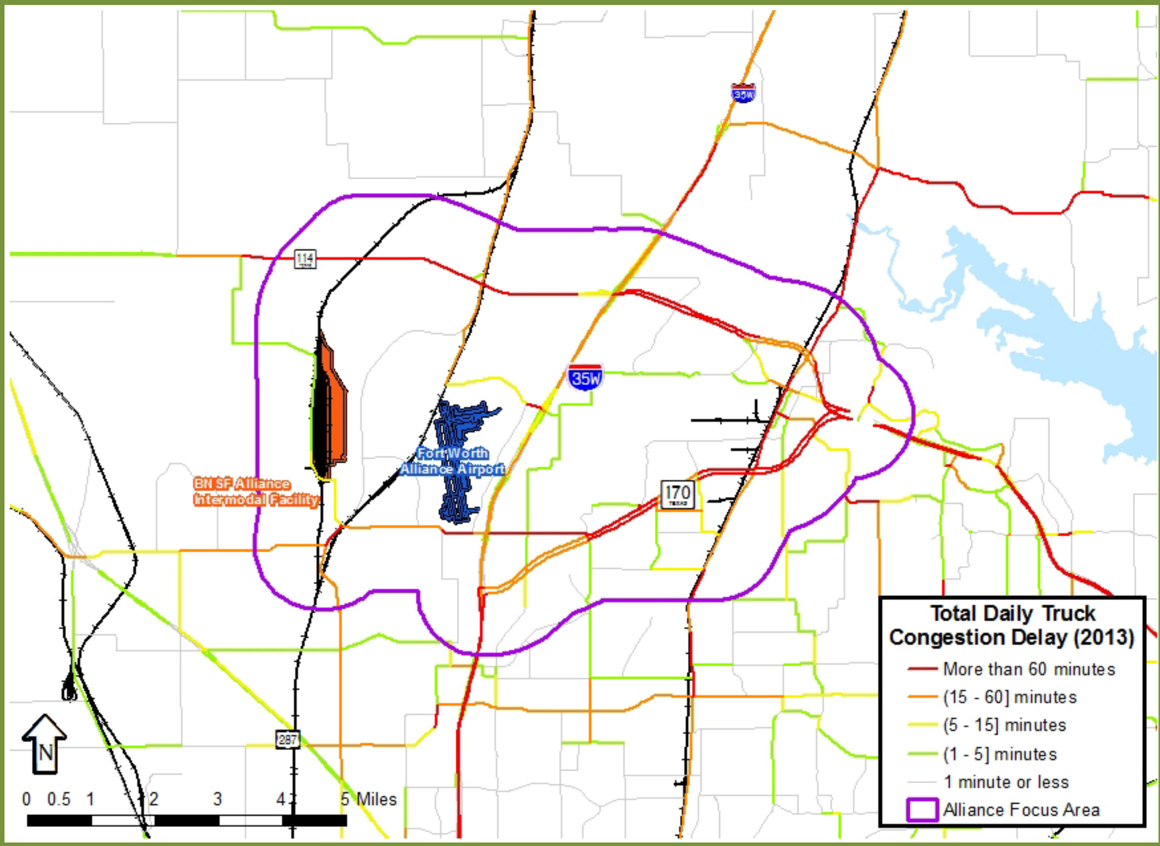
The total estimated daily congestion delay for Alliance focus area truck trips in the region is about 766 vehicle-hours.

Truck Congestion can be reduced by:

- Road capacity improvements, specifically on the limited access facilities
- Alternative routes, give the freight carries more than one route in and through the area

Figure 4-4

Figure 4-4: Alliance Focus Area Truck Congestion Delay



Source: NCTCOG 2014

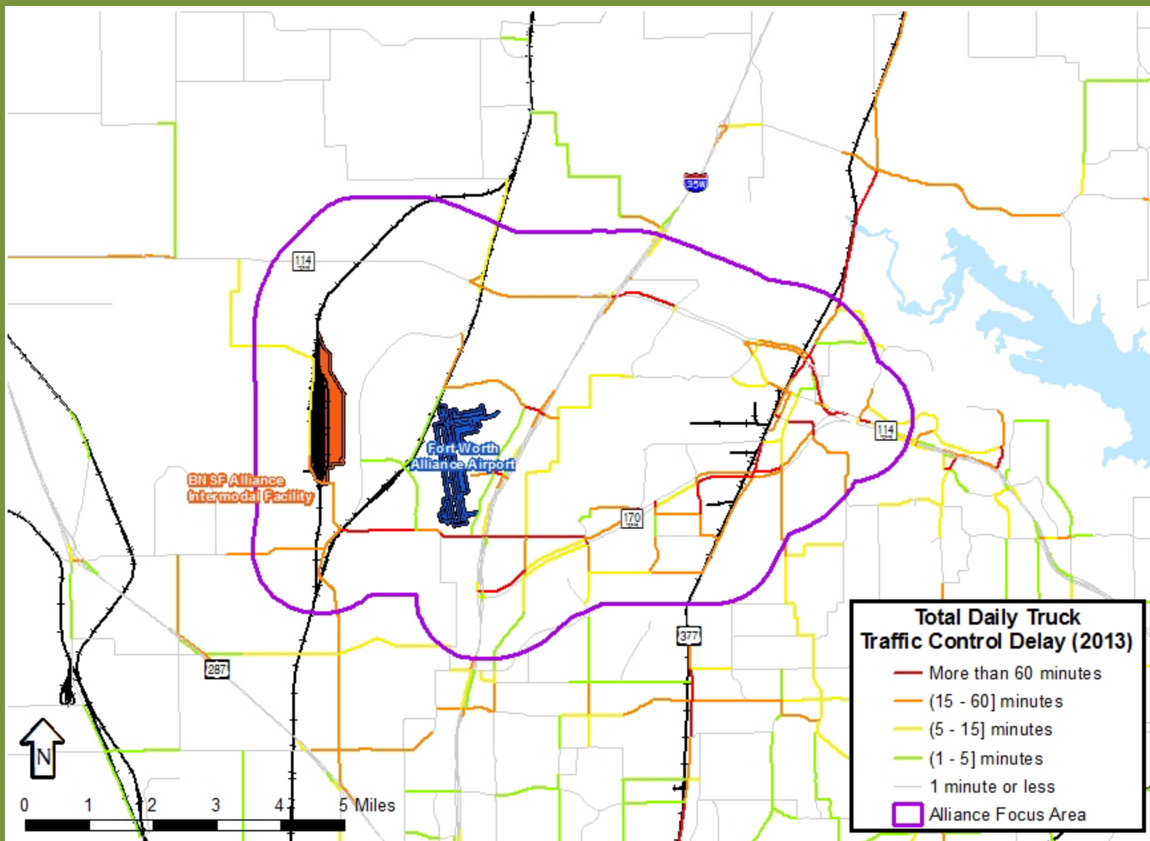
4.4.2 Traffic Control Delay

Traffic controls cause delay for freight movement to and from the Alliance focus area. Traffic control delay differs from daily congestion delay as this type of delay is created by traffic signals, stop signs, and speed limits.

Truck trips from the Alliance focus area encounter 345 vehicle-hours of traffic control delay each day. Unlike the estimated congestion delay discussed in section 4.4.1, traffic control delay is tightly focused in and around the Alliance focus area.
The daily traffic control delay for truck trips within the Alliance focus area is shown in Figure 4-5.

Figure 4-5

Figure 4-5: Alliance Focus Area Traffic Control Delay



Source: NCTCOG 2014

Since traffic control delay occurs mostly near the beginning or end of a trip, the benefits of optimizing traffic control systems are much more localized. The estimated results show highest traffic control delay along Westport Parkway/Keller-Haslet Road and on US 377. Additional roads with traffic control delay include Alliance Boulevard at IH35W, SH114/ IH35W Interchange, and Eagle Parkway at IH35W.

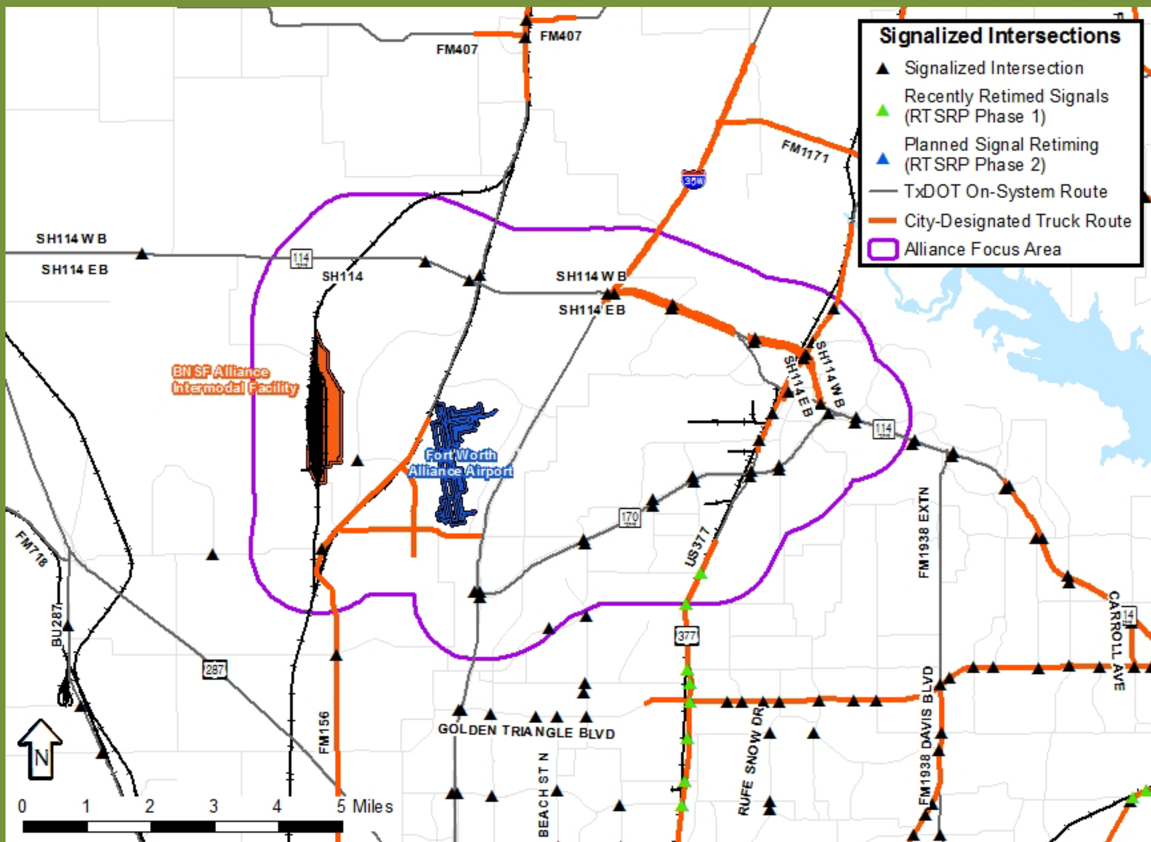
Figure 4-6 shows the signalized intersections in the Alliance focus area and the NCTCOG initiatives that focus on retiming traffic signals to improve traffic flow within a corridor. The portion of US 377 in the southeast portion of the focus area was included in the Regional Traffic Signal Retiming Program (RTSRP). No other roadways within the focus area are included in regional signal retiming initiatives. While traffic control delay can be reduced through signal retiming or other measures, some traffic control delay is inevitable.

Traffic control delay can be reduced by:

- Signal timing study along corridors with estimated signal delay including US 377 and Westport Parkway Keller-Haslet Road for the Alliance focus area
- Signal retiming/syncing and upgrading the traffic signals/signage along the corridors

Figure 4-6

Figure 4-6: Alliance Focus Area Traffic Signals



Source: NCTCOG 2014

4.5 Non-Recurring Congestion and Delay

Non-recurring congestion delay is attributed to unpredictable or highly variable sources such as traffic incidents, inclement weather, special events, or maintenance closures. This delay is best described as random. Non-recurring congestion is generally created by unforeseen circumstances and is typically not a product of transportation system deficiencies.

4.5.1 Truck Involved Crashes

Non-recurring congestion delays are more difficult to assess and address. The most common type of non-recurring congestion stems from traffic incidents, shown in Figure 4-7. Even minor crashes can cause delays for many transportation system users if the vehicles involved obstruct travel lanes. Crashes directly involving freight vehicles create much more delay for the shipment. Due to the amount of fuel most trucks carry during normal operations, crashes that involve trucks are often treated as HAZMAT incidents. The time required to assess potential hazards, document damage, and clear the incident adds to the delay.

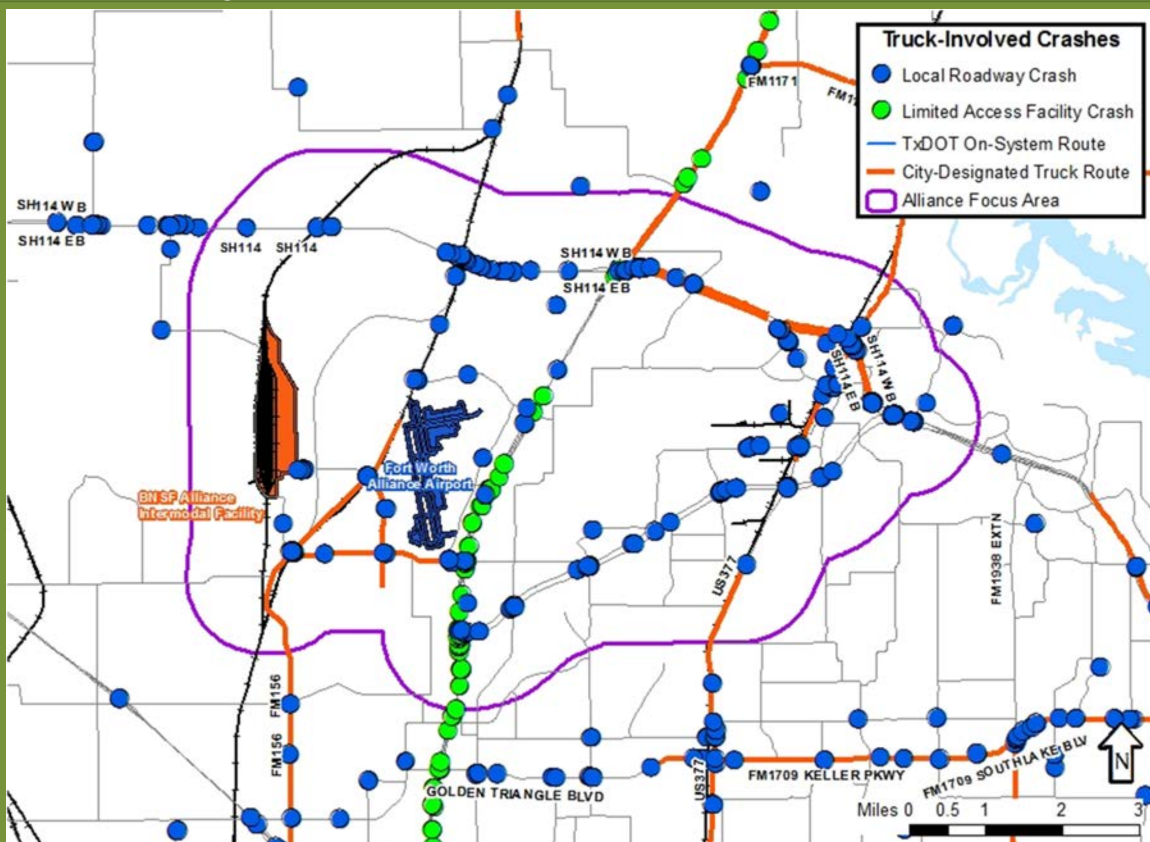
Figure 4-7 shows the locations of truck-involved crashes in the Alliance focus area from 2008 through 2012. There were 287 crashes reported over this five-year span with 92 on IH 35W, 67 on SH 114, 40 on SH 170, and the remaining 88 crashes were on other roadways/facilities.

Delay from truck-Involved crashes can be mitigated by:

- Safe driving practices such as no handhelds while driving
- Intersection improvements such as proper turning radius, clear lines of sight, and proper signage
- Signage on limited access facilities informing truck drivers of crashes and potential delays

Figure 4-7

Figure 4-7: Alliance Focus Area Truck-Involved Crashes



Source: NCTCOG 2014

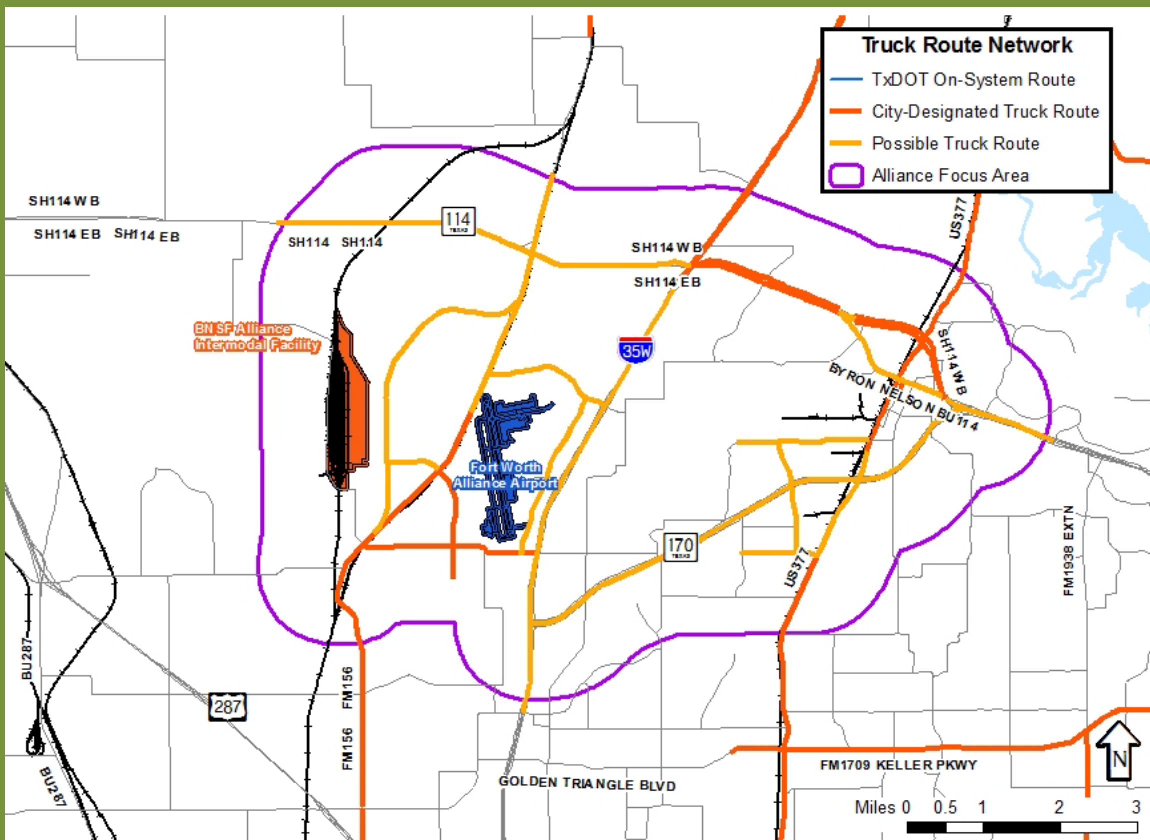
4.5.2 Truck Routes

Truck routes are another potential source of delay because they may not continue from one municipality to the next and they may not pass through the needed area. Most freight movement on roadways occurs in vehicles that must comply with local truck route ordinances and statewide regulations. As shown in Figure 4-8, only portions of US 377, SH 114, FM156, and IH 35W are designated as truck routes within the Alliance focus area. Some federal and state routes such as interstate highways are truck routes, regardless of local designations. The possible truck routes shown in yellow are considerations for local governments as truck routes.

These routes could close the gaps and increase contiguous movement. In an area heavily populated with freight facilities, truck routes and truck route connectivity is key. If truck routes are a discontinuous patchwork it can create delays. It limits the ability of truck drivers to dynamically reroute to bypass a freeway incident or major construction project. Trucks deviating from designated truck routes are subject to law enforcement action. Without a complete local route network, drivers have little choice but to wait for an incident to be cleared.

Figure 4-8

Figure 4-8: Alliance Focus Area Truck Routes



Source: TxDOT's Crash Records Information System (CRIS) - all TxDOT disclaimers apply to this information.

1. This data consists of all locatable crashes that include latitude and longitude information
2. This data is composed of TxDOT "Reportable Crashes" only

A "Reportable Motor Vehicle Traffic Crash" is defined by TxDOT as any crash involving a motor vehicle in transport that occurs or originates on a traffic way, results in injury to or death of any person, or damage to the property of any one person to the apparent extent of $1,000. A traffic way is defined as any land way open to the public as a matter of right or custom for moving persons or property from one place to another.

Delay from truck route segmentation can be mitigated by:

- A truck route study to identify which roads can and should be used as truck routes

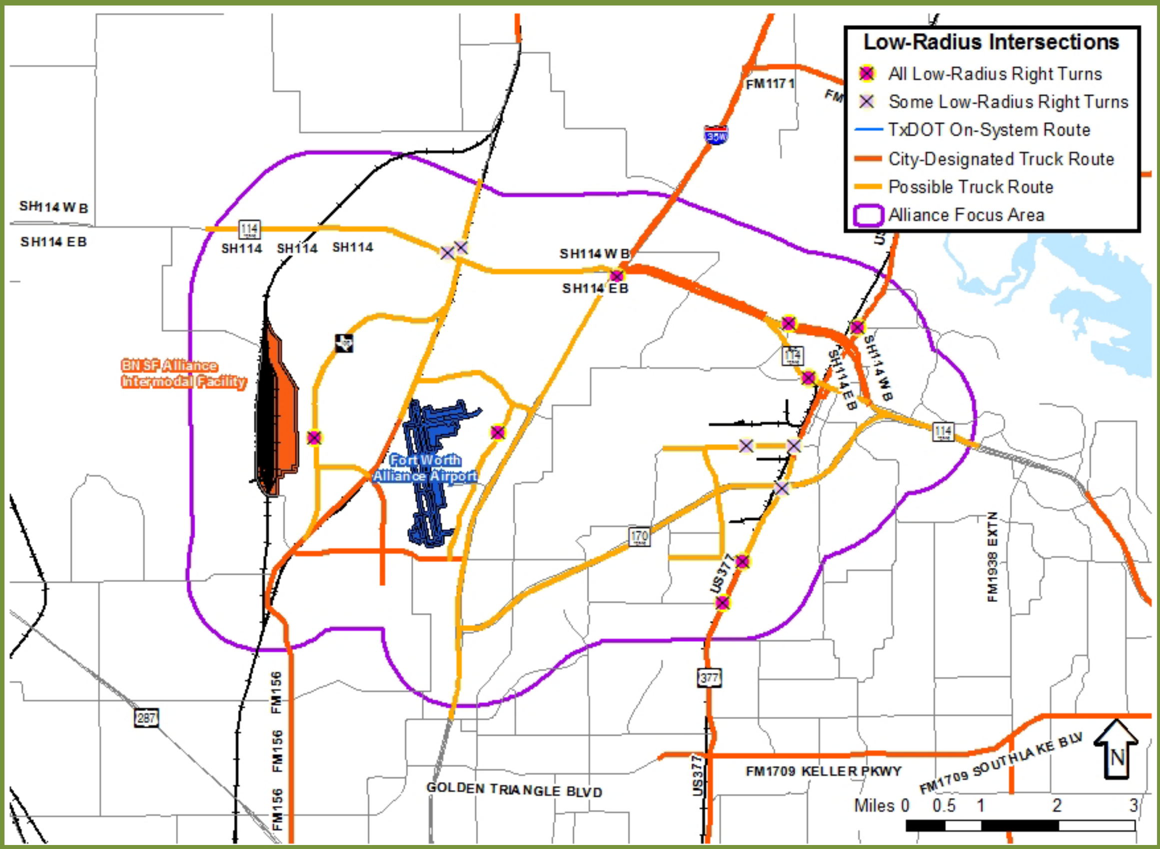
4.5.3 Roadway Geometry

Intersection turning radius, especially for right turns, is a source of delay for trucks. When the turning radius is less than 45 feet for standard tractor/trailer 18-wheeler trucks, drivers must maneuver the vehicle from the designated travel lanes to avoid “clipping” the corner. Intersections on designated truck routes and state facilities, as well as those on potential truck routes, were reviewed to determine if the existing intersection geometry allows truck turning movements. The turning radius at intersections on minor roads near major freight developments were also examined.

Figure 4-9 highlights intersections where one or more right turning radii is less than 45 feet. Intersections on truck routes with low-radius turns in the focus area are on US 377. There are additional intersections with low radius turns but they are not along the designated truck routes.

