mobility 2035

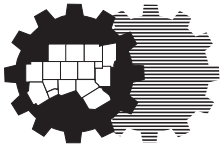
the metropolitan transportation plan for north central texas

What is NCTCOG?

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

It serves a 16-county metropolitan region centered around the two urban centers of Dallas and Fort Worth. Currently the Council has **240 members**, including 16 counties, 169 cities, 24 independent school districts, and 31 special districts. The area of the region is approximately **12,800 square miles**, which is larger than nine states, and the population of the region is over **6.5 million**, which is larger than 38 states.

NCTCOG's structure is relatively simple; each member government appoints a voting representative from the governing body. These voting representatives make up the **General Assembly** which annually elects a 15-member Executive Board. The **Executive Board** is supported by policy development, technical advisory, and study committees, as well as a professional staff of 310.



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

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NCTCOG's Department of Transportation

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

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

2035 mobility

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march 2011

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The Appendix is provided as a separate document.

foreword

Mobility 2035: Foreword

A New Way of Planning

For the past 20 years or so, transportation funding has increased fairly steadily. Beginning with the Intermodal Surface Transportation Efficiency Act of 1991, Congress began to systematically spend down the balance in the Highway Trust Fund. The trend continued with spending outpacing gas tax revenue and related fees. In 2008, the Trust Fund balance neared zero and Congress was forced to infuse the account with general revenue just to keep up with already approved funding commitments across the country. Since then, more than $29.7 billion in general revenue has been added to keep the account solvent. In addition, federal and state laws were passed that provided transportation professionals with several innovative financial tools, such as additional bonding capabilities and more flexible public-private partnership arrangements that further increased the availability of near-term funding opportunities.

The Dallas-Fort Worth Metropolitan Area was the recipient of its share of this additional revenue and was able to use it to implement critical roadway and transit projects and programs. However, the rate at which we were able to add capacity to our transportation system was exceeded by the continued unprecedented growth in people and businesses wanting to call Dallas-Fort Worth home. Between now and 2035, it is anticipated that the region's population will increase by 48 percent and employment will increase by 47 percent; however, new roadway capacity is expected to increase by only 13 percent while the rail network is expected to nearly triple.

Despite the recent economic downturn, the state of Texas and the Dallas-Fort Worth region continue to sustain strong growth thanks to its diversified economy and favorable business climate. In fact, the recent 2010 US Census showed that municipalities and counties in North Central Texas are still experiencing considerable growth, resulting in the 12-county transportation planning area growing from 5.1 million persons in 2000 to 6.4 million in 2010. Recently adopted population forecasts for the same area indicate that 9.8 million persons will call North Central Texas home in 2035.

2035 mobility

The Metropolitan Transportation Plan for North Central Texas

Unfortunately, the financial situation shows little sign of improvement. In fact, it is unlikely that current funding levels will be sustained, let alone increased. Federal and state gasoline taxes (the major source of transportation related revenue) have not increased since 1991 and 1993, respectively, and the state legislature has recently rescinded the option to move ahead with new public-private partnerships. In addition, a wave of fiscally conservative legislators have recently been elected at both the state and federal levels and are aiming to substantially cut government spending. While both the federal Highway Trust Fund and the state's transportation fund, Fund 006, are user fee-based accounts essentially generating their own revenue, the political will to increase funding levels may be quite difficult in the coming years given this reduced spending environment.

As a result of these increasing financial constraints, the inability of the region to build its way out of its congestion is becoming abundantly clear. The way in which transportation issues are addressed at the planning level will have to change drastically. Innovation and openness to exploring concepts that may not have been popular in years past will be crucial. The traditional recommendations of extending roadways and rail lines, as well as adding lanes in existing corridors, will not provide enough capacity to sustain travel expectations. The expected growth in travel demand will overwhelm our transportation system. Even with spending $101.1 billion on projects and programs, congestion will continue to degrade, resulting in a 44 percent increase in average travel time due to congestion.

