

6. Mobility Options

North Central Texas is a large, diverse place, and the mobility needs of residents and businesses vary greatly across the region. It is of utmost importance that the transportation system satisfies mobility needs and also provides transportation choices. The primary purpose of the Metropolitan Transportation Plan is to accommodate the multimodal mobility needs of this growing region. Mobility has a significant impact on quality of life. It allows people to live where they want; to access jobs, education, and healthcare; and provides a means to cultural and recreational activities. In addition to quality of life impacts, mobility also influences the regional economic vitality and appeal. The ability to move goods easily from producers to consumers has been a major factor in the growth and prosperity North Central Texas has experienced over the past 40 years.

The following sections discuss mobility options for the North Central Texas region. Full-sized versions of the Mobility 2045 recommendations maps contained within this chapter can be found in appendix **E. Mobility Options**, along with detailed policy, program, and project recommendations.



Mobility Options in North Central Texas

Source: NCTCOG

MOBILITY OPTIONS AT A GLANCE

A variety of transportation options are available to meet the diverse travel demands of the North Central Texas region. These modes work together to move goods, improve mobility, and provide access to, from, and throughout the area.

DID YOU KNOW ...

- ... there are 27 airports and 2 military training airfields in the region?
- ... Dallas-Fort Worth is home to the nation's largest inland port?
- ... Mobility 2045 recommends expanding the Regional Veloweb to approximately 1,884 miles?
- ... Mobility 2045 calls for almost 260 miles of passenger rail?

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6.1. Aviation

The Importance of Regional Aviation Planning

As the nation's largest inland port and its fourth-largest metropolitan area, North Central Texas relies heavily on aviation facilities to sustain growth and economic prosperity. By connecting the region to global markets, aviation facilities provide economic development opportunities, the ability to engage in business activities related to aviation and the movement of cargo, and leisure and tourism opportunities throughout the world. The region's airports serve as a nonconventional inland port system, providing global access and enhancing the regional economy. Improving and maintaining surface access and land-use compatibility is crucial to preserving the regional system of aviation facilities.

The region has approximately 400 aviation facilities and is home to over 300 aerospace and aviation employers. Collectively, aviation in North Central Texas accounts for over \$22 billion in economic impact.

Because of this economic impact, the Regional Transportation Council has a planning goal that landside access should not limit growth at the region's airports. Ideally, these airports should be able to grow to their airside limit without delays from roadway congestion. This includes intermodal connectors, which provide access for intermodal shipments to airports.

Aviation facilities are vital transportation assets, and to remain competitive, they require coordinated planning, land-use protection, and funding support.

Aviation Policies and Programs

Policies are an important element in the planning and implementation of programs and projects. Mobility 2045 supports the following policies associated with aviation:

AVIATION AT A GLANCE

The goal of regional aviation planning in North Central Texas is to promote, maximize, protect, and advance regional aviation infrastructure to accommodate future growth in the region. Achieving this goal will require integrating transportation connections while ensuring adequate future air and ground access and capacity within the region's aviation system.

NORTH CENTRAL TEXAS COUNCIL OF GOVERNMENTS AVIATION INITIATIVE GOALS

1. Update general aviation and heliport regional plans.
2. Maintain the Air Transportation Advisory Committee.
3. Develop new policies, partnerships, plans, and programs for aviation.
4. Examine the market and timing for:
 - Additional aviation facilities
 - New intercity high-speed rail access to aviation
 - Improvements to reliever, general aviation, and heliport assets
5. Determine needs related to:
 - Long-term airspace demands
 - Maintaining international competitiveness
 - Surface access to and land use around airports/heliports
 - Improving air quality

AIR TRANSPORTATION ADVISORY COMMITTEE

The Air Transportation Advisory Committee is composed of airport managers, city managers, aviation industry representatives, and aviation experts from throughout the region. This committee provides a regional forum for discussing aviation needs related to general aviation and heliports. During the Regional General Aviation and Heliport System Plan process, the Air Transportation Advisory Committee served as the Project Review Committee and performed technical review functions on behalf of the North Central Texas Council of Governments' Executive Board and Regional Transportation Council on an as needed basis.

Regional aviation planning at the North Central Texas Council of Governments does not address selection of projects for entitlement funding/block grants/Airport Improvement Program funding, airport closures, interference with activities of private commercial pilots, or the performance of air carrier system planning.

AV3-001: Improve efficiency, safety, air quality, and access related to aviation.

AV3-002: Provide input to the National Plan of Integrated Airport Systems and the Texas Airport System Plan.

AV3-003: Encourage compatible land-use planning surrounding airports in the region.

AV3-004: Establish a comprehensive and integrated Aviation Education System in North Central Texas.

AV3-005: Implement operational restrictions and other requirements of Unmanned Aircraft Systems around regionally significant aviation facilities.

Mobility 2045 supports the following programs associated with aviation:

AV2-005: Aviation Surface Access Planning

AV2-006: Data Collection and Performance Tracking

AV2-007: Continuous Aviation System Planning

AV2-009: Encroachment Prevention and Compatible Land-Use Planning

AV2-010: Integrated Aviation Education System

AV2-011: Coordination of Unmanned Aircraft Systems

Aviation Planning in Context

Various levels of planning are needed to meet the demands on the region's airport system. System planning occurs at all levels of government and plays a role in maintaining the region's airports.

At the federal level, the National Plan of Integrated Airport Systems (NPIAS) provides an overview of national aviation capacity needs and funding requirements. The 2017-2021 NPIAS identifies 3,332 existing and 8 proposed airports of national significance. These airports are eligible for federal funding under the Airport Improvement Program. Twenty-nine of these facilities are located in the 16-county region of North Central Texas.

At the state level, the Texas Airport System Plan (TASP) provides an overview of needed capacity and a statewide aviation activity forecast. Out of more than 1,600 landing facilities in the state, 292 airports meet TASP requirements. TASP provides guidelines that help determine how to maximize the value of public funds and identify capital improvements that best serve the state's aviation needs such as transportation, business, and economic development functions that will benefit Texas.

At the regional level, the Regional General Aviation and Heliport System Plan provides aviation activity forecasts for a specific geography in North Central Texas and will make recommendations about aviation infrastructure that is used regionally by corporate entities, private citizens, and aviation students.

At the local level, each airport will continue to maintain Airport Master Plans and Airport Layout Plans as required by the Federal Aviation Administration.

In addition, as the Metropolitan Planning Organization for the 12-county Dallas-Fort Worth Metropolitan Planning Area, the North Central Texas Council of Governments (NCTCOG) is responsible for providing surface access and services to improve air quality at aviation facilities; for processing data summary requests related to the Airport Improvement Program and Environmental Protection Agency programs; and for monitoring capacity and use at the region's major airports, including air cargo and foreign trade zone activity.

Aviation Facilities in North Central Texas

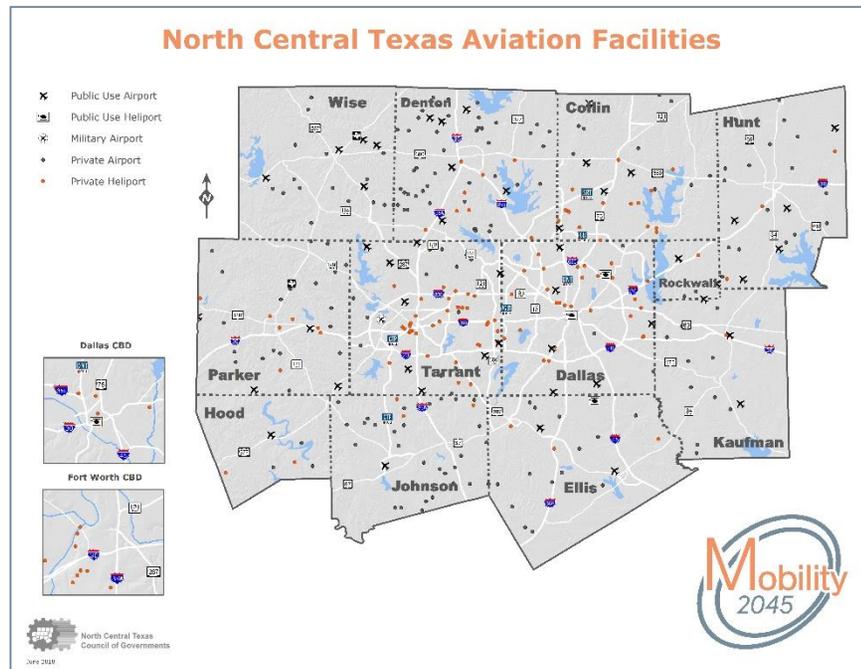
The 12-county Metropolitan Planning Area is home to a variety of public and private aviation facilities, including:

- **2 Primary Commercial Service Airports:** Airports that serve the needs of the flying public by hosting scheduled commercial airline service. These include Dallas Fort Worth International Airport and Dallas Love Field.
- **11 Reliever Airports:** Designated by the Federal Aviation Administration to relieve congestion at major commercial aviation locations by diverting general aviation traffic.
- **14 General Aviation Airports:** Designed to meet the needs of corporate aviation, small-scale cargo use, and recreational flight.

- **2 Existing Military Training Airfields:** Located at the Naval Air Station Fort Worth Joint Reserve Base and at Redmond Taylor Army Heliport in Dallas.
- **4 Public-Use Heliports:** Dallas Central Business District Vertiport, Garland/Dallas-Fort Worth Heloplex, Ferris-Red Oak Municipal Heliport, and DeSoto Heliport.
- **Over 300 Private-Use Airports and Heliports:** Serving the needs of private pilots and businesses. This includes private facilities serving recreational flight, short takeoff and landing, and sail planes.

These facilities are shown in **Exhibit 6.1-1**.

Exhibit 6.1-1: Aviation Facilities in North Central Texas



Data Collection and Performance Tracking

One of NCTCOG’s roles is to monitor aviation trends at the region’s commercial and air cargo airports. NCTCOG tracks the impact of Unmanned Aircraft Systems and the innovative technologies introduced through the Federal Aviation Administration’s Next Generation Air Transportation System (NextGen). Planning procedures for these technologies should benefit the long-term viability of the aviation system.

Aviation connects North Central Texas to national and global markets. The data shown in the following two graphs (**Exhibits 6.1-2 and 6.1-3**) illustrate recent trends in passenger and cargo volumes at the region’s major aviation facilities.

Exhibit 6.1-2: Annual Air Passenger Volumes

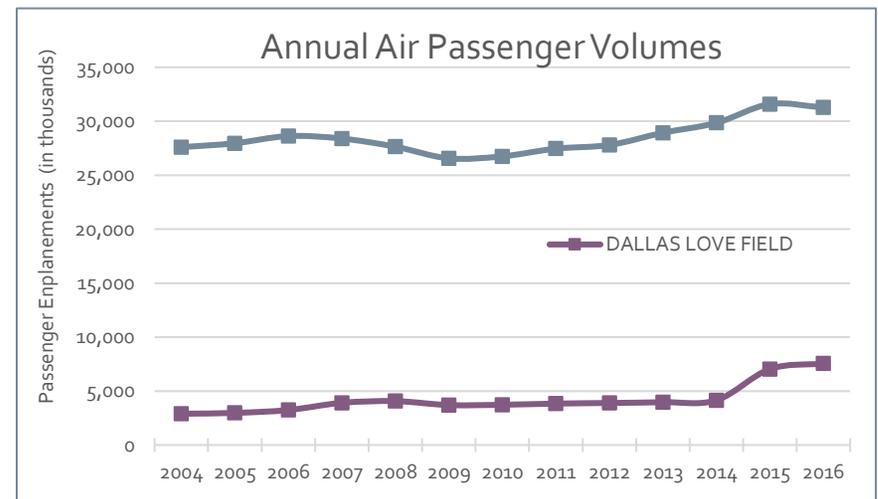
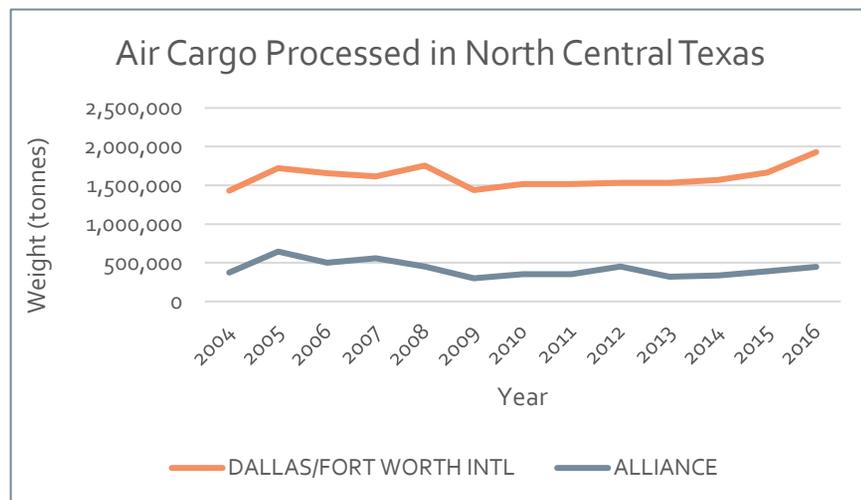


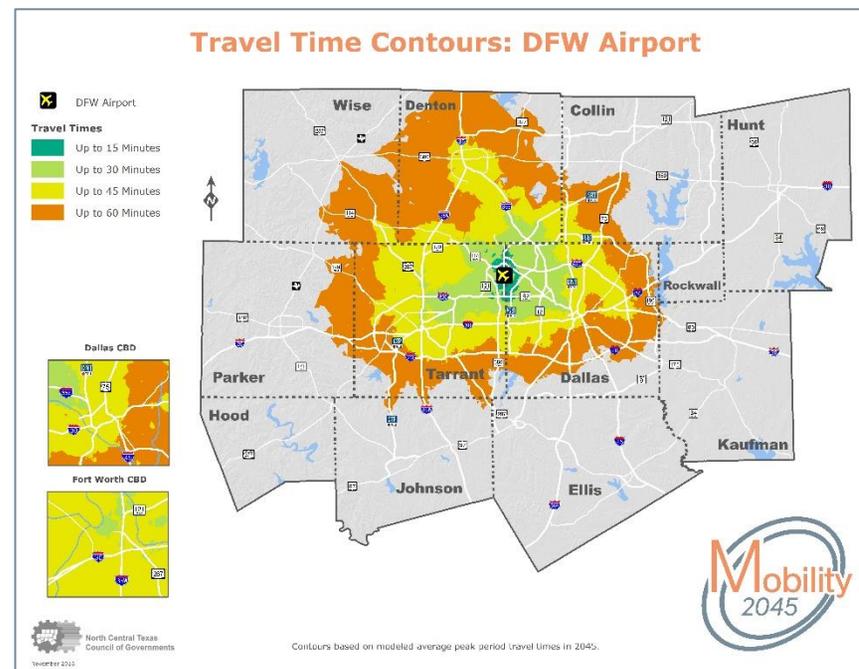
Exhibit 6.1-3: Total Regional Air Cargo Transported Annually


NCTCOG staff will continue to monitor these volumes and trends in aviation technology to assess infrastructure needs at the regional level.

Aviation Surface Action Planning

The mobility of air passengers and cargo is affected by the capacity of airports and surrounding highway and transit systems. Congestion in the air or on the ground can significantly impact air cargo operations and efficiency. National and international trade and travel require a surface transportation network that successfully connects with facilities for air passengers and cargo. The map in **Exhibit 6.1-4** displays projected travel times to or from Dallas Fort Worth International Airport. Similar maps for Dallas Love Field and Fort Worth Alliance Airport are located in Appendix E. **Mobility Options**. This analysis was performed based on models for the average peak-period traffic in 2045 and it assumes the recommendations in *Mobility 2045* have been constructed.

This analysis fulfills NCTCOG’s role as the region’s Metropolitan Planning Organization. NCTCOG also will inventory specific improvements to the roadways surrounding the region’s aviation facilities. This inventory will be created to assist decision makers in prioritizing and funding these connectors.

Exhibit 6.1-4: Surface Travel Time Contours for the Dallas Fort Worth International Airport in 2045


Continuous Aviation System Planning

NCTCOG also worked with the Federal Aviation Administration to produce a Regional General Aviation and Heliport System Plan for the 16-county NCTCOG region and surrounding areas. This effort updated the regional inventory, developed a system to manage aviation data, and analyzed demand on the current and forecast system. This study explored market demand, system deficiencies, needed improvements, and economic impacts of the regional general aviation and heliport system. NCTCOG coordinated with federal- and state-level planning agencies to ensure that regional priorities are considered in planning and funding decisions at those levels.

This study also addressed potential constraints on regional airspace, including changes to passenger and air cargo activity, changes in business travel, and the influence of new technologies. NCTCOG will coordinate with city officials, the public, and aviation stakeholders to ensure that recommendations are implemented to enhance the regional aviation system.

Encroachment Prevention and Compatible Land-Use Planning

As urban development increases, it will be vital for neighboring land use to be compatible with the region’s aviation facilities. The noise associated with airfields makes some land uses incompatible when located in close proximity to aviation facilities. These land uses include housing, schools, offices, and public gathering places. Safety is also a concern, particularly near the ends of the runways. When airport neighbors voice noise and safety concerns, the results can include restrictions on flight schedules, costly modifications by

airports, and in extreme cases, political pressure to close airports. Aviation facilities require a high level of public investment; promoting compatible land-use planning and land development controls can protect this investment. This effort will be of particular interest as the region’s population continues to grow.

Regional Military-Community Planning

In 2018, the North Central Texas Council of Governments completed work with the Naval Air Station Fort Worth Joint Reserve Base (NAS Fort Worth JRB), surrounding communities, and other regional military installations to develop a Regional Joint Land Use Study. The study identified strategies to allow military installations and surrounding communities to develop in a compatible manner to ensure that the military presence in North Central Texas is sustained. This Joint Land Use Study follows up on a similar study that focused on NAS Fort Worth JRB and was completed in 2008. At the conclusion of the 2008 study, NAS Fort Worth JRB and surrounding communities created the NAS Fort Worth JRB Regional Coordination Committee (RCC). The RCC is a collaborative effort to ensure that future development near the installation is compatible with current and future operations of the base. The RCC enhances communication and cooperation among the base and local governments. RCC participants identify and solve issues shared among the communities surrounding the installation, including transportation topics such as transit, safety, and infrastructure improvements; emergency preparedness; storm water management; and community education.

Integrated Aviation Education System

With a high concentration of aviation and aerospace companies operating in North Texas, it is vital that the industry workforce pipeline is prepared to meet current and future employment demands. According to the Texas Workforce Commission, these employers will need nearly 50,000 highly skilled and trained workers in 2020 to remain competitive in a rapidly evolving global market. Considering the industry’s annual economic impact of over \$40 billion, it is imperative that the local workforce is informed, educated, and skilled. NCTCOG’s Aviation Education Initiative, begun in 2009, has emphasized science, technology, engineering, and math courses at Independent School Districts (ISD), community colleges, and universities. By July 2013, about 800 students were enrolled in ISD aviation programs and about 300 students were

FACTORS AFFECTING AIRPORT SYSTEM PLANNING

PHYSICAL CONSIDERATIONS
Consider the geographical and engineered location of a new airport or of the expansion of an existing airport.

OPERATIONAL CONSIDERATIONS
Evaluate airside and landside access.

ENVIRONMENTAL CONSIDERATIONS
Take into account regulatory guidelines and mandates, including those addressing air quality, noise, and surrounding land use.

ECONOMIC CONSIDERATIONS
Evaluate the short- and long-term costs, as well as the source and timing of funding used to facilitate development of the aviation system.

SOCIO-POLITICAL CONSIDERATIONS
Ask the public: “Will the idea and development of new projects work for the surrounding community and our region?”

enrolled in college and university aviation programs. Embry Riddle Aeronautical University's Worldwide Campus announced in 2012 that it would offer bachelor's and master's degrees at Alliance Airport, and in 2013, Tarrant County College expanded its Aviation Maintenance program. In 2012, NCTCOG launched NCTaviationcareers.com to provide information about aviation training and careers. Over the next five years, four ISDs implemented aviation/aerospace programs for high school students and there is a new regional aviation maintenance school.

Coordination of Unmanned Aircraft Systems

Technological advances are leading to new uses of unmanned aircraft. Historically used almost exclusively by the military, Unmanned Aircraft Systems (UAS) use has grown in both the public and private sectors. NCTCOG is working with municipalities, first responders, and transportation partners to ensure unmanned and manned aircraft can coexist in the busy skies above North Central Texas. NCTCOG compiled a report, *Unmanned Aircraft: Policy, Operations and Local Integration*, which serves as a framework for how the agency, with guidance from the Air Transportation Advisory Committee, will approach UAS coordination. With Uber Elevate announcing its goal of making Dallas one of the test hubs for its urban air transportation platform, featuring unmanned helicopter taxi services and the eventuality of last-mile package delivery by UAS, North Central Texas is poised to become a frontrunner in UAS integration.

In addition, the city of Mineral Wells has been utilized as a center of UAS testing in the region. NCTCOG will continue working with its partners and private-sector entities, such as UAS operators or manufacturers, government entities, emergency responders, and others to accelerate safe UAS integration. Through workshops and other outreach efforts, NCTCOG will continue to help facilitate a regional effort that allows UAS technology to realize its potential while ensuring the skies remain safe for traditional aviation activities.

Summary

The goal of the aviation planning efforts in North Central Texas is to promote, maximize, protect, and advance regional aviation infrastructure to accommodate future growth in the region. This goal will be accomplished by collecting data, tracking performance, reviewing and monitoring surface transportation access to aviation facilities, conducting continuous aviation system planning, planning for compatible land use to prevent encroachment, integrating aviation education systems, and coordinating UAS efforts. The policies, programs, and projects discussed in this section are intended to advance the aviation planning activities and coordination efforts within North Central Texas.

New projects, programs, and policies will be developed as needed, and they will enable NCTCOG's Executive Board and the Regional Transportation Council to continue to support important aviation goals throughout the region.

See appendix **E. Mobility Options** for a complete listing of policies, programs, projects, and maps related to aviation.

6.2. Freight

Mobility 2045 Supported Goal

Improve the availability of transportation options for people and goods.

Freight Planning

Freight and goods movement are essential to our daily lives. Homes could not be built, fuel could not be delivered, and store shelves could not be filled without freight movement. In Texas, 20 tons per household and 12,700 tons per business of freight were moved in 2016.¹ If freight ceased to move, the effects would be felt within hours.

Freight transportation is a key component in our regional, state, and national economies. Freight-related employment constitutes approximately 20 percent of all regional employment. In 2015, North Central Texas accounted for 30 percent of Texas' gross domestic product.

The region is the nation's largest inland port, where freight is moved, transferred, and distributed to destinations across the state and around the world. Four major Interstate Highways criss-cross the region: IH 20, IH 30, IH 45, and IH 35 (including IH 35E and IH 35W branch routes). The region is a national railroad crossroads and a domestic and international air cargo hub, making it a national logistics hub. Ninety-eight percent of the US population can be reached from North Central Texas within 48 hours by truck. The region has one of the most extensive surface and air transportation networks in the world, providing widespread trade opportunities for the more than 600 motor/trucking carriers and almost 100 freight forwarders operating within the region.

As domestic and international freight demand continues to grow, the ability of infrastructure to meet that demand is crucial to the region's economy and mobility and to the safety of its residents. As such, freight integration is a critical component in the overall transportation planning process. Effective freight planning impacts Transportation Management and Operations, Transportation Safety, Intelligent Transportation Systems, and Air Quality.

These programs are addressed in the **Operational Efficiency** and **Environmental Considerations** chapters.

KEY TERMS

INTERMODAL TRANSPORTATION: The use of multiple modes to transport a particular element of freight.

FIRST/LAST MILE: Local street and arterial connections to ports and rail yards that are key to the efficiency of the freight system.

CLASS 1 RAILROADS: Freight railroads having annual carrier operating revenues of \$250 million or more after adjusting for inflation.

FOREIGN TRADE ZONE: An area within the US at or near an airport under US Customs control where goods are held duty free pending customs clearance.