Figure 4-9

Figure 4-9: Alliance Focus Area Low-Radius Intersections



Source: NCTCOG 2014

Delay from roadway geometry can be mitigated by:

- Identifying the low-radius turns on existing and potential truck routes
- Correcting roadway geometry at intersections along existing and potential truck routes, to expedite turning movements and decrease the potential for damage to vehicles and shipments that result from jumping curbs or clipping obstructions at corners
- In the Alliance focus area this would be the intersections on US 377

4.5.4 Railroad Crossings

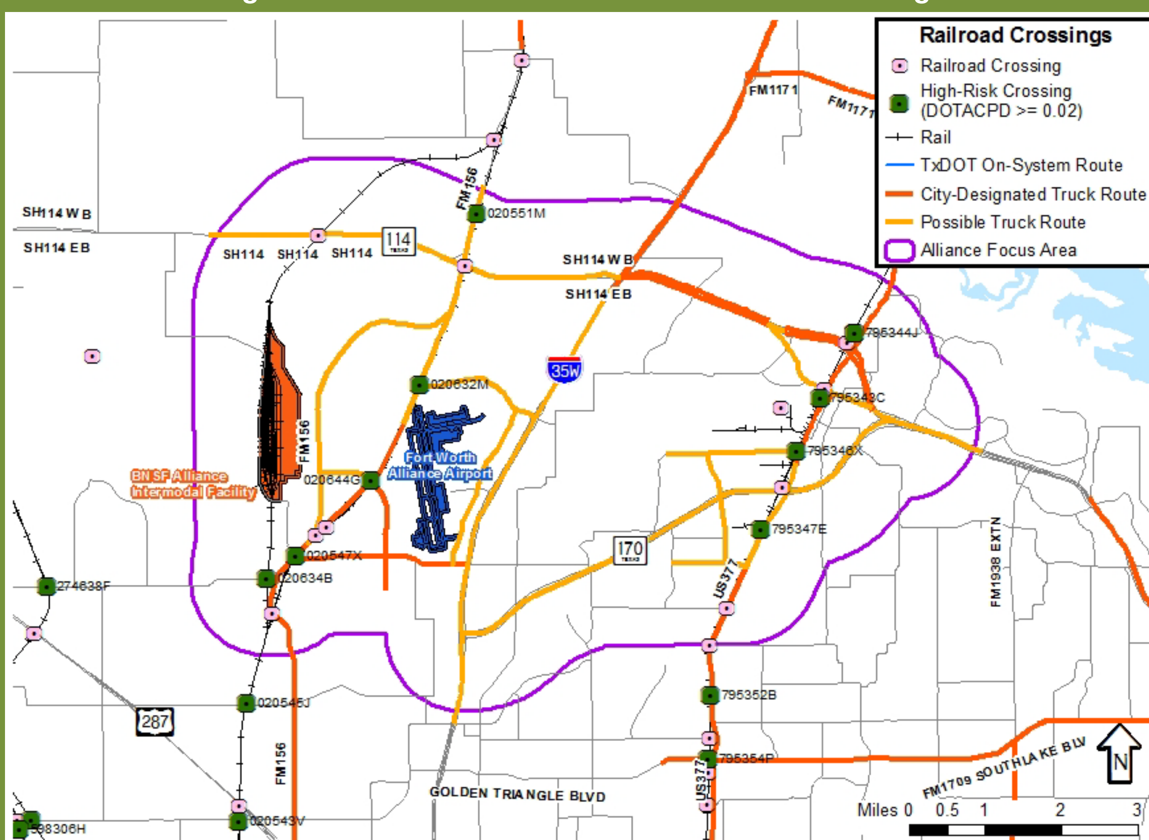
The final source of non-recurring delay considered for this study is at-grade railroad crossings. Crossings create delay by preventing roadway movements as trains pass and pose potential safety risks. Figure 4-10 shows the crossings listed in the Federal Railroad Administration (FRA) National Grade Crossing Inventory within the Alliance focus area.

There are five at-grade crossings on designated truck routes within the Alliance focus area: three Union Pacific (UP) crossings along US 377, Burlington Northern Santa Fe (BNSF) at Main Street near FM 156 in Haslet, and BNSF at Intermodal Parkway.

FRA data indicates 66 trains use the UP line and 50 trains use the BNSF line daily. The railroads are grade separated at crossing where rail lines cross major highways such as SH 114 and SH 170. The at-grade crossings at Main Street and at Intermodal Parkway both are considered high risk crossings by their US Department of Transportation Accident Prediction Value (DOTACPD). Three crossings along the truck route on US 377 and the UP line are considered high risk by their DOTACPD. These can cause delay because of potential accidents and the time it takes trucks to get through the crossing.

Figure 4-10

Figure 4-10: Alliance Focus Area Railroad Crossings



Source: NCTCOG 2014

Delay from railroad crossings can be reduced by:

- Rebuilding or leveling the crossing so that trucks can cross easily
- Grade separate crossings when practical
- Close unnecessary crossings
- Update warning equipment at crossings
- Synchronize crossing warning with nearby traffic signals to allow better overall movement

4.6 Non-Transportation Delay

Non-transportation delay is delay stemming from sources unrelated to the transportation system, including wait times to load/unload, staffing levels, equipment maintenance, or documentation/regulatory compliance. This delay can be both recurring and non-recurring.

Non-transportation congestion is generally produced by both the private- and public-sector entities. Within the Alliance focus area, the largest potential for non-transportation delay is at the BNSF Alliance Intermodal Facility shown in Figure 4-11. Efficiently transferring freight between modes, in this case between railway and truck, requires excellent logistics systems to ensure freight is handled appropriately.

Delay from non-transportation issues can be reduced by:

- Working with the freight carriers to understand their primary non-transportation delay issues and working together to identify potential solutions

Figure 4-11

Figure 4-11: BNSF Alliance Intermodal Facility

Source: NCTCOG 2014

4.7 Focus Area Recommendations

Recommendations were created based on data and analysis of the Alliance Focus Area. These projects were created in line with the regional policies and programs discussed in Section 2. Smaller projects that are freight specific will take priority

4.7.1 Projects

Projects are separated into five categories:

1. Truck Route Network Continuity
2. Intersection Improvements on Truck Routes
3. Road Capacity Improvements
4. Railroad Relocation
5. Railroad Crossing Improvements

The project categories are based upon the policies and programs found in Tables 2-1 and 2-2. Not every focus area has a project in all five categories. Recommended projects for the Alliance focus area are found in Table 4-1.

Table 4-1: Alliance Focus Area Project Recommendations

Road/Area	Limit From	Limit To	Project	Project Category
All	N/A	N/A	Truck Route Study	Truck Route Network Continuity
US 377	Keller Haslet Road	State Highway 114	Signal Timing Study	Intersection Improvements on Truck Routes
US 377	Keller Haslet Road	Henrietta Creek Road	Reconstruction of US 377 intersections to lengthen turn radii	Intersection Improvements on Truck Routes
Intermodal Parkway	Westport Parkway	End of Parkway	Increase from 2 to 4 lanes and improve weight capacity	Road Capacity Improvements
UP Mainline	Keller Haslet Road	US 377	Reduce “hump” at roadway crossings and eliminate queuing for signal between tracks and US 377	Railroad Crossing Improvements
UP Mainline	Westport Parkway	US 377	Eliminate queuing for signal between tracks and US 377	Railroad Crossing Improvements
UP Mainline	Henrietta Creek Road	US 377	Reduce “hump” at crossing and eliminate queuing for signal between tracks and US 377	Railroad Crossing Improvements

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5.0 GREAT SOUTHWEST FOCUS AREA

The Great Southwest focus area was chosen for analysis in this study as a traditional freight-orientated development. Much of the area is older with heavy concentrations of warehouse space.

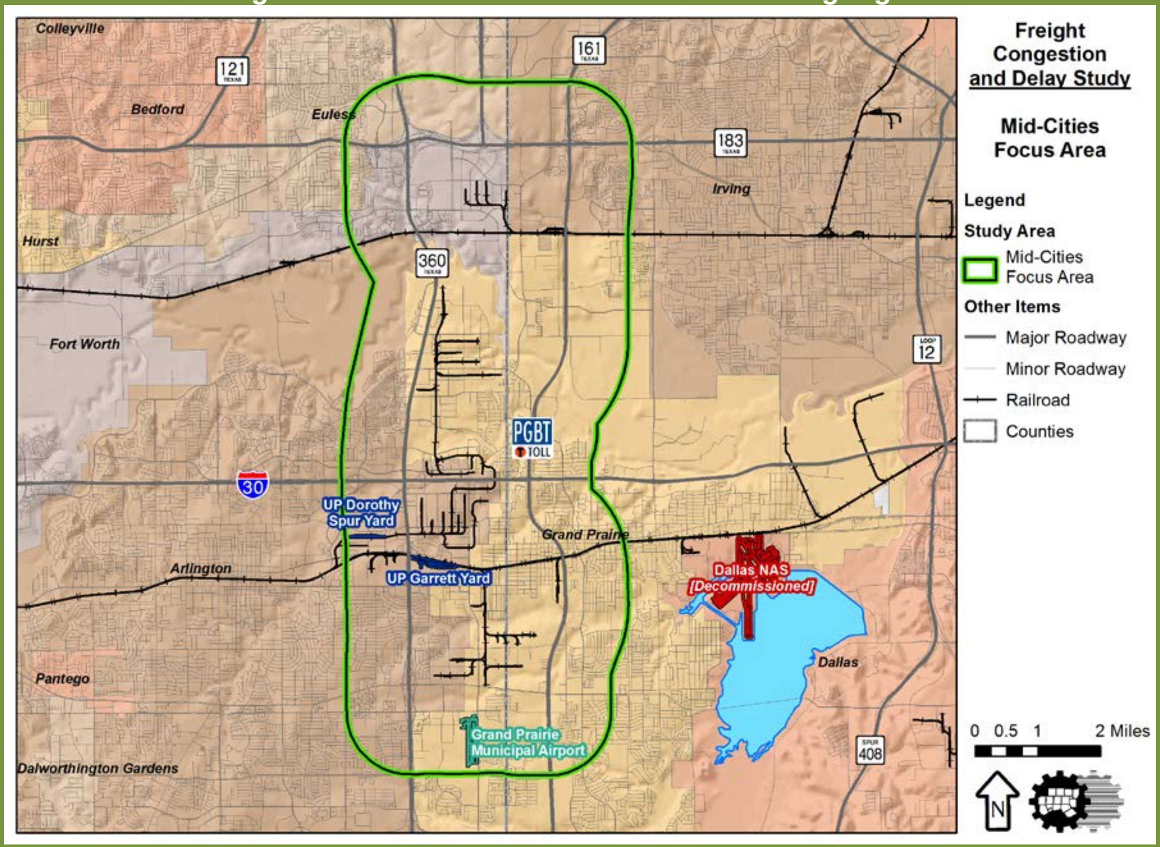
5.1 Introduction

For this study, the Great Southwest focus area is a one-mile buffer surrounding the area bounded by SH 183, President George Bush Turnpike (PGBT), SH 303, and SH 360. This area, shown in Figure 5-1, includes portions of the Cities of Euless, Irving, Grand Prairie, Arlington, and Fort Worth.

The Union Pacific (UP) Dallas Subdivision and Trinity Railway Express (TRE) both run east-west through the focus area, with multiple business spur tracks in the area. The limited access roadway facilities include IH 30, SH 360, SH 183, and the PGBT. The two small UP yards, General Motors Arlington Assembly Plant (GM Plant), and the Great Southwest Industrial Park are the dominant freight facilities.

Figure 5-1

Figure 5-1: Great Southwest Focus Area Highlights



Source: NCTCOG 2014

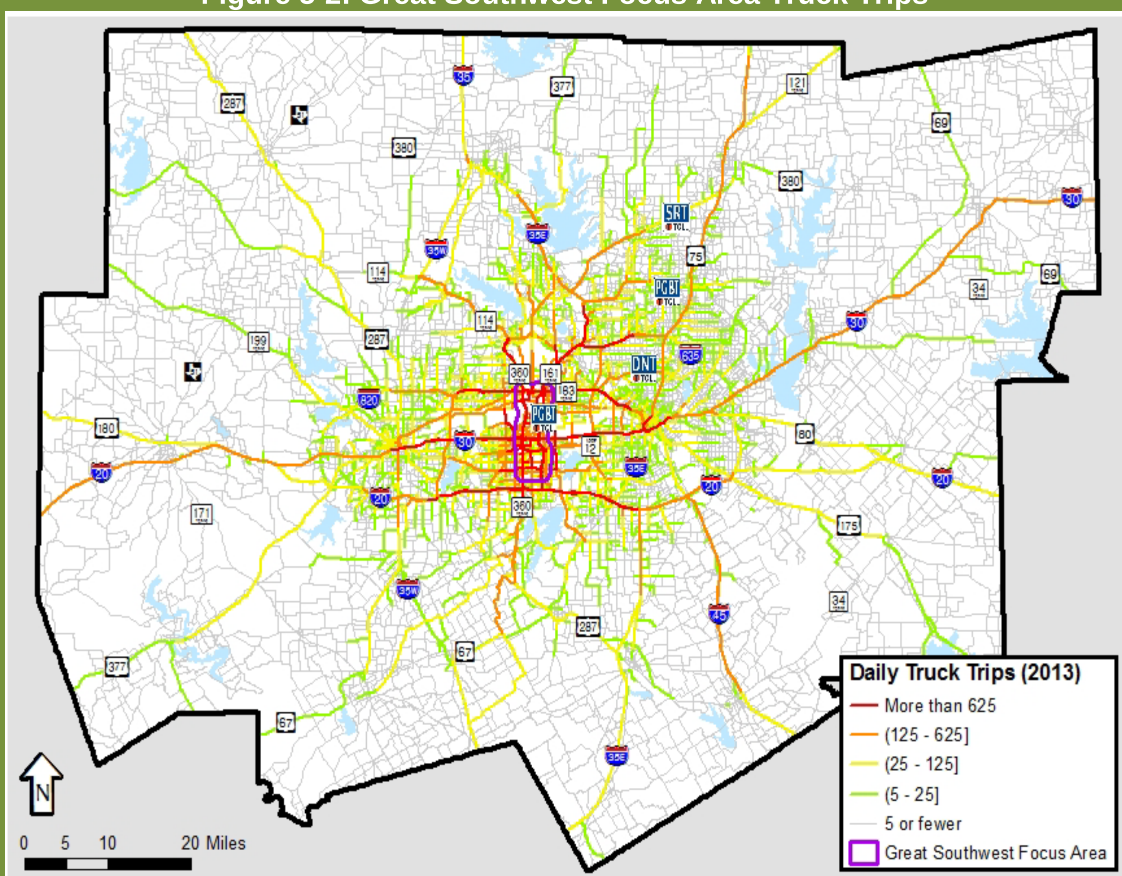
5.2 Truck Trips

The current year transportation network from *Mobility 2035 – 2014 Amendment* was used to estimate daily truck trips to and from the focus area. These are trips originating from or destined to the focus area. As expected most of these trips occur on major limited access facilities. Estimated truck movements associated with the Great Southwest focus area show the highest volumes on IH 30, IH 20, SH 183, SH 360, PGBT, and SH 121. Many truck trips also use US 75, SH 114, and IH 45. Freight movements to or from the Great Southwest focus area from outside the region are concentrated on IH 30 and US 75. Other notable out-of-region movements to and from the area use IH 20, and IH 35. These conditions are shown in Figure 5-2.

The total daily estimate of truck Vehicle Miles Traveled (VMT) to and from the Great Southwest focus area is approximately 811,000 VMTs, within the region. Seventy-three percent were estimated to be travelled on limited access facilities. Many of these truck trips continue to out-of-region destinations, increasing total daily truck VMTs from the Great Southwest focus area.

Figure 5-2

Figure 5-2: Great Southwest Focus Area Truck Trips



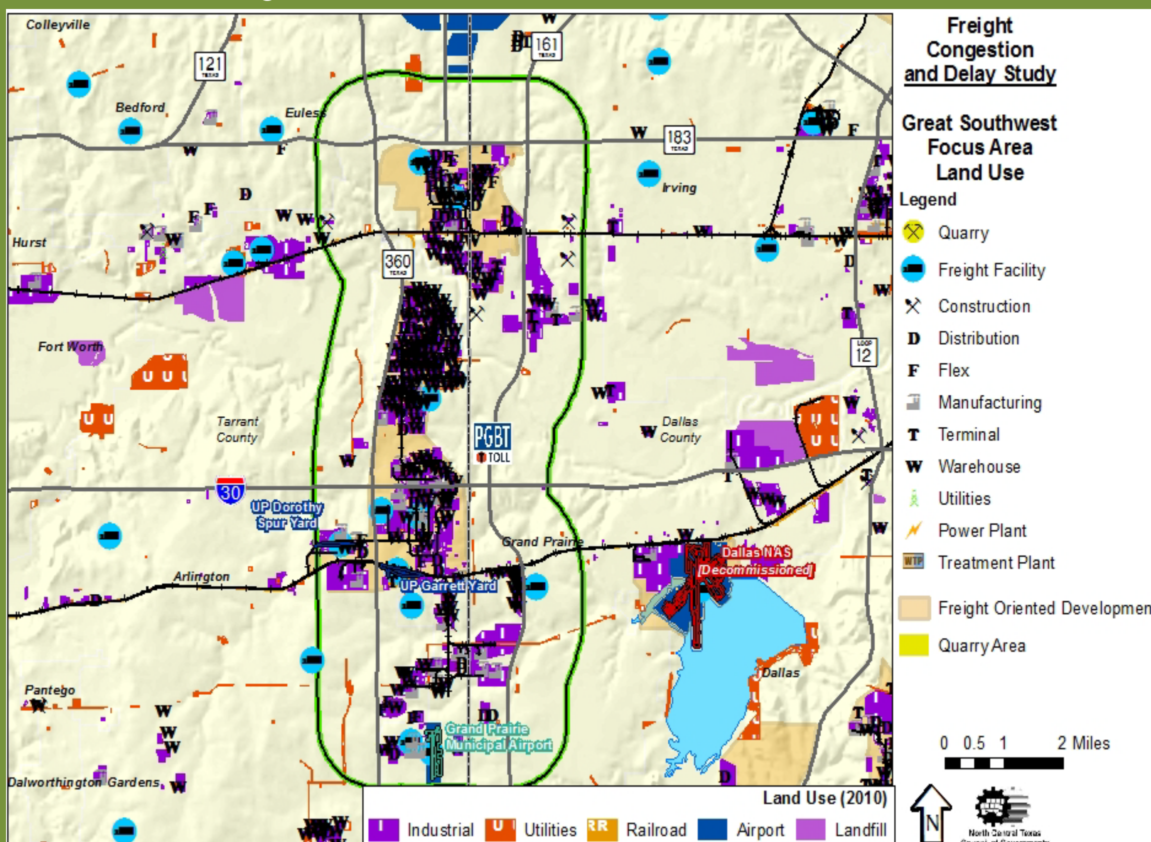
Source: NCTCOG 2014

5.3 Land Use

Freight intensive facilities and land uses in the focus area are shown in figure 5-3. Freight-oriented development is centrally located in the focus area and is dominated by warehouse space and more than 600 freight-oriented facilities. The greatest concentration is east of SH 360, south of the TRE line, and north of IH 30. Industrial land use surrounds the GM Plant in the southern portion of the focus area.

Figure 5-3

Figure 5-3: Great Southwest Focus Area Land Use



Source: NCTCOG 2014

5.4 Recurring Congestion and Delay

Recurring congestion and delay exhibits predictable patterns typically caused by high traffic volume, traffic signals, speed limits, regularly occurring bottlenecks, or major construction projects. This delay can be described as recurring daily in consistent locations. Recurring congestion and delay is typically created by transportation system deficiencies.

5.4.1 Daily Delay

The estimated impact of roadway congestion to freight movements was developed based on the daily truck trips shown in Figure 5-1. The daily congestion delay for truck trips is shown in Figure 5-4. Estimated congestion delay within the Great Southwest focus area includes: IH 30, SH 183, SH 360, and the PGBT. The heaviest congestion on arterials and collectors includes Valley View Lane/Roy Orr Boulevard, Carrier Parkway, Avenue K, and Great Southwest

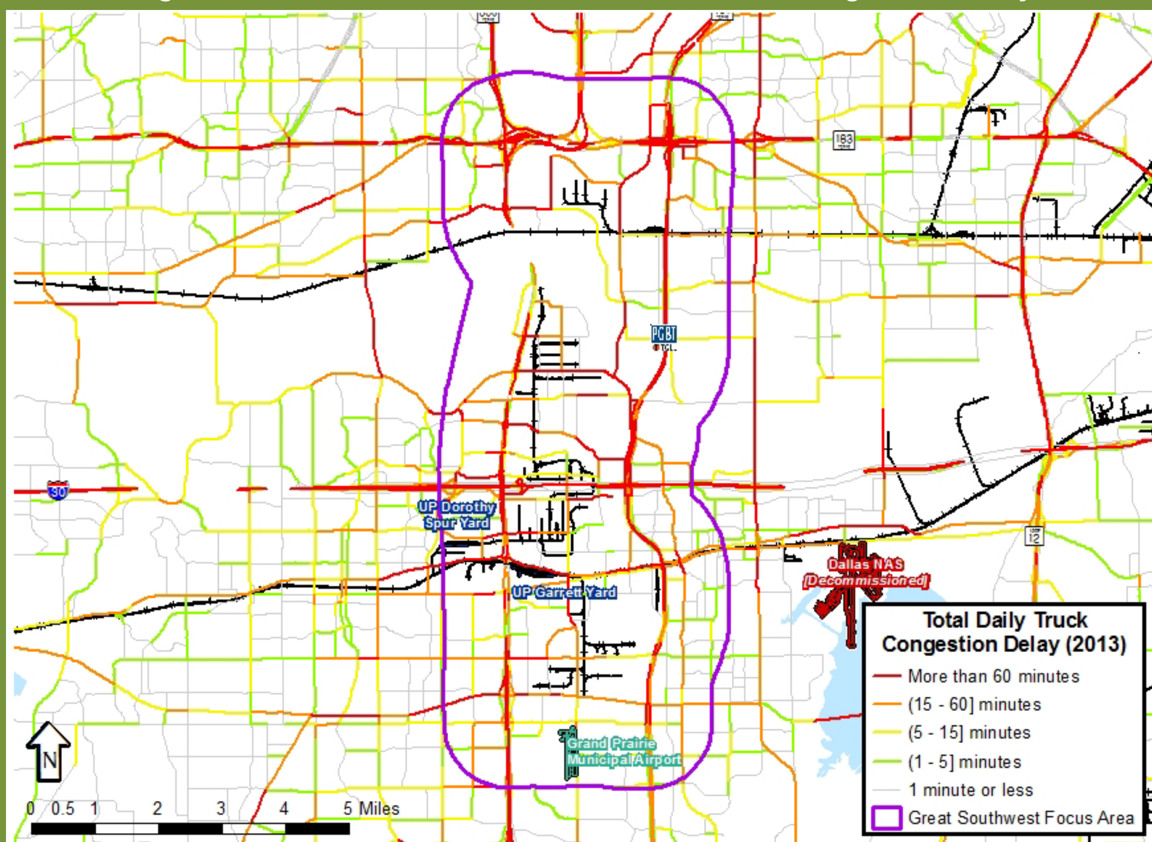
Parkway. The total estimated daily truck trip congestion delay for the Great Southwest focus area in the region, is approximately 3,052 vehicle-hours.

Recurring congestion delay can be improved by:

- Road capacity improvements, specifically on the limited access facilities
- Alternative and identifiable truck routes

Figure 5-4

Figure 5-4: Great Southwest Focus Area Truck Congestion Delay



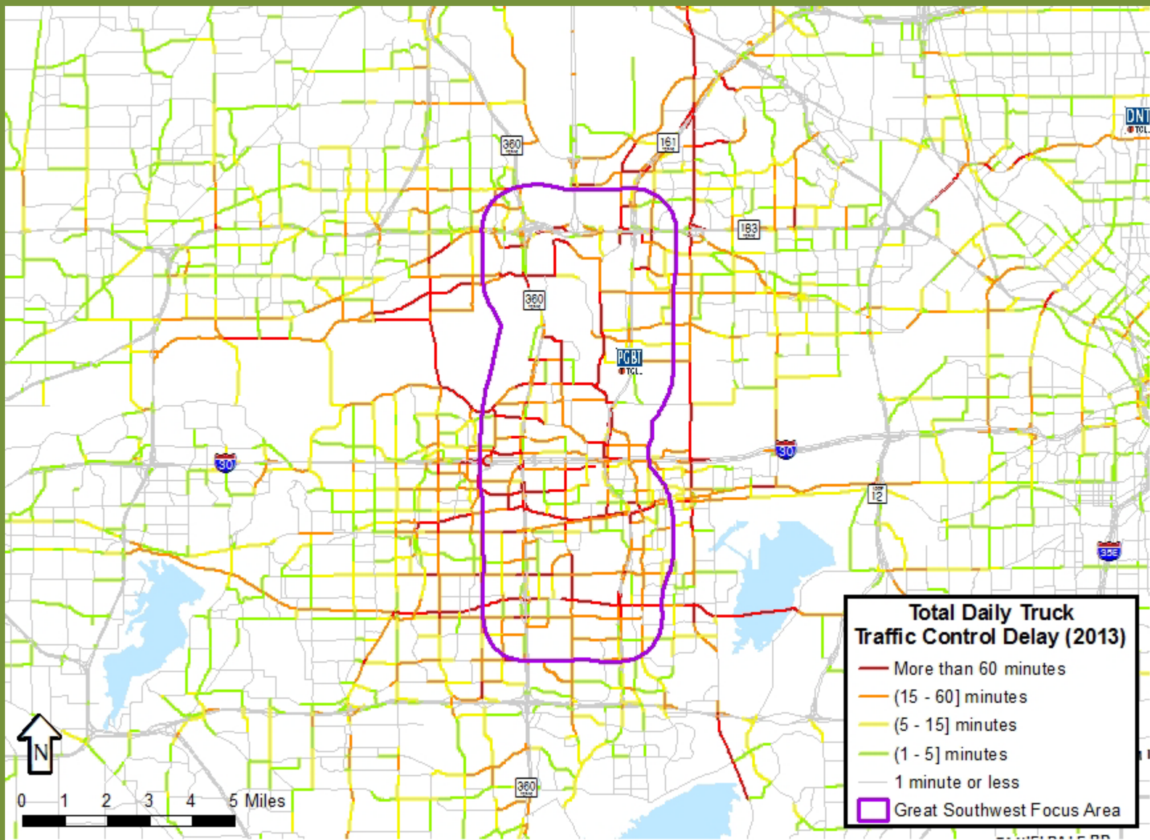
Source: NCTCOG 2014

5.4.2 Traffic Control Delay

Traffic controls also cause delay for freight movements to and from the Great Southwest focus area. Traffic control delay differs from daily congestion delay as this type of delay is created by traffic signals, stop signs, and speed limits. Truck trips from the Great Southwest focus area face about 1,361 vehicle-hours of traffic control delay each day. Unlike the estimated daily delay discussed in section 5.4.1, traffic control delay is tightly focused in and around the Great Southwest focus area. The daily traffic control delay for truck trips from the focus area is shown in Figure 5-5.