Maintaining a vibrant economic and social environment may require changes in both travel characteristics and behavior. This applies not just to the additional three million persons expected to reside in the Dallas-Fort Worth region by 2035, but to everyone who currently lives and works here as well. To that end, a major emphasis of Mobility 2035 will be to promote growth management strategies that strike a greater balance between land use and transportation. Programs and projects aimed at eliminating or reducing vehicle trips, shortening trips that would still occur, and utilizing the capacity of our system to its fullest are major recommendations.

Where capacity is added to the transportation system, it must be done strategically. In areas where the existing pavement or rail track is relatively new or in good shape, the existing infrastructure should be utilized if at all possible. If the pavement or track requires major rehabilitation or replacement, the infrastructure will be replaced simultaneously, with additional capacity as appropriate, so as to only impact the corridor once.

While strategically adding capacity and improving system operations will provide much needed mobility improvement, they must be done in a way that contributes to the overall quality of life, while also limiting impacts to the environment. This mobility plan expands on discussion points regarding potential environmental and social impacts that may occur as a result of its implementation. This discussion forms the basis for a more rigorous examination of these impacts as projects advance into ultimate planning and development stages such as the federal National Environmental Policy Act evaluations and equivalent state processes.

As Mobility 2035 was being prepared, the Regional Transportation Council held over 30 public meetings and outreach events, along with numerous meetings with local, state, and federal agency staff and elected officials. The policies, programs, and projects were discussed in these meetings over an 18-month timeframe and a Website was established to convey information and to enable additional input. While making hard choices of which programs and projects to keep in and which ones to defer to a later time is difficult, the exercise was extremely helpful in providing both a regional understanding of the current state of transportation funding challenges and a blueprint for future expectations as a result of reduced funding. As the regional and national economic, social, and environmental circumstances change, the North Central Texas Council of Governments will monitor the recommendations in this mobility plan and make adjustments as necessary.

introduction

2035 mobility

Introduction

Mobility 2035: The Metropolitan Transportation Plan for North Central Texas (Mobility 2035) is the defining vision for the multimodal transportation system in the Dallas-Fort Worth Metropolitan Area. Mobility 2035 was adopted in March 2011 by the Regional Transportation Council, serving as the policy body for the Metropolitan Planning Organization for the Dallas-Fort Worth area. The Regional Transportation Council is a 43-member independent transportation policy body that is comprised of elected or appointed officials from the metropolitan area and representatives from area transportation providers. Mobility 2035 guides the implementation of multimodal transportation improvements, policies, and programs in the 12-county Metropolitan Planning Area through the year 2035. *Exhibit 1.1* illustrates the 12-county Dallas-Fort Worth Metropolitan Planning Area.

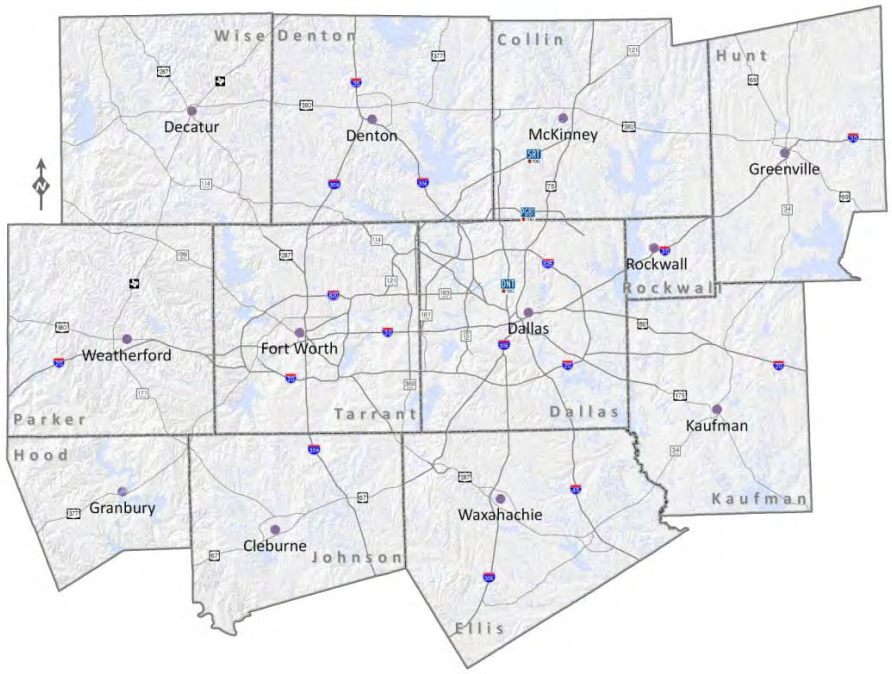


Exhibit 1.1: 12-County Dallas-Fort Worth Metropolitan Planning Area and County Seats