Effective freight planning must consider the following five significant freight transportation issues in the North Central Texas region:

- First/last mile connections
- Inadequate infrastructure
- Growing congestion on major regional transportation facilities
- Truck parking
- Safety

To help overcome these freight transportation issues, NCTCOG has multiple regional freight planning goals:

- Seek freight community participation in the planning process.
- Monitor freight traffic through the region to identify potential bottlenecks.
- Improve freight movement efficiency to, from, and within the region.

¹ Texas Freight Mobility Plan, 11/2/2017, www.movetexasfreight.com

- Promote safety, mobility, and accessibility.
- Reduce the air quality impacts of freight movements.
- Seamlessly incorporate freight considerations in transportation projects.
- Develop and use a sustainable and reliable funding source for freight programs and projects.
- Develop a regional freight database.
- Improve railroad safety and reliability.

Achievement of these goals will enable NCTCOG to better plan for the needs of freight transportation facilities and the freight sector as a whole.



Freight North Texas is an ongoing planning program led by NCTCOG to enhance the safety, mobility, efficiency, and air quality associated with freight movements within the North Central Texas region. As a part of creating the Freight North Texas Program, in September 2011, NCTCOG staff

convened the Regional Freight Advisory Committee, consisting of freight professionals. The Regional Freight Advisory Committee provides guidance to North Central Texas Council of Governments staff and regional policy makers regarding freight activities, and the council also provides strategic product and project review. The guiding document for Freight North Texas is *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 from the report include:

- Freight Congestion and Delay Study (completed in 2016)
- Regional Truck Parking Study (completed in 2017)
- Land-Use Compatibility Analysis (in progress)
- Economic Impact of Freight on the Region (not yet started)
- Freight Project Evaluation System (not yet started)

Completing these studies will provide a more comprehensive and accurate representation of regional freight and will help to identify and prioritize effective initiatives.

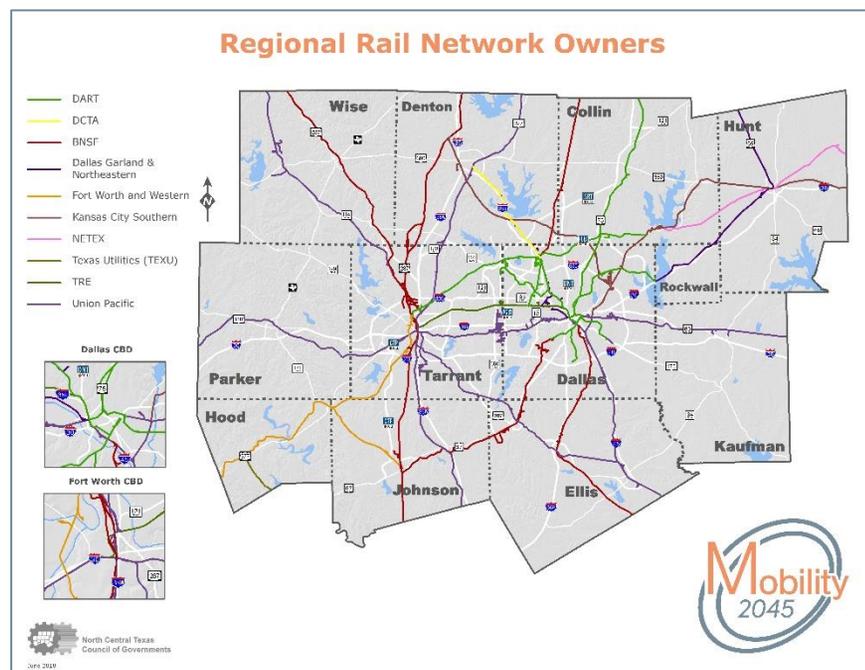
Texas Freight Mobility Plan

The Texas Freight Mobility Plan, adopted in late 2017, is the Texas Department of Transportation's (TxDOT) governing document for freight transportation planning in the state. The plan includes the Texas Multimodal Freight Network and Texas Highway Freight Network. It also assesses the state's freight transportation assets, goals, policies, and programs. The state, Metropolitan Transportation Organizations, and local governments will all be able to utilize these resources for freight planning. The plan also includes freight-related rail, air cargo, and highway projects that can benefit from federal funding. This freight funding has been established by the Fixing America's Surface Transportation Act and will be assigned to projects according to their priority as determined by TxDOT. NCTCOG strives to be in harmony with the Texas Freight Mobility Plan and will work with TxDOT on freight projects for the North Central Texas region. For more information on the Texas Freight Mobility Plan, please visit <http://movetexasfreight.com/>.

Rail Planning

As a vital part of the nation's freight network, Texas has over 10,000 miles of freight tracks, the most of any state. Three of the nation's Class 1 railroads operate within North Central Texas: 1) BNSF Railway, 2) Kansas City Southern, and 3) Union Pacific Railroad. These railroads can be seen in **Exhibit 6.2-1**. Each of these Class 1 railroads operates at least one intermodal facility in the region. In addition, several short-line railroads have local operations in the region, including the Dallas, Garland & Northeastern Railroad and the Fort Worth & Western Railroad. These rail lines combine to serve all 48 contiguous states, Alaska, Canada, and Mexico, and they work cooperatively with trucking firms and ocean shippers to expedite intermodal freight movements.

Exhibit 6.2-1: Regional Rail Network Owners



Key freight railroad facilities in North Central Texas include:

- BNSF Railway Intermodal and Carload Transportation Center at Alliance
- Kansas City Southern Wylie Intermodal Terminal in Wylie
- Union Pacific Railroad Dallas Intermodal Terminal in Wilmer
- Union Pacific Railroad Mesquite Intermodal Terminal in Mesquite

Rail is an important part of the region's freight system and working with the rail industry to create a more complete freight network is critical. NCTCOG has several policies and programs pertaining to freight rail planning. These include promoting proper land-use planning, encouraging safe and efficient rail crossings, and improving access to the intermodal facilities.

A Regional Rail Study will be conducted by NCTCOG and TxDOT to inventory rail assets, constraints, and safety issues on the rail network. The study also will develop a list of rail enhancements prioritized in the best interest of the North Central Texas region; the enhancements will address current passenger- and freight-rail performance concerns. To improve coordination between regional transit agencies and freight rail carriers, the study will also seek to

identify policies, programs, and agency-specific strategies to reduce freight delays and maintain on-time passenger rail service. The study will contain information and project recommendations for the rail system as a whole but will emphasize the integration of passenger and freight rail.

NCTCOG currently has several rail initiatives, including the Railroad Crossing Reliability Partnership Program and the Regional Railroad Crossing Banking Program. These help to create safer and more efficient rail movement in the region.

Air Cargo Planning

North Central Texas has two major air cargo facilities: 1) Dallas Fort Worth International Airport and 2) Alliance Airport. Alliance is exclusively an air cargo airport. Trucks are the primary method used to transport cargo away from the airports. Although air cargo carries a higher value than the other modes of freight, it does not have as big an impact on the regional freight network as other modes. Air cargo creates less impact because it has a relatively low weight compared with that of truck or rail cargo. Despite this low weight, the location of air cargo terminals and the volume of their goods movement still need to be considered in freight transportation planning. For more information about air cargo in the region, please refer to the *Aviation* section of this chapter.

Pipeline Planning

Pipelines and pipeline facilities in the region transport petroleum, natural gas, and other hazardous materials. The oil and natural gas industry is an integral component of the regional economy. NCTCOG tracks the impact of the pipelines on freight transportation networks. Regional commercial pipelines total approximately 16,000 miles, and this network operates mainly below ground.

Highway Planning

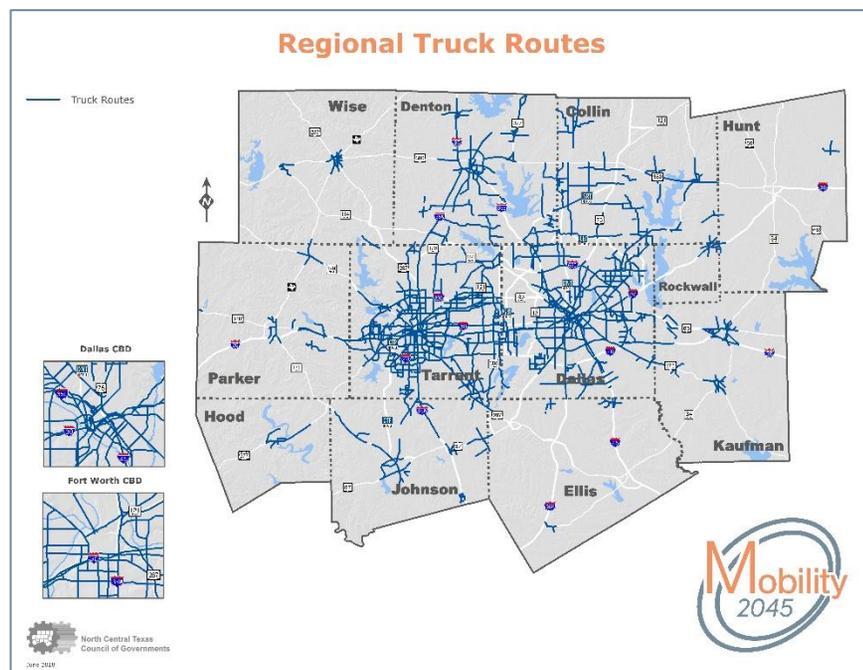
The US transportation system moves a daily average of approximately 54 million tons of freight valued at nearly \$48 billion. Most freight in the US is moved via truck. Deregulation of the trucking industry, the passage of the North American Free Trade Agreement, reductions in rail service, and growth

in time-sensitive freight have greatly impacted the number of trucks on the nation's roadways, including those in North Central Texas.

Truck travel characteristics and routes are continuously monitored and inventoried. This information helps to forecast the impact of proposed transportation planning and infrastructure projects on the movement of freight. Additionally, as more precise data is collected and monitored, models that forecast truck flow may be used to evaluate proposed changes to the transportation system.

Dedicated truck routes are an important component of the regional freight system. Primary and secondary truck routes for the region can be seen in **Exhibit 6.2-2**. Federal, state, and local governments may establish truck routes as a means to direct freight traffic to minimize congestion for both passenger and freight vehicles. Truck routes also offer designated routes to key freight facilities. Within Central Texas, 96 municipalities have some form of truck route designated by ordinance.

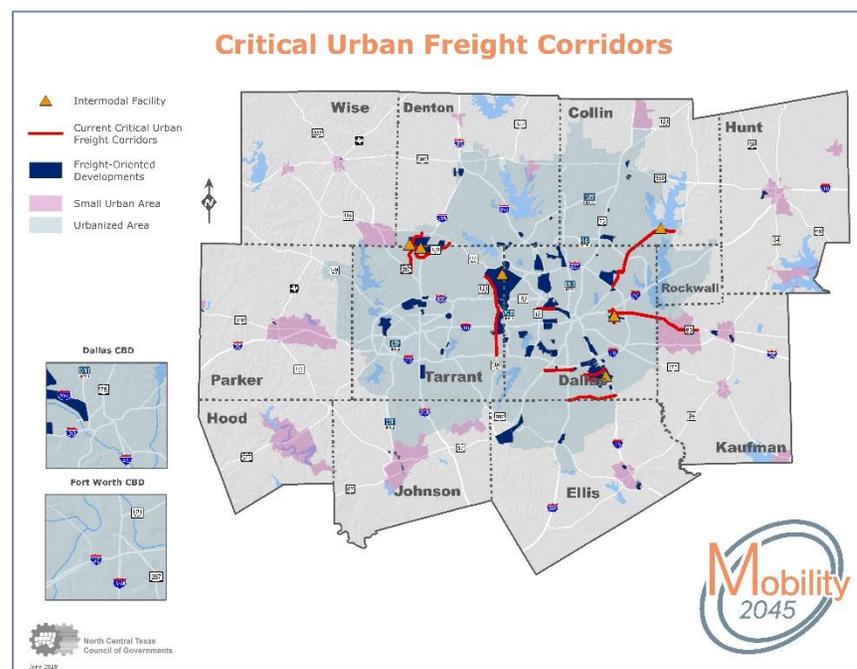
Exhibit 6.2-2: Regional Truck Routes



Connecting the region's freight network to the Federal Highway Administration's (FHWA) National Highway Freight Network (NHFN) is vital to the region's freight movement. NCTCOG engaged in developing a Regional Critical Urban Freight Corridor system. The goal was to identify important freight corridors that provide critical connectivity to the state freight network and the NHFN. The Regional Critical Urban Freight Corridor system aligns with Mobility 2045, the Transportation Improvement Program, and the State's 10-Year Plan.

Critical Urban Freight Corridors (CUFC) are a requirement of the Fixing America's Surface Transportation Act as part of FHWA's NHFN. Being a part of the NHFN allows these corridors, which would not normally be on the NHFN, to be eligible for state and federal funding. Twelve corridors were identified and approved by the Regional Transportation Council to submit to TxDOT and FHWA as the current CUFCs. These corridors are illustrated in **Exhibit 6.2-3**. NCTCOG will work with TxDOT staff every year to ensure the proper roads in the region are identified as CUFCs.

Exhibit 6.2-3: Current Critical Urban Freight Corridors



The truck lane restrictions proposed in the 2005 Truck Lane Pilot Study and 2009 Truck Lane Restriction Expansion Study are operational along sections of highway segments in Collin, Dallas, Ellis, Parker, Rockwall, and Tarrant counties. **Exhibit 6.2-4** illustrates these sections. As portrayed, the majority of the operational truck lane restrictions are in Dallas and Tarrant counties. **Exhibit 6.2-4** also illustrates plans for future truck lane restrictions, which will eventually reach Denton County. Combined, these truck lane restrictions are expected to improve highway safety and mobility and the region’s air quality. **Exhibit 6.2-5** illustrates the impact of truck lane restrictions on the average speed for vehicles traveling on IH 20 and IH 30.

Exhibit 6.2-4: Regional Truck Lane Restrictions

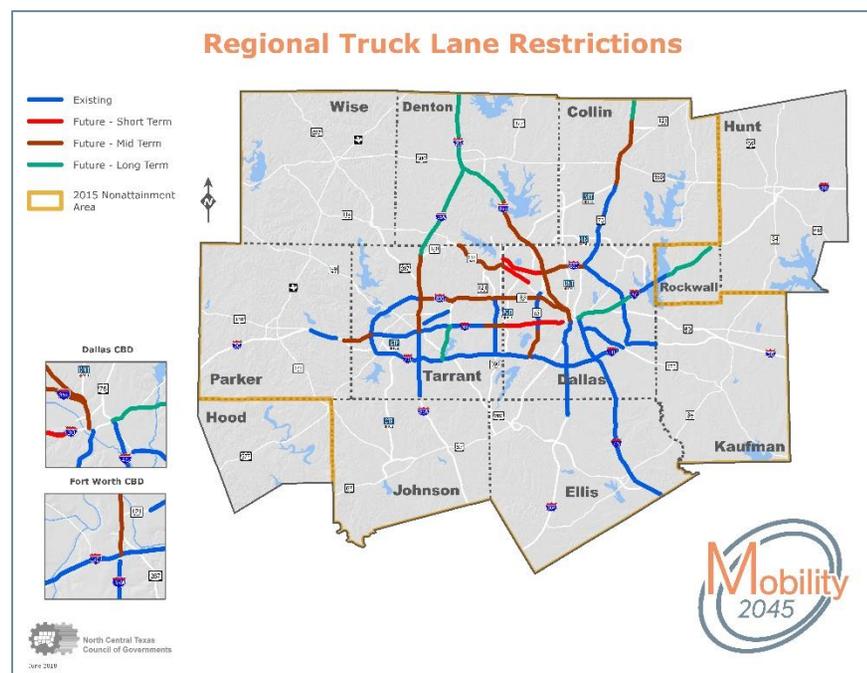


Exhibit 6.2-5: Truck Lane Restrictions Impacts

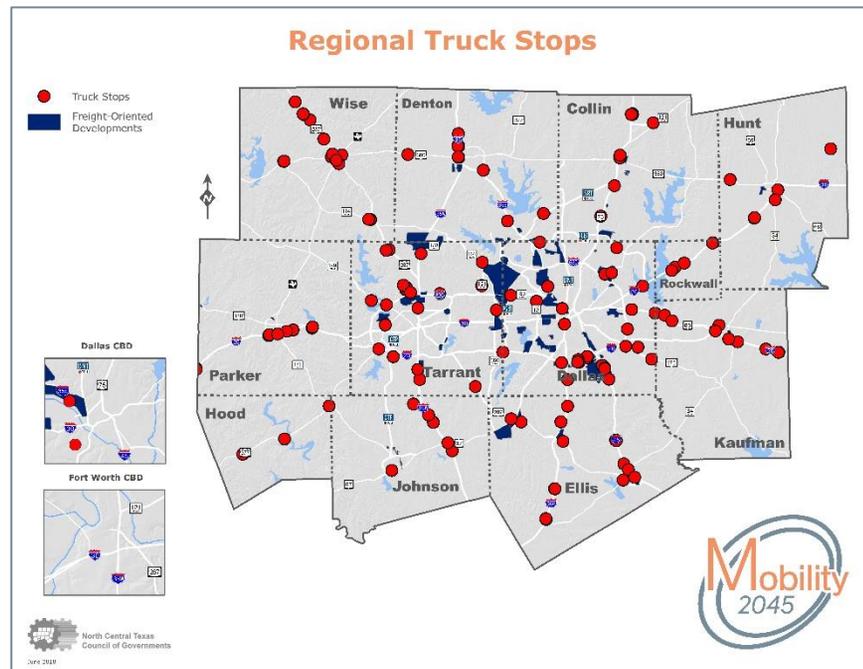
Lane	Without Truck Lane Restrictions (Standard Enforcement) mph	With Truck Lane Restrictions (Standard Enforcement) mph	Change in Average Speed mph
Left	71.5	72.4	0.9
Middle	65.6	66.2	0.6
Right	60.8	61.3	0.5

Source: NCTCOG (2009). North Central Texas Truck Lane Restriction Expansion Traffic Study Report. Retrieved from: <http://nctcog.org/trans/goods/trucks/TruckLaneRestrictionExpansionStudy> June 2009 Revised July 2

The recommendations included in this study provide verifiable data to local, regional, and state agencies and private entities. The recommendations also include opportunities to improve truck parking infrastructure by enhancing existing, and developing additional, truck parking facilities. Increasing the number of viable truck parking spaces would help truck drivers comply with federally mandated regulations, improve safety on roadways, and enhance regional economic development (see **Exhibit 6.2-6**).

Safety in freight movement, as stated earlier, is a high priority in the goods movement industry and needs to be properly tracked and evaluated on a consistent basis. Freight highway safety in the region is annually tracked by reviewing and analyzing truck-involved crashes. Analysis focuses on the crash location, possible causes, impact on traffic congestion, and potential solutions to improve highway safety involving truck movements. Please see **Exhibit 6.2-7**) for hotspots related to truck-involved crashes. For more information about safety and the region’s transportation system, please see the *Transportation System Safety* section.

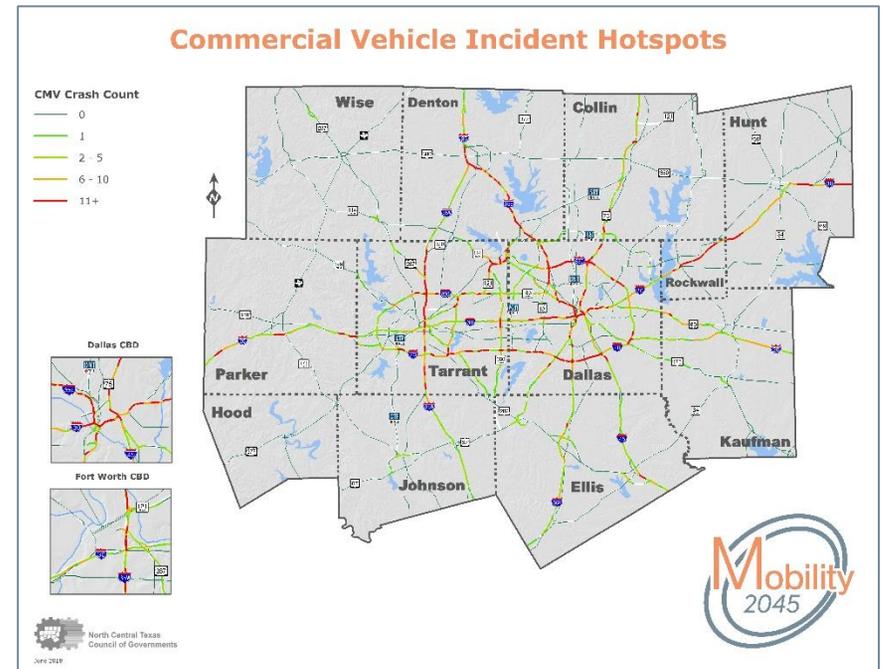
Exhibit 6.2-6: Regional Truck Stop Locations



The first/last mile connections are as important to freight movement as are Interstate Highways. Getting goods to and from intermodal facilities, warehouses, and factories on local streets and arterials can be the point of greatest delay. NCTCOG completed the Freight Congestion and Delay Study in 2015. This study examined four focus areas near intermodal facilities and freight-oriented developments. The study's purpose was to find improvements to the first/last mile connections that would benefit the regional system. The analyses identified several opportunities to improve these critical connections. Study recommendations include:

- Connecting truck routes to facilitate continuous routes in, out, and through the region.
- Improving the geometry of turns along truck routes.
- Improving weight capacity on the roads.
- Improving movement at railroad crossings.

Exhibit 6.2-7: Truck Involved Crash Hotspots



The process and findings of this study can be applied to areas beyond the four focus areas.

Key freight truck facilities in North Central Texas include:

- BNSF Railway Intermodal and Carload Transportation Center at Alliance
- Kansas City Southern Wylie Intermodal Terminal in Wylie
- Union Pacific Railroad Dallas Intermodal Terminal in Wilmer
- Union Pacific Railroad Mesquite Intermodal Terminal in Mesquite
- Dallas Fort Worth International Airport
- Alliance Airport Air Cargo Terminals
- Foreign Trade Zone Number 39: Dallas Fort Worth International Airport; Number 113: Ellis County; Number 168: Dallas-Fort Worth; Number 196: Fort Worth (Alliance)

NCTCOG is aware of the new and emerging technologies that affect freight transportation. These include electronic driver logs, automated vehicles, connected vehicles, and alternative delivery methods. These and other new

technologies will have a sizable impact on the movement of freight. NCTCOG will continue to monitor and incorporate potential impacts of new technologies into the planning process as they emerge. For more information on automated vehicles, see the **Transportation Technology** chapter.

NCTCOG will continue to monitor the impacts on freight movement that result from major infrastructure projects external to the region, including the Panama Canal Expansion and potential Red River Navigation projects.

Performance Measures

Performance measures provide a means to assess how Freight Goals and Policies are being met. Moving Ahead for Progress in the 21st Century Act (MAP-21) focused on safety, infrastructure condition, congestion reduction, system reliability, freight movement and economic vitality, environmental sustainability, and reduced project delivery delays. To help meet the goals set forth in MAP-21, Metropolitan Planning Organizations were required to establish and report on performance measures.

For freight movements, the MAP-21 performance measure is the Truck Travel Time Reliability Index that measures the reliability of travel times on the Interstate System within the metropolitan area. For more information on this and other federally required performance measures that NCTCOG targets, please see the *Performance Measures* section of the **Regional Performance** chapter.

Additional regional freight performance dimensions to track progress include:

- Yearly vehicle classification counts
- Complete (commercial vehicle) freight travel model
- Updated freight transportation facility inventory
- Reduction in annual number of accidents between trucks and non-trucks
- Increased travel speeds for non-truck traffic
- Reduction in accidents/incidents at at-grade railroad crossings
- Reduction in the number of at-grade railroad crossings
- Increased number of truck parking locations
- Reduction of incidents involving hazardous materials
- Improved and increased relationships with the freight community
- Improved attendance at Regional Freight Advisory Committee meetings
- Improved compatible land uses near freight development

Freight Policies

Mobility 2040 includes the following policies to guide attainment of freight goals:

FP3-001: Foster regional economic activity through safe, efficient, reliable freight movement while educating elected officials and the public regarding freight's role in the Dallas-Fort Worth region's economy.