Figure 5-5

Figure 5-5: Great Southwest Focus Area Truck Traffic Control Delay



Source: NCTCOG 2014

Since traffic control delay occurs mostly near the beginning or end of a trip, the benefits of optimizing traffic control systems are much more localized. Over 98 percent of the congestion delay for truck trips from the Great Southwest focus area occurs outside the focus area. The estimated results show highest traffic control delay along SH 303 (Pioneer Parkway), Carrier Parkway, and on Roy Orr Boulevard. Additional hotspots include SH 180, Amon Carter Blvd., and Trinity Parkway.

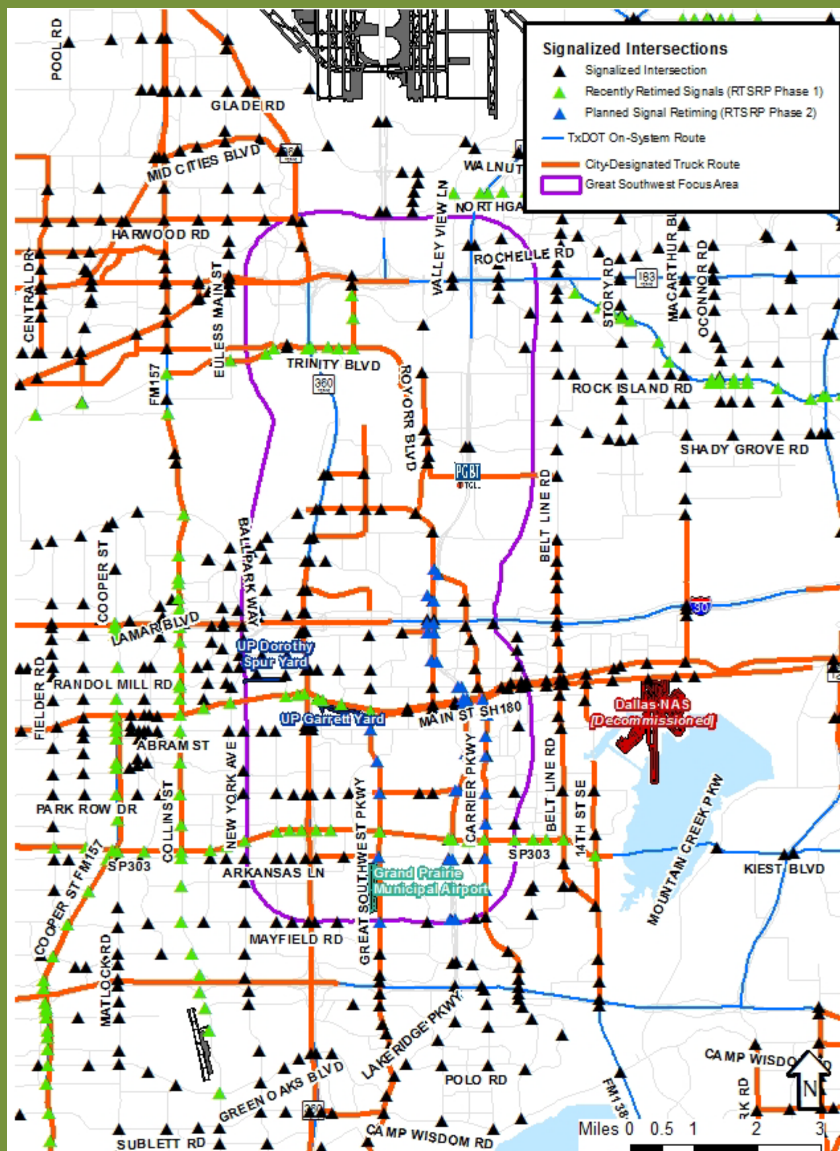
Figure 5-6 shows the signalized intersections in the Great Southwest focus area and NCTCOG's initiative to retime traffic signals, to improve traffic flow within the corridor. Portions of SH 180 and SH 303 in the south portion of the focus area and portions of Trinity Boulevard and Amon Carter Road were included in the Regional Traffic Signal Retiming Program (RTSRP). No other roadways within the focus area are included in regional signal retiming initiatives. While traffic control delay can be reduced through signal retiming or other measures, some traffic control delay is inevitable.

Traffic control delay can be reduced by:

- Signal timing study along corridors with estimated signal delay including Roy Orr Blvd., Abram Street, and the northern half of Carrier Parkway, for the Great Southwest focus area
- Determine the best course of action based on the study results
- Include signal retiming/syncing and upgrading the traffic signals/signage along the corridors

Figure 5-6

Figure 5-6: Great Southwest Focus Area Traffic Signals



Source: NCTCOG 2014

5.5 Non-Recurring Congestion and Delay

Non-recurring congestion delay is attributed to unpredictable or highly variable sources such as traffic incidents, inclement weather, special events, or maintenance closures. This delay is best described as random. Non-recurring congestion is generally created by unforeseen circumstances and is typically not a product of transportation system deficiencies.

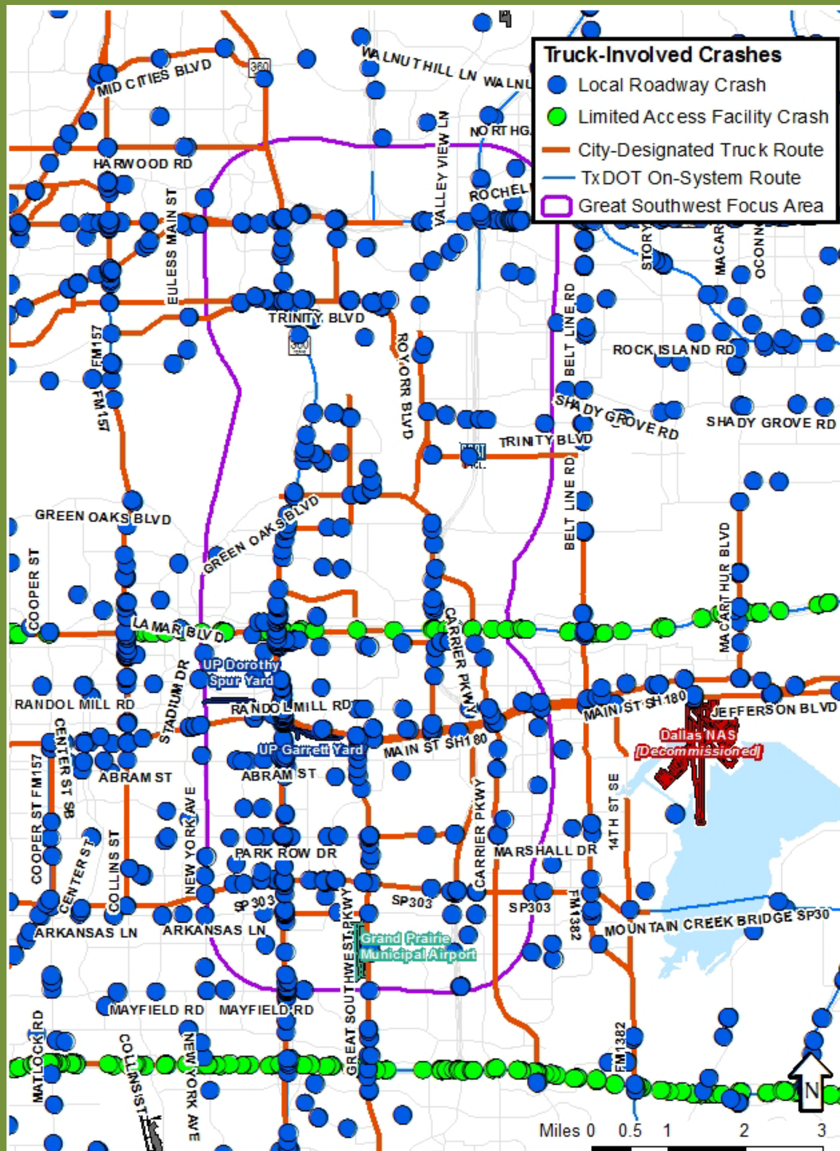
5.5.1 Truck Involved Crashes

Non-recurring congestion delays are more difficult to assess and address. The most common type of non-recurring congestion stems from traffic incidents. Even minor crashes can cause delays for many transportation system users if the vehicles involved obstruct travel lanes. Crashes directly involving freight vehicles naturally create even greater delays for the goods being moved. Because of the amount of fuel most trucks carry during normal operations, crashes are often treated as HAZMAT incidents. The time required to assess potential hazards, document damage, and clear the incident increases delay.

Figure 5-7 shows the locations of truck-involved crashes in the Great Southwest focus area from 2008 through 2012. Of the 475 crashes reported over this five-year span, 31 occurred on IH 30, 158 on SH 360, 41 on SH 183, and the remaining 245 were at other locations.

Figure 5-7

Figure 5-7: Great Southwest Focus Area Truck-Involved Crashes



Source: TxDOT's Crash Records Information System (CRIS) - all TxDOT disclaimers apply to this information.

1. This data consist of all locatable crashes that include latitude and longitude information.
2. This data is composed of TxDOT "Reportable Crashes" only.

A "Reportable Motor Vehicle Traffic Crash" is defined by TxDOT as: any crash involving motor vehicle in transport that occurs or originates on a traffic way, results in injury to or death of any person, or damage to the property of any one person to the apparent extent of $1,000. A traffic way is defined as any land way open to the public as a matter of right or custom for moving persons or property from one place to another.

Delay from truck-involved crashes can be mitigated by:

- Safe driving practices such as no handhelds while driving
- Intersection improvements such as proper turning radius, clear lines of sight, and proper signage
- Signage on limited access facilities to inform truck drivers of crashes and potential delays
- Alternate and easily identifiable truck routes

5.5.2 Truck Routes

Truck routes are another potential source of delay because they may not continue from one municipality to the next and they may not pass through the needed area. Most freight movement on roadways occurs in vehicles that must comply with local truck route ordinances and statewide regulations. As shown in Figure 5-8, only portions of some major routes are designated as truck routes within the Great Southwest focus area. Some federal and state routes, such as interstate highways, are truck routes regardless of local designations. The possible truck routes shown in yellow are considerations for local governments. These routes could close the gaps in the truck routes and increase contiguous movement.

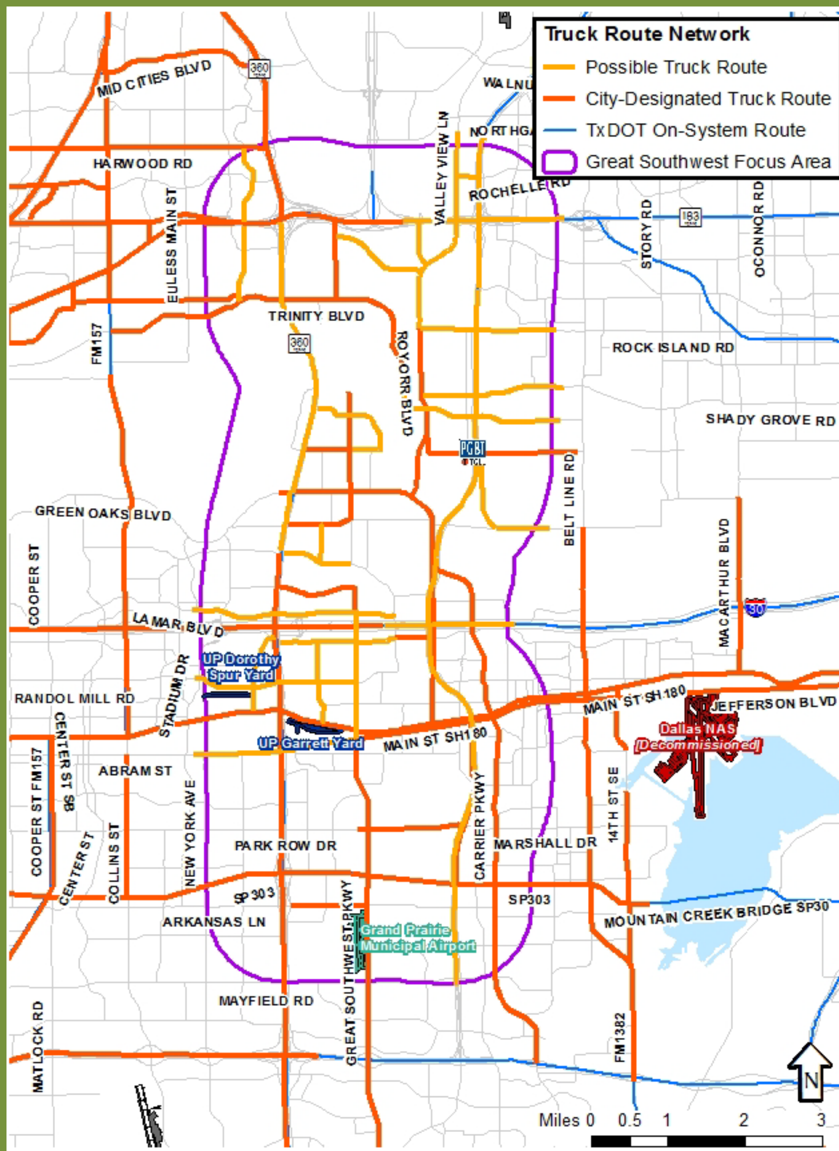
In an area heavily populated with freight facilities, truck routes and truck route connectivity is vital. Intermittent truck routes can and do create delays. It limits the ability of truck drivers to dynamically reroute to bypass a freeway incident or major construction project. Trucks deviating from designated truck routes are subject to law enforcement action. Without a complete local route network, drivers have little choice but to wait for an incident to be cleared.

Delay from truck route disconnect can be mitigated by:

- A truck route study to identify which roads can and should be used as truck routes
- Based on the results of the study, collaborate with impacted municipalities to establish more contiguous truck routes

Figure 5-8

Figure 5-8: Great Southwest Focus Area Truck Routes



Source: NCTCOG 2014

5.5.3 Roadway Geometry

The turning radius, especially for right turns, is another possible source of delay for trucks. When the turning radius is less than 45 feet for standard 18-wheelers, drivers need to maneuver their trucks outside of the designated travel lanes to avoid clipping the corner. Major intersections on designated truck routes and state facilities, as well as those on potential truck routes, were assessed to determine if the existing intersection geometry accommodates truck turning movements. The turning radius at intersections on minor roads near major freight developments was also examined.

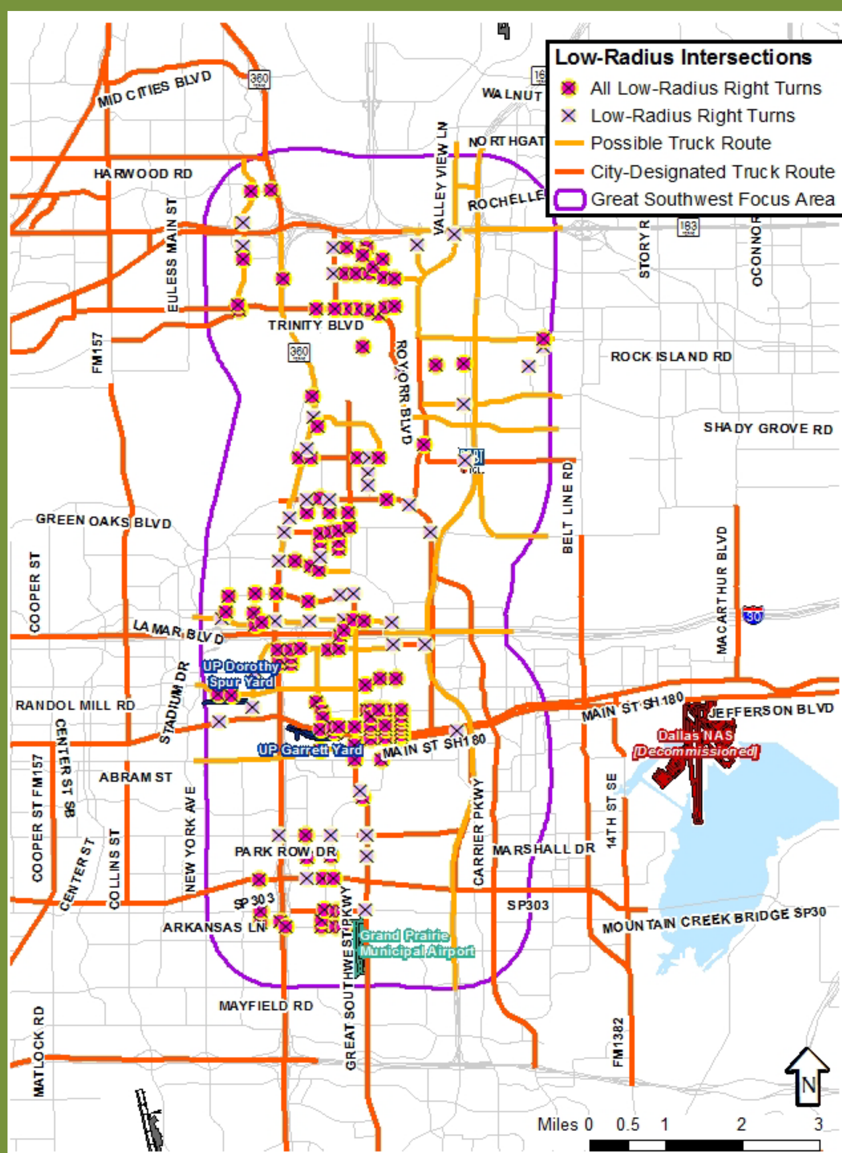
Figure 5-9 highlights intersections where one or more right turning radii is less than 45 feet. Intersections on truck routes with low-radius turns in the focus area are on Carrier Parkway, Trinity Parkway, SH 180, and Abram/Jefferson Street. Addressing the low-radius turns on existing and potential truck routes could reduce delay by expediting turning movements and decreasing the potential for damage to vehicles and shipments that result from jumping curbs or clipping obstructions at corners.

Delay from roadway geometry can be mitigated by:

- Correcting roadway geometry at intersections along truck routes and potential truck routes to include Great Southwest Parkway, Carrier Parkway, Trinity Parkway, SH 180, and Abram and Jefferson Streets

Figure 5-9

Figure 5-9: Great Southwest Focus Area Low-Radius Intersections



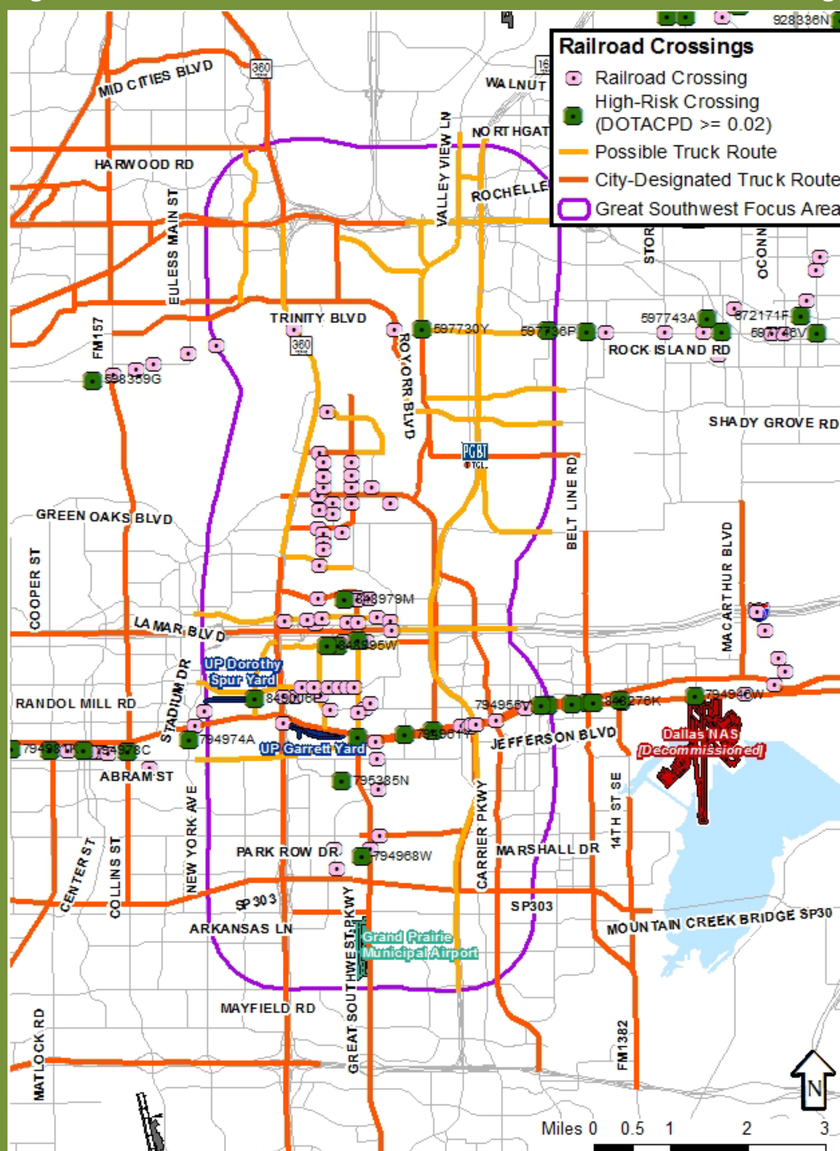
Source: NCTCOG 2014

5.5.4 Railroad Crossings

The final source of non-recurring delay considered for this study is at-grade railroad crossings. Crossings create delay by preventing roadway movements as trains pass and can also be a safety risk. Figure 5-10 shows the crossings listed in the FRA National Grade Crossing Inventory within the Great Southwest focus area. There are many at-grade crossings on designated truck routes within the focus area; many are on business spurs and not heavily used or not used at all. There are nine crossings on the UP line that parallels SH 180, many of which are deemed high risk.

Figure 5-10

Figure 5-10: Great Southwest Focus Area Railroad Crossings



Source: NCTCOG 2014

FRA data indicates 50 trains use the TRE line, 25 trains use the UP main line, and 5 use the business spurs daily. The railroads are grade separated at crossings where rail lines cross major highways such as SH 360 and PGBT. The four at-grade crossings on the UP line along SH 180 are not directly on the truck route but still have impact and are considered high risk crossings as characterized by the DOTACPD. These can cause delays because of potential accidents and the time it takes trucks to get through the crossings.

Delay from railroad crossings can be reduced by:

- Rebuilding or levelling the crossings so that trucks can cross easily
- Grade separate crossings when practical
- Close unnecessary crossings
- Update warning equipment at crossings
- Synchronize crossing warning with nearby traffic signals to allow better overall movement

5.6 Non-Transportation Delay

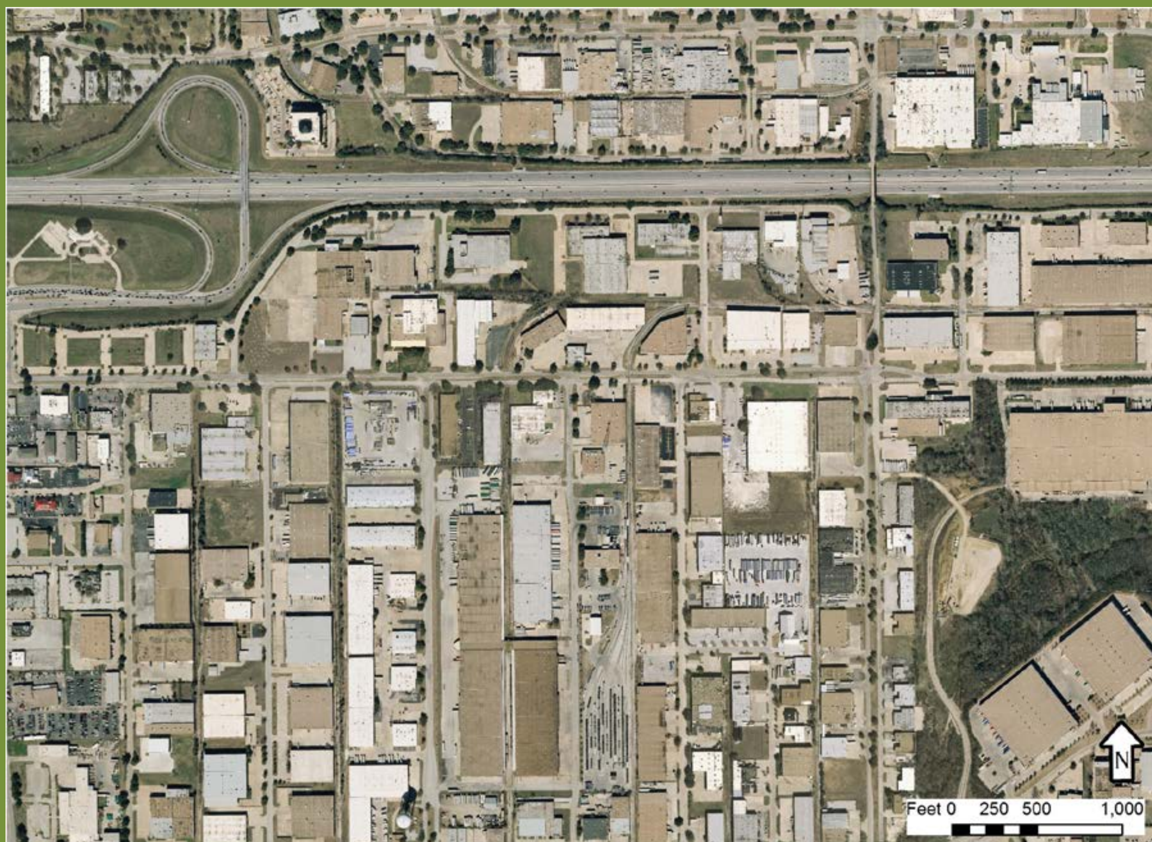
Non-transportation delay is delay stemming from sources unrelated to the transportation system, including wait times to load/unload, staffing levels, equipment maintenance, or documentation/regulatory compliance. This delay can be both recurring and non-recurring. Non-transportation congestion is generally produced by both the private- and public-sector entities. Within the Great Southwest focus area, the largest potential for non-transportation delay is the large number of warehouses shown in Figure 5-11. The GM Arlington Assembly Plant is also in the focus area, adding to the concentration of freight truck traffic. Efficiently transferring freight between modes, in this case between warehouses/plant and roadway/rail, requires excellent logistics systems to ensure freight is handled appropriately.