The Metropolitan Planning Organization at a Glance:

To facilitate a continuous, cooperative, and comprehensive planning process, federal law requires states to establish Metropolitan Planning Organizations for urban areas with more than 50,000 residents. Since 1974, the North Central Texas Council of Governments and the Regional Transportation Council have served as the Metropolitan Planning Organization for the Dallas-Fort Worth area.

The North Central Texas Council of Governments' Executive Board sets policy for comprehensive planning and coordination in North Central Texas and serves as the Metropolitan Planning Organization's fiscal agent. The Regional Transportation Council sets transportation policy for the Metropolitan Planning Organization and guides the decision-making process. The Regional Transportation Council relies on technical committees made up of staff from area government bodies to review, comment on, and prepare recommendations for transportation improvements. The North Central Texas Council of Governments' Transportation Department provides support and staff assistance to the Regional Transportation Council and its technical committees.

Mobility 2035 at a Glance:

- Mobility 2035 is a blueprint for the region's multimodal transportation system.
- Mobility 2035 supports goals emphasizing mobility, quality of life, system sustainability, and implementation.
- Mobility 2035 includes policies, programs, and projects for continued development.
- Mobility 2035 guides the expenditure of state and federal transportation funds.
- Mobility 2035 must demonstrate financial constraint. This means the Metropolitan Transportation Plan is not a wish list, but instead a series of recommendations for the most critical projects in the region.

Key Regional Transportation Planning Documents

Metropolitan Transportation Plan (MTP): A long-range plan for the Metropolitan Planning Area covering a planning horizon of at least 20 years that fosters mobility and access for people and goods, efficient system performance and preservation, and good quality of life.

Transportation Improvement Program (TIP): A short-range program of transportation improvements based on the long-range transportation plan; the TIP should be designed to achieve the area's goals using spending, regulating, operating, management, and financial tools.

Congestion Management Process (CMP): Areas with populations greater than 200,000 are designated as Transportation Management Areas (TMAs). TMAs must have a CMP that identifies actions and strategies to reduce congestion and increase mobility. The CMP includes a variety of strategies ranging from travel demand management techniques to the implementation of transit or bicycle and pedestrian facilities. The CMP provides for the effective management of new and existing transportation facilities.

State Implementation Plan (SIP): A metropolitan area's designation as an air quality nonattainment area or maintenance area creates additional requirements for transportation planning. Transportation plans, programs, and projects must conform to the state's air quality plan, known as the State Implementation Plan. In nonattainment or maintenance areas for air quality, the Metropolitan Planning Organization is responsible for coordinating transportation and air quality planning. Additionally, as a nonattainment area, the region must go through the transportation conformity process. Conformity is a way to ensure that transportation plans and programs meet air quality goals in order to be eligible for federal funding and approval. Whenever a Metropolitan Transportation Plan or Transportation Improvement Program is amended or updated, the Metropolitan Planning Organization must comply with the conformity requirements.

Mobility 2035 Supported Goals

Goals define the purpose of Mobility 2035 and guide efforts that accommodate the multimodal mobility needs of a growing region. These goals support and advance the development of a transportation system that contributes to the region's mobility, quality of life, system sustainability, and continued project implementation.

Mobility

- Improve the availability of transportation options for people and goods.
- Support travel efficiency measures and system enhancements targeted at congestion reduction and management.
- Assure all communities are provided access to the regional transportation system and planning process.

Quality of Life

- Preserve and enhance the natural environment, improve air quality, and promote active lifestyles.
- Encourage livable communities which support sustainability and economic vitality.

System Sustainability

- 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.

Implementation

- 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.