FP3-002: Encourage the freight industry to participate in freight system planning and development to improve air quality and delivery time reliability.

FP3-003: Identify and maintain regional freight networks to meet business and consumer demand benefiting everyday life.

FP3-004: Enhance intermodal freight activity through innovation, facility development, and improved connections to the freight network by requiring local governments to create a dedicated and recurring funding source for projects that enhance freight mobility.

FP3-005: Enhance freight-oriented land-use sustainability by requiring local governments to adopt compatible zoning requirements to property adjacent to freight-oriented development land uses.

FP3-006: Incorporate technological advancements into the freight system.

FP3-007: Improve efficiency by promoting safety, mobility, and accessibility on the freight networks.

FP3-008: Monitor freight traffic annually along major corridors and major freight facilities through the creation and maintenance of a regional freight database.

FP3-009: Incorporate freight analysis and involve the freight community in the planning process of all transportation projects.

FP3-0010: Improve air quality related to freight through adopting local ordinances prohibiting truck engine idling.

FP3-011: Improve railroad safety through public education, innovation, and partnering with local governments to address railroad crossing safety improvements.

FP3-012: Incorporate technological advancements into the regional freight network.

FT3-013: Encourage regional railroads to participate in rail system planning, identifying issues, and the development of integrated operations with local commuter rail agencies.

Freight Programs

Programs are an important element in the planning and implementation of the freight goals and policies. Mobility 2045 supports the following programs associated with freight:

- Data Collection
- Freight System/Network Planning
- Freight Outreach Activities
- Land-Use Planning

Each of these programs contains several parts and initiatives, which are outlined in the section below.

FP2-110: Data Collection

The program's purpose is to collect data and monitor freight traffic in the region, including:

- Vehicle classification counts and vehicle movements
- Freight Travel Demand Forecasting Model
- Freight transportation facility inventory
- Federal Highway Administration, state, local, and private data sources
- Economic information regarding impact of freight

Data will be collected for the region, and particularly for areas with freight facilities and high freight traffic. Capital improvement needs will be documented as well.

Data will also be used to help determine where potential issues may arise in the freight system and will help to create projects addressing these issues.

Data will also be used in outreach to elected officials and policy makers to communicate freight's importance to the region.

FP2-120: Freight System/Network Planning

The planning efforts and studies listed below are part of the Freight System/Network Planning Program:

- **Safety:** Increase public and freight operators' safety through education and projects.
- **Freight Rail:** Continue various regional rail planning efforts, including:
 - Complete the Regional Rail Study and implement recommendations
 - Railroad Crossing Banking Program
 - Railroad Safety Education Program
 - Railroad Crossing Quiet Zone Planning
 - Railroad Crossing Reliability Partnership Program
- **Freight Routes:** Identify, analyze, and improve freight routes, including:
 - Innovative solutions (e.g. truck-only lanes)
 - Develop and keep Critical Urban Freight Corridors up-to-date
 - Bottleneck removal projects
 - New technologies (e.g. automated vehicles)
 - Improve truck parking availability
 - Infrastructure improvements on primary and secondary freight networks and local truck routes
 - First/last mile access improvements
 - Operations improvement on key freight routes
 - Implement projects to enhance network connectivity
- **Hazardous Materials Routing:** Analyze/reevaluate hazardous materials routing to ensure safe movement of hazardous materials, and reevaluate current routes to account for current population and employment data.

FP2-130: Freight Outreach Activities

This program's purpose is to engage in educational and outreach activities within and outside the freight sector. Outreach participants include professionals in the freight industry, public officials, and the general public. This outreach will increase understanding of freight's importance to the region and of long-term freight planning for the public, industry professionals, and decision makers.

FP2-330: Land-Use Planning

This program's purpose is to help ensure compatible land uses are considered near freight development, including:

- Railroad tracks
- Intermodal facilities
- Freight-orientated developments
- Truck routes and other major freight carry roadways
- Truck parking facilities

This program will help create safer and more efficient freight centers.

Summary

Goods are moved, transferred, and distributed from North Central Texas to destinations across the United States and around the world via truck, train, and aircraft. Providing reliable infrastructure and freight planning that integrates multiple modes is crucial to the region's economy and is vital to the local, state, and national economies and residents' quality of life. Mobility 2045 recommends a variety of goals, policies, and programs to support the efficient, safe, and reliable movement of freight in North Central Texas.

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6.3. Active Transportation

Mobility 2045 Supported Goals

Improve the availability of transportation options for people and goods.

Support travel efficiency measures and system enhancements targeted at congestion reduction and management.

Ensure all communities are provided access to the regional transportation system and planning process.

Preserve and enhance the natural environment, improve air quality, and promote active lifestyles.

Encourage livable communities which support sustainability and economic vitality.

Ensure adequate maintenance and enhance the safety and reliability of the existing transportation system.

Develop cost-effective projects and programs aimed at reducing the costs associated with constructing, operating, and maintaining the regional transportation system.

Providing Traveler Choice

- All trips less than two miles in length in the urbanized area should have options available to be accomplished by non-motorized or transit modes of travel.
- All roadways in the urbanized area should be designed and constructed to accommodate at least three modes of transportation.
- Roadway projects should implement context-sensitive design approaches compatible with the community and neighborhood in which the roadway is located.

Introduction

Active transportation, or bicycle and pedestrian modes, is an integral component of Mobility 2045. Active transportation offers numerous options to

improve the existing transportation system efficiently and cost effectively through a variety of systematic enhancements. Active transportation benefits all road users and creates more livable, safe, cost-efficient communities. The region's active transportation network is used as a mode of transportation by people of all ages and abilities to walk and bicycle. The network is used for non-recreational trips and a variety of purposes such as traveling to work or school, and as first /last mile connections with transit services, including bus stops and rail stations.

A current federal statute, United States Code, Title 23, Chapter 2, Section 217 (23 USC 217), mandates that *"bicycle transportation facilities and pedestrian walkways shall be considered, where appropriate, in conjunction with all new construction and reconstruction of transportation facilities, except where bicycle and pedestrian use are not permitted."*

The United States Department of Transportation (USDOT) policy statement on Bicycle and Pedestrian Accommodation Regulations and Recommendations signed on March 11, 2010 is *"to incorporate safe and convenient walking and bicycling facilities into transportation projects. Every transportation agency, including DOT, has the responsibility to improve conditions and opportunities for walking and bicycling and to integrate walking and bicycling into their transportation systems. Because of the numerous individual and community benefits that walking and bicycling provide — including health, safety, environmental, transportation, and quality of life — transportation agencies are encouraged to go beyond minimum standards to provide safe and convenient facilities for these modes."*

The USDOT policy emphasizes that active transportation accommodations should be given the same priority as other transportation modes. Walking and bicycling facilities should meet accessibility requirements and provide safe, convenient, and interconnected transportation networks that ensure transportation choices are available for people of all ages and abilities, especially children. With this stronger emphasis for multimodal transportation facilities by USDOT, TxDOT has also established guidance, signed on March 23, 2011, to proactively plan, design, and construct facilities to safely accommodate bicycles and pedestrians.

Active Transportation Context in North Central Texas

Many cities and counties in the region have developed and adopted bicycle master plans, trail master plans, or a combination of both. Various communities are also developing plans for local pedestrian networks and programs to provide safe routes to schools. In addition, numerous cities and transportation agencies have adopted local policies for bicycle accommodations to encourage bicycling as a form of transportation. The number of locally adopted community bicycle and trail master plans in the region grows each year. These documents are used in the development of Mobility 2045 to ensure regional connectivity and continuity.

The types of pedestrian and bicycle facilities available differ from community to community, and their conditions vary based on the context and density of the surrounding area where they are located. These projects provide for non-motorized modes of transportation, and also enhance travel and tourism throughout the region, including access to destinations of statewide significance such as the Fort Worth Stockyards National Historic District, the Arlington Entertainment District, Fair Park in Dallas, and others.

In urban areas, the active transportation network typically includes a wide mix of interconnected sidewalks, off-street shared-use paths, and on-street bikeways, including designated or separated bike lanes and cycle tracks and marked shared lanes. The network concentration is the greatest in higher density urban areas and where there are high volumes of users requiring connections to transit and major destinations. These areas also have a significant number of short trips that can be achieved by walking and bicycling.

In suburban areas, the active transportation network typically includes similar facilities to those in urban areas. However, the overall network and mix of the active transportation network may vary from urban areas due to differences in the physical design and density of land uses and the opportunities for short walking and biking trips.

In rural unincorporated areas, the active transportation network may consist of signed wide shoulders on roads for safe bicycle travel between rural towns.

In order to support regional goals related to mobility, land use, the environment, the economy, and public health, Mobility 2045 recognizes that the active transportation network in the region cannot be treated as stand-alone facilities. Sidewalks, off-street shared-use paths, and on-street bikeways should be integrated as part of Complete Streets, and they should be interconnected with transit services and other modes of transportation. This seamless multimodal transportation network can connect housing and key destinations, including employment centers, education, medical, retail and entertainment centers, and others. Much of the region's 2045 active transportation network of pedestrian facilities and on-street bikeways will be implemented through Complete Streets designed and operated to enable safe access and travel for users of all ages and abilities.



Mobility 2045 supports the development of local Complete Streets policies and the implementation of Complete Streets infrastructure on both new and reconstructed streets; such design will safely accommodate all users in the region. Additional information on Complete Streets can be found in the *Sustainable Development* section of the **Operational Efficiency** chapter, the *Healthy Communities* section of the **Environmental Considerations** chapter, and in the *Roadway* section of this chapter. According to the 2009 National Household Travel Survey, in urban areas, 52 percent of all trips were three miles or less in distance, and 29 percent of all trips were one mile or less.

These trips are ideal for biking, walking, transit, or a combination of these modes of travel. By encouraging investment in facilities that support these forms of transportation, the region has the opportunity to shift short trips to walking and bicycling modes, resulting in more transportation choices and improved air quality. Therefore, Mobility 2045 aims to provide options for non-motorized or transit modes of travel for all trips in the urbanized area that are less than two miles in distance.

Combined Regional Paths and Bikeway Network

The active transportation network in the region consists of regional shared-use paths (Regional Veloweb), supporting community shared-use paths, and the on-street bikeway network (including on-street wide shoulders in rural areas). This network is reflected in the map in Exhibit 6.3-1 and the table in Exhibit 6.3-2. This network plays a key role in supporting Mobility 2045 and the implementation of the multimodal Complete Streets and transit infrastructure that safely accommodate all travelers throughout the region.



Exhibit 6.3-1: Combined Regional Veloweb, Community Paths, and On-Street Bikeway Network

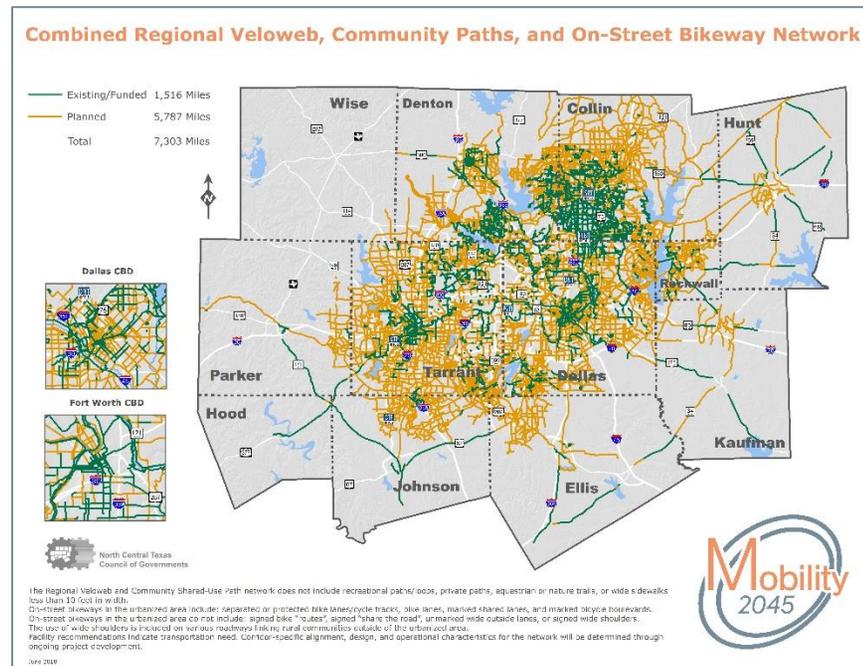


Exhibit 6.3-2: Combined Regional Veloweb, Community Shared-Use Paths, and On-Street Bikeways Network Miles by Facility Status (June 2018)

Facility Type*	Miles
Regional Veloweb Paths¹	
Regional Veloweb, Existing	455
Regional Veloweb, Funded	143
Regional Veloweb, Planned	1,285
Total Veloweb Paths	1,883
Community Shared-Use Paths¹	
Community Shared-Use Paths, Existing	318
Community Shared-Use Paths, Funded	57
Community Shared-Use Paths, Planned	2,584
Total Community Paths	2,959
Total Regional Veloweb and Community Paths	4,842
On-Street Bikeways²	
On-Street Bikeways, Existing	212
On-Street Bikeways, Funded	84
On-Street Bikeways, Planned	1,817
Total On-Street Bikeways (Urbanized Area)	2,113
On-Street Wide Shoulders, Existing (rural areas between communities)	247
On-Street Wide Shoulders, Planned (rural areas between communities)	101
Total On-Street Wide Shoulders (Rural Area)	348
Total On-Street Bikeways	2,461
Total All Facilities	7,303

¹ The Regional Veloweb and Community Shared-Use Path network does not include recreational paths/loops, private paths, equestrian or nature trails, or wide sidewalks less than 10 feet in width.

² On-street bikeways in the urbanized area include separated or protected bike lanes/cycle tracks, bike lanes, marked shared lanes, and marked bicycle boulevards. On-street bikeways in the urbanized area do not include signed bike "routes", signed "share the road", unmarked wide outside lanes, or signed wide shoulders. The use of wide shoulders is included on various roadways linking rural communities outside of the urbanized area.

Mobility 2045 represents extensive research on and compilation of the locally adopted master plans for active transportation infrastructure throughout the

region. By working with local and regional stakeholders, the plan prioritizes corridors for improvement as represented by the Regional Veloweb and other policies for active transportation infrastructure investment and safety. Mobility 2045 represents the compilation of 63 locally adopted plans with shared-use paths (trails) and 61 locally adopted plans that include on-street bikeway facilities. Various new or updated plans are adopted each year throughout the region, and the North Central Texas Council of Governments regularly coordinates with local jurisdictions to update a database of existing, funded, and planned active transportation facilities.

Recommended Off-Street Network: The Regional Veloweb

The Regional Veloweb is a network of off-street shared-use paths (trails) designed for non-recreational trip purposes by bicyclists, pedestrians, and other non-motorized forms of transportation. The Veloweb serves as the regional expressway network for active transportation, and it extends the reach of the region's roadway and passenger rail transit network for non-motorized transportation. The Veloweb has planned connections in 10 counties and 105 cities in North Central Texas. Alignments were determined through the cooperative efforts of local governments and NCTCOG staff by:

- Identifying existing and funded facilities.
- Reviewing locally planned bicycle and pedestrian facilities.
- Locating routes that would provide air quality benefits and access to transit stations and major destinations.
- Identifying corridors that provide the greatest potential for regional connectivity.
- Identifying routes that provide opportunities to enhance travel and tourism.

The Regional Veloweb is reflected in **Exhibit 6.3-3** and includes approximately 1,884 miles of shared-use path facilities in various stages of development. These shared-use paths are expected to be consistent with the recommendations and design guidance set forth by the American Association of State Highway Officials (AASHTO) for the development of bicycle facilities. The primary design considerations of Veloweb paths typically include wider cross sections (minimum 12-foot width) and grade-separated crossings of roadways with significant traffic flows. They may have wider 16- to 24-foot sections or separated facilities for pedestrians and bicyclists in areas experiencing high-peak user volumes due to the proximity to transit stations,

employment and education centers, and/or other major venues. Design considerations for regional and community pathways are described in more detail in **Exhibit 6.3-3**.

Exhibit 6.3-3: The Regional Veloweb

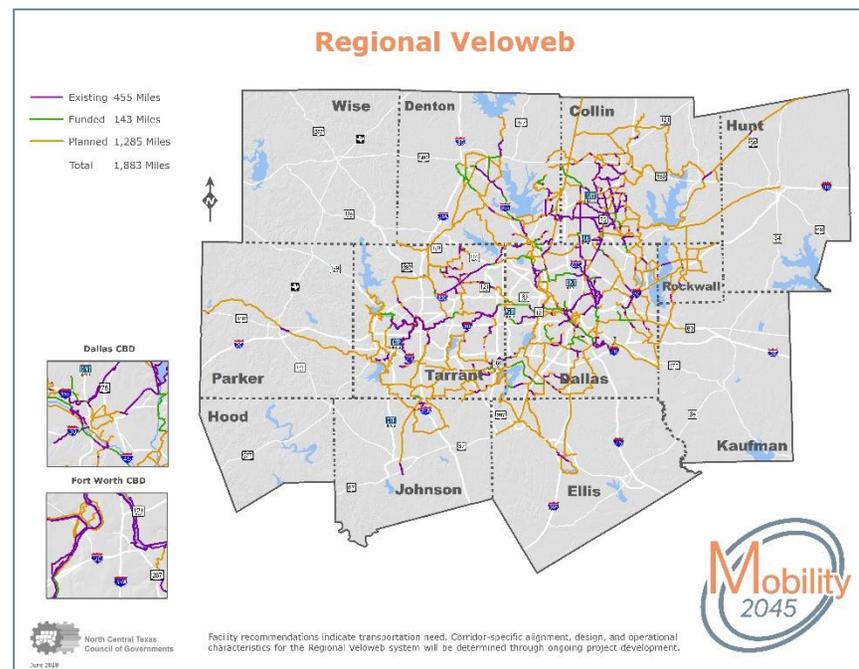


Exhibit 6.3-4: Regional Veloweb 2045 Pathways Classifications and Primary Design Considerations

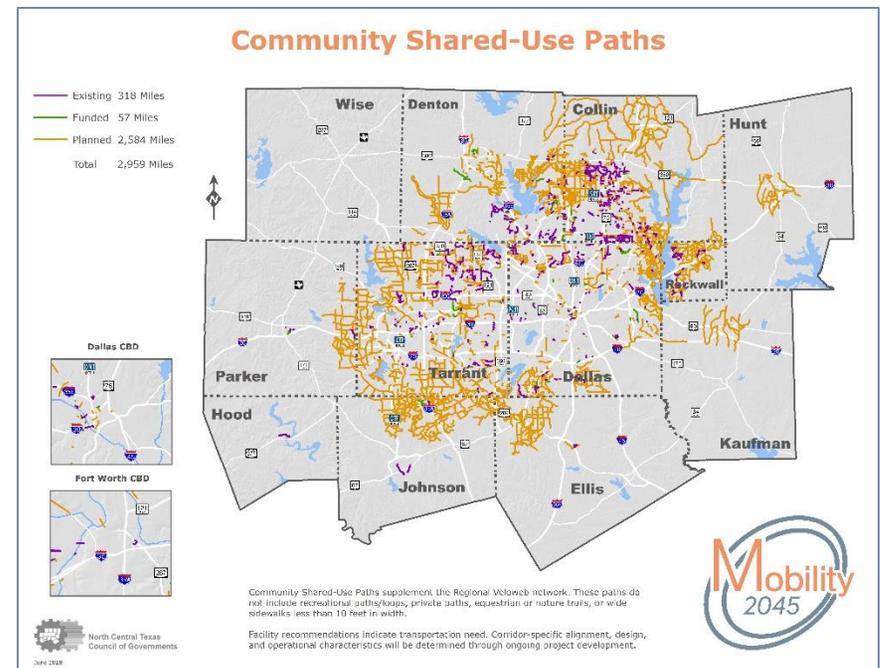
Regional Pathways 2045 Primary Design Considerations	Community Pathways Primary Design Considerations
Consistent with the guidance set forth by AASHTO for the development of bicycle facilities.	Consistent with the guidance set forth by AASHTO for the development of bicycle facilities.
<u>Minimum width:</u> 12 to 14 feet (typical) with 16- to 24-foot wide sections or separated facilities for pedestrians and bicyclists in areas with high-peak user volumes.	<u>Minimum width:</u> 10 to 14 feet (typical) with wider sections where warranted due to high-peak volumes.
Typically independent right-of-way corridors such as greenways, along waterways, freeways, active or abandoned rail lines, utility rights-of-way, and unused rights-of-way.	May include more alignments adjacent to local collector and arterial roadways, and through neighborhoods and areas where right-of-way is more constrained and user volumes are lower.
Continuous linear corridors that provide long-distance connections through cities and across counties; provide connections to major destinations, including transit stations, employment and education centers, and/or other major activity venues with high volumes of users.	Corridors generally shorter in length and may terminate within a community, may supplement adjacent on-street bikeways along roadways with higher traffic speeds and volumes not suitable for less experienced bicyclists, and may provide short connections between on-street bikeways and neighborhoods.
Grade-separated crossing of roadways with significant traffic flows. Few, if any, driveway crossings and signalized or stop sign intersections.	May include more at-grade crossings of roadways with signalized or stop sign intersections while minimizing any conflicts with motor vehicles and associated operational and safety issues.
Supported by a network of local community paths, sidewalks, and on-street bikeways that provide connections to local neighborhood destinations.	Serves as an extension of the regional pathway network by providing connections to local neighborhood destinations.
Constructed with a long-lasting impervious surface.	Constructed with a long-lasting impervious surface.

Off-Street Network: Community Shared-Use Paths

Community shared-use path facilities support the Regional Veloweb and help extend the reach of the Veloweb network by connecting it to local and neighborhood destinations. Approximately 2,955 miles of these paths, shown

in the map in **Exhibit 6.3-5**, are in various stages of development. These facilities are also expected to be consistent with the recommendations and guidance set forth by AASHTO for the development of bicycle facilities. This network of facilities does not include recreational park loops, private paths, equestrian or nature trails, or wide sidewalks less than 10 feet in width. Mobility 2045 forecasts that a portion of the network of community shared-use paths will be implemented. The paths that will be constructed are primarily located in corridors that serve as extensions of the Regional Veloweb and provide connections to transit facilities and other local major destinations. While not fully funded by Mobility 2045, community shared-use paths provide important connections within communities and will be implemented as funding is available.

Exhibit 6.3-5: Community Shared-Use Paths

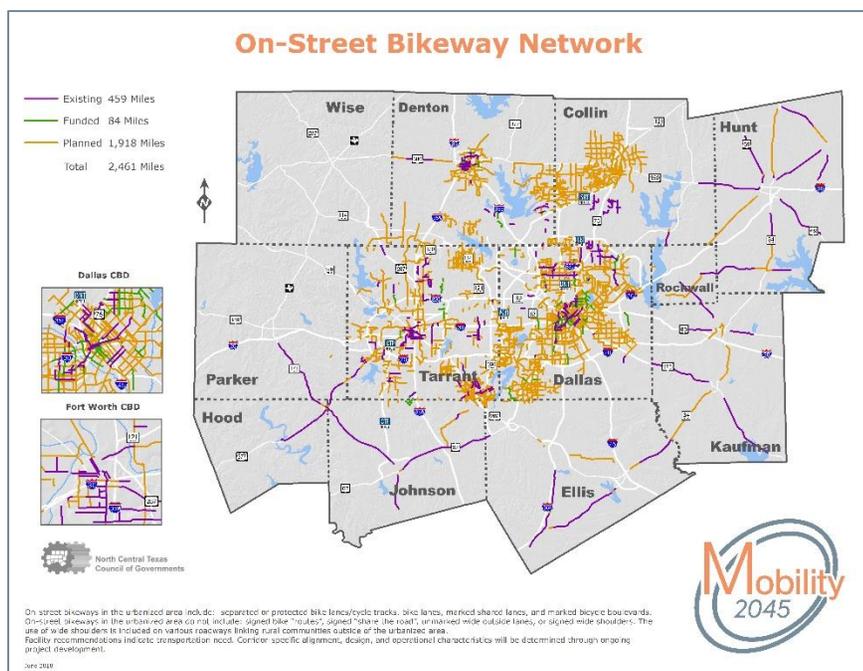


Regional On-Street Bikeway Network

On-street bikeways facilitate safe and convenient travel for bicyclists, and they serve as extensions of the Regional Veloweb and community shared-use path network by providing non-motorized travel connections between housing, employment, major destinations, and transit facilities. The existing and

planned on-street bikeway network, shown in **Exhibit 6.3-6**, provides the densest network of bicycle facilities in a growing number of communities throughout the region. Currently more than 61 locally adopted plans include on-street bikeway facilities representing more than 2,458 miles in various stages of development.