Delay from non-transportation issues can be improved by:

- Improved logistics in the area affected by non-transportation congestion

Figure 5-11

Figure 5-11: Great Southwest Warehouse District



Source: NCTCOG 2014

5.7 Focus Area Recommendations

Recommendations were created based on data and analysis of the Great Southwest focus area. These projects were created in line with the regional policies and programs discussed in Section 2. Smaller projects that are freight specific will take priority.

5.7.1 Projects

Projects are separated into five categories:

1. Truck Route Network Continuity
2. Intersection Improvements on Truck Routes
3. Road Capacity Improvements
4. Railroad Relocation
5. Railroad Crossing Improvements

The project categories are based upon the policies and programs found in Tables 2-1 and 2-2. Not every focus area has a project in all five categories. Recommended projects for the Great Southwest focus area are found in Table 5-1.

Table 5-1: Great Southwest Focus Area Project Recommendations

Road/Area	Limit From	Limit To	Project	Project Category
All	N/A	N/A	Truck Route Study	Truck Route Network Continuity
Carrier Parkway	SH 360	IH 30	Signal Timing Study	Intersection Improvements on Truck Routes
Trinity Boulevard	SH 360	PGBT	Signal Timing Study	Intersection Improvements on Truck Routes
Jefferson Street and SH 180	Great Southwest Parkway	Belt Line Road	Signal Timing Study	Intersection Improvements on Truck Routes
Trinity Boulevard	Breezewood Drive	Frye Road	Reconstruction of intersections to lengthen turn radii.	Intersection Improvements on Truck Routes
SH 180	109th Street	23rd Street	Reconstruction of intersections to lengthen turn radii at 105th, 109th , 23rd , 24th and 25th Streets	Intersection Improvements on Truck Routes
UP Mainline	Great Southwest Parkway	SH 180	UP mainline at Great Southwest Parkway- Reduce “hump” at crossing and eliminate queuing for signal between tracks and SH 180	Railroad Crossing Improvements
UP Mainline	23rd Street	SH 180/ Jefferson Street	UP mainline at 23rd Street- Eliminate queuing/stopping between tracks and SH 180, and tracks and Jefferson Street	Railroad Crossing Improvements
UP Mainline	19th Street	SH 180/ Jefferson Street	UP mainline at 19th Street- Reduce “hump” at crossing and queuing/stopping between tracks and SH 180, and tracks and Jefferson Street	Railroad Crossing Improvements

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6.0 IIPOD FOCUS AREA

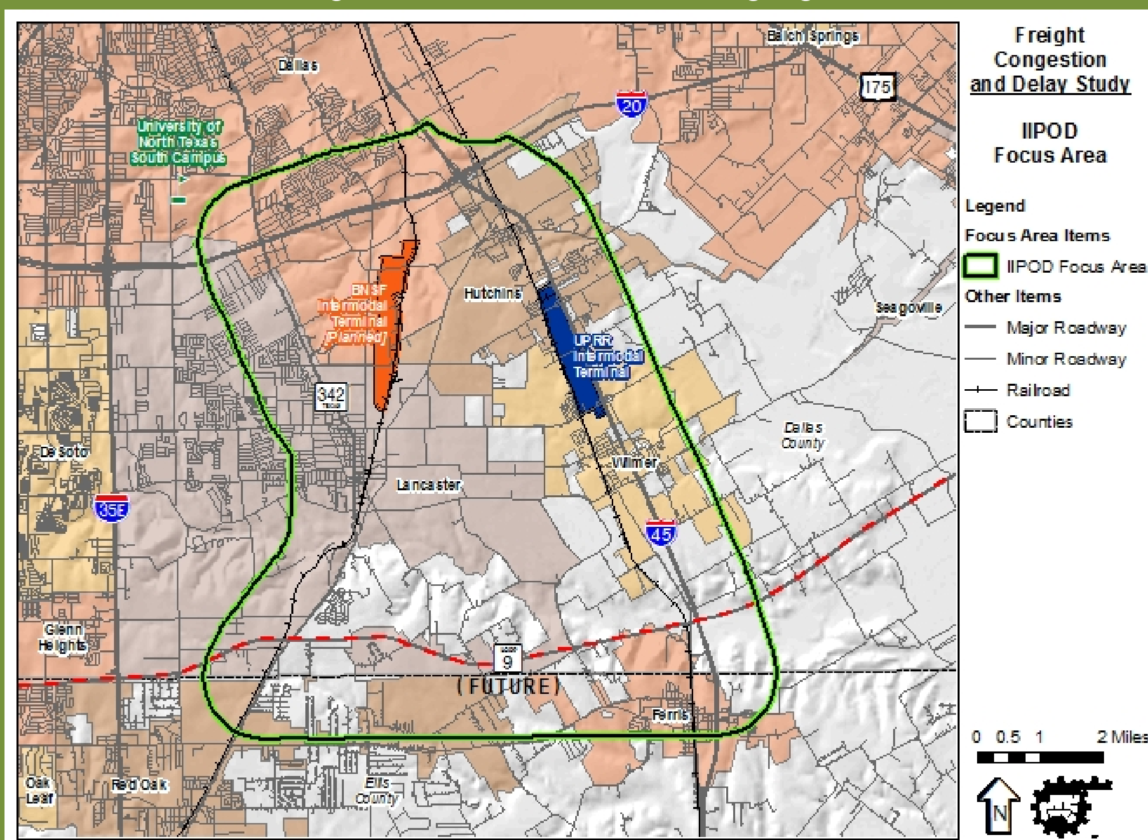
International Inland Port of Dallas (IIPOD) was chosen for analysis in this study as a developing freight-oriented development.

6.1 Introduction

For this study, the IIPOD focus area is a one-mile buffer surrounding the area bounded by IH 45, IH 20, SH 342, and the Dallas/Ellis County Line. This area, shown in Figure 6-1, includes portions of the Cities of Dallas, Ferris, Hutchins, Lancaster, Red Oak, and Wilmer.

Figure 6-1

Figure 6-1: IIPOD Focus Area Highlights



Source: NCTCOG 2014

The Union Pacific (UP) Ennis and Burlington Northern Santa Fe (BNSF) Teague-North Yard Subdivisions run north-south through the focus area. The two freeways within the focus area are six-lane IH 45 and eight-lane IH 20. The UP Dallas Intermodal Terminal (DIT), located between IH 45 and the UP main line, is the dominant freight facility in this area. BNSF plans to open a major intermodal terminal in the northern half of the focus area.

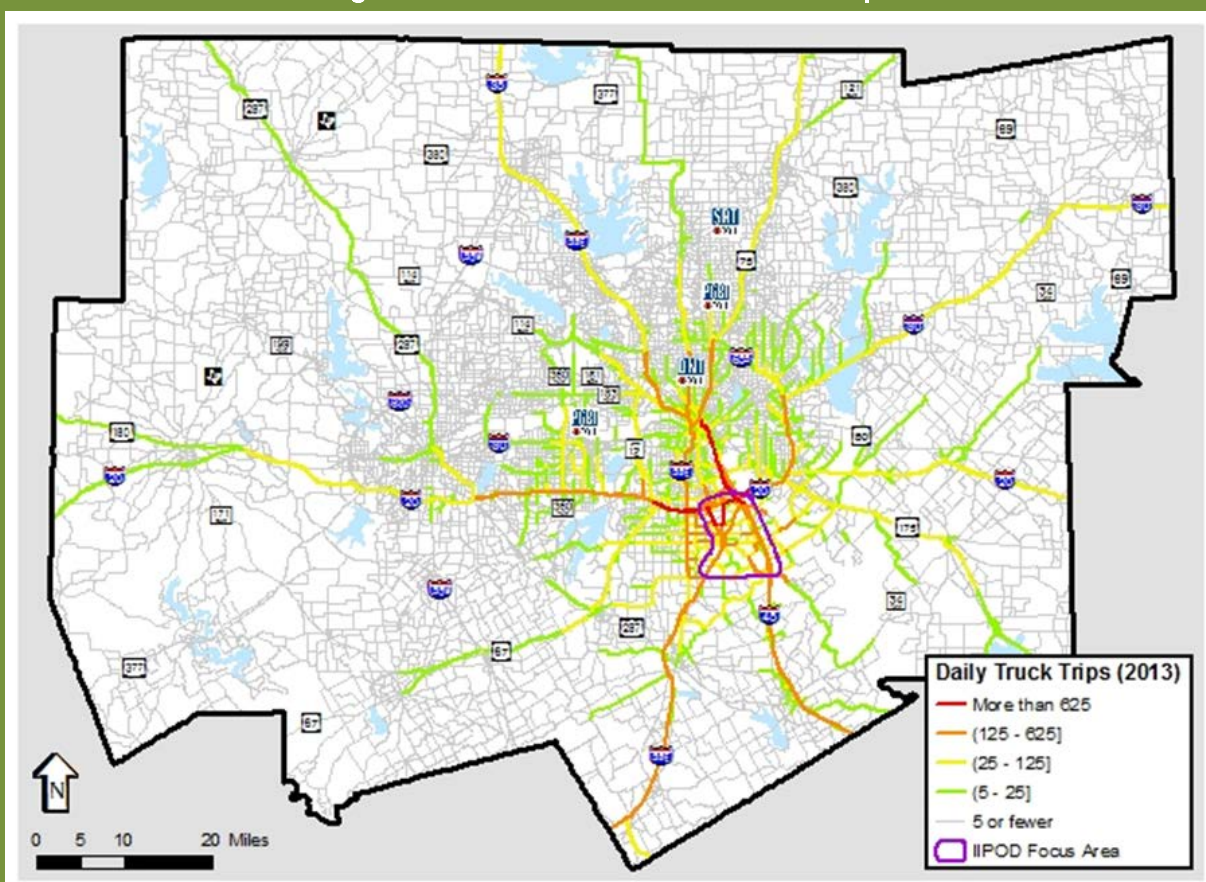
6.2 Truck Trips

The current year transportation network adopted in *Mobility 2035 – 2014 Amendment* was used to estimate daily truck trips to and from the focus area, shown in Figure 6-2. These are trips originating from or destined to the focus area. As expected, most of these trips occur on major limited access facilities. Estimated truck movements associated with the IIPOD focus area show the highest volumes on IH 20 and IH 45. Many truck trips also use IH 35E, US 75, and IH 635. Freight movements to or from the IIPOD focus area from outside the region are concentrated on IH 45 and IH 35E. The notable out-of-region movements to and from the area use IH 20, IH 30, IH 35, and US 75.

Total daily estimated truck Vehicle Miles Traveled (VMT) to and from the IIPOD focus area is approximately 204,000 within the region. The majority of these vehicle-miles (71.6 percent) were forecast to be travelled on limited access facilities. Many of these truck trips continue to out-of-region destinations, increasing total daily truck VMTs from the IIPOD focus area.

Figure 6-2

Figure 6-2: IIPOD Focus Area Truck Trips



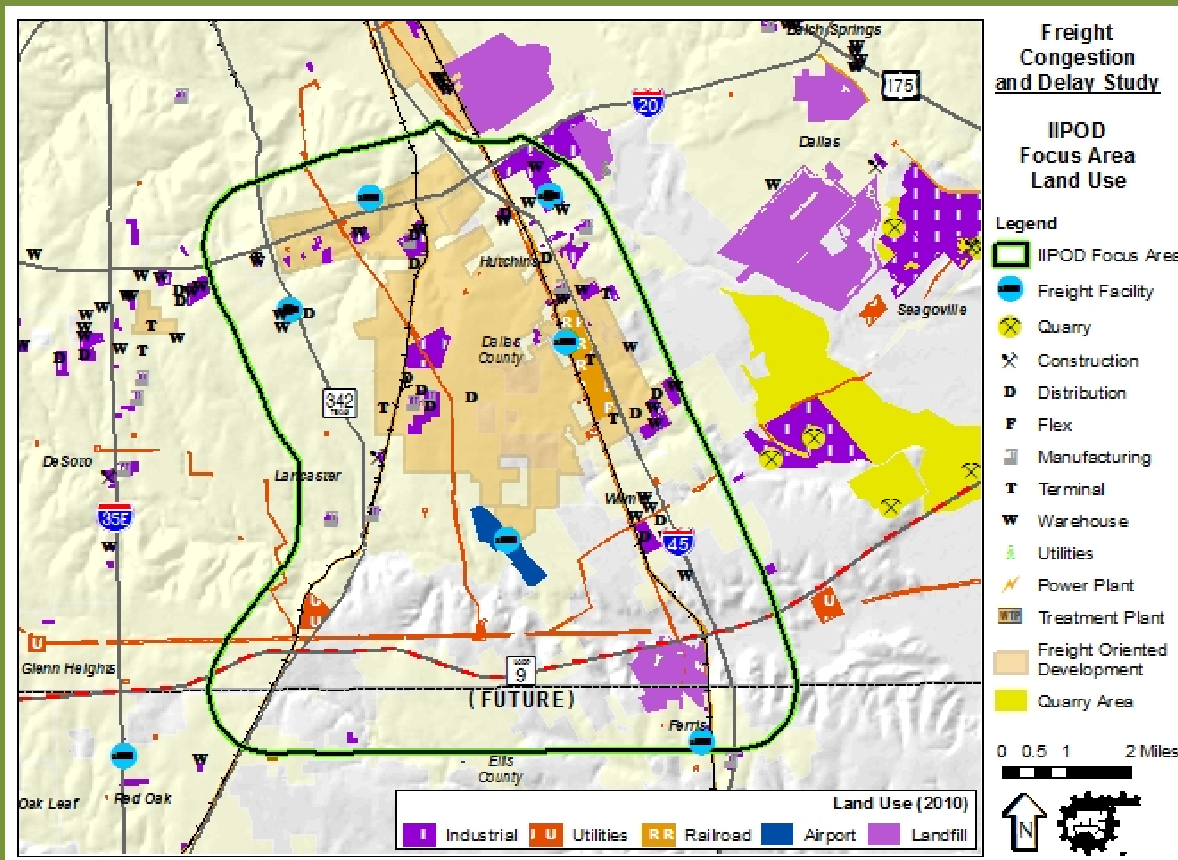
Source: NCTCOG 2014

6.3 Land Use

Freight intensive facilities and land uses in the focus area are shown in figure 6-3. The freight-oriented development is located mostly in the northeast section of the focus area. There are over 70 freight facilities throughout the area including the DIT. Other freight land uses include a landfill in the southeast corner of the area. Although not in the focus area there are several quarries to the east.

Figure 6-3

Figure 6-3: IIPOD Focus Area Land Use



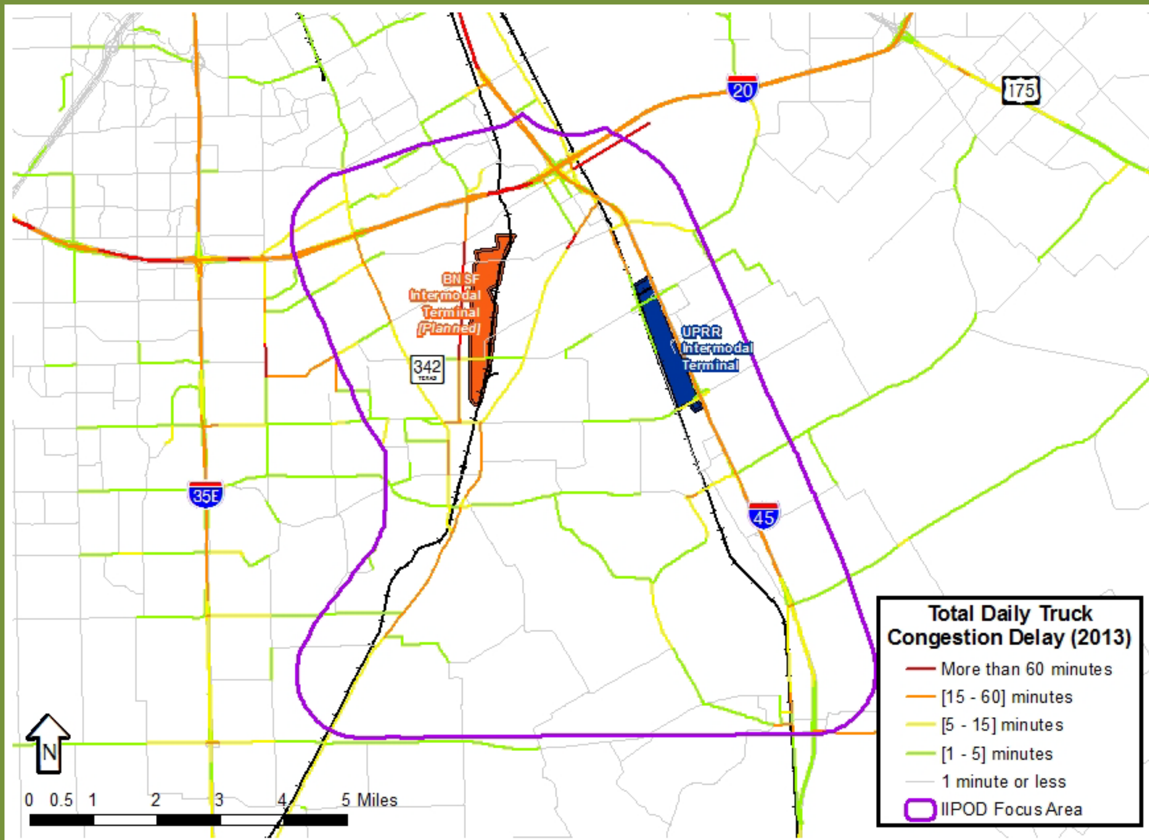
Source: NCTCOG 2014

6.4 Recurring Congestion and Delay

Recurring congestion and delay is delay exhibiting predictable patterns typically caused by high traffic volume, traffic signals, speed limits, regularly occurring bottlenecks, or major construction projects. This delay can be described as occurring daily in consistent locations. Recurring congestion and delay is typically created by transportation system deficiencies and is shown in Figure 6-4 for the IIPOD focus area.

Figure 6-4

Figure 6-4: IIPOD Focus Area Truck Congestion Delay



Source: NCTCOG 2014

6.4.1 Daily Delay

The estimated impact of roadway congestion to freight movements was developed based on the daily truck trips shown in Figure 6-2. The daily congestion delay for truck trips is shown in Figure 6-4. This estimated congestion delay within the IIPOD focus area include: IH 20 and IH 45. The heaviest congestion on arterials and collectors includes Lancaster Hutchins Road, SH 342, and Bonnie View Road.

The total estimated daily congestion delay for IIPOD focus area truck trips in the region is approximately 421 vehicle-hours.

Truck Congestion Delay can be reduced by:

- Road capacity improvements, specifically on the limited access facilities
- Alternate and easily identifiable truck routes

6.4.2 Traffic Control Delay

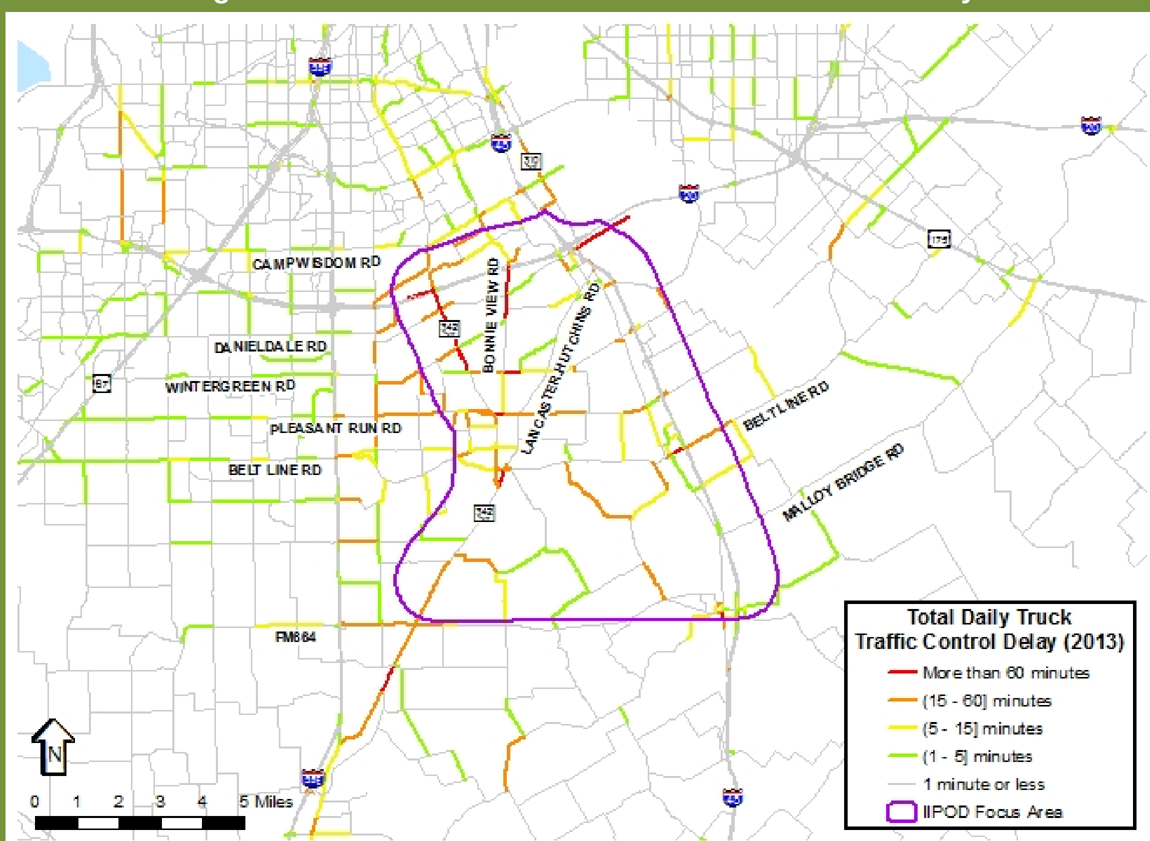
Traffic controls cause delay for freight movement to and from the IIPOD focus area. Traffic control delay differs from daily congestion delay as this type of delay is created by traffic signals, stop signs, and speed limits.

Truck trips from the IIPOD focus area face approximately 197 vehicle-hours of traffic control delay each day. Unlike the estimated congestion delay discussed in section 6.4.1, traffic control delay is tightly focused in and around the IIPOD focus area. The daily traffic control delay for truck trips within the IIPOD focus area is shown in Figure 6-5.

Since traffic control delay occurs mostly near the beginning or end of a trip, the benefits of optimizing traffic control systems are much more localized. The estimated results show highest traffic control delay along SH 342 (Lancaster Road in Dallas and Dallas Avenue in Lancaster) and on Bonnie View Road near IH 20. Additional roads with traffic control delay include Pleasant Run Road in Lancaster and Wilmer, Wintergreen Road in Lancaster, and Belt Line Road near IH 20.