Mobility 2035 Goal Themes

Legislative Basis for the Metropolitan Transportation Plan

Since the 1970s, Metropolitan Planning Organizations (MPOs) have been responsible for developing and maintaining a Metropolitan Transportation Plan. With the passage of the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA), the role of the MTP in the overall transportation planning process was greatly advanced. ISTEA called for the strengthening of the MTP to become a central mechanism for the decision-making process regarding investments to develop the metropolitan transportation system. The passage of the Transportation Equity Act for the 21st Century (TEA-21) continued this same philosophy.

Building on the two previous laws, the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users, or SAFETEA-LU (Public Law 109-59), was signed into law in 2005. This act approved funding for surface transportation projects and also represented the largest surface transportation venture in the country to date. While SAFETEA-LU authorized funding for many transportation funding categories and specific projects, it also continued the concepts identified in ISTEA and TEA-21 regarding the cooperative, continuing, and comprehensive regional transportation planning process.

SAFETEA-LU established eight planning factors that must be considered in the long-range plan. These factors include:

- Support economic vitality
- Increase safety
- Increase the ability of the transportation system to support homeland security
- Increase accessibility and mobility of people and freight
- Protect and enhance the environment
- Enhance the integration and connectivity of intermodal transportation
- Promote efficient system management and operation
- Emphasize preservation of the existing system

While SAFETEA-LU officially expired in September 2009, continuing resolutions passed by the United States Congress enable it to persist in providing the legislative backdrop for federal surface transportation activities. Mobility 2035 has been developed to fully meet all SAFETEA-LU requirements.

Economic Basis for the Metropolitan Transportation Plan

North Central Texas is a major economic, social, and political center of both Texas and the United States. The Dallas-Fort Worth area represents 34 percent of the state's economy and is the twelfth largest metropolitan economy in the world. The region supports a diverse economy and is home to 24 Fortune 500 companies. By the year 2035, the region is expected to experience a 48 percent increase in population and a 47 percent increase in employment. The transportation system is central to this growth because it allows for the efficient movement of people and goods. Without adequate transportation funding to ensure a high level of mobility, the region will be challenged to sustain economic growth. This is an important reality for the region and should be a priority for the state.

Metropolitan Transportation Plan Development Process

Mobility 2035 was developed amidst growing concern for increased congestion, reduced air quality, and the lack of financial resources to fund many desired transportation projects and programs. To maximize available funds, a prioritization process was followed to maximize the existing transportation system, then invest strategically in infrastructure improvements. The principles used to allocate financial resources include:

- Maintain and operate existing facilities
- Improve efficiency of existing facilities
- Reduce single-occupancy trips
- Improve land use/transportation connection
- Increase transit trips
- Increase auto occupancy

This process is detailed in *Exhibit 1.2*. Impacts to system safety and security, environmental justice, environmental mitigation, and intermodal planning are additional aspects that were considered throughout the development of Mobility 2035.

The Expanded Dallas-Fort Worth Regional Travel Model serves as the source for forecasting vehicle miles of travel and other travel characteristics for the area. This model is based on a four-step sequential process designed to model travel behavior and predict the level of travel demand at regional, sub-area, or small area levels. This model, developed by the North Central Texas Council of Governments' Transportation Department, is used to project future travel conditions and evaluate

the performance of roadway and rail facilities in the 12-county Metropolitan Planning Area, in addition to Hill County.