Exhibit 6.3-6: On-Street Bikeway Network



Consistent with guidance from AASHTO, the National Association of City Transportation Officials, FHWA, and the Separated Bike Lane Planning and Design Guide, the type and design of on-street bikeways can vary based on the community and context in which they are located. Bikeways in urban and suburban areas of the region are recommended to include the following:

- Separated or protected bike lanes/cycle tracks
- Bike lanes
- Marked shared lanes
- Marked bicycle boulevards

Communities may also provide on-street bicycle accommodations that include signed bike routes and signed shared roadways without designated bikeway

pavement markings, including wide outside lanes. However, these facilities are not represented in Mobility 2045. Bikeways between communities in rural unincorporated areas of the region generally consist of paved shoulders, particularly on roadways with higher speeds or traffic volumes. Paved shoulders in these rural areas provide opportunities for travel between small communities.

Pedestrian Network

Pedestrian facilities must accommodate a diverse group of travelers of all ages and abilities, including people who walk, jog, use wheelchairs or walkers, or push strollers. Pedestrians tend to be the most vulnerable road users; therefore, pedestrian facilities should be designed and implemented to increase their safety and effectiveness.

The pedestrian network provides a primary mode of travel for short trips and it supports other transportation modes. The network of pedestrian facilities should be complete, direct, safe, and enjoyable to use. This can be accomplished by addressing the continuity of the sidewalk network, the streetscape, and the physical context in which the sidewalk is located.

Planning for the pedestrian network requires similar consideration and analysis as planning for roadways. The pedestrian network enhances economic development by connecting places where people like to live and visit, and it improves safety by supporting safe routes to school. When fully developed, the pedestrian network should provide safe links between destinations such as schools, employment, and transit facilities. Programs that invest in this network should prioritize improvements that connect to major destinations, improve safety, and help promote community livability and a healthy lifestyle.

The primary considerations of the pedestrian network include:

- Completing gaps in the sidewalk network
- Completing first/last mile connections to transit services
- Providing safe routes, including crossings of busy streets and major barriers, that are compliant with the Americans with Disabilities Act
- Providing context-sensitive streetscapes

Americans with Disabilities Act and Transition Plans

The Americans with Disabilities Act (ADA) of 1990 is a civil rights statute that prohibits discrimination against people with disabilities. Title II of the ADA

addresses public services and the accessibility of public transportation to people with disabilities. After the ADA became effective, public facilities were required to be designed and constructed to be accessible by people with disabilities. Failing to design and construct facilities accessible by people with disabilities constitutes discrimination and is prohibited by law. Title II of the ADA applies to facilities built after 1990, pre-existing facilities, and any organization with 50 or more employees.

State and local governments are required to perform self-evaluations of current facilities and develop a transition plan to address deficiencies by building new projects and by altering existing projects, including performing reconstruction, major rehabilitation, widening, resurfacing, signal installation, and upgrades. This affects pedestrian facilities in the public right-of-way, including sidewalks, curb ramps, and warnings detectable by a range of users. In the case of noncompliance for state or local governments, FHWA will seek a voluntary compliance agreement. If an agreement cannot be met, FHWA will send the case to the Attorney General for action.

NCTCOG is helping local jurisdictions comply with ADA through policy, funding, and training for officials.

Policies, Programs, and Projects

This section describes the policy framework that guides the implementation of the region-wide network of urban and rural active transportation facilities. This includes the integration of Complete Streets, context-sensitive solutions, and other relevant initiatives into roadway planning, design, implementation, and maintenance policies. This multimodal network vision of *Mobility 2045* will create a seamless and interconnected transportation network that safely accommodates users of all ages and abilities, including pedestrians, bicyclists, transit riders, and motorists.

Three policies form the foundation of the *Mobility 2045* active transportation vision; these policies are supported by a variety of programs and projects. Each element plays an integral role in meeting shared regional goals and needs. Policies guide decision-making processes, programs compose the policy framework, and performance measures maintain accountability. See appendix E. **Mobility Options** for a complete listing of policies, programs, projects, and maps related to active transportation.

Policy BP3-001: Support the planning and design of a multimodal transportation network with seamless interconnected active transportation facilities that promotes walking and bicycling as equals with other transportation modes.

The active transportation network must be interconnected with transit services and integrated as part of Complete Streets to connect key destinations, including employment centers; education, medical, retail, and entertainment centers; and other destinations for daily activities. *Mobility 2045 promotes roadways in the urbanized area that are designed and constructed to accommodate at least three or more modes of transportation.*

BP2-001: Active Transportation Planning and Design

- A. Multimodal Transportation Plans:** Encourage development of local pedestrian and bicycle plans, as well as modifications to local transportation plans and standards that provide for pedestrian accommodations, on-street bikeways, and the network of off-street trails.
- B. Complete Streets:** Facilitate and support the adoption of local policies and the implementation of Complete Streets projects with bicycle and pedestrian facilities as routine accommodations for new roadway construction and reconstruction projects.
- C. Context-Sensitive Design:** Incorporate bicycle and pedestrian modes in all transportation corridor studies, support the adoption of regional and local policies, and implement Complete Streets projects and roadway projects that are sensitive in design to the context of their surroundings.
- D. Corridor Studies:** Integrate bicycle and pedestrian mobility in all transportation corridor studies, incorporate bicycle and pedestrian modes in corridor studies, and support the funding and construction of bicycle and pedestrian elements of final corridor studies.
- E. Americans with Disabilities Act Transition Plans:** Encourage local agencies to adopt and implement Americans with Disabilities Act transition plans.
- F. Local Regulations:** Encourage local jurisdictions to adopt ordinances, zoning standards, engineering standards, and guidelines that accommodate bicycle and pedestrian modes of travel through such means as Complete Streets policies, thoroughfare technical specifications, right-

of-way and easement preservation, bicycle parking ordinances, bicycle passing ordinances, and end-of-trip facilities.

G. Data Collection and Analysis: Monitor and evaluate the North Central Texas region's bicycling and walking efforts by collecting bicycle and pedestrian count data, analyzing bicycle and pedestrian crash data, conducting regional non-motorized travel surveys, developing an appropriate methodology indicating active transportation's modal share goal, and publishing findings.

H. Technical Support/Resources/Research: Collect relevant research materials regarding bicycle and pedestrian transportation to utilize in regional initiatives and provide as resources to local governments and area stakeholders.

Policy BP3-002: Implement pedestrian and bicycle facilities that meet accessibility requirements and provide safe, convenient, and interconnected transportation for people of all ages and abilities.

Mobility 2045 promotes bicycle and pedestrian projects that connect multiple jurisdictions and expand the regional network by improving coordination, connectivity, and continuity between counties and communities. To realize the potential of active transportation, special attention must be paid to the current barriers and safety issues the region is experiencing. These include:

- An incomplete network of bicycle and pedestrian facilities, including those that serve environmental justice and transit-dependent populations.
- High rates of pedestrian and bicycle crashes and fatalities involving motor vehicles.
- Limited funding for safe routes to school projects.
- Infrastructure that is not compliant with ADA.
- Significant barriers to safe active transportation travel; these barriers include freeways, major streets with high traffic volumes and speeds, and waterways.

Improving safety is a top priority for USDOT, and Mobility 2045 is committed to reducing fatalities and serious injuries on the transportation network throughout North Central Texas.

BP2-002: Active Transportation Network Implementation

A. Complete the Regional Active Transportation Network: Continue the Regional Transportation Council Local Funding Program initiatives and Sustainable Development Funding Programs. The Local Funding Program initiatives include the Local Air Quality Transportation Alternatives Program. Sustainable Development Funding Programs direct funds to local governments to improve, expand, and complete the bicycle and pedestrian facilities network and related programs throughout the region.

Implementation priorities include:

1. **Close Gaps and Improve Connectivity in the Regional Veloweb, On-Street Bikeway Network, and Pedestrian Network:** Eliminate major gaps in the regional network and complete connections to address major barriers such as freeways, railroads, and waterways.
2. **Linkages to Transit and Major Destinations:** Support and complete the development of pedestrian and bicycle facilities that provide access from neighborhoods to public transportation services, education facilities, employment centers, medical, retail, and other destinations.
3. **Environmental Justice Areas and Transit-Dependent Populations:** Improve accommodations for pedestrians and bicyclists in environmental justice areas and improve connections for transit-dependent populations.
4. **Regional Pedestrian Network:** Develop a Regional Pedestrian Network and Safety Plan. Implement projects that improve accommodations and safety for pedestrians, with special attention given to vulnerable road users and disadvantaged communities.
5. **Safe Routes to School:** Coordinate with Independent School Districts, municipalities, public safety officials, and other agencies throughout the region to ensure safe and accessible walking and bicycling corridors to education facilities.

B. Safety Improvements: Support efforts to reduce crashes and fatalities between motor vehicles and pedestrians and bicyclists, including the implementation of Proven Safety Countermeasures outlined by the Federal Highway Administration Office of Safety. Prioritize infrastructure design techniques and safety countermeasures projects in areas with high rates of pedestrian and bicycle crashes and fatalities.

C. Americans with Disabilities Act Compliance: Support efforts to identify American with Disabilities Act accessibility needs and incorporate improvements into the overall transportation network.

Policy BP3-003: Support programs and activities that promote pedestrian and bicycle safety, health, and education.

Walking and bicycling are legitimate forms of transportation that have the potential to positively impact the region by shifting travel modes, resulting in reduced congestion and improved air quality and public health. Mobility 2045 promotes enhanced safety for active travel by increasing education and training opportunities for cyclists, pedestrians, motorists, and professionals who are designing and implementing roadway facilities, implementing safety infrastructure projects, and promoting enforcement of traffic laws to reduce bicycle and pedestrian-related conflicts.

BP2-003: Active Transportation Education and Outreach

- A. Safety Education Programs and Campaigns:** Support and create programs and campaigns that educate bicyclists, pedestrians, and the general public about bicycle operation, bicyclists' and pedestrians' rights and responsibilities, and lawful interactions between motorists, bicyclists, and pedestrians to increase safety for all road users. Support programs aimed at increasing bicycle and walking trips by providing incentives, recognition, or services that make bicycling and walking more convenient transportation modes.
- B. Healthy and Livable Communities:** Create healthier and more livable communities by encouraging the use of bicycle and pedestrian facilities for work and non-work trips, and for daily physical activity.
- C. Enforcement:** Encourage enforcement efforts of traffic laws and target unsafe bicyclist, pedestrian, and motorist behaviors to improve safety and reduce collisions and conflicts between motorists, bicyclists, and pedestrians.
- D. Technical Training and Education:** Provide pertinent training to transportation-related professionals.
- E. Mapping Facilities and Plans:** Maintain a regional database and provide information regarding existing and planned active transportation facilities and related amenities throughout the region.

In the future, the multimodal network and related policies, programs, and projects may be considered in the context of automated vehicles. Such vehicles have the potential to both benefit (through vehicle safety features) and harm (through infrastructure such as dedicated lanes) efforts to safely implement active transportation. Appropriate policies could help ensure that automated vehicles improve safety for bicyclists and pedestrians. More information on automated vehicles can be found in the **Transportation Technology** chapter.

Priority Areas to Improve Facilities and Accessibility

Mobility 2045 recommends prioritizing improvements to active transportation facilities to close gaps within the larger network, increase the use of facilities, improve safety and comfort for pedestrians and bicyclists, and create easier access to destinations in areas with high propensity for walking and bicycling including:

- Public transportation facilities (bus stops and rail stations)
- Mixed-use/transit-oriented development areas
- Central business districts and major employment centers
- Educational institutions
- Neighborhood services (e.g. grocery stores, medical centers, libraries)
- Neighborhoods with transit-dependent populations
- Areas with pedestrian and bicycle safety concerns and high rates of crashes
- Areas with a high density of short car trips
- Areas with moderate to severe vehicle congestion levels (see appendix E. **Mobility Options**).
- Routes of statewide and regional significance identified by the Texas Department of Transportation Bicycle Tourism Trails Study

These destinations and routes are places that generate higher than average pedestrian and bicycle traffic. Prioritizing improvements in these areas and corridors will create the greatest benefit for people who travel by walking or bicycling. Other factors to consider when prioritizing projects include community support, cost/benefit analysis, sharing of construction costs, and geographic balance to ensure facilities are evenly constructed throughout the region.

Performance Measures

Federally required performance measures for Metropolitan Planning Organizations are addressed in the **Regional Performance** chapter. Additional performance dimensions related to active transportation include:

- Number of pedestrian fatalities
- Number of pedestrian serious injuries
- Number of bicyclist fatalities
- Number of bicyclist serious injuries
- Number of miles of existing Regional Veloweb
- Number of miles of existing community shared-use paths
- Number of miles of existing on-street bikeways

Summary

Active transportation is an important element in providing for the region's diverse needs and enhancing transportation choice. Walking and bicycling provide low-cost mobility options that place fewer demands on local roads and highways. Increased commitment to and investment in walking networks and bicycle facilities can help meet goals for cleaner, healthier air; less congested roadways; and more livable, safe, cost-efficient communities. The recommendations made in *Mobility 2045* seek to increase active transportation as a viable transportation mode for the residents of North Central Texas.

6.4. Public Transportation

Introduction

Public transportation provides thousands of people in North Central Texas with daily access to life-essential opportunities, reduces the number of cars on the roads, relieves congestion for people who drive, and improves air quality for all. *Mobility 2045* supports the creation of a seamless, well maintained, and technology-supported regional transit network that provides travelers with more choices for getting around. To ensure that the transit network and individual public transportation services achieve this vision, *Mobility 2045* includes policies and programs that guide future public transportation investments. This section outlines opportunities to cost-effectively expand and modernize public transportation service throughout the region. Information about the performance of the transit system, including transit asset state of good repair, are included in the **Regional Performance** chapter.

Future public transportation services compete with other priorities for funding, which will be limited at the federal, state, and local levels. The need to balance equity, environmental, and economic factors also influences future public transportation services. Several demographic trends influence future public transportation services. These include the extent, timing, and location of population growth and job growth; and residents' age, ability, income, and mobility preferences. Communities can customize public transportation services to their residents' specific needs (see *Right-Sizing Public Transportation Services* in appendix **E. Mobility Options**).

Emerging trends in technology, public-private partnerships, and other areas are shaping the types of public transit service available and how people access services. Future public transportation services will be one aspect of an overall transportation system where users view mobility as a service, rather than focusing on a specific mode of transportation like a privately-owned vehicle. In the transit industry, this mindset shift has already begun, with new emphasis on mobility-on-demand services where traditional bus or rail service is not a good fit. The Federal Transit Administration created the mobility-on-demand initiative to "envision a multimodal, integrated, automated, accessible, and connected transportation system in which personalized mobility is a key feature". Transit providers in the North Central Texas region are implementing

innovative transit services, including partnerships with transportation network companies, to put mobility on demand into practice.

For example, Dallas Area Rapid Transit (DART) was awarded a Federal Transit Authority grant to develop an integrated, multimodal application that leverages ride-sharing services to improve ease of access to DART stations, particularly in non-walkable areas underserved by transit. This plan supports seamless access to all public mobility services, including integration of different apps for scheduling, ticketing, and information on the wide variety of public transportation available in the region. NCTCOG formed a transit mobility-on-demand working group in 2017 to provide a forum for transit agencies, local governments, and other interested parties to discuss, coordinate, and promote demonstration of mobility-on-demand concepts and solutions in the region (www.nctcog.org/mod).

Transit agencies and local governments are also considering how to plan for, implement, and accommodate autonomous vehicles for public transit. In 2017, the city of Arlington tested a low-speed autonomous shuttle in its entertainment district. The technology has the potential to provide:

- Last-mile connections from transit stations.
- Mobility options for individuals who are unable to drive due to a disability.
- Shuttle service to tourism destinations and areas with high concentrations of parking, shopping, cultural, and entertainment opportunities.
- Shuttle service in small areas such as campuses, zoos, and medical service areas.

As technology develops, there is also potential for autonomous transit vehicles to impact public transportation by using larger vehicles traveling longer distances, such as buses and trains. For example, the Autonomous Rapid Rail Transit tested in China since October 2017 operates like a train but doesn't require the tracks, which results in lower capital costs. This type of service offers high flexibility in operation and may be a cost-effective alternative to traditional rail service in some operating environments. As autonomous vehicles enter the mainstream of transit service provision, transit agencies will need to proactively address the evolution of transit workforce needs, availability, training, and skillset.

The information that follows in this section summarizes current public transportation services and describes public transportation programs that will provide a variety of transit alternatives by 2045.

Mobility 2045 Supported Goals

Improve the availability of transportation options for people and goods.

Support travel efficiency measures and system enhancements targeted at congestion reduction and management.

Ensure all communities are provided access to the regional transportation system and planning process.

Preserve and enhance the natural environment, improve air quality, and promote active lifestyles.

Encourage livable communities which support sustainability and economic vitality.

Develop cost-effective projects and programs aimed at reducing the costs associated with constructing, operating, and maintaining the regional transportation system.

Public Transportation Providers

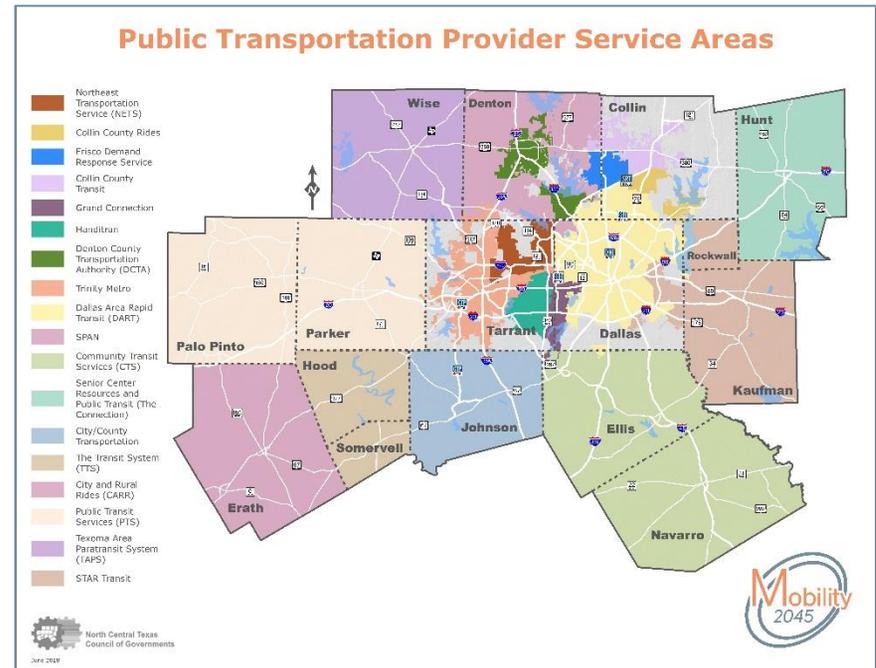
Public transportation in the North Central Texas region encompasses a variety of services. Public agencies provide a majority of the fixed-route bus, light rail, and demand-response services. The private sector also has an active role in providing public transportation services, such as intercity bus and rail; the private sector also partners with public agencies to enhance public transportation services. The public and private providers for transit services in the region are described below.

Public Agencies

Metropolitan transportation authorities operate most of the transit service in the region. DART, Trinity Metro (formerly the Fort Worth Transportation Authority and previously referred to as “the T”), and the Denton County Transportation Authority (DCTA) serve thousands of customers each day and tailor their services to local markets. Additional, smaller agencies also provide

public transportation. **Exhibit 6.4-1** shows the public transportation providers by service area as of November 2017.

Exhibit 6.4-1: Public Transportation Provider Service Areas

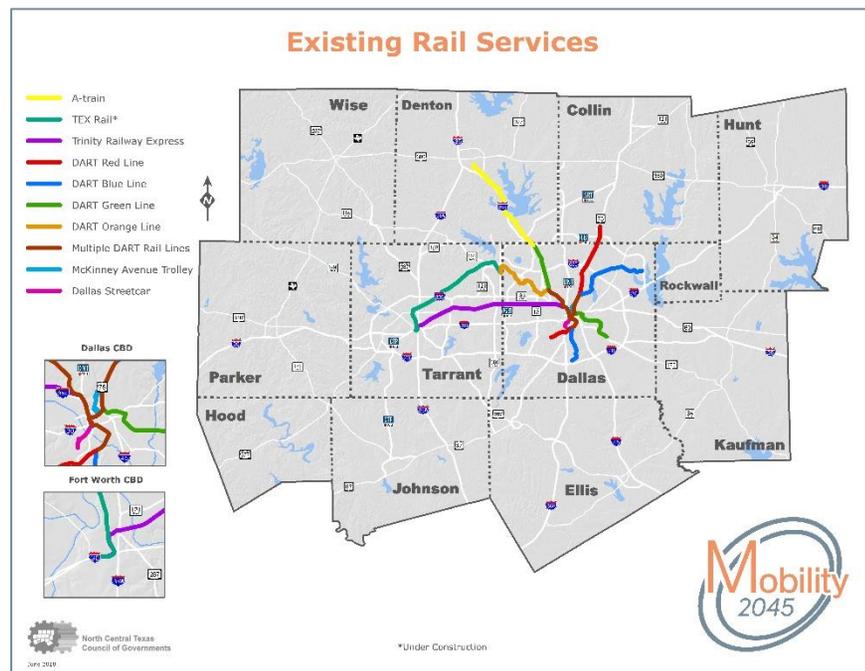


DART is the main transportation provider for 13 member cities: Addison, Carrollton, Cockrell Hill, Dallas, Farmers Branch, Garland, Glenn Heights, Highland Park, Irving, Plano, Richardson, Rowlett, and University Park. DART’s services include joint operation of the Trinity Railway Express (TRE), light rail, local bus service, ADA paratransit service, on-call zones, Dallas Streetcar, and vanpools. With about 652 buses and 145 routes, DART’s bus service provides local, regional, and express service. Arts, culture, sports, and daily business destinations can be reached using DART’s system.

The TRE is jointly owned and operated by DART and Trinity Metro and connects downtown Fort Worth to downtown Dallas. DART has a hub-and-spoke light rail system with four light rail lines. The region’s rail system is shown in **Exhibit 6.4-2**. DART operates an extensive bus network that includes local, express, crosstown, and connections to DART’s light rail stations. For

individuals whose abilities limit their use of bus and rail, DART operates an ADA complementary paratransit service.

Exhibit 6.4-2: Existing Rail Services



The cities of Wylie, Allen, and Fairview currently contract with Dallas Area Rapid Transit to operate Collin County Rides. This service provides demand-response rides for older adults and individuals with disabilities. Starting in 2018, DART has six zones (three in Plano and three in southern Dallas) where they are testing a mobility-on-demand transit service. This transit service accommodates last-mile connections to DART stations and provides internal circulation.

DART reported over \$679 million in total operating funds and over \$151 million in capital funds in 2016. Each year, DART provides almost 67 million annual trips. This total includes almost 34 million bus trips, almost 30 million light rail trips, 2 million commuter rail trips, over 515,000 vanpool trips, and almost 900,000 ADA paratransit trips.

Trinity Metro provides public transportation to meet the mobility needs of Tarrant County and the North Central Texas region. Trinity Metro's services include joint operation of the TRE, express bus routes, local bus service, ADA paratransit service, shuttle services, and vanpools. The service area includes the cities of Fort Worth and Blue Mound, as well as non-member cities that contract with Trinity Metro for transit service. The service area totals about 345 square miles and is home to over 864,000 people. Trinity Metro is currently constructing TEX Rail. When complete at the end of 2018, TEX Rail will provide a connection between downtown Fort Worth and Dallas Fort Worth International Airport.