Figure 6-5

Figure 6-5: IIPOD Focus Area Truck Traffic Control Delay



Source: NCTCOG 2014

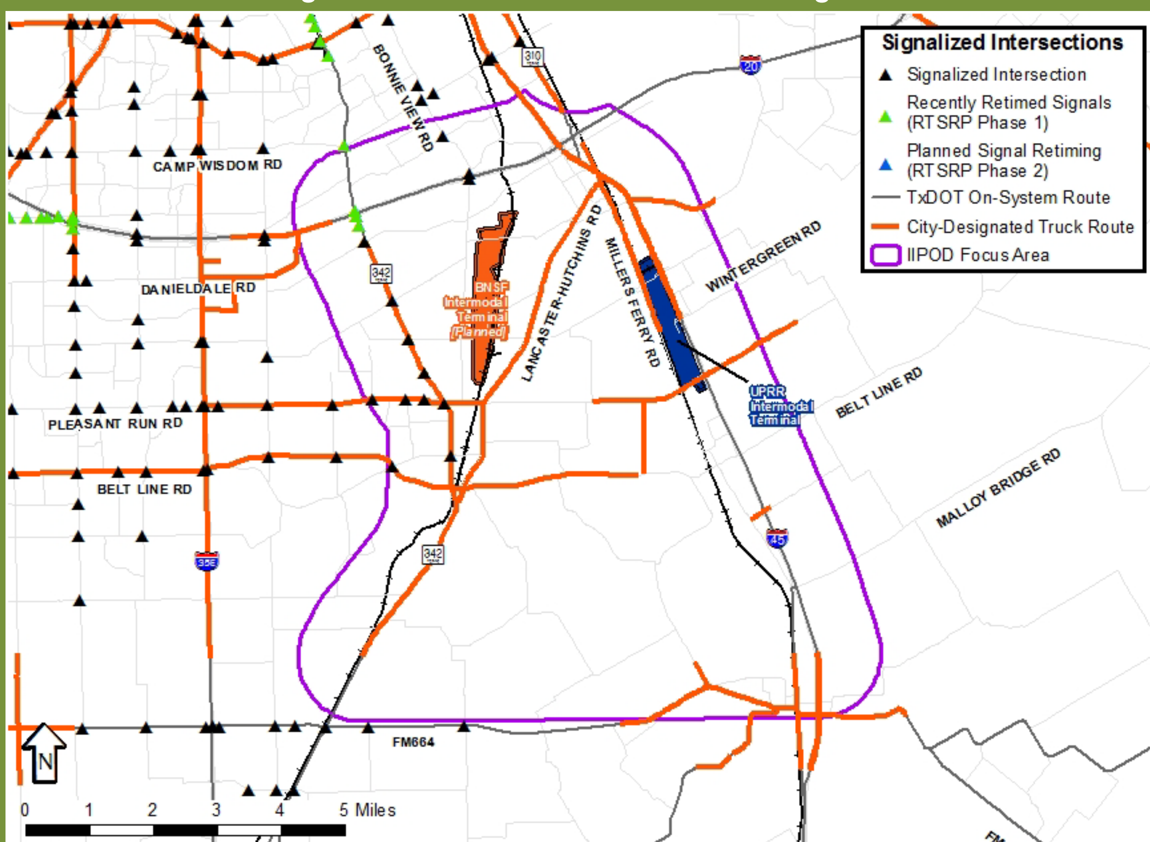
Figure 6-6 shows the signalized intersections in the IIPOD focus area and the NCTCOG initiatives that focus on retiming traffic signals to improve traffic flow within a corridor. The portion of SH 342 (Lancaster Road) within the City of Dallas was included in the Regional Traffic Signal Retiming Program (RTSRP). No other roadways within the focus area are included in regional signal retiming initiatives. While traffic control delay can be reduced through signal retiming or other measures, some traffic control delay is inevitable.

Traffic control delay can be reduced by:

- A signal timing study along corridors with estimated signal delay including SH 342 and Bonnie View Road in the IIPOD Focus Area
- Based on the results of the study, determine the best possible solutions which may include signal retiming/syncing and upgrading the traffic signals/signage along the corridors

Figure 6-6

Figure 6-6: IIPOD Focus Area Traffic Signals



Source: NCTCOG 2014

6.5 Non-Recurring Congestion and Delay

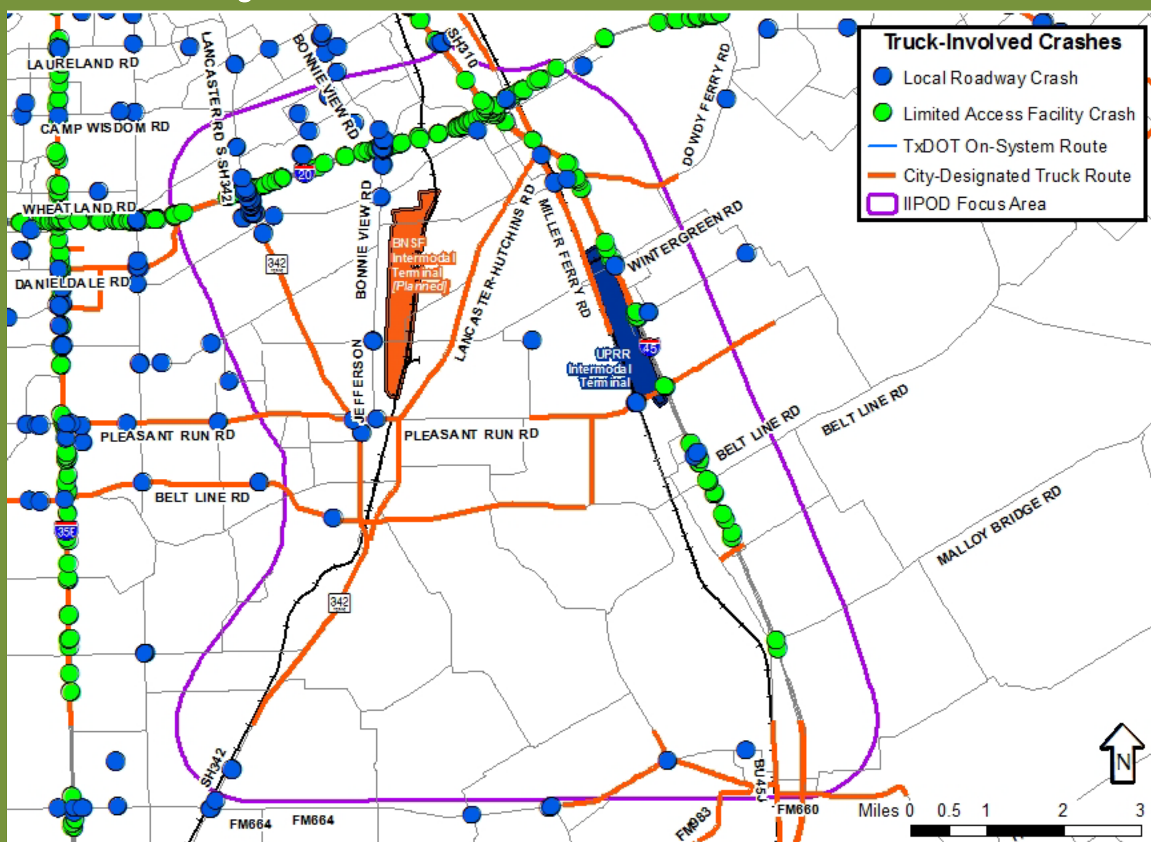
Non-recurring congestion delay is attributed to unpredictable or highly variable sources such as traffic incidents, inclement weather, special events, or maintenance closures. This delay is best described as random. Non-recurring congestion is generally created by unforeseen circumstances and is typically not a product of transportation system deficiencies.

6.5.1 Truck Involved Crashes

Non-recurring congestion delays are more difficult to assess and address. The most common type of non-recurring congestion stems from traffic incidents. Even minor crashes can cause delays for many transportation system users if the vehicles involved obstruct travel lanes. Crashes directly involving freight vehicles create much more delay for the shipment. Due to the amount of fuel most trucks carry during normal operations, crashes that involve trucks are often treated as HAZMAT incidents. The time required to assess potential hazards, document damage, and clear the incident contribute to the delay. Figure 6-7 shows the locations of truck-involved crashes in the IIPOD focus area from 2008 through 2012. There were 283 crashes reported over this five-year span with 212 were on IH 20 or IH 45, 29 were on SH 342, 11 were on Bonnie Road, and the remaining 32 crashes were on other road/facilities.

Figure 6-7

Figure 6-7: IIPOD Focus Area Truck-Involved Crashes



Source: TxDOT's Crash Records Information System (CRIS) - all TxDOT disclaimers apply to this information

1. This data consist of all locatable crashes that include latitude and longitude information.
2. This data is composed of TxDOT "Reportable Crashes" only.

A "Reportable Motor Vehicle Traffic Crash" is defined by TxDOT as: any crash involving motor vehicle in transport that occurs or originates on a traffic way, results in injury to or death of any person, or damage to the property of any one person to the apparent extent of $1,000. A traffic way is defined as any land way open to the public as a matter of right or custom for moving persons or property from one place to another.

Delay from truck-involved crashes can be mitigated by:

- Safe driving practices such as no handhelds while driving to help prevent the crashes
- Intersection improvements such as proper turning radius, clear lines of sight, and proper signage to help prevent the crashes
- Signage on limited access facilities for improved truck driver awareness
- Alternative and easily identifiable truck routes

6.5.2 Truck Routes

Truck routes are another potential source of delay because they may not continue from one municipality to the next and they may not go through area as needed. Most freight movement on roadways occurs in vehicles that must comply with local truck route ordinances and statewide regulations. As shown in Figure 6-8, only Ferris, Hutchins, and Lancaster have designated truck routes within the IIPOD focus area. Some federal and state routes, such as interstate highways, are also truck routes, regardless of local designations. The possible truck routes shown in yellow are considerations for local governments as truck routes. These could close the gaps in the truck routes and allow for more contiguous movement.

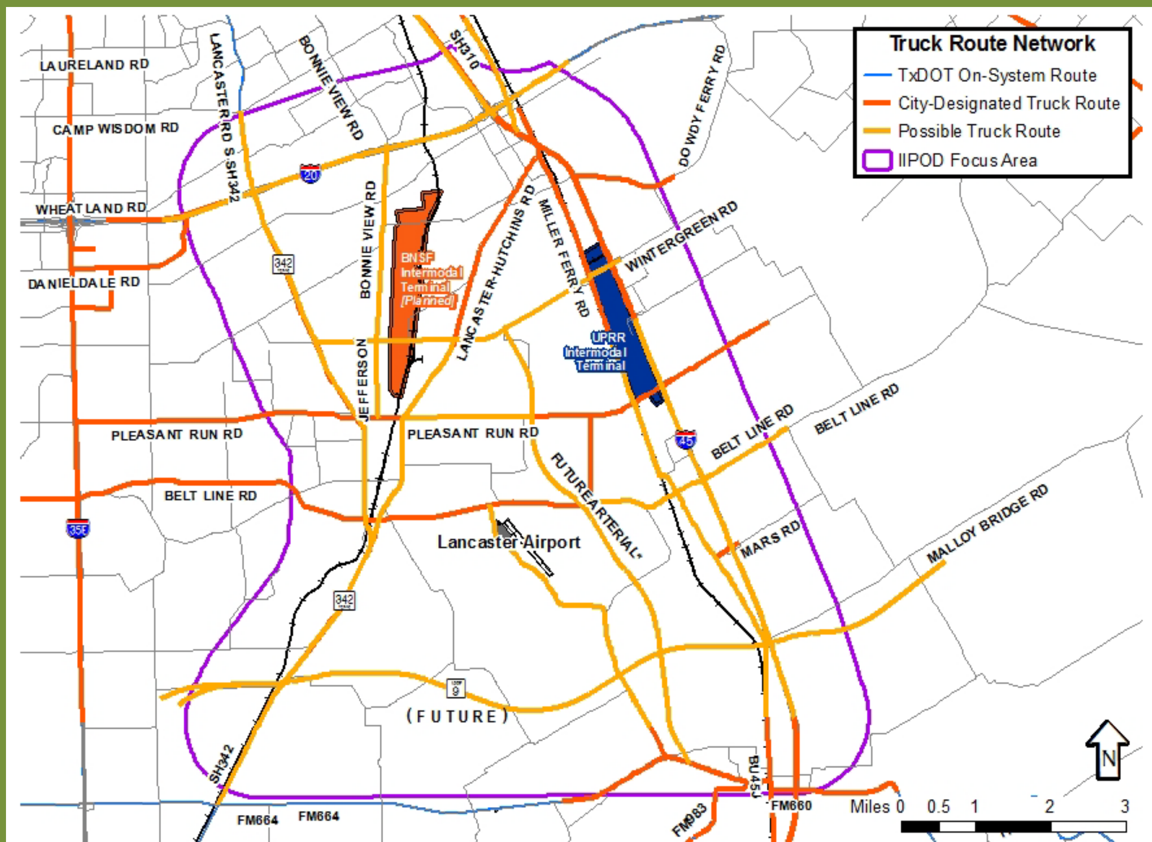
In an area heavily populated with freight facilities, truck routes and truck route connectivity is vital. If truck routes are a discontinuous patchwork it can create delays. It limits the ability of truck drivers to dynamically reroute to bypass a freeway incident or major construction project. Trucks deviating from designated truck routes are subject to law enforcement action. Without a complete local route network, drivers have little choice but to wait for an incident to clear.

Delay from truck route disconnect can be mitigated by:

- A truck route study to identify which roadways can and should be designated as truck routes

Figure 6-8

Figure 6-8: IIPOD Focus Area Truck Routes



Source: NCTCOG 2014

6.5.3 Roadway Geometry

Intersection turning radius, especially for right turns, can be a source of delay for trucks. When the turning radius is less than 45 feet for standard tractor/trailer 18-wheeler trucks, drivers must maneuver the vehicle from the designated travel lanes to avoid "clipping" the corner. Intersections on designated truck routes and state facilities, as well as those on potential truck routes, were reviewed to determine if the existing intersection geometry allows truck turning movements. The turning radius at intersections on minor roads near major freight developments was also examined.

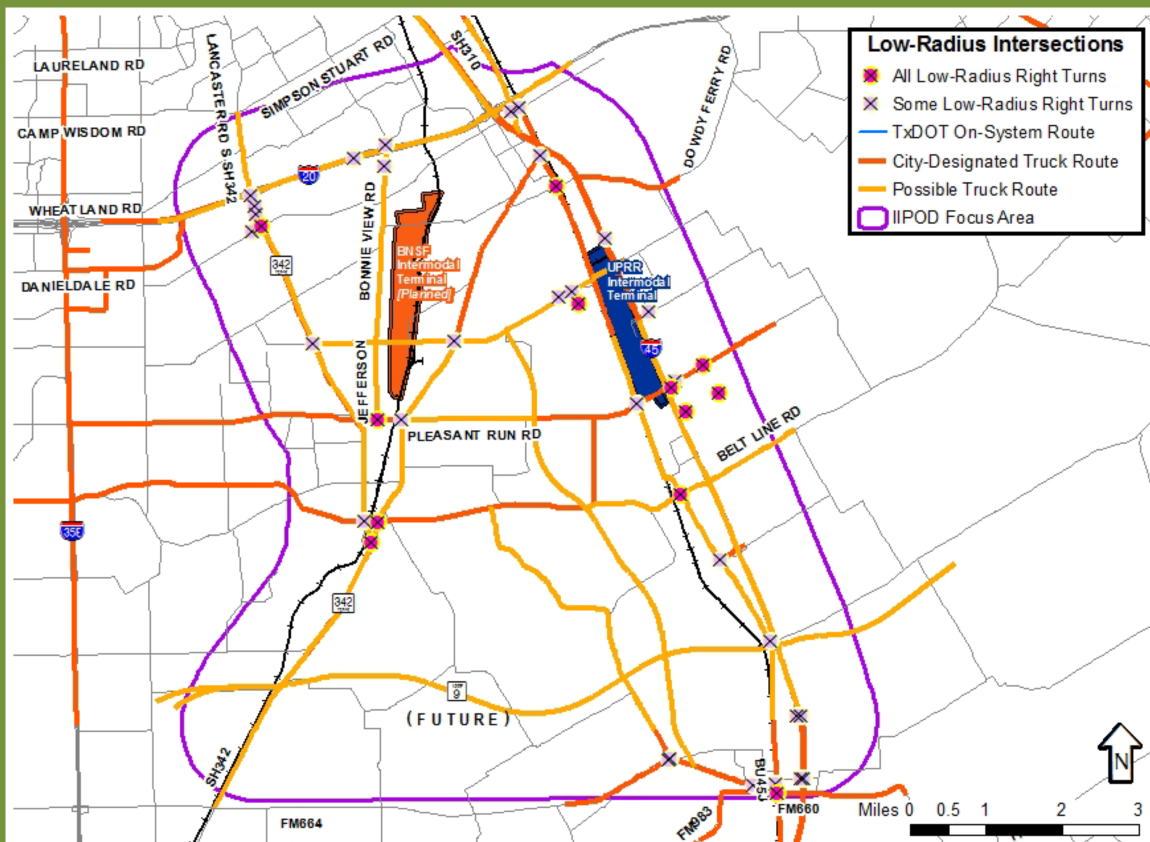
Figure 6-9 highlights intersections where one or more right turning radii is less than 45 feet. Intersections on truck routes with low-radius turns in this focus area exist on FM 664 and Lancaster-Hutchins Road. There are additional intersections with low-radius turns but they are not along the designated truck routes. Addressing the low-radius turns on existing and potential truck routes could reduce delay by expediting turning movements and decreasing the potential for damage to vehicles and shipments that result from jumping curbs or clipping obstructions at corners.

Delay from roadway geometry can be mitigated by:

- Correcting roadway geometry at intersections along truck routes and potential truck routes

Figure 6-9

Figure 6-9: IIPOD Focus Area Low-Radius Intersections



Source: NCTCOG 2014

6.5.4 Railroad Crossings

The final source of non-recurring delay considered for this study is at-grade railroad crossings. Crossings create delay by preventing roadway movements as trains pass and they are also a safety risk. Figure 6-10 shows the crossings listed in the Federal Railroad Administration (FRA) National Grade Crossing Inventory within the IIPOD focus area. There are three at-grade crossings of designated truck routes within the IIPOD focus area: UP at FM 664, BNSF at Belt Line Road, and BNSF at Pleasant Run Road.

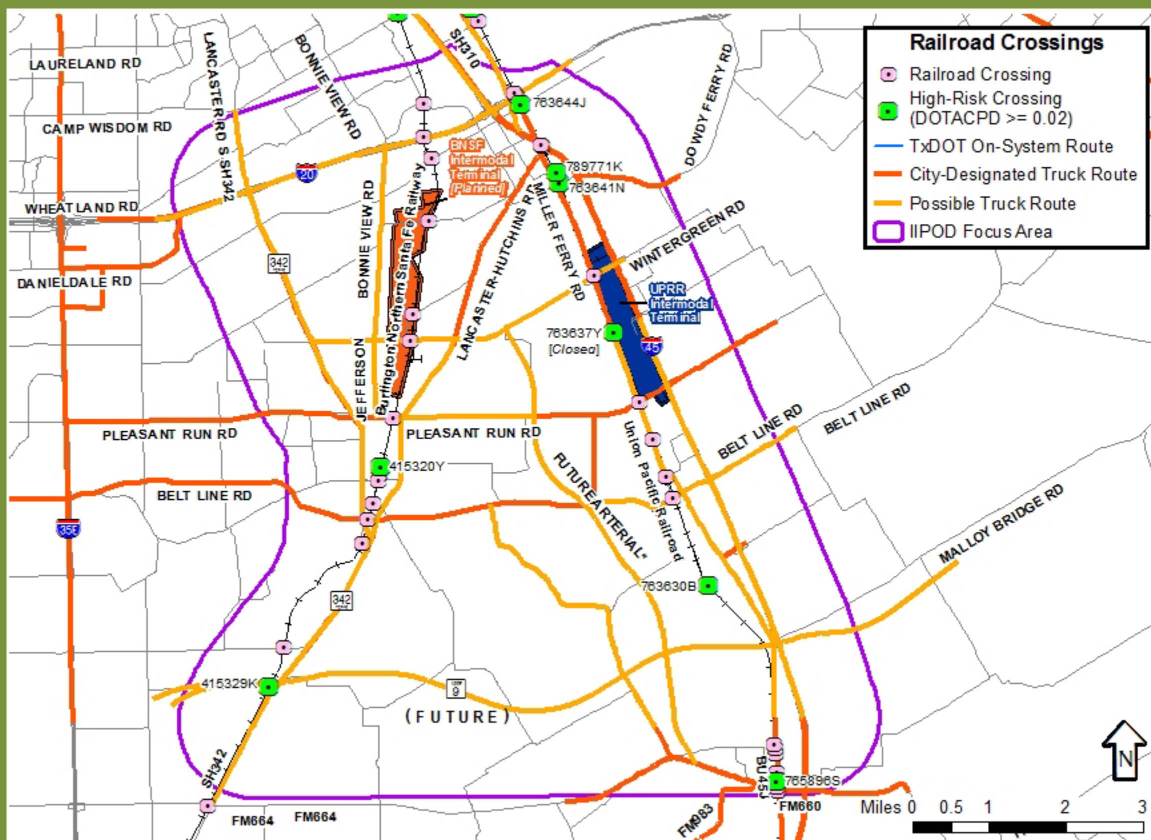
FRA data indicates 10 trains use the UP line and 5 trains use the BNSF line daily. The new grade separated crossing of the UP line at Wintergreen Road provides a reliable method to cross the UP line regardless of train frequencies. Similarly, the grade separated crossing of the BNSF line at SH 342 facilitates the flow of freight over the roadway network. The UP at FM 664 crossing has the highest US DOT Accident Prediction Value for any crossing in the focus area. This crossing will no longer be on a designated truck route after TxDOT completes the FM 664 realignment. These can cause delays due to accidents and the time it takes trucks to get through the crossing.

Delay from railroad crossings can be reduced by:

- Rebuilding or levelling the crossing so that trucks can cross easily
- Grade separate crossings when practical
- Close unnecessary crossings
- Update warning equipment at crossing
- Synchronize crossing warning with traffic signals nearby to allow better overall movement

Figure 6-10

Figure 6-10: IIPOD Focus Area Railroad Crossings



Source: NCTCOG 2014

6.6 Non-Transportation Delay

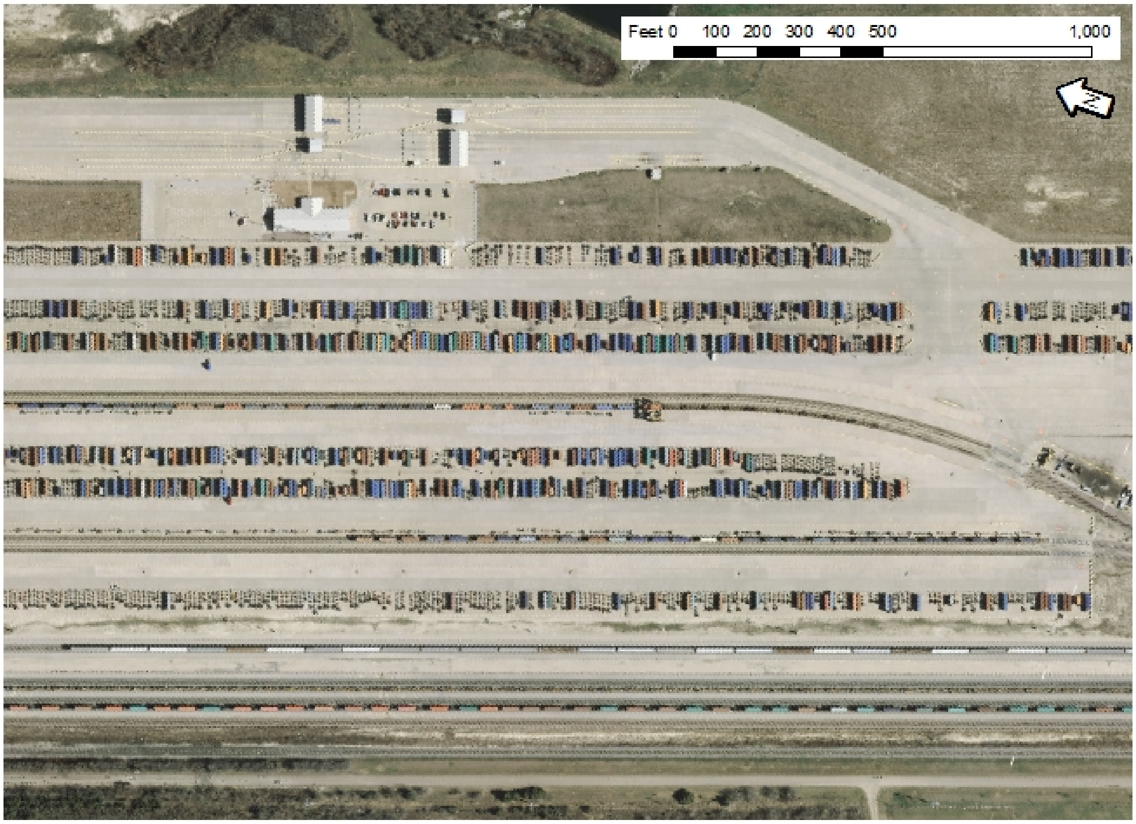
Non-transportation delay is delay stemming from sources unrelated to the transportation system, including wait times to load/unload, staffing levels, equipment maintenance, or documentation/regulatory compliance. This delay can be both recurring and non-recurring. Non-transportation congestion is generally produced by both the private- and public-sector entities. Within the IIPOD focus area, the largest potential for non-transportation delay is at the UP Dallas Intermodal Terminal shown in Figure 6-11. Efficiently transferring freight between modes, in this case between railway and truck, requires excellent logistics systems to ensure freight is handled appropriately.

Delay from non-transportation issues can be reduced by:

- Working together with the freight carriers to better understand freight transportation issues and find solutions

Figure 6-11

Figure 6-11: Union Pacific Dallas Intermodal Terminal



Source: NCTCOG 2014

6.7 Focus Area Recommendations

Recommendations were created based on data and analysis of the Alliance Focus Area. These projects were created in line with the regional policies and programs discussed in Section 2. Smaller projects that are freight specific will take priority.