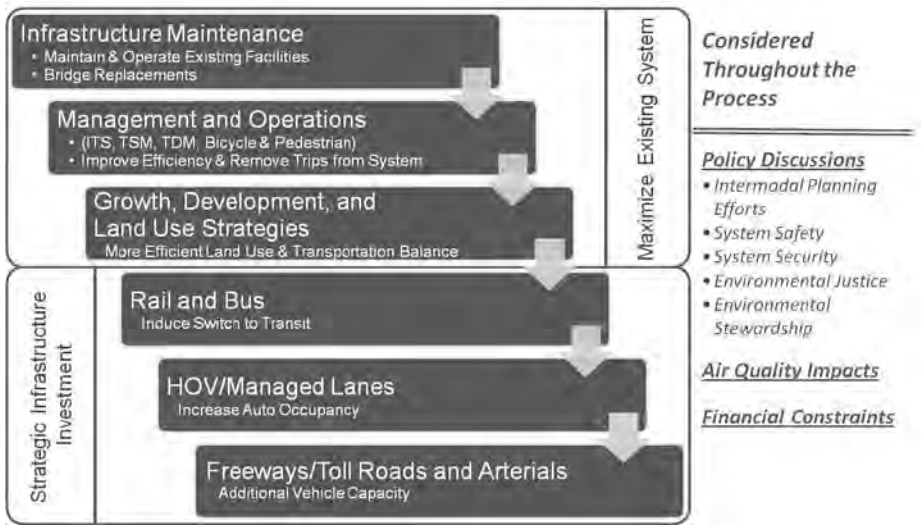


Exhibit 1.2: Mobility 2035 Development Process

Mobility 2035 Planning Elements

A number of important planning elements played a role in the development of the recommendations contained in Mobility 2035. The major sections of Mobility 2035 reflect these elements and emphasize their importance in providing a comprehensive strategy that supports a quality transportation system.

Financial Reality: The Mobility 2035 recommendations are required to be financially constrained, meaning only reasonably expected sources of revenue over the time horizon of the plan can be included. Transportation funding sources, such as gas tax revenues, have not been immune to the impacts of the economic downturn. This has created a gap between available funding and needed system improvements. The Mobility 2035 recommendations reflect the region's current and anticipated financial reality.

Social Considerations: North Central Texas will experience both continued growth and a continued shift in its demographic profile. Improved mobility and accessibility should strike a balance with the needs of the community. Public input is vital to the development of the recommendations for 2035. Considering the benefits and burdens of transportation on communities is important. Ensuring specific groups or communities do not experience disproportionate negative impacts due to system improvements, ensuring timely and appropriate public involvement, and being sensitive to a changing demographic profile are important social considerations.

Environmental Considerations: Clean air, water, and the availability of open space for recreation and wildlife habitat is a central quality of life consideration for residents of North Central Texas. It is important to consider the impacts the transportation system has on environmental resources such as air quality. Supporting a broad approach to assessing conservation goals and opportunities to improve the decision-making process through data exchanges and partnerships is an essential step in advancing the efficient delivery of transportation projects. Mobility 2035 supports a transportation system that maintains and enhances the environment, considers and accommodates conservation priorities, and improves the decision-making process which will lead to high quality transportation projects.

North Central Texas in Context

Over the past three decades, the Dallas-Fort Worth region has been one of the most rapidly growing areas in the United States. This growth can be attributed to a favorable business climate coupled with a low cost of living. However, the area has not been untouched by recent downturns. Maintaining and improving quality of life is important for the continued growth and success of the region.

A review of peer cities was conducted to determine if the region's economic competitiveness would be mired if traditional means of funding for the transportation system were reduced and needed improvements were delayed. Because North Central Texas actively pursues innovative funding strategies, the ability to implement transportation improvements in the face of shrinking revenues allows North Central Texas to address congestion issues more effectively than other regions.

Operational Efficiency: Building enough capacity to solve the region's congestion problems is not a viable option. Efforts must be made to manage the current system more effectively. Managing system demand and congestion through technology and other low-cost operational strategies can maximize the current system and substantially improve congestion and air quality in the region. Developing in a more sustainable way and emphasizing the land use/transportation relationship is an important strategy in improving operational efficiency.

Mobility Options: Providing transportation choices is vital to maintaining and improving the quality of life for North Central Texas residents. Because the transportation needs of the region far outweigh the available funds, strategic investment in infrastructure is required. Mobility 2035 recommendations strike a balance between meeting the most critical mobility needs while making a variety of transportation options available.

Policies, Programs, and Projects

The Mobility 2035 recommendations consist of policies, programs, and projects that reflect regional priorities and support Mobility 2035 goals. These policies, programs, and projects support the continued development and implementation of a high quality transportation system. The major expenditures for Mobility 2035 are summarized in *Exhibit 1.3* and detailed recommendations are provided throughout the document.