As described above, Trinity Metro and DART jointly operate the TRE. Trinity Metro also jointly operates an express bus route (North Texas Xpress) with DCTA that connects downtown Fort Worth with Denton with a stop at Alliance Texas, an 18,000 acre master planned, mixed-use community in North Fort Worth. For individuals whose abilities limit their use of bus and rail, Trinity Metro operates ADA complementary paratransit service.

Trinity Metro provides over 7.3 million annual trips on all services, including nearly 384,000 ADA paratransit trips in 2016. Trinity Metro spent almost \$68 million in total operating funds and almost \$69 million in capital funds in 2016.

DCTA's services include operation of the A-train (commuter rail), joint operation of the North Texas Xpress, fixed-route buses, shuttles, ADA paratransit service, vanpools, and contract service in Collin County, including Frisco and the McKinney Urban Transit district. The service area includes 138 square miles and is home to over 405,000 people. The three member cities include Denton, Highland Village, and Lewisville. Several non-member cities contract with DCTA to provide transit services.

The cities of McKinney, Melissa, Princeton, Lowery Crossing, and Celina are members of the McKinney Urban Transit District which currently contracts with DCTA to operate Collin County Transit. This service provides demand-response rides throughout Collin County for older adults, individuals with disabilities, and low-income residents.

In 2016, DCTA spent over \$27 million in total operating funds and over \$12 million in capital funds. In 2016, DCTA provided over 3 million trips, which included over 2.3 million trips via bus; over 545,000 via rail; more than 37,000 trips on ADA paratransit; and over 199,000 vanpool trips.

Fifteen smaller public transportation providers operated in the region as of October 2017. These providers are highlighted below and their service areas are shown in **Exhibit 6.4-1**.

Handitran serves the city of Arlington; Grand Connection serves the city of Grand Prairie; Frisco Demand-Response Service serves the city of Frisco; Northeast Transportation Services serves the cities of Bedford, Euless, Grapevine, Haltom City, Hurst, Keller, and North Richland Hills. These demand-response services are available for seniors and people with disabilities.

As the region has continued to grow, public transportation agencies that historically served the region's smaller communities and rural areas have expanded to serve communities with suburban development and emerging growth. These transportation agencies also provide daily bus routes connecting communities to the region's core so riders can access jobs and services. Public Transportation Services serves Parker County residents with demand-response transportation and operates a commuter connection from Mineral Wells and Weatherford to Fort Worth. City/County Transportation, operating under the city of Cleburne, serves Johnson County with demand-response transportation and a commuter connection from Cleburne and Burleson to Fort Worth. STAR Transit serves Kaufman County, Rockwall County, and portions of Dallas County, including Mesquite, Balch Springs, Seagoville, and Hutchins. STAR Transit provides demand-response transportation, fixed routes, and commuter service into Dallas.

Several smaller transportation providers operate demand-response service only for "lifeline" type trips. Nonprofit agencies or rural transit agencies provide such trips during a limited number of hours per day or a limited number of days per week. Span, Inc. provides demand-response transportation to Denton County communities outside of DCTA's service area. Community Transit Services serves Ellis County, The Connection serves Hunt County, TAPS serves Wise County, and The Transit System serves Hood County. In addition, nonprofit or other providers offer client-specific transportation in support of their overall mission, which may be job training, nutrition, or services for specialized populations like cancer patients, individuals with disabilities or older adults.

Private Providers of Public Transportation

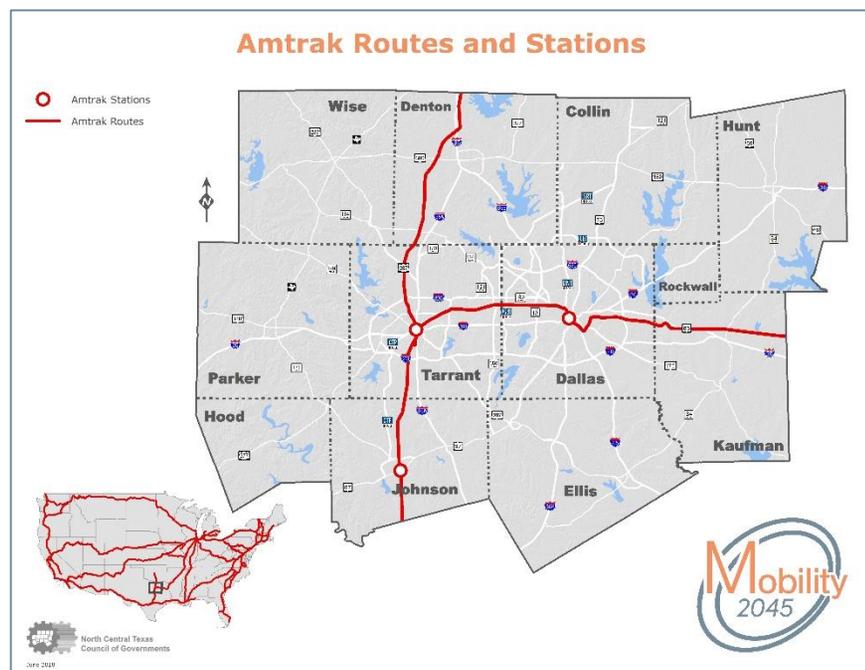
The private sector also plays a significant role in providing public transportation services. Because of its geography and fast economic development, North Central Texas has been a service hub for private companies that directly own a bus fleet and operate intercity service open to the public. In addition to traditional for-hire transportation services like taxis and airport shuttles, transportation network companies, described below, operate in the region and provide ride hailing services. A list of private providers of public transportation operating in the North Central Texas region as of December 2017 can be found in appendix **E. Mobility Options**.

Intercity Bus and Rail

Regional and national rail and bus carriers link the region to outside destinations with services operated by Amtrak, Greyhound, Megabus, Tornado Bus Company, and El Expreso Bus Company.

Amtrak is the nationwide passenger rail system that provides medium- and long-distance intercity service. Two Amtrak routes travel through North Central Texas, as shown in **Exhibit 6.4-3**. The Texas Eagle Amtrak route connects the region to major cities, including Chicago, St. Louis, San Antonio, and Los Angeles. The Texas Eagle provides daily connections between Chicago and San Antonio and connects San Antonio to Los Angeles through North Central Texas three times a week. The Heartland Flyer is a daily Amtrak route between Oklahoma City and Fort Worth. The three Amtrak stations serving North Central Texas are Dallas Union Station in downtown Dallas, the Intermodal Transportation Center in downtown Fort Worth, and the Intermodal Transportation Depot in Cleburne.

Exhibit 6.4-3: Amtrak Routes and Stations



Intercity bus systems including Greyhound, Megabus, Tornado Bus Company, and El Expresso Bus Company make Interstate connections and connect to Mexico. Like Amtrak, these intercity bus routes generally run daily and the cost of bus tickets depends on distance and varies between companies. Because intercity buses are for longer trips, vehicles are generally equipped with premium onboard amenities, including personal air conditioning, onboard restrooms, reclining seats, wifi, and interior storage for luggage.

Transportation Network Companies

Transportation Network Companies, like Uber or Lyft, facilitate connections between individual riders and drivers that operate their own personal vehicles. Besides their traditional business, in recent years Transportation Network Companies have begun to partner with transit agencies to provide supplemental service such as last-mile connections to transit stations and an alternate, same-day service option for paratransit riders that increases the spontaneity and independence of the riders' lives. For example, Uber and Lyft are working with DART so travelers can request a ride via the transit

authority's GoPass mobile ticketing application. Air taxis may be a future offering under the transportation network company umbrella. Uber has announced its Uber Elevate project to provide on-demand aviation in the future.

Public Transportation Programs

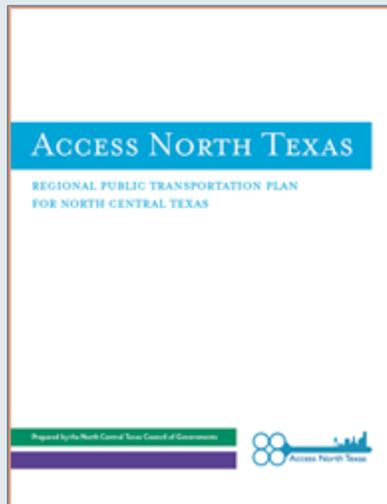
Meeting transit demand requires multiple forms of transit to ensure mobility for residents across North Central Texas. The transit programs outlined below summarize the types of transit service that are included in Mobility 2045. The Community Access Transit Program provides demand-response services, ensuring individuals across the region can access needed goods and services. The Last-Mile Transit Connections Program includes fixed bus and rail routes and people movers where demand is high enough to support these services. The Regional Connections: Next Generation Transit Program for bus and rail service links activity centers and serves key travel corridors. The State and National Transit Connections Program includes high-speed rail and other services that extend beyond North Central Texas. Lastly, the Transit Enhancements and Mobility Improvements Program is focused on enhancing the efficiency and quality of public transportation. Together, these programs and services provide transit options for residents across the region, in line with community priorities, through 2045.

TR2-001: Community Access Transit Program

The Community Access Transit Program supports transit services, primarily demand-response transit, that link people to life-essential opportunities such as employment, education and job training, medical care, healthy food, and enriching activities.

Because of its high flexibility in operation, including routing and scheduling, demand-response transit is common in areas with low passenger demand where fixed-route bus service would not be financially viable. Demand-response transit typically operates in shared-ride mode with van-size vehicles, and it requires riders to reserve the service in advance. In recent years, technology has increasingly enabled instant dispatch of vehicles, which can significantly improve the booking timeframe.

SPOTLIGHT ON PLANNING FOR COMMUNITY ACCESS TRANSIT



Public transportation services for seniors, individuals with disabilities, and low-income individuals are required to meet federal and state requirements for coordination and efficiency. In order to help the region meet those requirements, a detailed plan that prioritizes public transportation strategies for North Central Texas was completed in 2018. See the Access North Texas plan online at www.accessnorthtexas.org.

Community access transit may be eligibility based; for example, transit that complies with the Americans with Disabilities Act. In areas with fixed-route services, public transportation operators are required to provide demand-response transportation for people with disabilities; this demand-response transportation is called ADA complementary paratransit. Other types of community access transit include community shuttles, volunteer driver programs, and subsidized taxi programs. The time needed to plan for and implement community access transit is six months to a year.

TR2-002: Last-Mile Transit Connections Program

The Last-Mile Transit Connections Program supports rail or bus services that improve passengers' access to their final destinations after using regional transit. Mobility 2045 includes several last-mile transit connection projects; they are outlined in the project listing in appendix E. **Mobility Options**.

The Last-Mile Transit Connections Program provides multiple last-mile transit solutions, including fixed-route rail, bus, and on-demand service. Streetcars, people movers, circulators, and trolleys are fixed-route services moving people around within a specific area such as a downtown, regional activity center, or transit-oriented development. Buses can provide last-mile connections via local bus service or site-specific shuttles that feed into the regional transit system. Transit agencies increasingly are piloting partnerships with private carriers such as ride hailing companies or local taxi companies to subsidize on-demand last-mile connections. In the future, the use of autonomous transit vehicles will be part of the evolution of last-mile transit service.

The time needed to plan and implement last-mile transit connections varies by the type of service. Bus service typically requires six months to over a year for more complex systems. Rail technology typically requires 5 to 10 years; more time may be required if complexity arises, including environmental factors, funding source timing, and technology integration. Both bus and rail last-mile connections will require more time for planning and implementation if the connections involve capital improvement such as stops, stations, or the installation of overhead power.

Streetcars and people movers will be discussed in more detail below.

Streetcars

Streetcars generally require lower capital cost to build than other types of rail transit, and streetcars are relatively more adaptive to the existing urban built environment. Streetcars are widely recognized as a tool to attract development along the route, as well as an amenity to promote tourism. Mobility 2045 supports the transit role streetcars serve to fill the gap between communities and employment in the urban core, as well as to create a seamless multimodal transit connection for commuters.

Two streetcar lines operate in downtown Dallas: the Dallas Streetcar and the M-Line Trolley. The Dallas Streetcar is a collaborative endeavor between the

city of Dallas and DART. The 2.45-mile modern streetcar line connects Downtown Dallas Union Station to the Bishop Arts District in Oak Cliff. DART and the city of Dallas are planning a future expansion of the Dallas Streetcar to the north with a connection to the M-Line Trolley.

The M-Line Trolley is a 4.6-mile vintage streetcar operated by the non-profit organization McKinney Avenue Transit Authority. The M-Line Trolley connects the Downtown Dallas Arts District with shops, entertainment, dining, and attractions in Uptown. It links to the DART light rail system at Cityplace/Uptown Station on the northern end and is one block from the St. Paul Station or Pearl/Arts District Station on the southern end. A feasibility study will explore an expansion of the M-Line Trolley north to Knox Street. Future plans to connect and integrate the Dallas Streetcar and the M-Line Trolley will need to address differences between the two systems while maintaining the best of both systems. For example, the modern trolley has accessibility and updated technology features, and the vintage cars have a unique historical and cultural value that could be maintained for special events and weekend service.

People Movers

People movers circulate travelers across a geographically small area, typically using automated, electrically-powered vehicles operating on elevated guideways. People movers connect districts or single destinations to larger-scale regional transit. While these systems are similar to regional light rail, people movers typically operate smaller vehicles that serve small areas with stations spaced closer together and a more frequent level of service.

When properly planned and carefully implemented, these systems can reduce congestion, enhance transit-oriented developments, optimize parking, and expand the reach of transit.

People movers are commonly built in the following locations:

- At airports, where terminals are large and/or not immediately adjacent to one another (Dallas Fort Worth International Airport; Newark, Tampa).
- Entertainment districts where a large number of visitors travel between closely spaced destinations (Las Vegas, Orlando).
- Downtowns, in areas where a people mover could connect to other forms of transit or serve areas with many residents and non-office commercial activity (Miami, Las Colinas, Jacksonville).

Two people mover systems currently operate in North Central Texas. The Dallas Fort Worth International Airport Skylink shuttles passengers between Dallas Fort Worth International Airport's terminals. The system enables passengers to make connections without having to be rescreened by security.



DFW Skylink people mover trainset in operation at Dallas Fort Worth International Airport. (Dallas Fort Worth International Airport, 2014)

Completed in 1989, the Las Colinas APT is one of the oldest people mover systems in the United States. The recent connection to DART rapid transit through Las Colinas has increased ridership, and created interest in adding new stations, system upgrades, and extensions of the system to new entertainment venues and the Irving Convention Center.

While not usual practice, people movers can also be used to move freight. The original people mover at Dallas Fort Worth International Airport did accommodate freight operations. Several new people mover systems have options that accommodate freight.

Regional stakeholders have expressed renewed interest in people movers in the region. The following areas were identified as prime locations to potentially build new people mover systems:

- **Dallas Love Field:** This system would connect Dallas Love Field's terminal to Dallas Area Rapid Transit's Green/Orange Line.
- **Southwestern Medical District:** This system would provide circulation between the University of Texas Southwestern Medical Center and Parkland hospital campuses and provide connections to the TRE and DART.
- **Dallas Midtown/Galleria:** As part of a district revitalization effort, people movers could enhance local circulation and connect travelers to regional transit services.
- **Arlington Entertainment District/University of Texas at Arlington:** This system would connect the University of Texas at Arlington, downtown Arlington, Arlington's entertainment district, proposed high-speed rail

lines, the TRE (commuter rail), and proposed redevelopment areas at the Dallas Fort Worth International Airport.

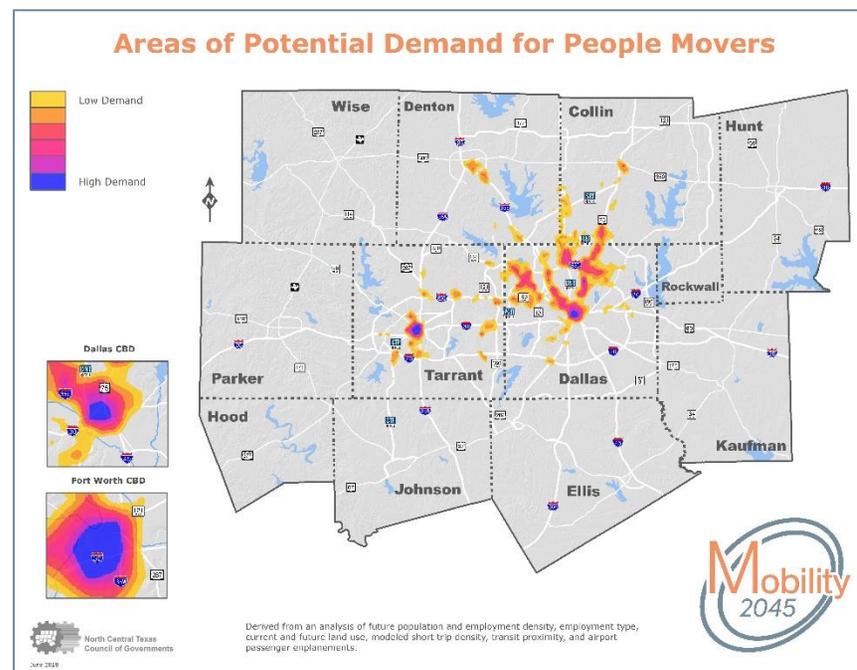
- **Arlington General Motors Facility (freight):** This freight-only system would connect the General Motors factory to a nearby railyard.
- **Irving Freeport:** This system would serve an area of office and light industrial land use immediately north of Dallas Fort Worth International Airport, and connect to DART.
- **Naval Air Station Fort Worth Joint Reserve Base:** This system would provide circulation within this military facility, possibly connecting to the nearby Lockheed Martin Aeronautics Company.

In response to these proposals and stakeholder requests, NCTCOG initiated a series of studies to evaluate the feasibility of people mover systems in the region. The initial concept study used Geographic Information Systems tools to perform a region-wide spatial analysis. This analysis revealed areas that are generally conducive to people movers, pending more detailed analysis (**Exhibit 6.4-4**). This analysis was further refined into a smaller list of projects for additional examination (**Exhibit 6.4-5**). Future studies will examine the applicability of these areas using subarea methods and models to quantify local demand and the feasibility of specific systems.

Mobility 2045 recommends the following strategies to further the implementation of people movers in the region:

- Continue research and analyze the feasibility of people movers in the region.
- Support efforts to enhance and expand the Las Colinas Area Personal Transit System to serve the Irving Convention Center and future developments in the area.
- Continue ongoing efforts to implement people mover systems identified by regional stakeholders at Dallas Love Field, the Southwestern Medical District, Dallas Midtown/Galleria, Dallas Fort Worth International Airport to Arlington, and General Motors' Arlington assembly plant.
- Encourage developers and local governments to work cooperatively using land use and complementary policies on existing and planned developments to increase and enhance access to regional transportation systems.

Exhibit 6.4-4: Areas of Potential Demand for People Movers



TR2-003: Regional Connections: Next Generation Transit Program

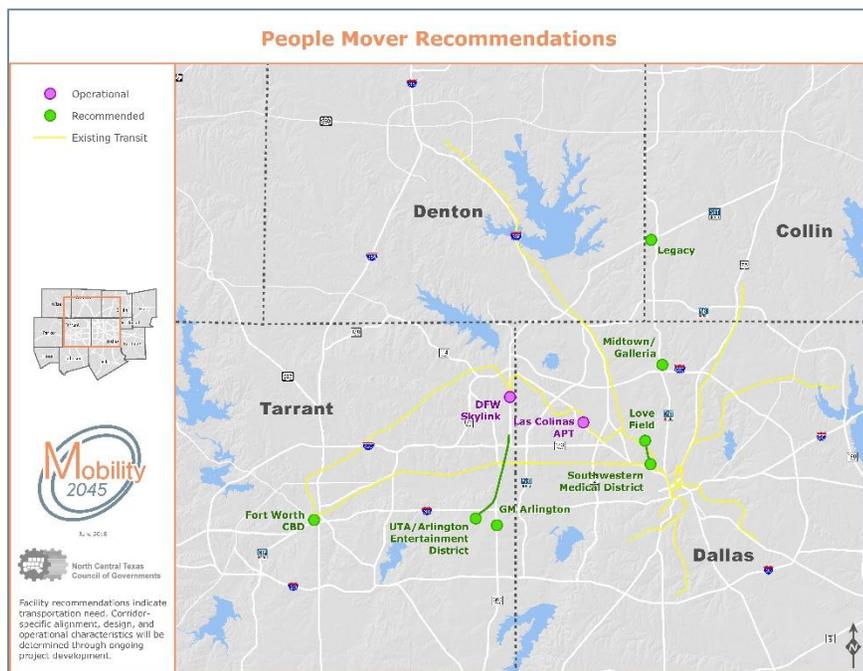
The Regional Connections: Next Generation Transit Program supports a broad range of innovative bus and rail services and concepts as part of the region's robust transit network. The program includes, but is not limited to, regional rail; light rail; stacked commuter rail and special event rail; and high-intensity bus and guaranteed transit. Mobility 2045 calls for transit service expansion including:

- New service in high-intensity transit corridors.
- Extensions of transit lines in emerging transit markets.
- Expansions that increase core capacity aimed at improving overall system capacity.
- Transit lines that connect communities.

Regionally significant projects are outlined in appendix **E. Mobility Options**. The success of all transit services depends on supportive land uses, which may be developed well in advance of new service. More information about transit-

oriented development is included in the *SD2-003: Transit-Oriented Development Program* section of Mobility 2045's **Operational Efficiency** chapter.

Exhibit 6.4-5: List of Projects



Regional Rail Network

Mobility 2045 envisions a long-term, high-performance regional rail network linking communities throughout North Central Texas. Regional rail corridors vary in existing conditions, future travel demand, interaction with freight, financial requirements, and other factors; therefore they reflect different levels of opportunities for implementation. Following TEX Rail's anticipated opening in 2018, 10 additional regional rail projects are being planned in the region, as shown in appendix E. **Mobility Options**. Planning for future rail corridors includes technical analysis, as well as participation from transit agencies and communities, to ensure the right factors are in place to build and operate regional rail. **Exhibit 6.4-6** outlines two variables and their impact on implementing regional rail service: ridership and existing track condition.

Many of the future rail corridors in the region are proposed for existing freight corridors, and the track condition in those corridors is one factor in determining what implementation scenarios are possible.

Corridors with higher projected ridership that are located in active freight corridors with good track condition may enable lower-cost opportunities to implement interim service (such as stacked commuter rail and special event rail, described in the following section); this interim service can be followed by investment for a later full buildout of the corridor. Corridors with medium projected ridership that are located in active freight corridors with good track condition may be good candidates for interim implementation. Corridors not in active freight corridors or with poor track condition generally require full buildout and higher capital costs (estimated to be \$35 million per mile).

Rail service involves rigorous planning and engineering; it requires extensive capital investment in stations, rail cars, maintenance facilities, rail guideways on which the rail cars travel, signals along guideways and at crossings, and overpasses and underpasses.