6.7.1 Projects

Projects are separated into five categories: Truck Route Network Continuity, Intersection Improvements on Truck Routes, Road Capacity Improvements, Railroad Relocation, and Railroad Crossing Improvements. The project categories are based upon the policies and programs found in Tables 2-1 and 2-2. Not every focus area has a project in all five categories. Recommended projects for the IIPOD focus area are found in Table 6-1. The projects are for the focus area and would benefit the region.

Table 6-1: IIPOD Focus Area Project Recommendations

Road/Area	Limit From	Limit To	Project	Project Category
All	N/A	N/A	Truck Route Study	Truck Route Network Continuity
SH 342	IH 20	Pleasant Run Road	Signal Timing Study	Intersection Improvements on Truck Routes
IH 20 Frontage Road	SH 342	JJ Lemmon Road	Signal Timing Study	Intersection Improvements on Truck Routes
IH 20 Frontage Road	SH 342	Bonnie View Road	Reconstruction of intersections to lengthen turn radii at SH 342, Dynasty Drive, and Bonnie View Road.	Intersection Improvements on Truck Routes
SH 342	Cedardale Road	Lancaster Hutchins Road	Reconstruction of intersections to lengthen turn radii at Cedardale Road, Wintergreen Road, Belt Line Road, and Lancaster Hutchins Road	Intersection Improvements on Truck Routes
IH45	Fulghum Road Exit	Fulghum Road Exit	Eliminate the “jug handle” exit	Road Capacity Improvements
IH45	Wintergreen Road Exit	Wintergreen Road Exit	Eliminate the “jug handle” exit	Road Capacity Improvements

7.0 MESQUITE FOCUS AREA

The Mesquite focus area was chosen for analysis in this study as a uniquely different type of freight-orientated development. The area is not a planned area like the IIPOD and Alliance and does not have a well-developed warehouse area like that Great Southwest has.

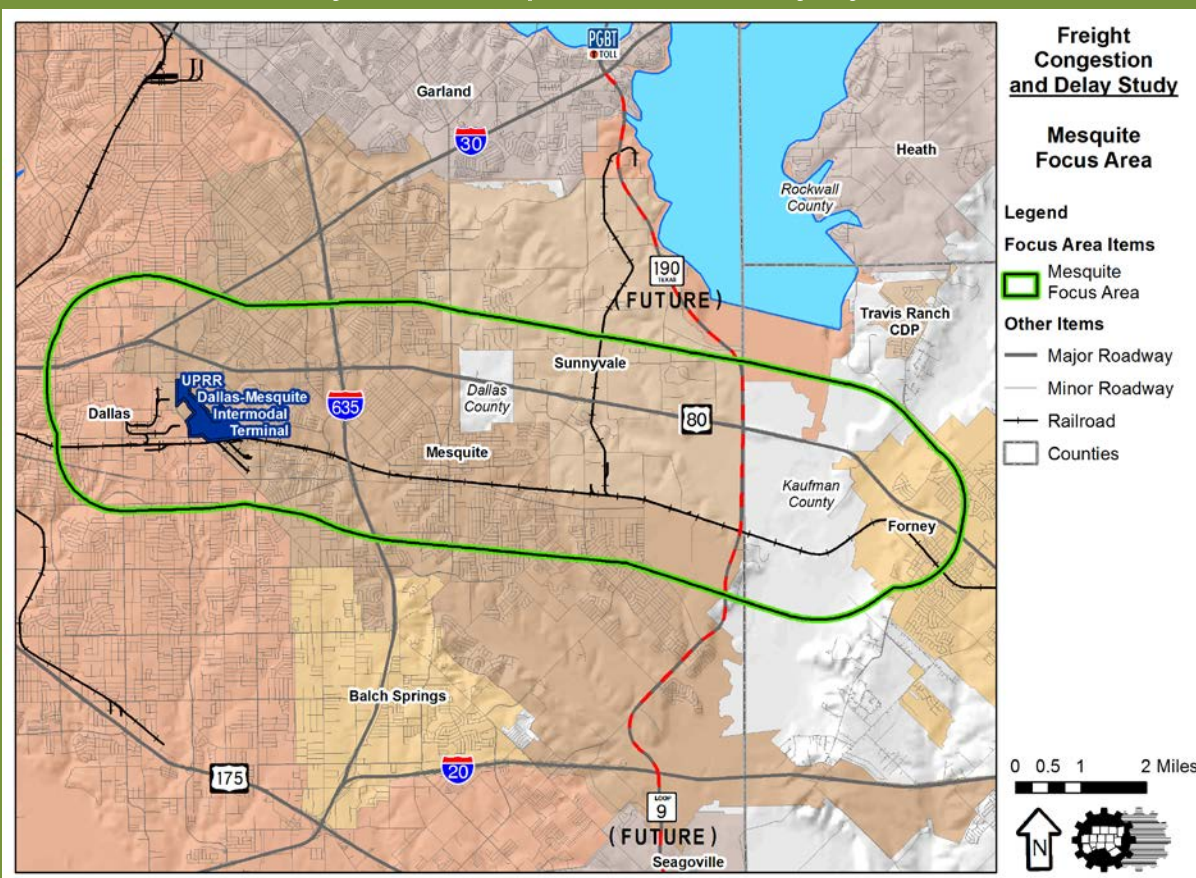
7.1 Introduction

For this study, the Mesquite focus area is a one-mile buffer surrounding the area bounded by IH 30, US 80, and the UP Dallas Subdivision. This area, shown in Figure 7-1, includes portions of the Cities of Dallas, Mesquite, Sunnyvale, and Forney.

The Union Pacific (UP) Dallas Subdivision runs east-west through the focus area. The limited access facilities within the focus area include, IH 30, US 80, and IH 635. The UP Dallas Mesquite Intermodal Terminal, located between US 80 and the Dallas Subdivision, is the dominant freight facility in this area.

Figure 7-1

Figure 7-1: Mesquite Focus Area Highlights

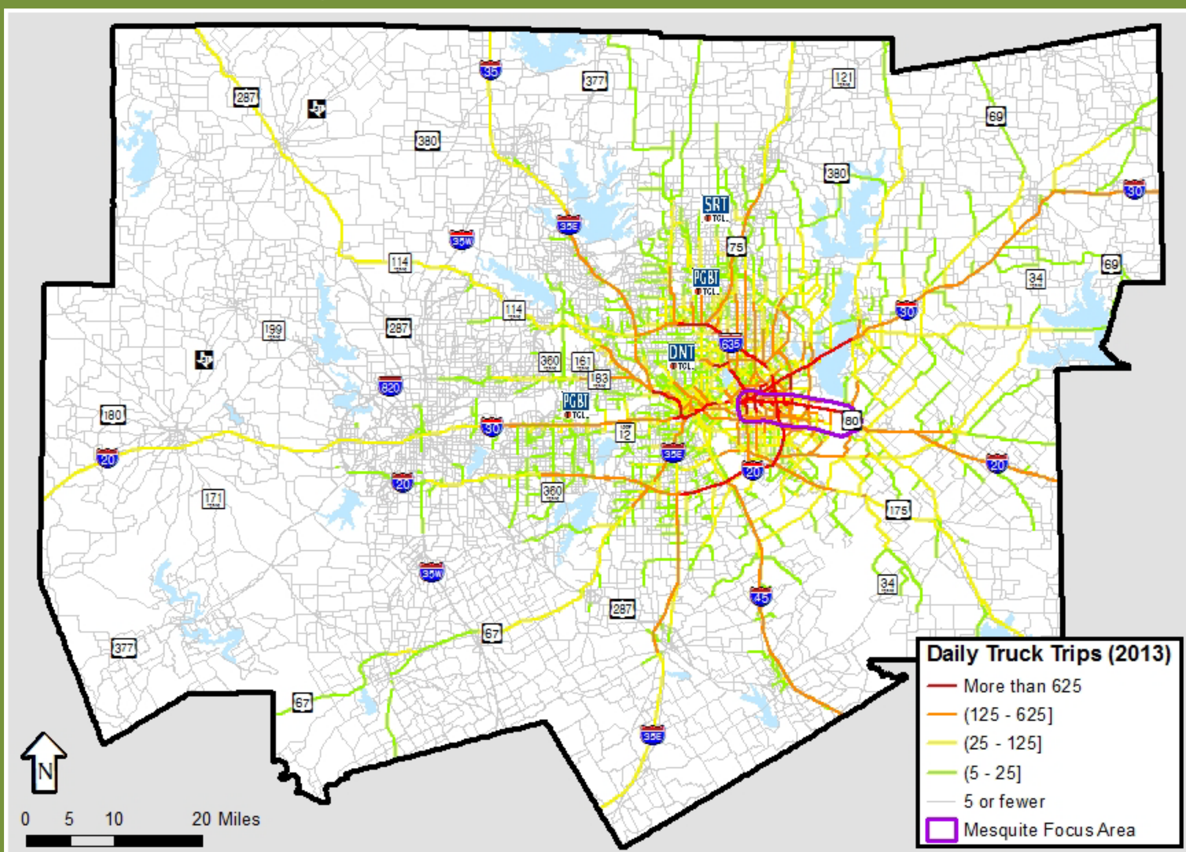


Source: NCTCOG 2014

7.2 Truck Trips

The current year transportation network adopted in *Mobility 2035 – 2014 Amendment* was used to estimate daily truck trips to and from the focus area, shown in Figure 7-2. These are trips originating from or destined to the focus area. As expected, most of these trips occur on major limited access facilities. Estimated truck movements associated with the Mesquite focus area show the highest volumes on IH 635 and US 80. Many truck trips also use IH 30, IH 45 and IH 20. Freight movements to or from the Mesquite focus area from outside the region are concentrated on IH 45, IH 30, and IH 20. Other notable out-of-region movements to and from the area use IH 45, IH 30, and IH 20.

Figure 7-2



Source NCTCOG 2014

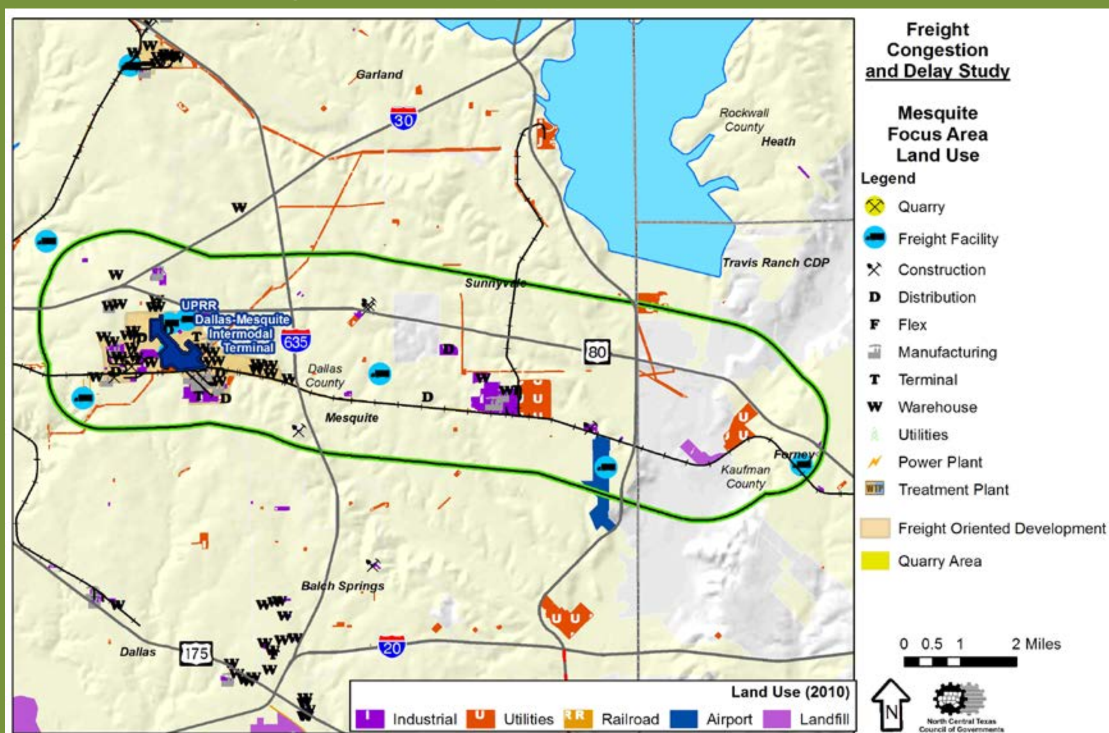
Total daily estimated truck VMTs to and from the Mesquite focus area is approximately 531,807 within the region. Seventy-three percent of the VMTs were estimated to be travelled on limited access facilities. Many of these truck trips continue to out-of-region destinations, increasing total daily truck VMTs from the Mesquite focus area.

7.3 Land Use

Freight intensive facilities and land uses in the focus area are shown in figure 7-3. The majority of freight-oriented development is in the western side of the focus area, including the Dallas Mesquite Intermodal Terminal. Most of the warehouses are near the intermodal terminal. Other freight land uses include utilities in the central and eastern sections.

Figure 7-3

Figure 7-3: Mesquite Focus Area Land Use



Source: NCTCOG 2014

7.4 Recurring Congestion and Delay

Recurring congestion and delay is delay exhibiting predictable patterns, typically caused by high traffic volume, traffic signals, speed limits, regularly occurring bottlenecks, or major construction projects. This delay can be described as occurring daily in consistent locations. Recurring congestion and delay is typically created by transportation system deficiencies.

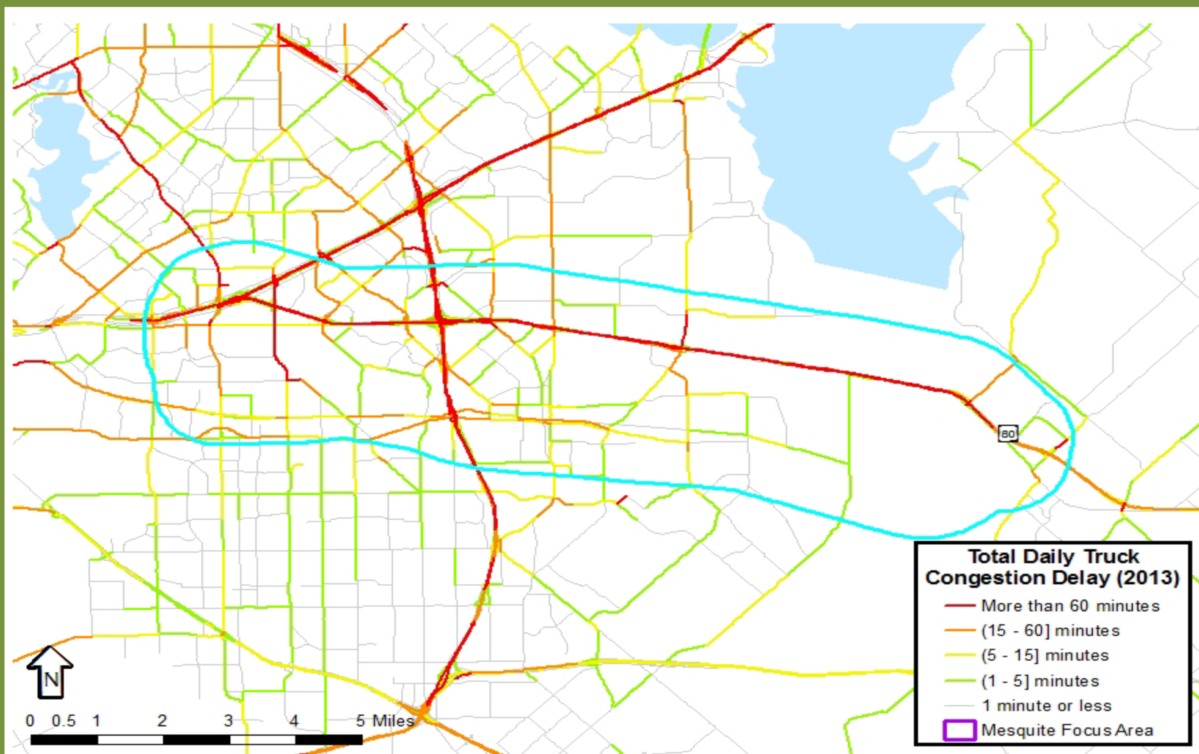
7.4.1 Daily Delay

The estimated impact of roadway congestion to freight movements was developed based on the daily truck trips shown in Figure 7-2. The daily congestion delay for truck trips is shown in Figure 7-4. Estimated congestion delay within the Mesquite focus area includes: IH 635, US 80, and IH 30. The heaviest congestion on arterials and collectors includes Big Town Blvd., Belt Line Road, Collins Road, and Motley Drive. The total estimated daily congestion delay for the Mesquite focus area truck trips in the region is approximately 1,635 vehicle-hours.

Recurring Truck Congestion can be reduced by:
- Road capacity improvements, specifically on the limited access facilities
- Alternate and easily identifiable truck routes

Figure 7-4

Figure 7-4: Mesquite Focus Area Truck Congestion Delay



Source: NCTCOG 2014

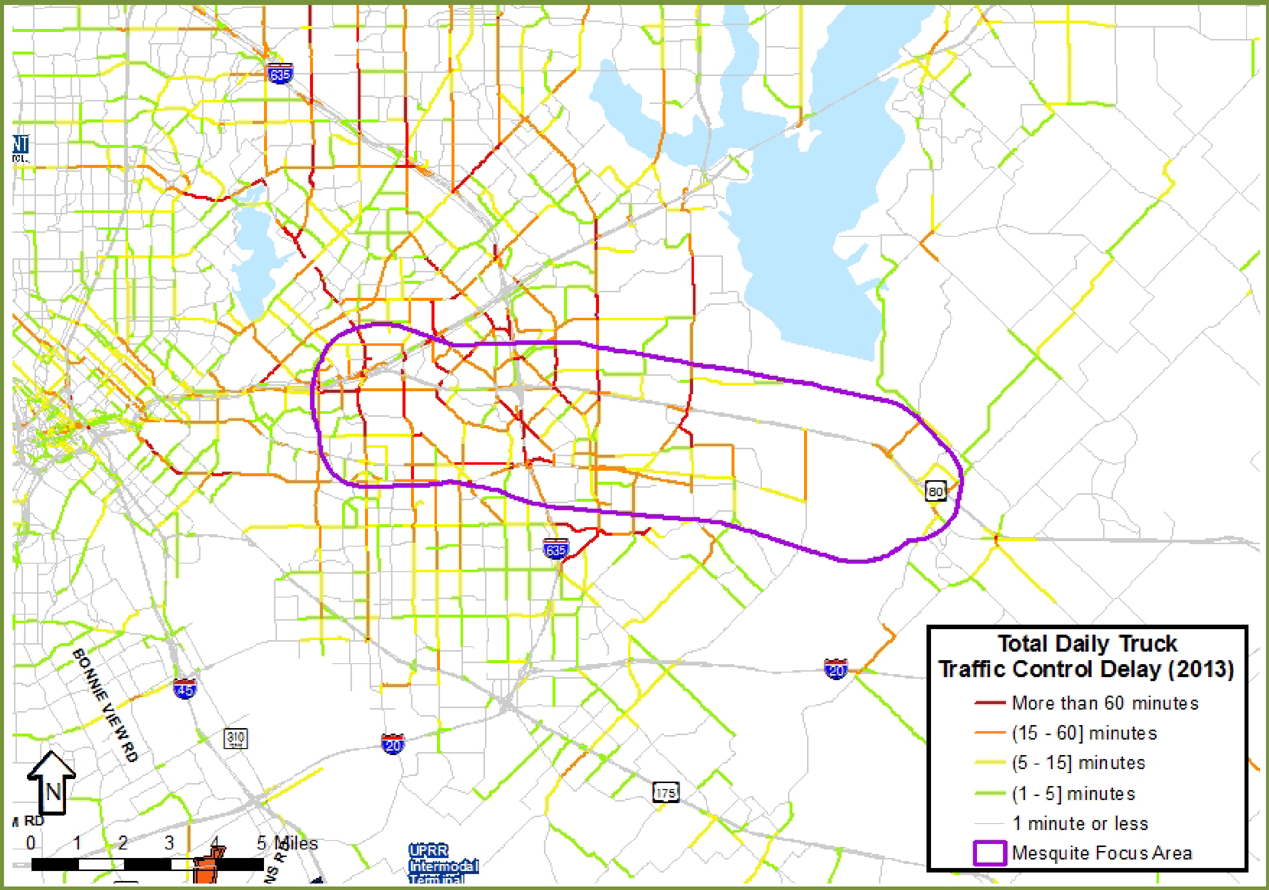
7.4.2 Traffic Control Delay

Traffic controls cause delay for freight movements to and from the Mesquite focus area. Traffic control delay differs from daily congestion delay as it is created by traffic signals, stop signs, and speed limits.

Truck trips from the Mesquite focus area encounter 847 vehicle-hours of traffic control delay each day. Unlike the estimated congestion delay discussed in section 7.4.1, traffic control delay is tightly focused in and around the Mesquite focus area. The daily traffic control delay for truck trips within the Mesquite focus area is shown in Figure 7-5.

Figure 7-5

Figure 7-5: Mesquite Focus Area Traffic Signals



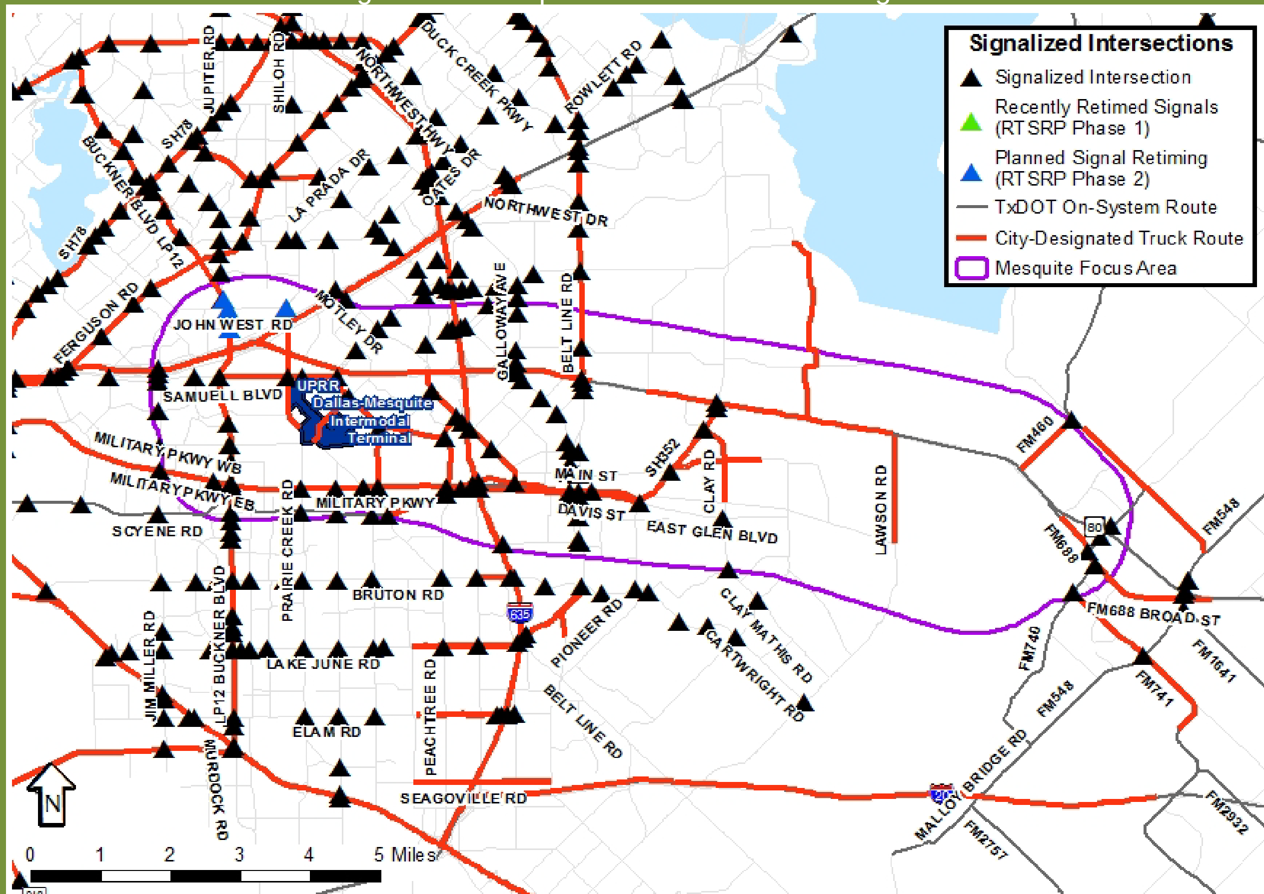
Source: NCTCOG 2014

Since traffic control delay occurs mostly near the beginning or end of a trip, the benefits of optimizing traffic control systems are much more localized. The estimated results show highest traffic control delay along SH 352 near US 80 and Belt Line Road near US 80. Additional roads with traffic control delay include Galloway Avenue and Loop 12 near IH 30.

Figure 7-6 shows the signalized intersections in the Mesquite focus area and NCTCOG's initiatives that focus on retiming traffic signals to improve traffic flow within a corridor. No corridors in the focus area were included in the Regional Traffic Signal Retiming Program (RTSRP). No other roadways within the focus area are included in regional signal retiming initiatives. While traffic control delay can be reduced through signal retiming or other measures, some traffic control delay is inevitable.