Mobility 2035 Expenditures	
Infrastructure Maintenance	$27.3
Management and Operations Strategies	$4.8
Growth, Development, and Land-use Strategies	$3.9
Public Transportation	$18.9
Freeway, Tollway, HOV/Managed Lane, and Arterial System	$46.2
Total (Actual $, Billions)	**$101.1**

Exhibit 1.3: Mobility 2035 Major Expenditures

Public Involvement

Public participation is essential to any planning process. During the development of Mobility 2035, a number of techniques were used to educate and involve the public. Soliciting feedback from and educating North Central Texas residents through public workshops, public meetings, community events, presentations, surveys, and print and digital media was essential to developing a long-range transportation plan that widely supports the region's priorities. Outreach began in December 2009 and continued through all phases of MTP development.

Summary

Mobility 2035 is the product of a comprehensive, cooperative, and continuous planning effort. The recommendations seek to meet the transportation demands of the estimated 9.8 million people that will call North Central Texas home by 2035. The Regional Transportation Council Resolution adopting Mobility 2035 and the North Central Texas Council of Governments Executive Board Resolution endorsing Mobility 2035 are included in Appendix H.


downtown dallas
financial reality
2035 mobility

Financial Reality

Mobility 2035 Supported Goals

- 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.

Introduction

Federal regulations require that metropolitan transportation plans be financially constrained to available resources. This means that projects and programs may only be included in the long-range plan if funding can be identified for their implementation. It is estimated that the Dallas-Fort Worth region would need approximately $395.3 billion to eliminate the worst levels of congestion. Mobility 2035 identifies approximately $101.1 billion in resources to fund transportation in the region through the year 2035. Mobility 2035 does not represent a wish list of transportation projects and programs, but instead is an inventory of the most needed projects and programs that most meet the region's transportation goals. In addition to financial constraint, the metropolitan transportation plan must report financial information in year of expenditure and total project cost to more accurately reflect the true cost of implementing programs and projects over time. Financial information in Mobility 2035 is adjusted for inflation and represents year of expenditure and total project cost unless otherwise noted.

Mobility 2035 Policies

Policies represent an important part of the planning process as they often set the tone for project or program development and delivery. The following policies are broad and meant to guide the financial aspects of transportation planning. These policies are not intended to address the specific allocation of funds or funding for individual projects and programs. A complete list of policies can be found in Appendix A.

Transportation Funding at a Glance:

Funding improvements for the region's multi-modal transportation system is complex. There are a number of revenue sources available to build and maintain the system; however, many revenue streams for transportation are restricted to certain uses – this means that only particular types of improvements can be funded with a given source. Transit in the region is largely funded by the sales taxes that are collected within the given transit authority's service area. Roadway projects are funded through federal and state fuel taxes, vehicle registration fees, toll user fees, state and local bond programs, and local governments' general funds. Other transportation improvements like bicycle/pedestrian facilities and congestion management tools can also be funded with the previously mentioned sources. There are two important documents when it comes to funding transportation projects. They are this document, the Metropolitan Transportation Plan, and the Transportation Improvement Program. The Metropolitan Transportation Plan is a long-range planning document that acts like a savings account. It serves as a guide for the projects and programs that the region would like to implement over the life of the Metropolitan Transportation Plan. It also identifies potential ways in which the desired improvements could be funded. The Transportation Improvement Program is a more near-term planning document and acts like a checking account. It lists the specific projects that will be programmed for funding in the near term. For a project to be funded it must be in both the Metropolitan Transportation Plan and the Transportation Improvement Program.

Did you know …

… state and federal fuel taxes are assessed on a per-gallon basis? This means that no matter how much fuel costs, you are always paying the same amount of tax.

… current state fuel taxes are $0.20 per gallon and have not increased since 1991?

… federal fuel taxes are $0.184 cents per gallon for gasoline and $0.244 for diesel and have not increased since 1993?

F3-001: The Regional Transportation Council (RTC) will select and program projects within the guidelines established by the funding source. Programming and selection guidelines for RTC Local Funds are determined by the RTC.

F3-002: Incorporate sustainability and livability options during the project selection process. Include additional weighting or emphasis as appropriate and consistent with RTC policy objectives including, but not limited to, demand management, air quality, natural environment preservation, social equity, or consideration of transportation options and accessibility to other modes (freight, aviation, bicycle and pedestrian).