Exhibit 6.4-6: Two Factors Affecting Rail Implementation

		Track Condition	
		Good (lower-cost opportunities)	Poor (higher-cost opportunities)
Ridership	Higher	Interim Implementation followed by Full Buildout <i>Frisco Line</i> <i>Waxahachie Line</i>	Full Buildout <i>McKinney Line</i>
	Medium	Interim Implementation <i>Cleburne Line</i> <i>Mansfield Line</i>	Full Buildout <i>Cotton Belt East Extension</i> <i>Green Line – Southeast Extension</i> <i>Midlothian Line</i> <i>Scyene Line</i> <i>Southwest TEX Rail</i>
	Very Low	Deferred Implementation <i>Not included in Mobility 2045</i>	Deferred Implementation <i>Not included in Mobility 2045</i>

As recommended projects are developed, specific corridor and station locations could change, as could the vehicles used. Funding details also will be

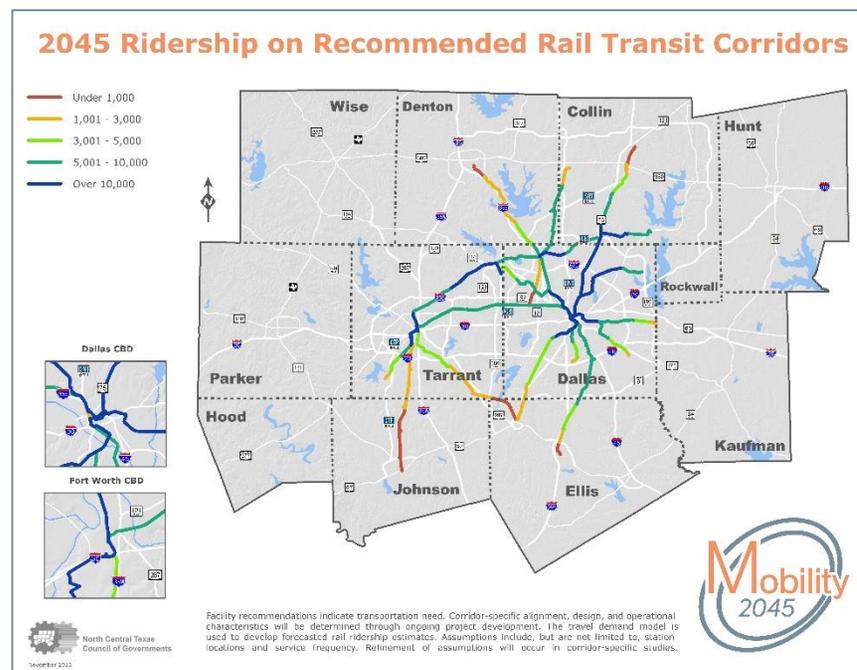
determined as the projects are developed. Regional connections with rail service can take 10 to 20 years to plan and implement. The time required depends on funding availability, collaborative support for a project, and other factors. In some cases, the initial time required for planning and implementation can be decreased by phasing a rail project. Phasing initially develops a segment that meets many of the goals of the larger project and could include non-rail technology that matches the reliability, capacity, and service frequency of rail or stacked commuter rail and special event rail, as described in the following section. After initial phases are implemented, additional time would be needed to plan and implement expansions to a full buildout. **Exhibit 6.4-7** shows ridership in year 2045 for rail service recommended in this plan.

Stacked Commuter Rail and Special Event Rail

Stacked commuter rail in active freight corridors with available capacity is a cost-effective strategy to address high travel demand during peak hours. As growth continues, emerging transit markets call for effective solutions to connect residents to employment. High demand for commuting trips in the peak direction during peak hours may be served by stacked commuter rail. This type of rail service operates inbound in the morning, stacks (holds) the trains during the day, and then operates trains outbound in the evening peak. Stacked special event rail shares the same philosophy as stacked commuter rail and is operated to address the temporary spike in demand during special events. Both stacked and special event rail service may use new, low-cost locomotives and spare commuter rail cars that are already located in the region to operate service at startup.

Strong communication, coordination, and cooperation with freight rail operators is essential for the success of passenger rail and freight rail operating on shared tracks. Although passenger rail service is recommended in freight corridors, the Regional Transportation Council does not intend to degrade current or future freight rail service, but rather to enhance transportation options for the traveling public. Key elements of successful interaction between passenger rail and freight rail generally include identifying and addressing physical constraints on infrastructure and facilities for both types of services, integrated dispatching and scheduling, transparent and shared costs, shared responsibility, and technology upgrades.

Exhibit 6.4-7: Ridership on Recommended Transit Corridors



Infill Stations

Infill stations can be a cost-effective tool by transit agencies to improve transit access within existing transit service areas. Infill stations may be newly built between existing stations on existing fixed guideways in areas experiencing significant growth or redevelopment.

Three infill stations exist or are planned in the region; all are in DART's light rail system. Lake Highlands Station was opened in 2010 as part of DART's Blue Line expansion to better serve the Lake Highlands Town Center development. It is the first infill station in the region. Two infill stations are planned along the Orange Line in Irving to provide access to major land-use developments.

High-Intensity Bus & Guaranteed Transit

High-intensity bus ranges from traditional express bus service to service with defined stations and exclusive right-of-way. As development takes place, high-intensity bus service can respond to growing demand for transit relatively quickly; it can operate in areas where the cost or capital requirements of rail

service are prohibitive. Successful services can expand over time and lay the groundwork for other transit services — such as rail — in the future. **Exhibit 6.4-8** summarizes opportunities for high-intensity bus service. Specific projects are included in appendix **E. Mobility Options** and are shown in the Major Transit Corridors Recommendations map, **Exhibit 6.4-9**.

Exhibit 6.4-8: High-Intensity Bus Service Opportunities

High-Intensity Bus Service	Where
Lower cost alternative to rail service	In corridors where rail service is not feasible.
Precursor for rail service	In rail corridors or on parallel facilities with excess capacity before rail service is implemented.
Other opportunities	In other high-demand corridors, including corridors with toll managed lanes or toll roads with excess capacity; grant commitment in multimodal corridor.

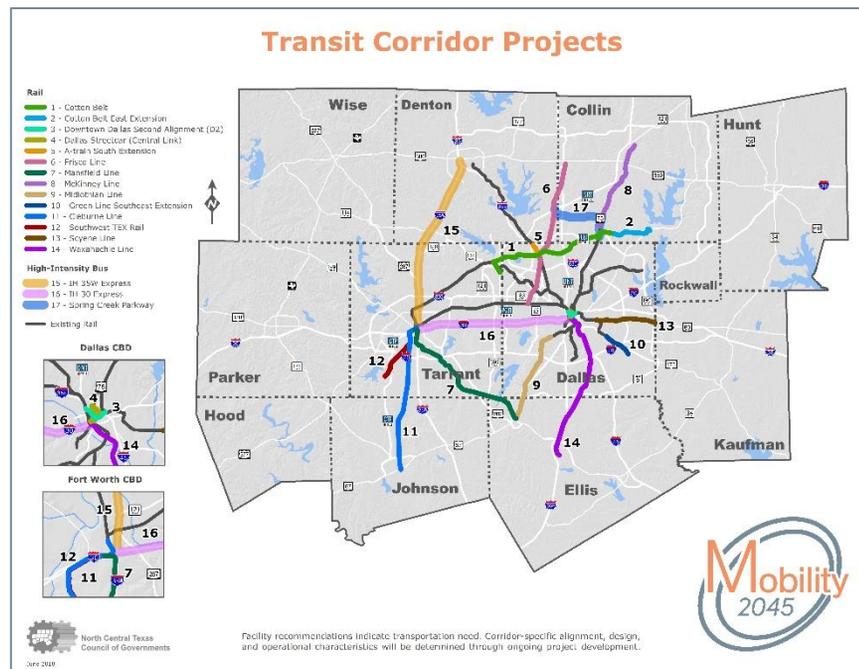
High-intensity bus features premium operation characteristics and amenities to attract riders. Operating features can increase the capacity of transit service in corridors with high demand and can provide a realistic alternative to driving alone. For example, high-intensity bus can:

- Provide frequent peak service in high-demand corridors with potential for additional off-peak and weekend service.
- Create travel time savings and reliability when operating on tolled managed lanes, high-occupancy vehicle lanes, or exclusive bus right-of-way.
- Create travel time savings by taking advantage of transit signal prioritization or a transit queue jumping lane in mixed traffic.

Amenities, both onboard and at stations, can make high-intensity bus service more attractive to riders. These amenities include:

- Seating availability
- Seating comfort
- Real-time transit vehicle information
- Station security
- Station cleanliness
- Proximity to services
- Reliability
- Schedule span
- Service frequency

Exhibit 6.4-9: Major Transit Corridors Recommendations

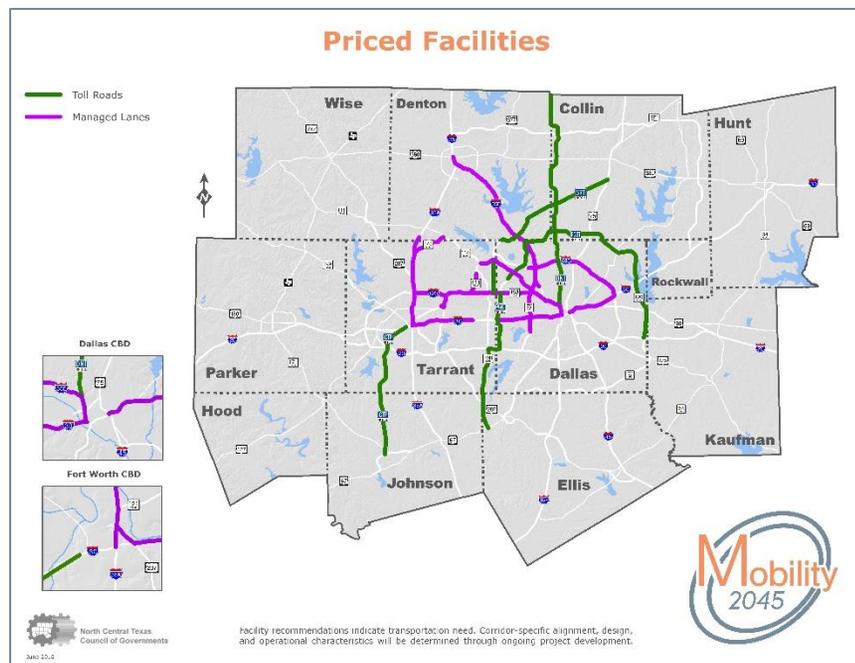


The Transportation Research Board’s “Transit Cooperative Research Program Report 166: Characteristics of Premium Transit Services that Affect Choice of Mode” explores the full range of factors that influence transit travel.

Guaranteed transit is a concept derived from high-intensity bus with emphasis on the reliability of the service. The high reliability of guaranteed transit is achieved by operating buses in tolled managed lanes where certain travel speeds can be maintained. The North Central Texas region has been planning, constructing, and operating tolled managed lanes along heavily traveled highway corridors. These lanes use dynamic pricing to help maintain the free flow of traffic. Transit service in tolled managed lanes is widely accepted in the United States. In many cases, buses are exempted from paying tolls on the managed lanes and may be supported by a portion of the toll revenues.

Mobility 2045 supports strategically operating high-intensity bus in all existing and future tolled managed lanes in the region, as shown in **Exhibit 6.4-10**.

Exhibit 6.4-10: Guaranteed Transit on Existing and Future Tolled Managed Lanes



Other service planning recommendations for guaranteed transit include incorporating park-and-rides (particularly underutilized ones), discounting fares if buses do not reach their destination on time, and integrating guaranteed transit with guaranteed ride home programs.

The time needed to plan for and implement a single route with few enhancements is typically six months to one year. The time needed to plan and implement complex regional bus service can range from three to five years for a single route or 5 to 10 years for a multi-route system. The variation in time depends on the scale of implementation, the amount of right-of-way available, and the degree to which the routes will be integrated with existing transit services.

TR2-004: State and National Transit Connections Program

Transit also links North Central Texas to neighboring regions, the rest of Texas, and the nation. Existing services include intercity bus and intercity rail via Amtrak. Mobility 2045 includes plans for high-speed rail service that will connect North Central Texas to other regions.

High-Speed Passenger Rail

The North Central Texas region has been identified as a potential hub for passenger rail routes serving distant regions. Federal and state plans indicate a need for high-speed passenger rail service to, through, and within the region. Corridors traveling through North Central Texas include proposed service to Oklahoma City; Austin; San Antonio; Houston; Shreveport, Louisiana; and Little Rock, Arkansas. Alignments have not been determined, but planning is progressing for some of these corridors.

Four proposed corridors would provide service from Oklahoma City to South Texas, Fort Worth to Shreveport, Fort Worth to Dallas, and Dallas to Houston. Recommendations for Mobility 2045 include at-grade and grade-separated high-speed passenger rail service within the region, as identified in **Exhibit 6.4-11**. The recommendations identified in this exhibit were thoroughly discussed with the Regional Transportation Council's (RTC) Multimodal/ Intermodal/ High-Speed Rail/Freight Subcommittee.

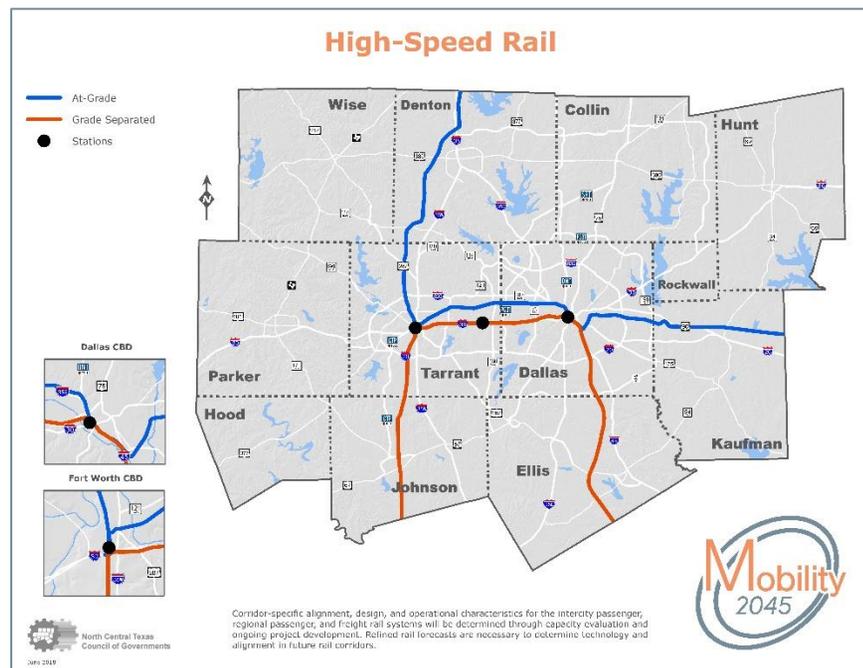
The RTC determined the recommendations would include stations in downtown Fort Worth, Arlington, and downtown Dallas. In addition, the RTC determined the most effective and efficient plan for the region would provide a seamless service – a "one seat ride" – for passengers, meaning passengers would not be required to transfer to reach their destination.

High-speed passenger rail service within North Central Texas is not intended to be a stand-alone service; rather, service within the region is an integral component of a larger statewide and potential national network.

The Dallas-to-Houston corridor has been identified as having the most potential for high-speed passenger rail service. An effort led by the private sector is analyzing the corridor for environmental impacts, alignment options, station locations, and funding options. The Dallas-to-Houston corridor is

recommended as a grade-separated high-speed passenger rail service corridor, as shown in **Exhibit 6.4-11**.

Exhibit 6.4-11: High-Speed Rail Recommendations



The proposed corridor extending from Oklahoma City to South Texas also exhibits high ridership potential, particularly segments south of Fort Worth. Initial planning indicates a need for at-grade higher-speed passenger rail service from Fort Worth to Oklahoma City. From Fort Worth southward, grade-separated high-speed passenger rail service has been identified as the appropriate technology. Additional analysis is needed to refine the corridor alignment and service types.

Planning for the proposed corridor extending eastward from Dallas to Shreveport, Louisiana indicates a need for higher-speed at-grade passenger services.

Within the North Central Texas region, both at-grade and grade-separated high-speed passenger rail service is recommended from Fort Worth to Dallas. The recommended grade-separated high-speed service in this corridor includes stations in downtown Fort Worth, Arlington, and downtown Dallas as identified in **Exhibit 6.4-11**. By connecting the identified grade-separated high-speed passenger rail corridors, a “one seat ride” can be achieved from South Texas to Houston through North Central Texas. The region supports the development of one seat/one ticket high-speed passenger rail connectivity between Fort Worth, Arlington, Dallas, Houston and South Texas through the Dallas station. Should regulatory, environmental, financial, or other challenges prohibit the timely development of a one seat/one ticket connection through the Dallas station, the region will support and coordinate with high-speed passenger rail system implementers to develop a cross-platform transfer solution for all rail passengers that is as close to a one seat/one ticket connection as possible.

Cost estimates for grade-separated high-speed passenger rail within North Central Texas are provided in **Exhibit 6.4-12**. The Fort Worth-to-Austin and Dallas-to-Houston corridors will be funded with private-sector initiatives. The Fort Worth-to-Dallas project will be funded with a public-private partnership.

Exhibit 6.4-12: Cost Estimates

ID	From	To	Distance	Private	Public	Total
			(within MPA)	Revenue Sources (\$millions)		
1	Johnson/Hill County Line	Fort Worth	38	\$4,200	\$0	\$4,200
2	Fort Worth	Dallas	34.8	\$2,100	\$1,500	\$3,600
3	Ellis/Navarro County Line	Dallas	41.6	\$3,800	\$0	\$3,800
Totals			114.4	\$10,100	\$1,500	\$11,600

Alternative High-Speed Modes

Additional high-speed modes of travel, such as magnetic levitation, are being explored with public and private funding. Potential routes include one from Dallas to Laredo through Fort Worth, which was identified in a private, internationally competitive assessment of potential routes.²

TR2-005: Transit Enhancements and Mobility Improvements Program

In addition to implementing the public transportation services described above, the region plans to invest time and money to maximize existing transit assets. This will be accomplished by completing projects that enhance the safety of the transit system; cost-effectively increase the capacity of the system; and improve the seamlessness of the system. Maximizing the existing system will increase its efficiency and support transit as a mode of choice for the region's residents and visitors. Transit agencies prepare plans for managing transit assets, and Mobility 2045 supports the implementation of those plans to maintain a state of good repair for transit assets throughout the region.

The operation of the transit system can be enhanced by coordinating services across providers. This can create seamless trips for transit users and provide regional travel for the crowds that attend special events. Mobility management techniques can provide transit information to travelers in a way that is strategic and cost effective. These improvements to the operation and mobility management of public transportation are known as operational enhancements.

Physical changes that improve the transit system are known as capital enhancements. Capacity improvements can cost effectively meet growing demand for service. They include extending platforms at rail stations; adding larger buses to fleets; and double-tracking rail corridors, which adds a track to a corridor and allows trains to travel in opposite directions simultaneously.

Safety and security improvements include adding security equipment, adding the latest safety features at railroad crossings, and using positive train control,

which is technology that automatically stops trains to prevent a crash. Mobility 2045 supports transit agencies as they manage safety risks and safety hazards within the region's public transportation systems, including measuring the performance of the system and working to improve the safety of the system.

Technology improvements are cost effective means to improve the capacity of transit systems. These improvements include changes to scheduling, signalization, and other areas of operations.

Accessibility improvements make it easier for passengers of all abilities to access transit services and facilities. These improvements can be made to rail or bus stations and include sidewalks and curb cuts. Other accessibility improvements help transit passengers connect to other modes of transportation. These improvements provide better access for bicyclists and pedestrians and create systems to help travelers navigate through the region. For more information on travel for bicyclists and pedestrians, please see the *Active Transportation* section of this chapter.

The time needed to plan for and implement the transit enhancements and mobility improvements outlined here depends on the scope of the specific project and can range from several months to several years.

Financial Summary

This section summarizes the financial resources supporting the public transportation programs described in Mobility 2045, including capital and operating costs.

Exhibit 6.4-13 outlines the costs to implement public transportation programs through 2045. The programs are financially constrained to expected revenues. The **Financial Reality** chapter provides information on the overall financial resources supporting implementation of this plan.

² Hyperloop One Announces 10 Winners for Hyperloop One Global Challenge. 2017. Virgin Hyperloop One. <https://hyperloop-one.com/hyperloop-one-announces-10-winners-hyperloop-one-global-challenge>

Exhibit 6.4-13: Public Transportation Programs

Transit Cost Categories, 2017-2045	Total Cost (Actual \$, M)
Community Access Transit Program	\$3,183.3
Last-Mile Transit Connections Program	\$15,859.2
Regional Connections: Next Generation Transit Program	\$27,864.7
State and National Transit Connections Program	\$11,600.0
Transit Enhancements and Mobility Improvements Program	\$1,279.0
Total	\$59,786.2

Federal Funding

Federal funding for public transportation in North Central Texas, including funding from the Federal Transit Administration, is programmed by the RTC. Federal funding sources are available for capital investments, pilot projects, and transportation planning. In limited cases, this funding also is available for transportation operations, with some sources intended specifically for transit-dependent populations. Federal funding programs are either formula-based or discretionary. Formula-based programs allow transit providers to access federal funds that are distributed to urbanized areas based on a formula using population, population density, and other factors related to ridership. Discretionary funding, when available, typically involves submitting a project or program as part of a competitive selection process.

State Funding

TxDOT also provides funding for public transportation allocated by the Texas Transportation Commission. Public transportation formula programs through TxDOT primarily focus on rural and small urban systems, but state funding is sometimes available on a discretionary basis for other public transportation projects.

Local Funding

Cities and counties have the option to contribute to transit services through their own revenue sources, such as general funds and sales tax revenues. Public transportation competes for local funds against other priorities such as police, libraries, and parks unless funding is specifically dedicated to transit. Local sales tax can provide revenue for transit services. Currently, the state of Texas limits the combined sales tax for all taxing authorities to 8.25 percent.

The state sales tax rate is 6.25 percent, leaving up to 2 percent for cities to apportion in a variety of ways. Cities that are members of DART, Trinity Metro, and DCTA currently dedicate a portion of their sales tax to those transit authorities. Cities that want to support public transportation, but do not already allow a Transit Sales and Use Tax, may have opportunities to reallocate existing sales tax revenue to fund transit services or identify a different source of public funds to support transit.

Innovative Finance, Public-Private Partnerships, and Private-Sector Funding

Depending on the scale of the transit service to be implemented, a variety of innovative financing techniques, public-private partnerships, and private-sector participation may be needed to leverage other federal, state, and local funds. To implement the system of rail service included in Mobility 2045, creative partnerships involving all of these approaches will be needed. For bus service, private-sector participation from employers, merchants, retail establishments, and private-nonprofit organizations can be incorporated on a case-by-case basis.

Mobility 2045 is consistent with the RTC's policy position on transit implementation in the Cotton Belt corridor, as shown in appendix E. **Mobility Options.**

Policies

The RTC has shown policy support for transit to further provide direction as the region creates successful public transportation services. This plan's policies for public transportation are outlined below.

TR3-001: Public transportation needs should be met by existing transportation authorities and providers through a comprehensive, coordinated, and cooperative approach to maximize existing transportation resources. Alternative implementation approaches may be necessary if existing transportation authorities and providers are unable to provide needed services in a timely manner (consistent with **Regional Transportation Council Policy P09-03**).

TR3-002: Work with the region's existing public transit providers to ensure a seamless multimodal transit system through:

- Seamless connections
- Coordinated fare structure
- One-stop access to services
- Standardization of assets, technologies, and service characteristics that promote interoperability
- Improved interaction between public, private-for-profit, and private-nonprofit transit providers (consistent with **Regional Transportation Council Policy P09-03**)
- Elimination of gaps in service to establish a minimum level of service
- Service expansion

TR3-003: Existing and future public use rights-of-way should be monitored for appropriate public transportation service.

TR3-004: Transportation authority members who receive funds for the implementation of projects that promote transit accessibility will be required to pay back funds, as determined by the Regional Transportation Council, should the entity choose to not continue as a member of that authority.

TR3-005: Support the planning and development of high-speed rail to, through, and within the North Central Texas region by leading project development efforts and coordinating with federal and state initiatives as appropriate.

TR3-006: Maximize the efficient use of public transportation resources in North Central Texas, including public, private-nonprofit, and private-for-profit providers of services.

TR3-007: Implement safety, management and operations, and multimodal system integration projects and programs as appropriate.

TR3-008: Establish policies and procedures that encourage and reward coordination.

TR3-009: Support efforts to make accommodations for rail and other public transportation services to major events centers during special events.

TR3-010: Support efforts by transit authorities to secure funding through local, state, federal, and other sources for the development and implementation of

public transportation, including the Federal Transit Administration’s Capital Investment Grant Program.

TR3-011: Establish policies fostering high-speed rail system interoperability resulting in a “one seat ride” system operation to, through, and within the North Central Texas region.

TR3-012: Establish policies encouraging regional access by identifying grade-separated high-speed rail station locations in downtown Fort Worth, Arlington, and downtown Dallas.

TR3-013: Support the planning and development of sustainable land uses near grade-separated high-speed rail locations by coordinating with the cities of Fort Worth, Arlington, and Dallas.

TR3-014: Support the planning and development of sustainable land uses near at-grade high-speed rail station locations by coordinating with the cities’ hosting stations.

6.5. Roadway

Mobility 2045 Supported Goals

Improve the availability of transportation options for people and goods.