Figure 7-6

Figure 7-6 Mesquite Focus Area Traffic Signals



Source: NCTCOG 214

Traffic control delay can be mitigated by:

- Signal timing study along corridors with estimated signal delay including SH 352 and Belt Line Road for the Mesquite focus area
- Determine the best course of action based on the study results
- This can include signal retiming/syncing and upgrading the traffic signals/signage along the corridors

7.5 Non-Recurring Congestion and Delay

Non-recurring congestion delay is attributed to unpredictable or highly variable sources such as traffic incidents, inclement weather, special events, or maintenance closures. This delay is best described as random. Non-recurring congestion is generally created by unforeseen circumstances and is typically not a product of transportation system deficiencies.

7.5.1 Truck Involved Crashes

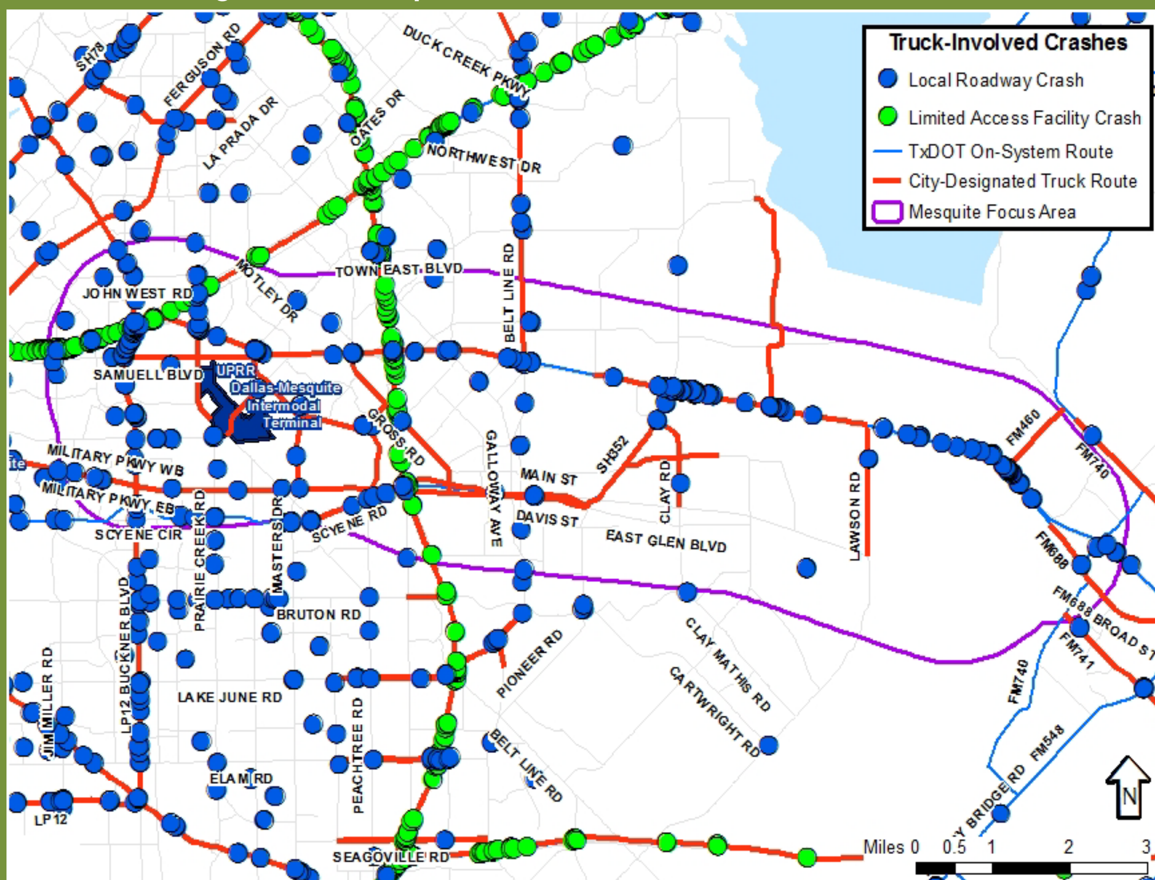
Non-recurring congestion delays are more difficult to assess and address. The most common type of non-recurring congestion stems from traffic incidents. Even minor crashes can cause delays for many transportation system users if the vehicles involved obstruct travel lanes.

Crashes directly involving freight vehicles create much more delay for the shipment. Because of the amount of fuel most trucks carry during normal operations, crashes that involve trucks are often treated as HAZMAT incidents. The time required to assess potential hazards, document damage, and clear the incident all increases delay.

Figure 7-7 shows the locations of truck-involved crashes in the Mesquite focus area from 2008 through 2012. Of the 335 crashes reported over this five-year span about 103 were on IH 30 or IH 635, 109 were on US 80, 38 were on Loop 12, and the remaining 85 were on other road/facilities.

Figure 7-7

Figure 7-7: Mesquite Focus Area Truck-Involved Crashes



Source: TxDOT's Crash Records Information System (CRIS) - All TxDOT disclaimers apply.

1 This data consists of all locatable crashes that include latitude and longitude information.
2. This data is composed of TxDOT "Reportable Crashes" only.

A "Reportable Motor Vehicle Traffic Crash" is defined by TxDOT as: any crash involving motor vehicle in transport that occurs or originates on a traffic way, results in injury to or death of any person, or damage to the property of any one person to the apparent extent of $1,000. A traffic way is defined as any land way open to the public as a matter of right or custom for moving persons or property from one place to another.

Delay from truck-Involved crashes can be mitigated by:

- Safe driving practices such as no handhelds while driving to help prevent the crashes
- Intersection improvements, such as proper turning radius, clear lines of sight and proper signage
- Signage on limited access facilities to keep truck drivers more informed of accidents
- Alternative and easily identifiable truck routes

7.5.2 Truck Routes

Truck routes are another potential source of delay because they may not continue for one municipality to the next and they may not go through area as needed. Most freight movement on roadways occurs in vehicles that must comply with local truck route ordinances and statewide regulations. As shown in Figure 7-8, only US 80, SH 352, Gross Road, IH 30, and IH 635 are designated as truck routes within the Mesquite focus area. Some federal and state routes such as interstate highways are truck routes, regardless of local designations. The possible truck routes shown in yellow are considerations for local governments as truck routes. These routes could close the gaps in the truck routes and allow for more free movement in the area.

In an area heavily populated with freight facilities, truck routes and truck route connectivity is essential. If truck routes are a discontinuous patchwork it can create delays and limit the ability of truck drivers to dynamically reroute to bypass a freeway incident or major construction project.

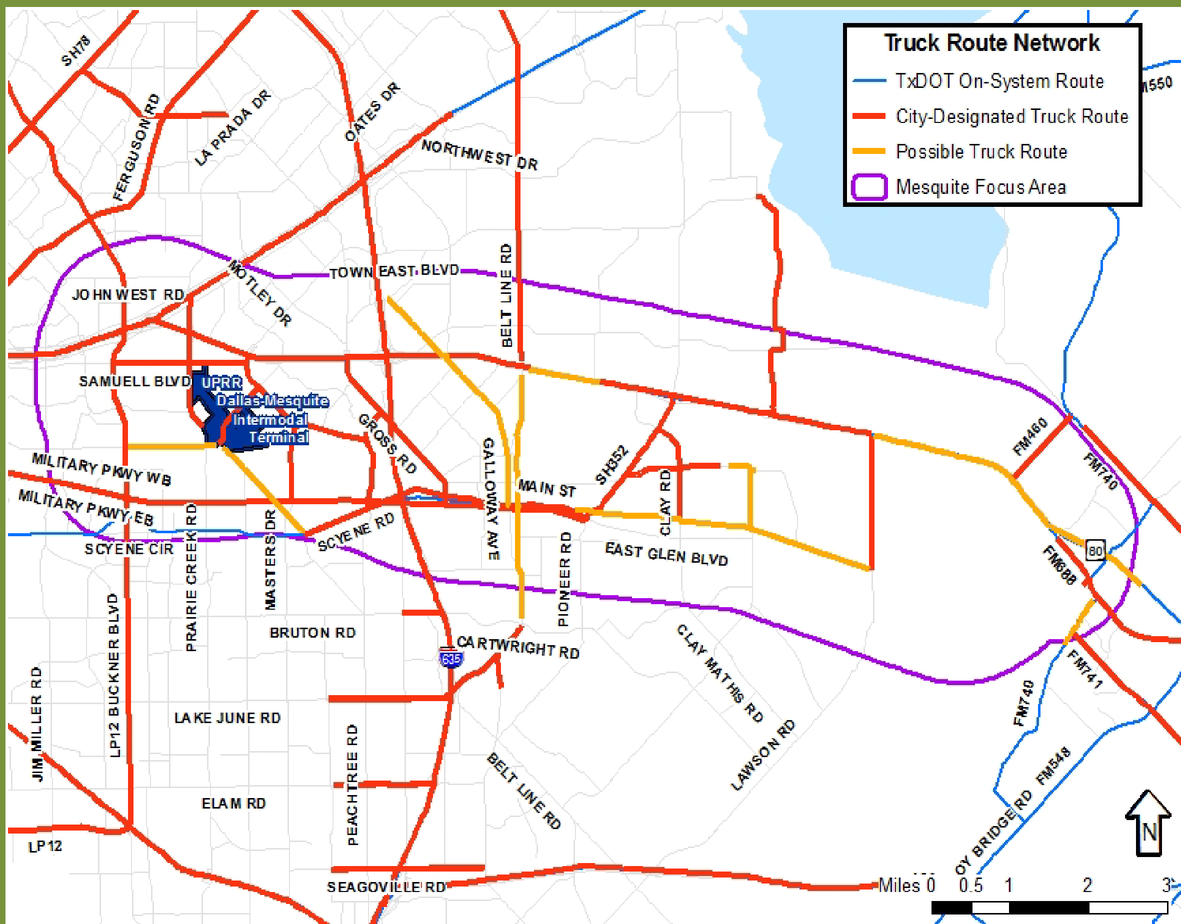
Trucks deviating from designated truck routes are subject to law enforcement action. Without a complete local route network, drivers have little choice but to wait for an incident to clear.

Delay from truck route fragmentation can be mitigated by:

- A truck route study to identify which roadways can and should be used as truck routes

Figure 7-8

Figure 7-8: Mesquite Focus Area Truck Routes



Source: NCTCOG 2014

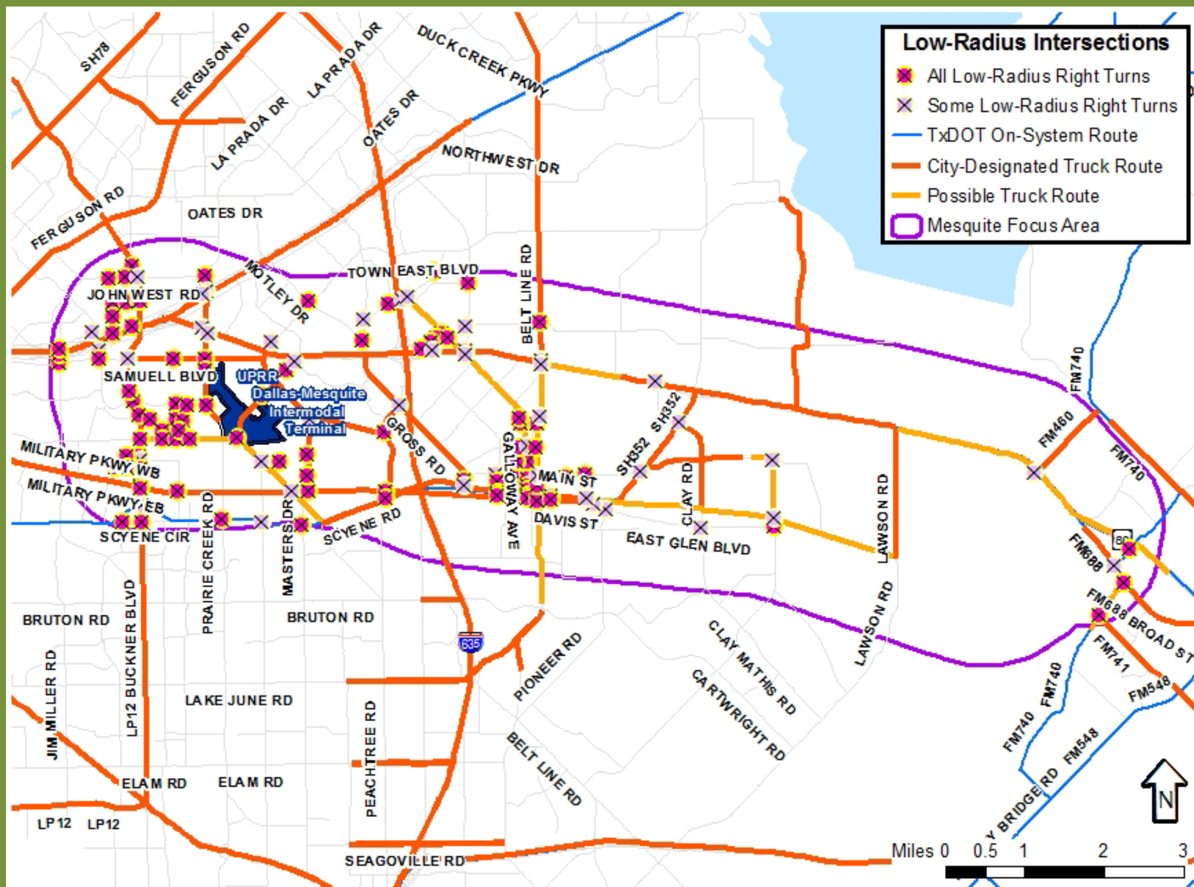
7.5.3 Roadway Geometry

Intersection turning radius, especially for right turns, is a source of delay for trucks. When the turning radius is less than 45 feet for standard tractor/trailer 18-wheeler trucks, drivers must maneuver the vehicle from the designated travel lanes to avoid “clipping” the corner. Intersections on designated truck routes and state facilities as well as those on potential truck routes were reviewed to determine if the existing intersection geometry allows truck turning movements. The turning radii at intersections on minor roads near major freight developments were also examined.

Figure 7-9 highlights intersections where one or more right-turning radii is less than 45 feet. Intersections on truck routes with low-radius turns are on Belt Line Road, Loop 12, and SH 352. There are additional intersections with low-radius turns but the intersections on the above named roads are the most egregious in this focus area. Addressing the low-radius turns on existing and potential truck routes could reduce delay by expediting turning movements and decreasing the potential for damage to vehicles and shipments that result from jumping curbs or clipping obstructions at corners.

Figure 7-9

Figure 7-9: Mesquite Focus Area Low-Radius Intersections



Source: NCTCOG 2014

Delay from roadway geometry can be mitigated by:

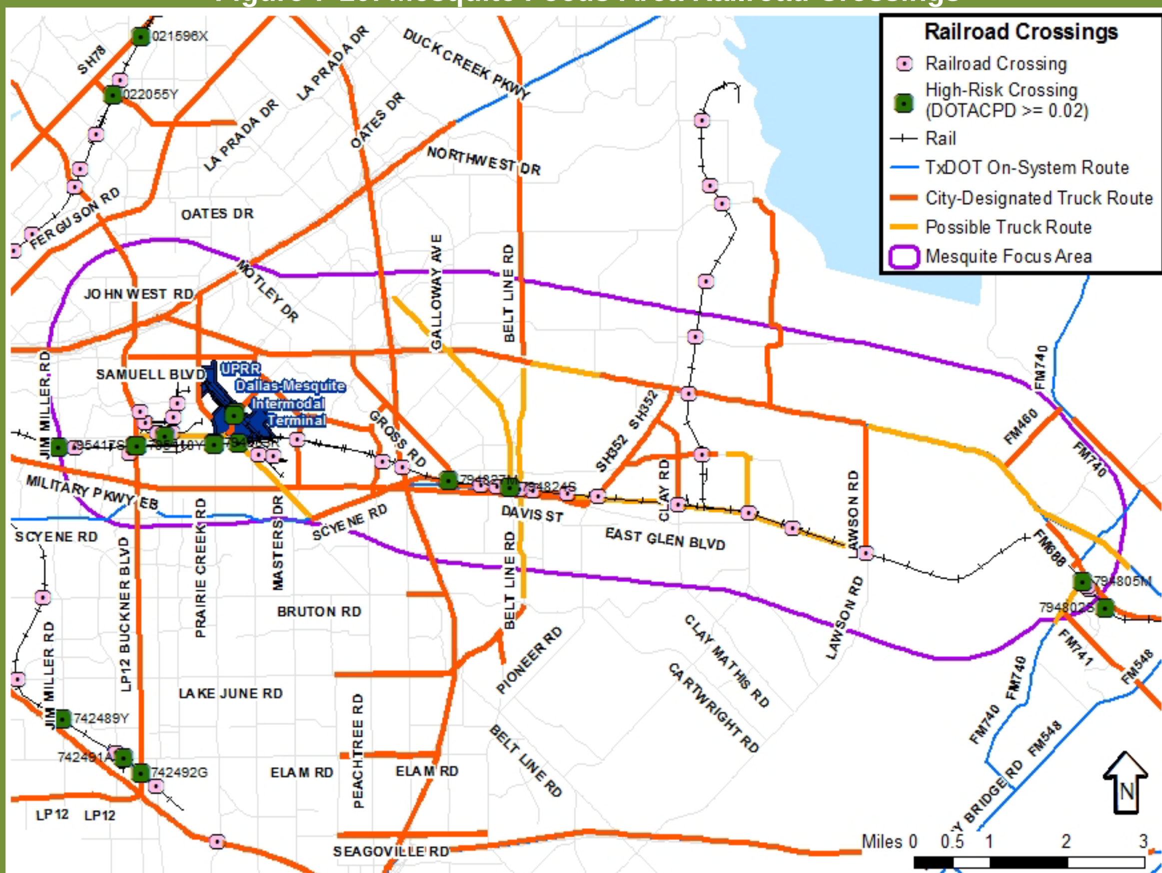
- Correcting roadway geometry at intersections along truck routes and potential truck routes
- In the Mesquite focus area this would be the intersections on Belt Line Road, SH 352 and Loop 12

7.5.4 Railroad Crossings

The final source of non-recurring delay considered for this study is at-grade railroad crossings. Crossings create delay by preventing roadway movements as trains pass and they are a safety risk. Figure 7-10 shows the crossings listed in the Federal Railroad Administration (FRA) National Grade Crossing Inventory within the Mesquite focus area. There are no at-grade crossings of designated truck routes. There are however many at-grade crossings on roads that feed into truck routes. There are several along SH 352, including two high-risk crossings.

Figure 7-10

Figure 7-10: Mesquite Focus Area Railroad Crossings



Source: NCTCOG 2014

FRA data indicates 20 trains use the UP line daily. The railroads are grade-separated at crossings where rail lines cross major highways and roads such as IH 635 and Loop 12. The at-grade crossings on the UP line along SH 352 are not directly on the truck route but can still impact movements. Two of these crossings are considered high-risk crossings by the DOTACPD. Two crossings along the truck route on SH 180 and the UP, are also considered high risk by the DOTACPD.

Delay from railroad crossings can be reduced by:

- Rebuilding the crossing to make it level and easy to cross
- Grade separate crossings when practical
- Close unnecessary crossings
- Update warning equipment at crossings
- Synchronize crossing warning with traffic signals nearby to allow better overall movement

7.6 Non-Transportation Delay

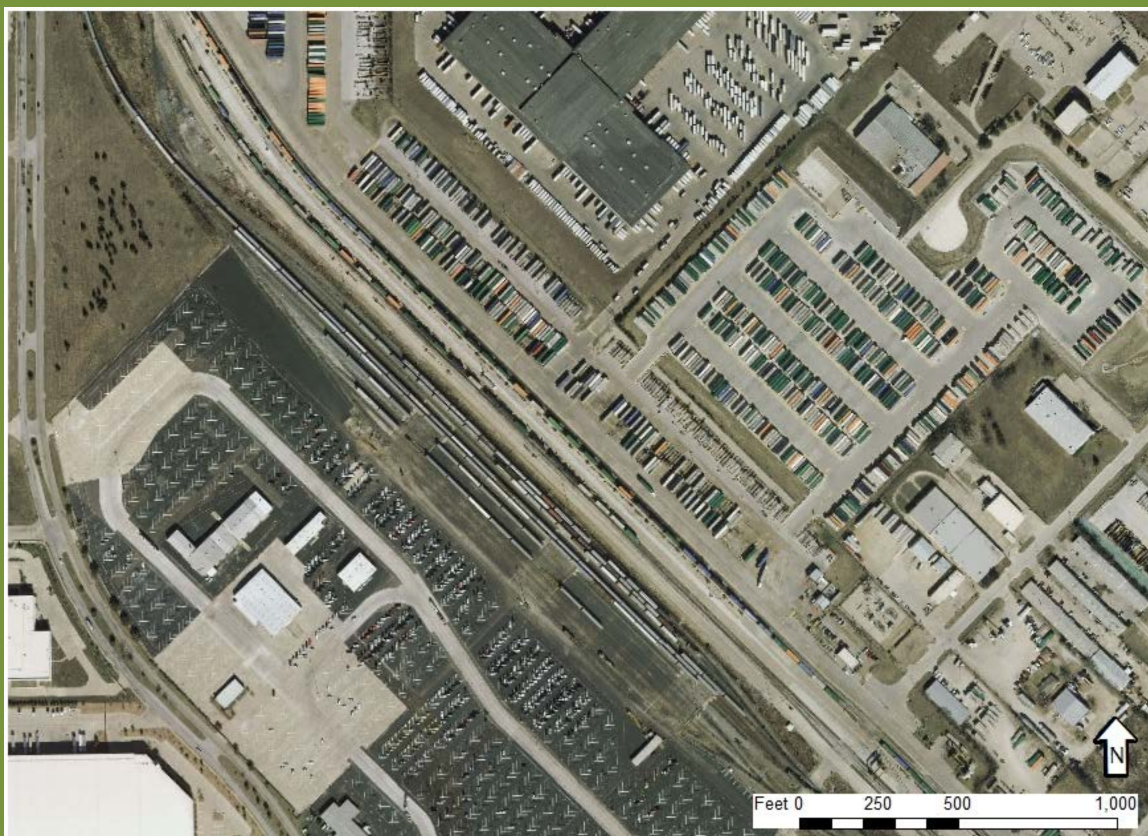
Non-transportation delay stems from sources unrelated to the transportation system, including wait times to load/unload, staffing levels, equipment maintenance, or documentation/regulatory compliance. This delay can be both recurring and non-recurring. Non-transportation congestion is generally produced by both the private and public sectors. Within the Mesquite focus area, the largest potential for non-transportation delay is at the UP Mesquite Intermodal Facility shown in Figure 7-11. Efficiently transferring freight between modes, in this case between railway and truck, requires excellent logistics systems to ensure freight is handled appropriately.

Delay from non-transportation issues can be reduced by:

- Collaboration with the freight carriers to gain a better understanding of specific non-transportation delays and identify potential solutions

Figure 7-11

Figure 7-11: Union Pacific Dallas Mesquite Intermodal Terminal



Source: NCTCOG 2014

7.7 Focus Area Recommendations

Recommendations were created based on data and analysis of the Mesquite focus area. These projects were created in line with the regional policies and programs discussed in Section 2. Smaller projects that are freight specific will take priority.

7.7.1 Projects

Projects are separated into five categories: Truck Route Network Continuity, Intersection Improvements on Truck Routes, Road Capacity Improvements, Railroad Relocation, and Railroad Crossing Improvements. The project categories are based upon the policies and programs found in Tables 2-1 and 2-2. Not every focus area has a project in all five categories. Recommended projects for the Mesquite focus area are found in Table 7-1.

Table 7-1: Mesquite Focus Area Project Recommendations

Road/Area	Limit From	Limit To	Project	Project Category
All	N/A	N/A	Truck Route Study	Truck Route Network Continuity
SH 352	Loop 12	Pioneer Road	Signal Timing Study	Intersection Improvements on Truck Routes
Beltline Road	IH 30	SH 352	Signal Timing Study	Intersection Improvements on Truck Routes
SH 352	Cross Road	Pioneer Road	Reconstruction Intersections to lengthen turn radii	Intersection Improvements on Truck Routes
Loop 12	Chenault Street	Scyene Road	Reconstruction of intersections to improve turn radii	Intersection Improvements on Truck Routes
SH 352	Kearney Street	US 80	Increase 4 lanes rural road to 4 lanes urban road	Road Capacity Improvement

8.0 RECOMMENDATIONS

The recommendations are based upon analysis of each focus area, discussion between NCTCOG staff, and input from RFAC. The recommendations for each focus area are documented in their respective sections. The projects are based upon the policies and programs identified in Section 2.6. This section serves as a summary of all the focus area projects. For more detail and background, please refer to each individual section.

8.1 Alliance Focus Area Projects

The Alliance focus area recommended projects are shown in table 8-1. Truck route continuity and railroad crossing delays were the primary issues identified.

8.2 Great Southwest Focus Area Projects

The Great Southwest focus area recommended projects are shown in table 8-2. This focus area is older and freight traffic is more concentrated. Lack of sufficient turning radii at intersections is the primary issue identified, with several railroad crossing improvements needed as well.