F3-003: Ensure adequate funding for multi-modal elements within implemented projects.

F3-004: Utilize project staging and phasing of metropolitan transportation plan recommendations to maximize funding availability and cash flow.

F3-005: Ensure that adequate funding is given to maintenance and operations of the existing multi-modal transportation system consistent with federal and/or state guidelines and recommendations.

F3-006: Pursue roadway and transit pricing opportunities to expedite project delivery.

F3-007: Pursue project cost reductions through value engineering, streamlined project development, and other activities.

F3-008: Pursue an increase in North Central Texas' share of state and federal allocated funds consistent with RTC legislative position.

F3-009: Pursue legislative actions aimed at increasing revenue through initiatives identified by the RTC.

F3-010: Leverage traditional and non-traditional transportation funding to expand services across the region.

F3-011: Utilize multiple funding sources, including innovative funding methods, in order to fully fund projects.

Financial Planning Process

The Metropolitan Planning Organization (MPO) recognizes that the region's transportation needs far exceed our ability to pay for the improvements. Likewise, federal planning regulations require that financial constraint is exercised in the metropolitan transportation plan (MTP). As a result, an iterative process was developed to balance funding between the major elements of the MTP based upon regional priorities. Through the process, mobility needs were identified based on the goals and objectives of the MTP and costs for projects and programs were estimated and summed. Independently, revenue sources were identified and projected through the plan horizon year of 2035. Available revenues were then allocated to an appropriate mode. It is important to note that not all sources of revenue for transportation improvements can be spent on all modes. This process was repeated until an acceptable level of service for each mode was reached based upon the financial resources available. *Exhibit 2.1* details the financial planning process for Mobility 2035.

Exhibit 2.1: Financial Planning Process

Costs

Cost estimations for projects and programs were developed in one of two ways. Direct costs were provided by the implementing agency for known individual projects, and unit costs were used to calculate total project costs where no specific cost was available. Costs for recommended programs and projects are reported in the appendices located at the end of this document.

Revenue Estimation

Traditionally, funds for implementing projects and programs have been estimated using a financial forecasting model that tracks historical transportation revenue from federal and state motor fuels taxes, state vehicle registration revenues, and other federal and state taxes which are used to fund transportation. The forecasting model provides an estimate of future revenues based upon historic trends. However, due to a number of factors, including recent economic downturn, insolvency of the Highway Trust Fund, rescissions, and increased fuel efficiency, this is no longer the preferred method to forecast future revenues. In addition to the factors previously mentioned, inconsistencies between financial forecasts used by the 25 Texas MPOs in development of their long-range transportation plans have created difficulties in formulating a statewide plan. To address the uncertainty of long-range forecasting and to ensure standard methods are used across the state, a workgroup with members from the Texas Association of MPOs and the Texas Department of Transportation was formed to create a financial model that would allow users to test various financial scenarios while keeping the forecasting methods consistent. The model created by this group is known as the *Transportation Revenue Estimation and Needs Determination System*, or TRENDS, and was validated by the Texas Transportation Institute. The TRENDS model was used to forecast state and federal funds for Mobility 2035. The financial forecasts for Mobility 2035 also include predicted revenue from the region's toll and managed lane system and local funds, as well as the revenues from the region's three transit authorities: Dallas Area Rapid Transit, Denton County Transportation Authority, and The Fort Worth Transportation Authority.

Revenue Scenarios

During the development of Mobility 2035 three revenue scenarios were considered. These scenarios illustrated possible financial conditions for the regional transportation system based upon potential actions taken or not taken by federal, state, or local governments. *Exhibit 2.2* provides details on the assumptions made under each scenario.

Status Quo Scenario

The Status Quo scenario represents a minimal level of investment that focuses on traditional transportation revenues as they exist today. Under this scenario, there would be no increase in fuel taxes, vehicle registration fees, and other sources over the next 25 years. This scenario would also include minimal use of toll roads, managed lanes, and other innovative funding techniques. Approximately $74.9 billion would be available to fund transportation projects in the region over the next 25 years.