Support travel efficiency measures and system enhancements targeted at congestion reduction and management.

Ensure all communities are provided access to the regional transportation system and planning process.

Encourage livable communities which support sustainability and economic vitality.

Ensure adequate maintenance and enhance the safety and reliability of the existing transportation system.

Pursue long-term sustainable revenue sources to address regional transportation system needs.

Provide for timely project planning and implementation.

Develop cost-effective projects and programs aimed at reducing the costs associated with constructing, operating, and maintaining the regional transportation system.

Providing Traveler Choice

- All roadways in the urbanized area should be designed and constructed to accommodate at least three or more modes of transportation.
- All roadway projects should implement a context-sensitive design approach compatible for the community and neighborhood in which the roadway is located.

Regional Roadway Agencies

Freeways and tollways in North Central Texas are constructed, operated, and maintained by both public and private agencies. The freeways in the region are managed by TxDOT whose Dallas, Fort Worth, and Paris districts encompass the North Central Texas region. The toll roads in the region have been

ROADWAY AT A GLANCE:

Regional Roadway System Operators

- Texas Department of Transportation Dallas District
- Texas Department of Transportation Fort Worth District
- Texas Department of Transportation Paris District
- North Texas Tollway Authority
- Collin County Toll Road Authority

ROADWAY SYSTEM FIGURES:

Source: Expanded Dallas-Fort Worth Regional Travel Model

Freeway/Tollway Lane Miles per County

<u>County</u>	<u>Year 2018</u>	<u>Year 2045</u>
Collin	484	754
Dallas	2,083	2,520
Denton	402	744
Ellis	388	481
Hood	0	0
Hunt	118	176
Johnson	155	208
Kaufman	223	246
Parker	159	193
Rockwall	77	105
Tarrant	1,498	1,955
Wise	12	39

Express/HOV/Tolled Managed Lane Miles Per County

<u>County</u>	<u>Year 2018</u>	<u>Year 2045</u>
Collin	11	0
Dallas	151	296
Denton	23	83
Tarrant	95	210

FREEWAY/TOLLWAY VEHICLE MILES OF TRAVEL PER DAY

Source: Expanded Dallas-Fort Worth Regional Travel Model

Year 2018	98,391,007
Year 2045	147,108,329
Total Change	48,717,322
Percent Change	50%

constructed and are managed by the North Texas Tollway Authority. These public agencies work independently and in collaboration to improve existing roadways and develop new corridors to meet the growing demand for regional travel.

Controlled Access Roadways

The freeways and tollways in North Central Texas are primary elements in the regional roadway system. These roadways are characterized by controlled-access freeway and tollway lanes where traffic enters via ramps, and cross streets use overpasses or underpasses rather than halting the flow of traffic on the freeways and tollways. Controlled access roadways often include parallel frontage roads. The freeway and tollway system accounts for a small percentage of the total miles of roadway lanes in the region, but the system carries nearly half of all vehicular travel. Mobility 2045 projections indicate that significant demand will continue to be placed on freeways and tollways.

Roadway Classifications

The controlled access roadways discussed in this section are described as freeways, tollways, and managed lanes; the latter include express lanes, express/high-occupancy vehicle (HOV) lanes, and tolled managed lanes. Freeways are generally funded with tax revenues and do not charge a toll for usage. Tollways, or toll roads, are corridors built and maintained primarily through user fees or tolls.

On general purpose toll lanes, tolls only vary by vehicle type and are fixed throughout the day. Express/HOV lanes and tolled managed lanes are typically constructed in the medians of existing corridors or in corridors formerly used exclusively as HOV lanes. Drivers can pay a toll to use these lanes instead of using parallel freeway lanes. The toll in these managed lanes can vary based on the number of people in a vehicle, the vehicle type, congestion in the lanes, or the time of day. Mobility 2045 and RTC policies both allow variable pricing on express/HOV and tolled managed lanes based on the time of day, the facility's congestion level, and the number of occupants in the vehicle. During peak morning and evening commute periods, express/HOV and tolled managed lanes will be either free or discounted for vehicles with at least two occupants. However, in the future, vehicles may need to have three or more people to receive discounted tolls based on the operations of the regional managed lane

system and the need for continuity and consistency within the regional system.

Roadway Funding Considerations

Traditionally, TxDOT has financed highway projects on a “pay as you go” basis using motor fuel taxes and other revenue deposited in the State Highway Fund. However, increasing population, growing traffic demand, inflation, and increasing fuel efficiency have outpaced the ability of traditional funding and financing mechanisms to implement necessary transportation improvements.

Extensive improvements to the freeway and tollway system require high-cost initial elements, including right-of-way acquisition and construction, as well as expensive long-term costs, including maintenance, operation, and rehabilitation. Mobility 2045 faces the challenge of balancing huge demands on an aging and heavily used system with inadequate funding from traditional revenue sources, including fuel taxes and vehicle registration fees. For this reason, previous Metropolitan Transportation Plans for the region relied heavily on tolls and innovative funding and financing to satisfy the demand for new roadway facilities and the expansion of existing corridors.

Past sessions of the State Legislature have focused on the reliance on tolls and the need to reevaluate the balance between tolled and non-tolled roadways. A guiding principle in the development of Mobility 2045 has been to consider this pendulum swing away from tolled roadways and toward more tax-funded facilities. State Proposition 1 and State Proposition 7 have provided the region with more transportation funding toward general purpose lanes, and the state gas tax will no longer be diverted to non-transportation uses.

The funding from these changes only accounts for approximately one-third of the identified need for transportation projects. For this reason, Mobility 2045 still includes recommendations for toll roads and tolled managed lanes both to manage congestion and to leverage funds to deliver both tolled and non-tolled capacity. Mobility 2045 supports managed lane implementation within a tolled managed lane policy area, known as the Toll Managed Lane System Policy boundary. A map of the Toll Managed Lane System Policy boundary can be found in the *Roadway Section* of appendix **E. Mobility Options**. Within this boundary lies 13 percent of the region's land area but 79 percent of the region's congestion. However, Mobility 2045 does reduce the level of tolling as compared with previous Metropolitan Transportation Plans by a percentage

ROADWAY TERMS TO KNOW

TOLL ROAD: On a toll road, or tollway, all drivers using the general purpose lanes pay a toll.

MANAGED LANE: In managed lanes, operational strategies are proactively implemented in response to changing conditions. Managed lanes improve traffic operations and maximize the efficiency of a roadway through active management of the lane(s). According to Federal Highway Administration guidance, strategies for managing lanes typically fall into one of three categories:

- Vehicle eligibility based on occupancy requirements and/or vehicle type restrictions (e.g. trucks, buses).
- Access based on limiting access point(s) to the lane(s), time of day, contraflow and/or reversible operations, and/or ramp metering.
- Pricing/tolling based on occupancy, vehicle type, and/or time of day.

Mobility 2045 identifies three types of managed lanes as part of the roadway system:

EXPRESS/HOV LANES: Existing interim HOV lanes that will be converted to managed operation with minimal reconstruction efforts are called *Express/HOV Lanes*. These lanes will allow single-occupant vehicular use for a toll based on a fixed-fee schedule while high-occupancy vehicles, vanpools, transit vehicles, and motorcycles will remain free at all times. Vehicles using parallel freeway lanes or frontage roads in the corridor do not pay a toll.

TOLLED MANAGED LANES: New toll lanes added to existing freeway corridors where significant reconstruction occurs are called *Tolled Managed Lanes*. The existing number of free lanes in the corridor remains the same or is increased, while dynamically priced toll lanes provide additional capacity and mobility choices with a discounted toll for high-occupancy vehicles during peak periods. The tolled managed lanes in the North Central Texas region are called TEXpress lanes. Vehicles using parallel freeway lanes or frontage roads in the corridor do not pay a toll.

EXPRESS LANES: Similar to tolled managed lanes, *Express Lanes* are typically built in the median of freeway corridors and separated from parallel traffic by barriers. Express lanes do not have a toll component, so they cannot offer a guaranteed speed. Express lanes have significantly fewer entrance and exit ramps than parallel freeway lanes and allow through traffic to avoid congestion that results from local trips. Express lanes are a new concept for the North Central Texas region and are being planned for corridors previously designed for tolled managed lanes where additional tax funding allows the roadway to be built without tolls.

comparable to the new funding made available for freeway capacity by the State Legislature.

Additionally, it is expected that the increased negative attention toward tolling and other innovative funding and financing mechanisms will be viewed as a short-term reaction and that the pendulum will swing back toward a more balanced position as is demonstrated in these plan recommendations. As elected officials grapple with realistic options for additional funding, combined with recent input on managed lanes and informal polling demonstrating that the lanes' users value reliability, tolling and innovation will continue to be viewed as viable options under certain conditions and in certain corridors. In fact, the federal government's current position relies on strategic investment in public funds and leveraging that public-private partnerships can provide. If states and metropolitan areas don't include these types of projects, they may be left out in their ability to attract additional federal resources.

Management of the Roadway System

As North Central Texas continues to experience population growth and traffic congestion, more emphasis will be placed on actively managing the capacity of major roadway facilities. New hardware and software technologies that provide an increased ability to monitor and operate roadways will enhance the reliability of tax-supported roads and toll roads.

Tolled managed lanes have been added to existing freeways across the urban core of North Central Texas. In these corridors, drivers have the choice of paying a toll to use the tolled managed lanes or traveling for free on the parallel freeway lanes or frontage roads. It is RTC policy that no existing free lanes will be eliminated in corridors where tolled managed lanes are constructed. Additionally, in some corridors, the construction of tolled managed lanes leverages funding to build more freeway lanes. The tolls collected from tolled managed lanes help finance the expansion, reconstruction, and operation of not just the tolled lanes, but the freeway lanes and frontage roads as well.

Managed lanes maximize the efficiency of a roadway through the introduction of tolls, time-of-day pricing, and/or vehicle occupancy, or vehicle type requirements. Different forms of managed lanes can be implemented based on the circumstances of the corridor:

- In the conversion of HOV lanes to express/HOV lanes, excess capacity may allow vehicles with one occupant to access these lanes by paying a toll.
- In selected toll roads, capacity could be managed through incentives that encourage a higher number of occupants per vehicle or by using congestion pricing that varies the toll based on traffic levels at different times of day.
- In freeway corridors where additional capacity is warranted, added capacity could be provided based on vehicle type, vehicle occupancy restrictions, or tolling while existing lanes remain free.

Tolling Policies and Business Terms

Because of the ability for multiple entities to become involved in tollway construction and the operation of toll roads and tolled managed lanes, the RTC has expanded regional policies for these priced facilities.

Toll Road Business Terms

In April 2006, after consultation with TxDOT, the RTC approved new business terms for tollways on state highways. These terms were subsequently modified by the RTC in July 2006 and September 2006. The business terms are highlighted in appendix **E. Mobility Options**. The terms were established to enable more local participation in the review and selection of public-private partnership toll projects, to set limits for toll rates and toll rate adjustments that maintain equity between various toll projects, and to help introduce the region to a concept known as variable time-of-day pricing. This pricing charges higher toll rates during the peak periods of the day to encourage the use of carpools/vanpools and transit, and it encourages telecommuting. It also encourages flexible work hours that allow single-occupant travelers to use toll facilities during off-peak periods when tolls are lower. These efforts are expected to help improve peak-period level-of-service, congestion, and the region's air quality.

The excess revenue policy for all TxDOT-sponsored toll facilities honors all previous RTC agreements and puts forth the following:

- All excess revenue generated from individual toll projects shall remain in the TxDOT district in which that revenue-generating project is located.
- Excess revenue generated from individual toll projects shall be placed in county-specific accounts and prorated based on the residential county of all toll payers on all tollways.
- Projects funded with excess toll revenue should be selected in a cooperative TxDOT/RTC selection process which considers the desires of the cities and counties where the revenue-generating project is located.

The policy enables non-tolled roadways, either on or off of the state highway system, to be improved or reconstructed using excess toll revenue funds. It also ensures that input from local governments will help determine which projects should receive funding. The Regional Transportation Council's policies regarding business terms and excess revenues further establish the North Central Texas region's commitment to toll projects where feasible, allowing swifter implementation of some projects that would be delayed if they were funded strictly with traditional revenue sources.

Tolled Managed Lane Policy

TxDOT and the RTC have developed additional policies for tolled managed lane projects. These policies support regional goals such as ensuring travel reliability, providing revenue for public-private partnership projects, and providing incentives for travelers to use HOV and transit. These policies support dynamic pricing which provides flexibility in setting the toll rate within allowable limits. This type of pricing allows operators to set market-based toll rates based on the demand being placed on the corridor and real-time congestion levels; the toll rates could fluctuate throughout the day in response to changing traffic conditions. Dynamic pricing is currently used on some managed lanes in the region.

The policies for tolled managed lanes, as shown in appendix **E. Mobility Options**, were approved by the RTC in May 2006 and modified in September 2006, September 2007, and December 2012.

The RTC approved other existing policies regarding excess toll revenue for tolled managed lanes in June 2005. The policies are nearly identical to those established for TxDOT-sponsored tollways, with one notable exception – local governments and transportation authorities shall be given the right to invest in a tolled managed lane project as a means to fund the project, as well as to

generate local revenue. Shares offered by the RTC would be allocated into programs related to air quality and sustainable development. These shares would also be used to leverage federal transportation funds. In some corridors, the RTC has committed to serve as a financial backstop to offer assurances and to hold bond holders harmless if revenues are negatively impacted by techniques used to manage congestion.

Express/HOV Lanes Policy

The freeway corridors that currently include HOV lanes will be completely rebuilt over time, improving the flow of traffic on the general purpose freeway lanes and frontage roads. In some cases, the HOV lanes may be reopened as tolled managed lanes, but some of the existing HOV lanes will be converted into express/HOV lanes as an interim improvement until the corridor can be fully reconstructed. Due to geometric and design constraints, the express/HOV lane facilities would have a fixed toll schedule that will vary by time of day and vehicle occupancy, but in some corridors, pricing could be impractical. In December 2012, the RTC adopted a new policy to specifically address the operation of the express/HOV lane system as provided in appendix E. **Mobility Options.**

The proposed express/HOV lanes differ from the existing HOV lanes in operation today. HOV lanes on IH 30 and US 75 are considered immediate action or interim facilities. These are temporary solutions in a corridor where a permanent facility is expected to be constructed at the same time the freeway is widened or reconstructed. Mobility 2045 recommends reconstruction for all of the corridors that currently include interim HOV lanes. These lanes will eventually be replaced with express lanes, tolled managed lanes, or general purpose lanes.

The existing interim HOV lanes are located in the following corridors:

- IH 30: East R.L. Thornton Freeway
 - Contra-flow lane with a moveable barrier; operates during peak travel hours only
 - Limits: Dallas central business district to Northwest Drive in Mesquite
- US 75: Central Expressway
 - One lane concurrent flow in each direction, buffer-separated facility; operates 24 hours per day
 - Limits: IH 635 in Dallas to Bethany Drive in Allen

Development of Roadway Recommendations

As **Exhibit 6.5-1** shows, the process to select programs and projects to include in the Metropolitan Transportation Plan first considers those that maximize the existing transportation system. Only after these strategies are reviewed and incorporated into the plan are strategic infrastructure projects such as rail lines, arterial roadways, freeways, and tollways considered. This approach ensures that regional travel demand is first addressed through those strategies that have the greatest air quality benefit; these programs and projects also are generally more cost effective than adding capacity for single-occupant vehicles on major roadways.

To begin evaluating which freeway and tollway projects should be included in the plan, the recommendations from previous Metropolitan Transportation Plans are reviewed. Discussions with TxDOT and the North Texas Tollway Authority are conducted to determine potential modifications to those recommendations. The recommendations are then updated to include results from ongoing corridor studies, environmental assessments, environmental impact statements, and advanced planning studies. After potential projects are identified, technical, environmental justice, and financial analyses take place. These analyses are considered while the potential freeway and tollway projects are evaluated, selected, and prioritized.

Technical Analysis

The technical analysis of freeway and tollway projects relies on data from the Expanded Dallas-Fort Worth Regional Travel Model. Travel modeling is used to identify system deficiencies, determine demand on new or expanded facilities, and test the impact of potential improvements on corridor and regional congestion measured by level-of-service. Level-of-service is determined based on:

- Projected daily volumes
- Facility type (freeway, tollway, managed lane, arterial, etc.)
- Number of lanes
- Area type (urban, suburban, rural)

Exhibit 6.5-1: Prioritization of Improvements



Project Evaluation, Selection, and Prioritization

Mobility 2045 projects were evaluated, selected, and prioritized using a technical and analytical process. The approach strategically prioritizes projects, a necessity because of the limited amount of funding available for improvements to roadway capacity. All candidate roadway projects and corridors were scored and ranked based on the seven national performance goals identified in MAP-21 and the Fixing America’s Surface Transportation Act. These national performance goals were used to determine what criteria would be used to score the projects and corridors, as highlighted in **Exhibit 6.5-2**.

Roadway and transit project recommendations for inclusion in Mobility 2045 went through a continuous, coordinated, and comprehensive process. The process began, as illustrated in **Exhibit 6.5-3**, by identifying the needs of the region. Recommendations in Mobility 2040 were re-analyzed to determine whether their scope was sufficient for 2045. All other corridors in the region were also evaluated based on the goals identified in **Exhibit 6.5-2**.

The candidate corridors must meet technical feasibility, have acquired local consensus, and have an anticipated funding source identified. Project delivery was an essential factor because it focused on planning elements such as system continuity, physical barriers, and right-of-way constraints. It also focused on the project’s planning status; for example, whether it had received environmental clearance or been included in previous Metropolitan Transportation Plans. Preference was given to projects that had a stage or stages under construction but needed additional funding to complete the final elements. Continuous coordination with transportation partners was essential in all areas of Mobility 2045 development.

The final methodology incorporates input from the RTC and absolute data for performance metrics related to each MAP-21 goal. Each performance metric was assigned a weight based on feedback and polling data received from the RTC. The weighted scores were then used to rank the candidate corridor segments.

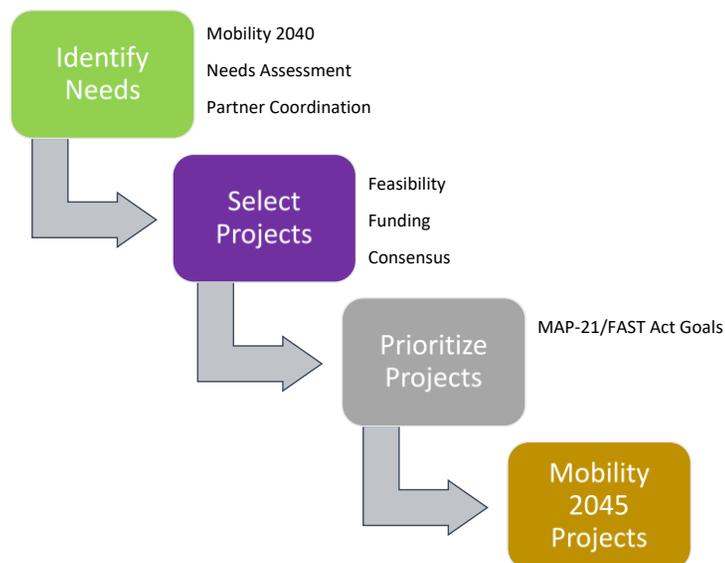
Lastly, the rankings were analyzed to identify whether federally protected populations may face a delay in benefits. No delay was found. The methodology and results of this analysis are described in the *Regional Environmental Justice Analysis* section of the **Social Considerations** chapter.

Exhibit 6.5-2: Evaluation and Project Selection Criteria

MAP-21 Goal	Criteria Used	Unit Measure
Congestion Reduction	Traffic Volume/Roadway Capacity	Traffic Volume/Roadway Capacity Ratio
System Reliability	Level of Travel Time Reliability	80 th Percentile of Travel Time Divided by the Median (50 th percentile) Travel Time
Safety	Crash Rate	Fatal and Serious Crashes per 100 Million Vehicle Miles Traveled
Infrastructure Condition	Pavement Conditions	Pavement Conditions from TxDOT Aggregated to Represent Average Conditions
Freight Movement	Truck Volume Percentage	Daily Truck Volume Divided by Daily Volume
Economic Vitality	Recent Activity Density Change	Percent Change in Activity Density (population and employment) from 2000 to 2017
	Future Activity Density Change	Percent Change in Activity Density (population and employment) from 2017 to 2045
Environmental Sustainability	Estimate of Environmental Impact Based on Project Type	High Impact: New Location Project Moderate Impact: Expansion of Existing Facility Low Impact: Asset Optimization
Reduced Project Delivery Delay	Planning Status, Funding Availability, Constraints, and System Continuity	Information Only

Exhibit 6.5-3: Project Prioritization

Project Prioritization



Asset Optimization

Financial realities make it difficult to continue large-scale projects that require total reconstruction to improve capacity; other options to optimize the regional transportation system must also be considered. Consistent with FHWA initiatives on Context Sensitive Solutions and Performance-Based Practical Design, Asset Optimization involves a strategic design and performance-oriented approach to address corridor improvement planning through incorporation of the business principles of asset management.³ Projects identified as Asset Optimization are those where corridor deficiencies or performance gaps can be addressed using lower-cost techniques that are quicker to implement than higher-cost capacity expansion projects. These cost-effective and time-saving techniques are examples of asset management. The range of potential Asset Optimization improvements include, but are not limited to, those in Exhibit 6.5-4.

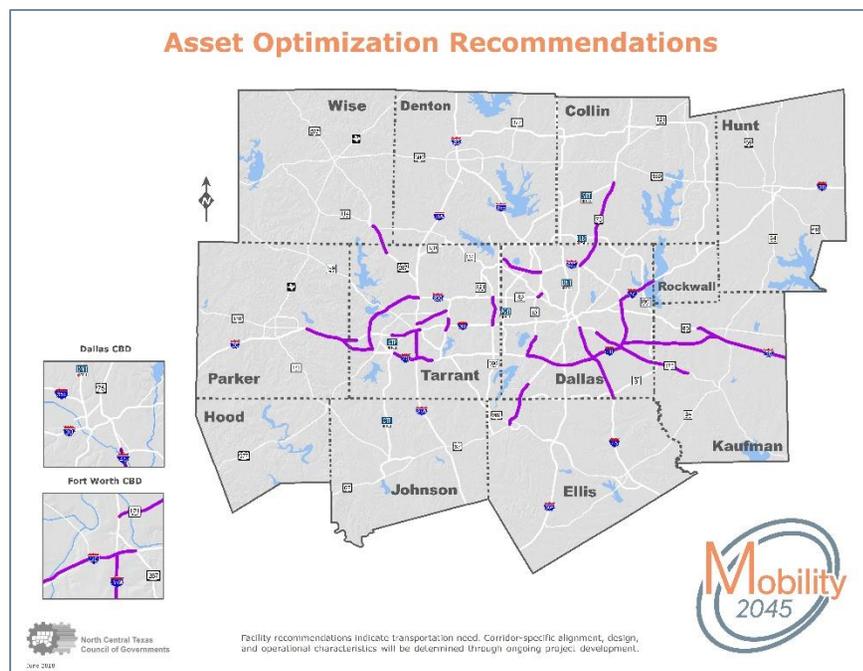
³ <https://www.fhwa.dot.gov/planning/css/> and <https://www.fhwa.dot.gov/design/pbpd/>

Exhibit 6.5-4: Asset Optimization



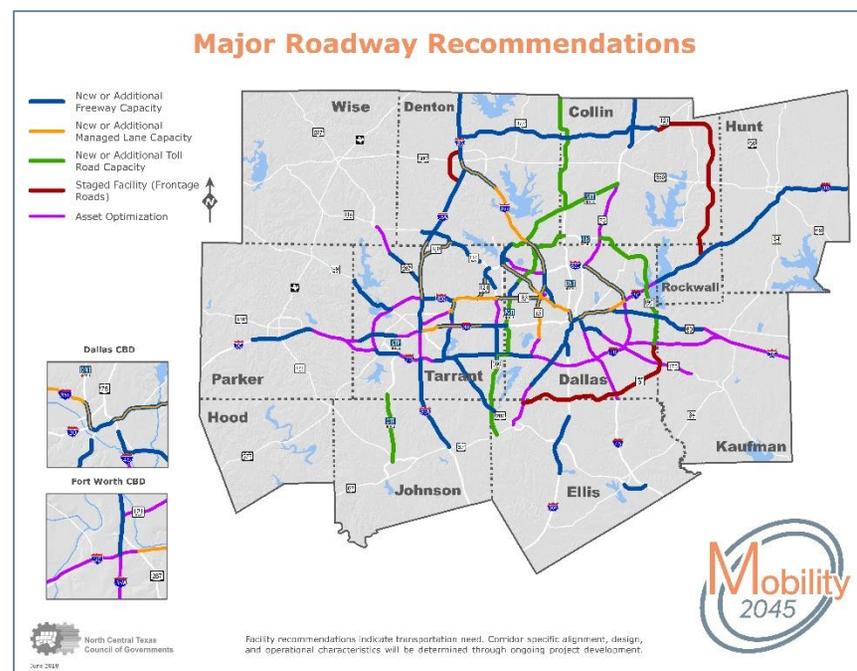
In North Central Texas, initial pilot projects have identified the Asset Optimization improvements shown in Exhibit 6.5-5. These projects have provided valuable lessons and potential direction for future efforts, including strategies to alleviate bottlenecks and promote greater system efficiency. Partnerships were formed with transportation providers and local stakeholders to collect and analyze data. These partnerships helped develop the data management system and created a more holistic understanding of infrastructure planning and investing from the perspective of lifecycle costs and benefits. Additionally, by integrating local knowledge, statewide expertise, and regional coordination with the data, staff were able to determine how to best proceed with potential projects. Decisions considered safety, accessibility, and mobility attributes while planning improvements to existing roadways within available rights-of-way. Projects could address critical needs and be something that all stakeholders could support.