8.3 IIPOD Focus Area Projects

Recommended projects for the IIPOD focus area are shown in table 8-3. Reconstruction of the interchanges near the intermodal facility are needed to improve turning radii to expedite truck movements into and out of the facility. Multiple intersection improvements along the truck routes were also identified.

8.4 Mesquite Focus Area Projects

The recommendations for the Mesquite focus area projects are shown in table 8-4. Primary concerns include insufficient turning radii at multiple intersections on the truck routes. This focus area is unique in its layout with most of the freight activity on the western end. With recent development, eastern rural routes are insufficient and should be upgraded to urban lanes.

Table 8-1: Alliance Focus Area Project Recommendations

Road/Area	Limit From	Limit To	Project	Project Category
All	N/A	N/A	Truck Route Study	Truck Route Network Continuity
US 377	Keller Haslet Road	State Highway 114	Signal Timing Study	Intersection Improvements on Truck Routes
US 377	Keller Haslet Road	Henrietta Creek Road	Reconstruction of US 377 intersections to lengthen turn radii	Intersection Improvements on Truck Routes
Intermodal Parkway	Westport Parkway	End of Parkway	Increase from 2 to 4 lanes and improve weight capacity	Road Capacity Improvements
UP Mainline	Keller Haslet Road	US 377	Reduce "hump" at roadway crossings and eliminate queuing for signal between tracks and US 377	Railroad Crossing Improvements
UP Mainline	Westport Parkway	US 377	Eliminate queuing for signal between tracks and US 377	Railroad Crossing Improvements
UP Mainline	Henrietta Creek Road	US 377	Reduce "hump" at crossing and eliminate queuing for signal between tracks and US 377	Railroad Crossing Improvements

Table 8-2: Great Southwest Parkway Focus Area Project Recommendations

Road/Area	Limit From	Limit To	Project	Project Category
All	N/A	N/A	Truck Route Study	Truck Route Network Continuity
Carrier Parkway	SH 360	IH 30	Signal Timing Study	Intersection Improvements on Truck Routes
Trinity Boulevard	SH 360	PGBT	Signal Timing Study	Intersection Improvements on Truck Routes
Jefferson Street and SH 180	Great Southwest Parkway	Belt Line Road	Signal Timing Study	Intersection Improvements on Truck Routes
Trinity Boulevard	Breezewood Drive	Frye Road	Reconstruction of intersections to lengthen turn radii	Intersection Improvements on Truck Routes
SH 180	109th Street	23rd Street	Reconstruction of intersections to lengthen turn radii at 105th, 109th, 23rd, 24th and 25th Streets	Intersection Improvements on Truck Routes
UP Mainline	Great Southwest Parkway	SH 180	UP mainline at Great Southwest Parkway- Reduce “hump” at crossing and eliminate queuing for signal between tracks and SH 180	Railroad Crossing Improvements
UP Mainline	23rd Street	SH 180/ Jefferson Street	UP mainline at 23rd Street- Eliminate queuing/stopping between tracks and SH 180, and tracks and Jefferson Street	Railroad Crossing Improvements
UP Mainline	19th Street	SH 180/ Jefferson Street	UP mainline at 19th Street- Reduce “hump” at crossing and queuing/stopping between tracks and SH 180, and tracks and Jefferson Street	Railroad Crossing Improvements

Table 8-3: IIPOD Focus Area Project Recommendations

Road/Area	Limit From	Limit To	Project	Project Category
All	N/A	N/A	Truck Route Study	Truck Route Network Continuity
SH 342	IH 20	Pleasant Run Road	Signal Timing Study	Intersection Improvements on Truck Routes
IH 20 Frontage Road	SH 342	JJ Lemmon Road	Signal Timing Study	Intersection Improvements on Truck Routes
IH 20 Frontage Road	SH 342	Bonnie View Road	Reconstruction of intersections to lengthen turn radii at SH 342, Dynasty Drive, and Bonnie View Road	Intersection Improvements on Truck Routes
SH 342	Cedardale Road	Lancaster Hutchins Road	Reconstruction of intersections to lengthen turn radii at Cedardale Road, Wintergreen Road, Belt Line Road, and Lancaster Hutchins Road	Intersection Improvements on Truck Routes
IH45	Fulghum Road Exit	Fulghum Road Exit	Eliminate the "jug handle" exit	Road Capacity Improvements
IH45	Wintergreen Road Exit	Wintergreen Road Exit	Eliminate the "jug handle" exit	Road Capacity Improvements

Table 8-4: Mesquite Focus Area Project Recommendations

Road/Area	Limit From	Limit To	Project	Project Category
All	N/A	N/A	Truck Route Study	Truck Route Network Continuity
SH 352	Loop 12	Pioneer Road	Signal Timing Study	Intersection Improvements on Truck Routes
Beltline Road	IH 30	SH 352	Signal Timing Study	Intersection Improvements on Truck Routes
SH 352	Cross Road	Pioneer Road	Reconstruction of intersections to lengthen turn radii	Intersection Improvements on Truck Routes
Loop 12	Chenault Street	Scyene Road	Reconstruction of intersections to improve turn radii	Intersection Improvements on Truck Routes
SH 352	Kearney Street	US 80	Increase 4 lanes rural road to 4 lanes urban road	Road Capacity Improvement

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APPENDIX A REGIONAL ANALYSIS METHODOLOGY

A-1 Regional Truck Traffic Forecasts

All regional truck movements were modeled with the Dallas-Fort Worth Regional Travel Demand Model for the Expanded Area (DFX) software application. DFX is a collection of components that implements a trip-based four-step travel demand model on the TransCAD 5.0 platform. The parameters, coefficients, and models in this application are calibrated based on the following data sources:

- 2005 external stations survey
- 1994 workplace survey
- 2004 Texas Department of Transportation (TxDOT) traffic saturation counts
- 1996 Dallas-Fort Worth household survey
- 2008 Fort Worth Transportation Authority (FWTA) and Denton County Transportation Authority (DCTA) transit onboard survey
- 2007 Dallas Area Rapid Transit (DART) transit onboard survey
- 2004 automatic traffic count stations
- 1999 SkyComp freeway density, speed and volume study
- 2001 Dallas/Fort Worth International Airport survey

DFX accepts the following input files: demographic data, roadway network including toll roads and HOV, transit supply system including rail and park-and-ride, airport enplanements, and external stations forecasts. It produces traffic volumes and speeds on roadways and transit usage data on the transit system. In addition to flexible coding tools, a smooth menu system for performing model runs, and extensive reports, the software provides a comprehensive file management system for the organization of input and output data.

The DFX is the North Central Texas Council of Governments' (NCTCOG) official travel demand model. The software is developed and maintained by the Model Development Group in the Transportation Department at NCTCOG. Any modifications to the link attributes generated, assigned, or calculated by DFX will void the calibration of the model.

The design and implementation of the regional travel model for the Dallas-Fort Worth metropolitan area in its current structure and platform started with the introduction of the Dallas-Fort Worth Regional Travel Demand Model (DFWRTM) version 1.0.0 and its subsequent versions developed mainly by Ken Cervenka, Arash Mirzaei, Francisco Torres, and Sharam Bohluli. DFX still utilizes most of the core components and concepts of DFWRTM.

All geographic, matrix, and network files used in the regional truck traffic analysis were outputs of the full model run for the year 2013 performed for *Mobility 2035 – 2013 Update*. Table A-1 lists the fields in the final model run network that were used to calculate truck movements and delays within the MPA.

Table A-1: Model Fields Used to Calculate Performance Measures

Field Name	Description
MODEL_LENGTH	Length of the link in miles
UDelayAM_AB	Unsignalized delay in the AB direction in AM period (minutes)
UDelayAM_BA	Unsignalized delay in the BA direction in AM period (minutes)
SDelayAM_AB	Signalized delay in the AB direction in AM period (minutes)
SDelayAM_BA	Signalized delay in the BA direction in AM period (minutes)
CDelayAM_AB	Congestion delay in the AB direction in AM period (minutes)
CDelayAM_BA	Congestion delay in the BA direction in AM period (minutes)
UDelayPM_AB	Unsignalized delay in the AB direction in PM period (minutes)
UDelayPM_BA	Unsignalized delay in the BA direction in PM period (minutes)
SDelayPM_AB	Signalized delay in the AB direction in PM period (minutes)
SDelayPM_BA	Signalized delay in the BA direction in PM period (minutes)
CDelayPM_AB	Congestion delay in the AB direction in PM period (minutes)
CDelayPM_BA	Congestion delay in the BA direction in PM period (minutes)
UDelayOP_AB	Unsignalized delay in the AB direction in OP period (minutes)
UDelayOP_BA	Unsignalized delay in the BA direction in OP period (minutes)
SDelayOP_AB	Signalized delay in the AB direction in OP period (minutes)
SDelayOP_BA	Signalized delay in the BA direction in OP period (minutes)
CDelayOP_AB	Congestion delay in the AB direction in OP period (minutes)
CDelayOP_BA	Congestion delay in the BA direction in OP period (minutes)
AMTRUCK_AB	Traffic volume of Truck mode in p.m. period in AB direction
AMTRUCK_BA	Traffic volume of Truck mode in p.m. period in BA direction
PMTRUCK_AB	Traffic volume of Truck mode in off peak period in AB direction
PMTRUCK_BA	Traffic volume of Truck mode in off peak period in BA direction
OPTRUCK_AB	Daily traffic volume of Shared ride HOV mode in AB direction
OPTRUCK_BA	Daily traffic volume of Shared ride HOV mode in BA direction
DAYTRUCK_AB	Daily traffic volume of Truck mode in AB direction
DAYTRUCK_BA	Daily traffic volume of Truck mode in BA direction

A-1-i Roadway Truck Volumes

Daily truck volumes in each direction on all modeled transportation facilities are a standard DFX model output. Total truck volumes and truck vehicle-miles travelled on each roadway segment were calculated using the following equations:

$$Daily\ Truck\ Volume_{link} = DAYTRUCK\_AB_{link} + DAYTRUCK\_BA_{link}$$

$$Daily\ VMT_{link} = Daily\ Truck\ Volume_{link} \times MODEL\_LENGTH_{link}$$

A-1-ii Roadway Truck Congestion

Daily congestion delay for truck trips on all modeled transportation facilities was calculated using the following equation:

$$Daily\ Truck\ Congestion\ Delay_{link} = \begin{matrix} AMTRUCK\_AB \times CDelayAM\_AB + AMTRUCK\_BA \times CDelayAM\_BA + \\ PMTRUCK\_AB \times CDelayPM\_AB + PMTRUCK\_BA \times CDelayPM\_BA + \\ OPTRUCK\_AB \times CDelayOP\_AB + OPTRUCK\_BA \times CDelayOP\_BA \end{matrix}$$

A-1-iii Roadway Truck Traffic Control Delay

Daily traffic control delay for truck trips on all modeled transportation facilities was calculated using the following equations:

$$Daily\ Truck\ Signalized\ Delay_{link} = \begin{matrix} AMTRUCK\_AB \times SDelayAM\_AB + AMTRUCK\_BA \times SDelayAM\_BA + \\ PMTRUCK\_AB \times SDelayPM\_AB + PMTRUCK\_BA \times SDelayPM\_BA + \\ OPTRUCK\_AB \times SDelayOP\_AB + OPTRUCK\_BA \times SDelayOP\_BA \end{matrix}$$

$$Daily\ Truck\ Unsignalized\ Delay_{link} = \begin{matrix} AMTRUCK\_AB \times UDelayAM\_AB + AMTRUCK\_BA \times UDelayAM\_BA + \\ PMTRUCK\_AB \times UDelayPM\_AB + PMTRUCK\_BA \times UDelayPM\_BA + \\ OPTRUCK\_AB \times UDelayOP\_AB + OPTRUCK\_BA \times UDelayOP\_BA \end{matrix}$$

$$Daily\ Truck\ Traffic\ Control\ Delay_{link} = Daily\ Truck\ Signalized\ Delay_{link} + Daily\ Truck\ Unsignalized\ Delay_{link}$$

A-2 Regional Truck-Involved Crashes

The regional truck-involved crash data consists of five separate shapefiles, one shapefile for each year from 2008 to 2012. Each shapefile contains the following fields: crash ID (a unique identifier for the crash record that is not equivalent to the actual crash report number), crash month/year, crash time, construction zone flag, crash severity, vehicle make, vehicle model, vehicle body style, vehicle type, location information, and the primary contributing factors. Only trucks of the following type were included in the summary: Auto Carrier, Beverage, Bobtail, Concrete, Container, Crane, Drilling, Dump, Flatbed, Garbage, Grain, Lift Boom, Lowboy, Refrigerator Van, Semi-Trailer, Stake, Tanker/Tube Trailer, Tractor, Trailer, Semi-Trailer, Pole Trailer, Truck, Truck Tractor, Utility Trailer, and Wrecker. The “vehicle body style” records identified as “not entered”, were only included if the Vehicle Make/Model was undeniably a non-passenger truck (e.g. Kenworth, Peterbilt, Freightliner, Caterpillar, Mack, etc.).

All crash data used in this report comes from the TXDOT Crash Reporting Information System (CRIS). All data from CRIS is provided by TxDOT with the following disclaimer:

The crash data contained in this report is preliminary and incomplete. It has not been finalized nor certified.

Only reportable motor vehicle traffic crashes were queried for this request. A reportable motor vehicle traffic crash is defined as: “Any crash involving a motor vehicle in transport that occurs or originates on a traffic way, results in injury to or death of any person, or damage to the property of any one person to the apparent extent of $1,000.”

Federal highway safety laws require the state to create this crash database for use in obtaining federal safety improvement funds. Section 409 of Title 23 of the United States Code, forbids the discovery and admission into evidence of reports, data, or other information compiled or collected for activities required pursuant to Federal highway safety programs, or for the purpose of developing any highway safety construction improvement project, which may be implemented utilizing federal-aid highway funds, in tort litigation arising from occurrences at the locations addressed in such documents or data. Information that is not available to a party in civil litigation may be confidential under state law, pursuant to Tex. Gov't. Code Sec. 552.111.

APPENDIX B FOCUS AREA ANALYSIS METHODOLOGY

B-1 Focus Area Truck Traffic Forecasts

A select zone analysis was conducted for each focus area to determine the number of truck trips on the regional transportation system start and/or end within the focus area. For the purposes of this study, all DFX model transportation survey zones (TSZ) that overlap any portion of the focus area was considered to be a focus area TSZ.

B-1-i Select Zone Analysis

The goal of performing a select zone analysis is to identify the fraction of the volume on every link that has originated from and/or is destined to a single set of pre-defined zones. For this process a manual traffic assignment using the TransCAD multi-modal multi-class assignment (MMA) tool. All geographic, matrix and network files used in the select zone analysis were outputs of the full model run for the year 2013 performed for *Mobility 2035 – 2013 Update*.

The current traffic assignment process applied in the DFX application consists of defining the demand matrices for each analysis period and performing a MMA. Each demand matrix (AM.mtx, PM.mtx, and OP.mtx) has four cores which represent the trips generated by the different vehicle classes of DA, SRNOHOV, SRHOV, and Truck. The result of each model run includes the total link volume and the share of each of the vehicle classes. Every model run can only use a single demand matrix but does accept multiple cores. We can now describe the concept of select-zone analysis by following our current assignment process. The process in this document follows the concept of disaggregating the demand matrices based on the selected zones. This process will result in a matrix that has at least 8 cores. Four cores are from the original OD matrix and four new cores that separate truck trips into four categories based on the selected zones. The sum of the four new truck matrices needs to be equal to the original truck matrix. The traffic assignment step that follows the data preparation will be the same as is used in a standard DFX model run with the exception that there will be more matrix cores that need to be selected at the time of the analysis.

The step-by-step process for performing a single-set select zone analysis is shown below.

- Open TransCAD
- Open a geography file (ACTRDWY.dbd), and the corresponding demand matrix (*.mtx), TSZ structure (TSZ.dbd), and network file (*.net)
- The ACTRDWY can be found under TCMODEL\RoadwayNetwork\RDWY\GEO\ACT
- The demand matrices can be found under TCMODEL\RoadwayNetwork\RDWY\GEO\ACT\APT\TRNT\EXT
- The TSZ structure can be found under TSZGeographic\GEO
- The network file is under TCMODEL\RoadwayNetwork\RDWY\GEO\ACT\APT\TRNT\EXT
- You can open them all in separate windows and do not need to add the TSZ as a layer to the ACTRDWY window.
- Saving copies of the original ACTRDWY, OD matrices, and network files in a separate project folder is advised.
- Select the zones of interest from the TSZ layer and name the selection set “SelectZones”
- While in the TSZ window go to “Selection” in the menu bar and click on the “Combine Selection” menu item
- Create a “New Selection Set” by “Choosing features not in” the “SelectZones” selection set. This set is called the “NOTSelectZones”. Now you should have two separate TSZ sets that do not have any common zones and the union of them will be the total zones in the TSZ structure.
- Click on the window containing the demand matrix
- Go to “Matrix” item in the menu bar select the “Indices” menu item
- Click on the “Add Index” button
- In the “Add Matrix Index” window select the items listed below:
- Dataview: TSZ
- Field: TSZ
- Name: SZ_ROW
- Use for: Rows, to find the share of trips originating from the select zones
  Columns, to find the share of trips destined for the select zones
- Field: TSZ
- Selection: SelectZones
- Click “OK” This will take you back to the “Matrix Indices” window. You will now see a new item in the “Index Name” list called “SZ_ROW”
- Repeat the steps 9 and 10 three more times with the inputs in Table B-1 and all other settings as described in step 9

Table B-1: Select Zone Matrix Index Settings

Step	Item	First Time	Second Time	Third Time	Fourth Time
9c	Name	SZ_ROW	NOTSZ_ROW	SZ_COL	NOTSZ_COL
9d	Use for	Rows	Rows	Columns	Columns
9f	Selection	SelectZones	NOTSelectZones	SelectZones	NOTSelectZones

- The selections in the “Rows” and “Columns” drop down boxes should be “Rows” and “Columns” at this time. Depending on the selection that you have made in step 9 the new indices might only show up in one of “Rows” or “Columns” drop down box or in both.
- Close the “Matrix Index” window
- While the demand matrix window is active, click on “Matrix” in the menu bar and select the “Contents” menu item
- In the “Matrix File Contents” window click on the “Add Matrix” button. This operation will add a new core to the demand matrix. Repeat this step three additional times and rename the new cores as follows: SZB_Trucks, SZS_Trucks, SZE_Trucks, and NOTSZ_Trucks
- These will be the cores that have to be populated and used in the assignment step.
- If you accidentally add extra cores remove them before going to step 16.
- Close the “Matrix File Contents” window
- Select the demand matrix window by clicking on its top header bar.
- From the “Matrix” item on the menu bar select the “Indices” menu item
- Select the “SZ_ROW” set from the “Rows” drop down box
- Select the “SZ_COL” set from the “Columns” drop down box
- You will now see only a portion of the original matrix in the background as only the rows and columns corresponding to the sets chosen in steps 19 and 20 are being displayed.
- Click on “Close”
- From the drop down box select the “SZB_Trucks” core
- You will see a set of cells with null values
- From the “Matrix” menu bar select the “Update” item
- Select the items below in the “Update Matrix” window
- Matrix File : AM
- Matrix : Truck
- Missing Values : Should overwrite existing values
- Cells to Update : All Cells
- Click “OK”. Now there should be some values in the visible fields of the matrix
- You need to repeat steps 19 through 27 three more times (a total of four times) with the settings shown in Table B-2.

Table B-2: Select Zone Matrix Update Settings

Step	Item	First Time	Second Time	Third Time	Fourth Time
19	"Rows"	SZ_ROW	SZ_ROW	NOTSZ_ROW	NOTSZ_ROW
20	"Columns"	SZ_COL	NOTSZ_COL	SZ_COL	NOTSZ_COL
23	Core	SZB_Trucks	SZS_Trucks	SZE_Trucks	NOTSZ_Trucks

At this point you have completed the data preparation portion of the select-zone analysis. Check the sum of all the matrices to ensure that the totals are equal to the original trip matrices. Perform an MMA analysis by following the steps highlighted in the model documentation. Only the cores listed below have to be used in the assignment step:

Drive Alone, SRIDE NOHOV, SRIDE HOV (original unaltered matrices)
SZB_Trucks, SZS_Trucks, SZE_Trucks and NOTSZ_Trucks
Do not select the original Truck matrix in the assignment window.
After the MMA is completed, the output file will have extra fields representing the share of each of the four new classes generated in the above steps. Table B-3 summarizes the types of truck trips that are differentiated using select zone analysis.

Table B-3: Select Zone Multi-Modal Multi-Class Assignment (MMA) Truck Trip Interpretation

Core	Description
SZB_Trucks	Truck trips that both start and end in the selected zones
SZS_Trucks	Truck trips that start in the selected zones and end outside the selected zones
SZE_Trucks	Truck trips that start outside the selected zones and end in the selected zones
NOTSZ_Trucks	Truck trips that neither start nor end in the selected zones

Repeat these steps two more times using the files listed in Table B-4 with all other steps unchanged.

Table B-4: Select Zone Source Data Files

Step	Item	First Time	Second Time	Third Time
2b	OD Matrix	AM.mtx	PM.mtx	OP.mtx
2d	Network	AM.net	PM.net	OP.net
26a	Matrix File	AM	PM	OP

B-1-ii Roadway Truck Volumes

Daily truck volumes to, from, and within the selected zones were aggregated from the three link flow output files generated using MMA. Total daily truck volume and vehicle-miles travelled to, from, and within the selected zones on a roadway link was calculated using the following equations:

$$AB\ Select\ Zone\ Truck\ Volume_{link}^{t} = \sum_{t=AM,PM,OP} AB\_SZB\_Trucks_{link}^{t} + AB\_SZS\_Trucks_{link}^{t} + AB\_SZE\_Trucks_{link}^{t}$$

$$BA\ Select\ Zone\ Truck\ Volume_{link}^{t} = \sum_{t=AM,PM,OP} AB\_SZB\_Trucks_{link}^{t} + AB\_SZS\_Trucks_{link}^{t} + AB\_SZE\_Trucks_{link}^{t}$$

$$Daily\ Select\ Zone\ Truck\ Volume_{link} = \sum_{t=AM,PM,OP} AB\ Select\ Zone\ Truck\ Volume_{link}^{t} + BA\ Select\ Zone\ Truck\ Volume_{link}^{t}$$

$$Daily\ Select\ Zone\ Truck\ VMT_{link} = Daily\ Select\ Zone\ Truck\ Volume_{link} \times MODEL\_LENGTH_{link}$$

B-1-iii Roadway Truck Congestion

Daily congestion delay for truck trips to/from the selected zones were aggregated from the three link flow output files generated using MMA. Total daily congestion delay for truck trips to/from the selected zones on a roadway link was calculated using the following equation:

$$Daily\ Select\ Zone\ Truck\ Congestion\ Delay_{link} = \sum_{t=AM,PM,OP} \begin{matrix} AB\ Select\ Zone\ Truck\ Volume_{link}^{t} \times CDelay\_AB_{link}^{t} + \\ BA\ Select\ Zone\ Truck\ Volume_{link}^{t} \times CDelay\_BA_{link}^{t} \end{matrix}$$

B-1-iv Roadway Truck Traffic Control Delay

Daily traffic control delay for truck trips to/from the selected zones were aggregated from the three link flow output files generated using MMA. Total daily traffic control delay for truck trips to/from the selected zones on a roadway link was calculated using the following equation:

$$Daily\ Select\ Zone\ Truck\ Traffic\ Control\ Delay_{link} = \sum_{t=AM,PM,OP} \begin{matrix} AB\ Select\ Zone\ Truck\ Volume_{link}^{t} \times (UDelay\_AB_{link}^{t} + SDelay\_AB_{link}^{t}) + \\ BA\ Select\ Zone\ Truck\ Volume_{link}^{t} \times (UDelay\_AB_{link}^{t} + SDelay\_AB_{link}^{t}) \end{matrix}$$

B-2 Traffic Signal Assessment

NCTCOG maintains a regional database of signalized intersections at www.nctcog.org/trans/data/crossings/TrafficSignal.asp. Lists of recent and planned traffic signal retiming projects conducted through the Thoroughfare Assessment Program (TAP) and the Regional Traffic Signal Retiming Program (RTSRP) are available at www.nctcog.org/trans/tsm. It is suggested that traffic signals on existing or potential truck routes should be considered for inclusion in future traffic signal optimization efforts. The specific thoroughfares in each focus area recommended for further study are listed in the main body of the report.

B-3 Truck-Involved Crashes

The truck-involved crash analysis performed at the focus area level consisted of identifying locations within each focus area with clusters of reported crashes.

B-4 Truck Route Assessment

The Possible Truck Routes layer was developed based on including all on-system TxDOT facilities and other major roadways to create a coherent truck route network within the focus area.

B-5 Intersection Geometry Assessment

The Low-Radius Right Turns layer was developed by assessing major intersections on existing and/or potential truck routes. Intersections with one or more right turns where the radius is less than 45 feet are coded as low-radius. Additional turning radius assessments were made in areas where many truck facilities were observed. All measurements of turning radii at intersections are based aerial orthophotography conducted by NCTCOG in 2013.

B-6 Roadway/Railroad Crossing Assessment

The FRA railroad crossing layer was downloaded directly from the FRA website. A DOTACPD value of 0.02 was used as the cutoff for high-risk crossings. Daily train trips come directly from the FRA. Locations where the measured queuing distance between a railroad crossing and an adjacent roadway intersection was less 100 feet than were flagged for additional analysis.