Exhibit 6.5-5: Potential Asset Optimization Improvements



authorities, and TxDOT; and the express/HOV and a tolled managed lane system that is being developed cooperatively between the North Central Texas Council of Governments, TxDOT, and NTTA. Tollways play an integral role in the recommendations of Mobility 2045. As part of the nondiscrimination efforts, analyses were performed to determine whether protected populations experience disproportionate negative impacts associated with the addition of tollways and tolled managed lanes. These results indicate that construction of this toll road and tolled managed lane system creates no disproportionate impacts on environmental justice populations. These analyses are detailed in the **Social Considerations** chapter.

Exhibit 6.5-6: Major Roadway Recommendations



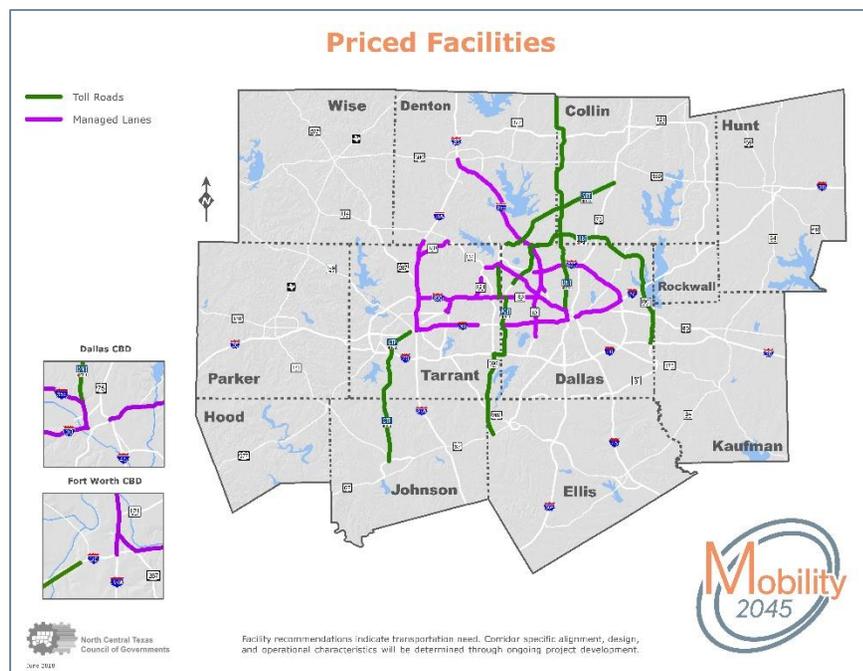
Controlled Access Roadway Recommendations

Exhibit 6.5-6 shows the final Mobility 2045 recommendations for controlled access roadways. The total cost for implementing these freeway, tollway, and managed lane improvements is over \$30 billion. Costs from the plan are based on current planning and engineering studies, were reviewed by TxDOT and the North Texas Tollway Authority (NTTA), and represent total project costs reflected in year-of-expenditure dollars, which is consistent with federal planning requirements.

Tolled Facilities

Exhibit 6.5-7 displays the network of tolled roads and tolled managed lanes recommended in Mobility 2045. The network shown in this map includes the existing toll road system managed by NTTA; new tollways that are expected to be constructed by local toll authorities, regional mobility

Exhibit 6.5-7: Tolled Facilities



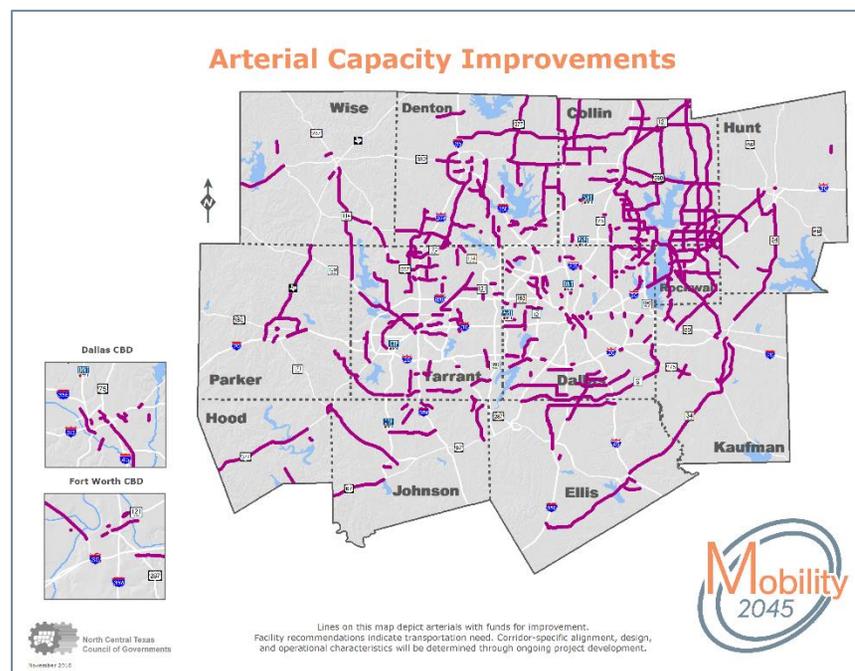
Regional Arterials

In addition to larger, controlled access roadways, arterial streets play a key role in urban mobility, carrying traffic from highways to local streets. By 2045, approximately 39 percent of vehicle miles traveled will be on the region’s principal and minor arterials. Arterials pass through areas where a controlled access roadway would be unwarranted or undesirable and through areas with high concentrations of intensive land use such as central business districts. These streets may also supplement highways by providing an alternative route in the event of crashes, road construction, or recurring congestion. While arterials must provide needed transportation capacity, they also must be compatible with adjacent land uses and provide access to those land uses. The arterials that are currently funded for improvement or are anticipated to be funded within the timeframe of Mobility 2045 are shown in **Exhibit 6.5-8**.

Regionally significant arterials (RSA) form the backbone of the arterial roadways. Arterials are identified as regionally significant if they serve regional transportation needs, provide service to regional activity centers, connect

communities, and maintain access to and from areas outside of the region. RSAs are forecast to carry approximately 22 percent of all vehicular traffic in the region by 2045. Roadways that are designated as RSAs require federal review for air quality conformity. The designation does not imply that all RSAs will be guaranteed funding. Other non-regionally significant arterials are also eligible for federal funding but are not required for federal review for transportation conformity.

Exhibit 6.5-8: Funded Major Arterial Improvements



The Design of Arterials and Thoroughfares

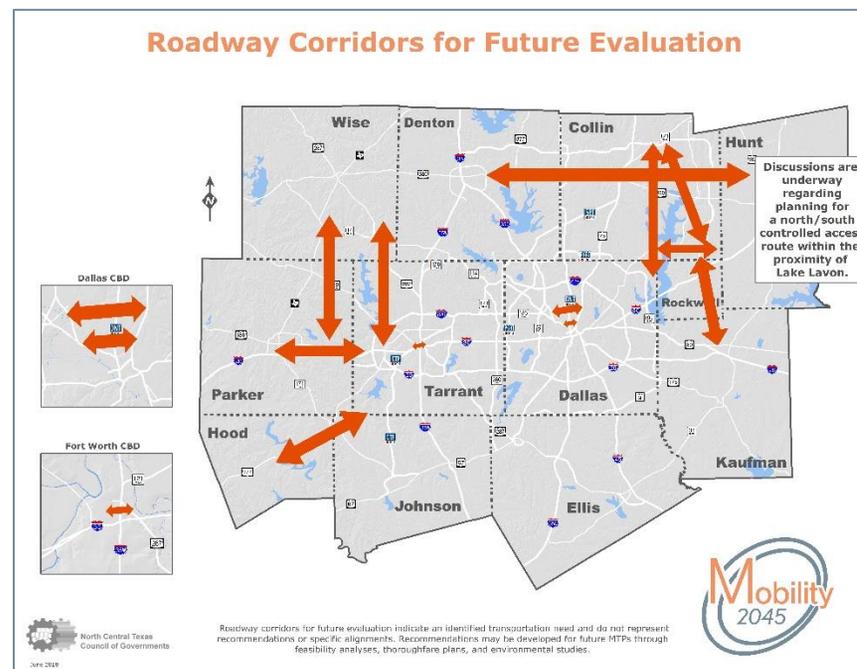
As mentioned in the *Healthy Communities* section of the **Environmental Considerations** chapter, Mobility 2045 encourages the use of Federal Highway Administration’s endorsed principles for context-sensitive solutions and the development and implementation of local Complete Streets policies to accommodate all users (e.g. pedestrians, transit users, bicyclists, motorists, freight providers). Street design should depend on the context of the community, street, and potential users. The goal is not necessarily to include all of these components to make a street complete; the goal is to balance the safety and convenience of all road users, regardless of development density.

Corridors for Future Evaluation

NCTCOG continues to partner with transportation partners and local governments to identify needs and priorities on the roadway system. For example, recent studies have taken place in Collin County, Dallas County, and western Tarrant County and have identified corridors to be considered in future Metropolitan Transportation Plans, as shown in **Exhibit 6.5-9**. **Exhibit 6.5-9** is an illustrative map of roadway corridors not included in the financially constrained portion of Mobility 2045. This map identifies specific corridors or wider study areas where additional analysis or funding are needed before recommendations can be included in the Metropolitan Transportation Plan. These corridors highlight areas of additional transportation need or locations where thoroughfare or sub-area studies are beginning or ongoing; however, finalized recommendations must be produced before these corridors can be considered in future Metropolitan Transportation Plans. For that to occur, the corridors will be subject to a project development process that includes feasibility studies, environmental analyses, the development of locally preferred alternatives, and identification of funding sources.

In addition to coordinating with local transportation partners in developing the illustrative roadway corridors for future evaluation, a technical analysis was done to identify areas where anticipated growth in population and/or employment would occur but the existing arterial framework may be deficient in handling the future demand. The analysis considered forecasted growth in population and employment density, arterial spacing and connectivity, and congestion on the arterials, as well as congestion on any surrounding facilities. These areas, as depicted on **Exhibit 6.5-10**, are not project specific recommendations but may warrant further study.

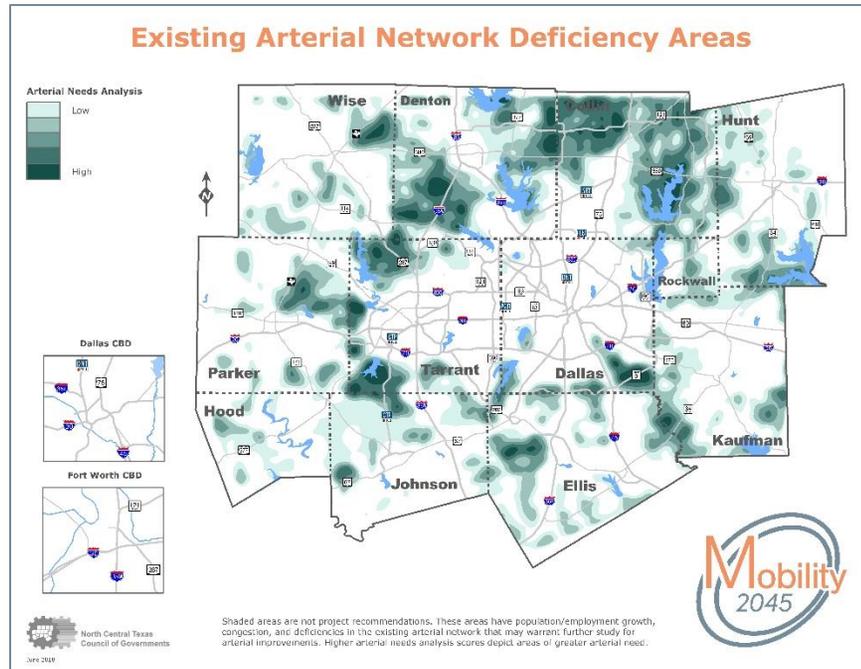
Exhibit 6.5-9: Illustrative Major Roadway Corridors for Future Evaluation



Urban Thoroughfare Revitalization

The region contains many corridors where Complete Streets principles could be applied. Aging urban thoroughfares in the Metropolitan Planning Area are good examples. Many of these facilities are state highways once serving through traffic that is largely now served by the region's freeway system. Many aging urban thoroughfares are underutilized, in need of repair and maintenance, and may have adjacent land uses requiring reinvestment and revitalization. While no longer heavily used for through traffic, many of these streets remain key gateways traversing the center of communities. They are good candidates for Complete Streets improvements due to their underutilized capacity and generally wide right-of-way. For more information on Complete Streets, see the *Designing Transportation Facilities to Support Healthy Communities and the Environment* section in the **Environmental Considerations** chapter.

Exhibit 6.5-10: Arterial Network Deficiency Areas



- Repairing and maintaining aging infrastructure.
- Completing streets as necessary by adding alternative modes of transportation.
- Coordinating with school districts on school location decisions and school related traffic safety, and working with local governments, TxDOT, and public-private partnerships to complete projects.



River Oaks Boulevard (SH 183) in River Oaks. The SH 183 Corridor Master Plan currently underway is exploring revitalization options

Source: NCTCOG

Since transportation projects can influence land use indirectly by increasing or decreasing mobility and accessibility, it is essential to integrate land-use contexts when planning the revitalization of urban thoroughfares. When transportation projects are context sensitive, they spur reinvestment in the surrounding area compatible with the community vision.

Local governments seeking to revitalize urban thoroughfare corridors have undertaken various planning and implementation efforts. NCTCOG has partnered with local governments and TxDOT on several corridor studies, including the Garland Road Vision, SH 5 Corridor Planning Study, SH 183 Corridor Master Plan, SH 199 Corridor Master Plan, and the Preston and Northwest Highway Area Plan.

Regional guidelines now under development should provide consistent strategies for selecting corridors to redevelop based on the needs of a community. These guidelines will form the basis of a needs assessment through which strategic investments can be selected to revitalize thoroughfares. Such guidelines could include the following strategies:

Roadway Policies and Programs

The implementation of improvements to the regional roadway system is guided by the following policies, which can be found in appendix E. **Mobility Options**. These policies direct the planning and development of roadways in a consistent manner and recognize, among other principles, the need to identify strategic improvements, to pursue innovative funding opportunities, and to actively manage roadway demand.

FT3-001: The Regional Transportation Council does not support converting existing free non-HOV/managed lane corridors to tollways.

FT3-002: Evaluate all new limited-access capacity for priced facility potential.

FT3-003: To maximize the use of available funds, where reasonable, priced facilities should be developed with no or minimal federal and state funding assistance.

FT3-004: Plan and program non-regionally significant arterial improvements cooperatively with local governments.

FT3-005: Management strategies consistent with the Regional Congestion Management Process, congestion management plans for regional tollway operators, and federal single-occupancy vehicle justification requirements, unless precluded by existing bond covenants, should be implemented when an existing freeway, tollway, or managed lane adds capacity. Future bond covenants should accommodate a full range of management strategies.

FT3-006: System-wide HOV occupancy will be consistent with the latest Regional Transportation Council policy.

FT3-007: Additional and improved interchanges, collector-distributor roads, frontage roads, and auxiliary lanes should be considered and implemented as appropriate on all freeway/tollway facilities in order to accommodate a balance between mobility, access, operational, and safety needs.

FT3-008: Encourage the early preservation of right-of-way in recommended roadway corridors.

FT3-009: Encourage the preservation of right-of-way in all freeway/tollway corridors to accommodate potential future transportation needs.

FT3-010: Corridor-specific design and operational characteristics for recommended roadways will be determined through the project development process.

FT3-011: Support advanced planning activities such as thoroughfare planning and sub-area studies to aid in strategic decision making regarding Metropolitan Transportation Plan and project development.

FT3-012: Corridor and environmental studies should be conducted with consideration for the region's air quality and financial constraints.

FT3-013: Support federal and state interregional corridor initiatives as appropriate.

FT3-014: Evaluate and implement all reasonable options such as Asset Optimization to maximize corridor capacity, functionality, accessibility, and

enhancement potential utilizing existing infrastructure assets and right-of-way.

Mobility 2045 supports the following programs associated with the roadway system:

TSM2-005: Bottleneck Program for Regional Corridors (see appendix D. **Operational Efficiency**)

NRSA2-001: Non-Regionally Significant Arterial Program

NRSA2-002: Asset Optimization Program (see appendix E. **Operational Efficiency**)

Automated Vehicles

The roadway recommendations contained within Mobility 2045 are based on the assumption that the current highway system will continue to operate until 2045 as it has for the past half century. This operating model features humans driving vehicles that are owned by individuals and typically carry a single person.

These longstanding operating assumptions may be subject to extensive changes between now and 2045, and those changes will be reflected in later editions of the region's long-range transportation plans. The possible changes to consider include:

Vehicle Automation: Multiple companies and countries around the world are developing automated vehicle systems. These vehicles range from low-speed shuttles to high-speed vehicles. Test deployments are going on all over the world.

Shared Mobility: The emergence of transportation network companies such as Uber and Lyft, and other forms of shared mobility such as bike share, has given birth to a mobility-as-a-service approach. This approach allows people to seek mobility through ridership on fleet vehicles purchased and operated by third parties.

Electrification: Numerous countries in Asia and Europe plan to transition from internal combustion engine vehicles to electric vehicles before 2045. Electric vehicles are increasingly competitive with internal combustion engine vehicles on performance and price. A majority of the automated vehicles are being developed on an electric platform. Electric powertrains can support a wide variety of vehicle types and use cases.

Developing technologies have the potential to provide the region with more options in managing its highway system. Automated vehicles, coupled with wireless communications, may allow vehicles to travel with shorter distance between vehicles, increasing the carrying capacity of roadways without physically expanding the road. Vehicle types may emerge that are less bulky than today's vehicles and are able to operate with greater precision so that lane widths can be reduced, increasing the capacity of roadways. Roadway-related improvements that help optimize the operation of automated vehicles on the highway may have a higher return on investment than the traditional added capacity of a roadway. The type of improvements range from good quality highway striping to roadway electronics that supplement the onboard capabilities of automated vehicles.

NCTCOG and its regional partners will continue to monitor these developments, looking for opportunities to cost-effectively improve the operation of the region's highway system.

Maintenance and Preservation of the Roadway System

The maintenance and preservation of the existing roadway system is an important factor for reasons related to safety, operations, economics, and sustainability. Existing roadways must be maintained to ensure their reliability and to maximize their useful life. Maintenance activities can be routine (simple cleaning or sweeping, restriping, and pothole repairs), preventive (overlays, crack sealing), or major (complete reconstruction and replacement).

The Texas Department of Transportation currently maintains more miles of highway and more bridges than any other state in the US. There are currently

88,710 lane miles of public roadways in the 12-county Dallas-Fort Worth Metropolitan Planning Area that must be maintained and preserved.⁴ This number is expected to increase by at least 7,000 lane miles as new roadways are constructed and widened to accommodate future population and economic growth. To address this existing and future demand, approximately 8 percent of the funding identified in Mobility 2045 is dedicated to maintaining and operating the region's roadway system.⁵

Existing federal regulations now require Metropolitan Transportation Plans to identify strategies to preserve the existing and future transportation system and evaluate the condition and performance of transportation assets through the preparation of Transportation Asset Management Plans.⁶ Additional information related to these regulations and performance measures for pavement and bridge conditions is provided in the **Regional Performance** chapter.

Roadway Policies and Programs

The improvement and management of the regional roadway system is guided by the following policy, which can be found in appendix **E. Operational Efficiency**. This policy directs the planning and development of roadways in a consistent manner and recognizes, among other principles, the need to:

- Determine more cost-effective strategic improvements that consider asset life-cycle
- Pursue innovative funding opportunities
- Actively manage roadway demand

FT3-015: Support the asset management objectives in the Texas Transportation Plan to maintain and preserve multimodal facilities using cost-beneficial treatments and to achieve a state of good repair for pavement, bridge, and transit assets.

⁴ Texas Transportation Plan 2040 and TxDOT Roadway Inventory Annual Reports 2016

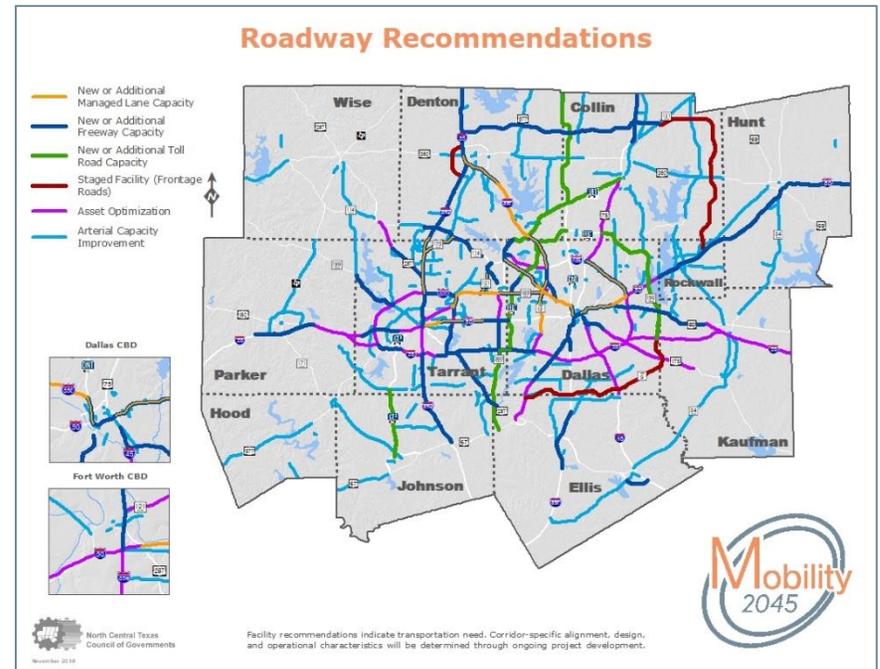
⁵ Approximately 28% of the funding identified in Mobility 2045 is dedicated to maintaining and operating the transportation system, including roadway and transit.

⁶ 23 CFR 450.324(f)(7) and 23 CFR 450.324(f)(4)

Summary

The roadway system recommendations included in Mobility 2045 amount to a significant investment in improvements, expansions, management, and new capacity for the region’s mobility. **Exhibit 6.5-11** displays the funded roadway recommendations found in Mobility 2045, including freeways, tollways, managed lanes, frontage roads, and major arterials. Managing congestion as North Central Texas grows to a region of 11.2 million people by 2045 will require strategic and ongoing investment in these identified corridors, which form the basis of the regional roadway system and serve millions of travelers each day.

Exhibit 6.5-11: Roadway Recommendations



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