Mobility 2035 Financial Scenario Assumptions

Funding Strategies	Status Quo	Enhanced (Federal and State)	Enhanced + Local Option
State Fuel Tax (per gallon)	$0.20 (existing)	+$0.05 in 2020 & +$0.05 in 2030	Same as Enhanced
State Fuel Tax Indexing	-	To Fuel Efficiency by 2015	Same as Enhanced
Federal Fuel Tax (per gallon)	$0.184 (existing)	+$0.05 in 2020 & +$0.05 in 2030	Same as Enhanced
Average Vehicle Registration Fee	$60 (existing)	Same as Status Quo	+$10 in 2015 & +$10 in 2025
Toll Roads, Managed Lanes, CDA, and PPP	Currently Funded Facilities	Same as Status Quo	Additional Facilities
Other Assumptions	-Regional Partners Continue to Implement Projects -Reliance on Local Entities to Fund Projects Locally	Same as Status Quo Plus: -End 80% of Diversions Incrementally by 2025 -Maintenance: TxDOT Addresses Pavement Conditions; MPO Funds Bridge Replacements	Same as Enhanced
Total Revenue ($B)	**$74.9**	**$86.4**	**$101.1**
Additional Revenue from Status Quo ($B)		**+$11.5**	**+$26.2**

Exhibit 2.2: Mobility 2035 Financial Scenario Assumptions

Statewide Enhanced Scenario

The Statewide Enhanced scenario represents the financial conditions that would exist if taxes or fees for transportation were increased at the state or federal level. Under this scenario, the increased tax or fee would be applied at the state level and the Dallas-Fort Worth region would receive a portion of the generated funds back. Like the Status Quo, this scenario would include minimal use of toll roads, managed lanes, and other innovative funding techniques. Under this scenario, approximately $86.4 billion would be available to fund transportation projects in the region between now and 2035.

Statewide Enhanced + Local Option Scenario

The Statewide Enhanced + Local Option scenario represents the most aggressive of the three funding options. In this scenario, the assumptions from the Statewide Enhanced scenario would be used with the addition of several local revenue initiatives. Local initiatives could be project based, like implementing a robust toll and managed lane system and/or they could be tax or fee based, like an increase in vehicle registration fees. The fees from the local revenue initiatives would only be assessed in the 12-county Metropolitan Planning Area and would be used to leverage additional funds for projects of high importance within the region. Under this scenario, it is estimated that $101.1 billion would be generated to fund transportation improvements in the region over the next 25 years.

Mobility 2035 Selected Revenue Scenario

After evaluating historic trends, the current state of transportation funding, and the plausibility of future funding, the RTC selected the $101.1 billion Statewide Enhanced + Local Option scenario to represent the financially constrained revenue forecast for Mobility 2035. This scenario is more than $44 billion dollars less than the previous plan, Mobility 2030 – 2009 Amendment. *Exhibit 2.3* summarizes the major expenditure categories for Mobility 2035.

Mobility 2035 Expenditures	
Infrastructure Maintenance	$27.3
Management and Operations Strategies	$4.8
Growth, Development, and Land-Use Strategies	$3.9
Public Transportation	$18.9
Freeway, Tollway, HOV/Managed Lane, and Arterial System	$46.2
Total (Actual $, Billions)	**$101.1**

Exhibit 2.3: Mobility 2035 Major Expenditures

Because financial projections that extend 25 years in the future is anything but certain, and because revenue is largely dependent on national, state, and local policies, Mobility 2035 contains a financial plan that forms the basis for ongoing financial planning based on funding sources that can reasonably be expected to be available for transportation uses. The following financial assumptions are utilized in Mobility 2035:

- Beginning in 2015, the state fuel tax will be indexed (adjusted annually) to fuel efficiency. Because fuel taxes are assessed on a per gallon basis, as vehicles become more efficient they consume less fuel. This decreases the amount of revenue available for transportation improvements. By indexing to fuel efficiency, existing revenues can be maintained into the future.
- Beginning in 2015, a $10 local option vehicle registration or mobility fee will be assessed within the 12-county Metropolitan Planning Area boundary.
- In 2020, both state and federal fuel taxes will be increased by 5 cents each.
- In 2025, an additional $10 local option vehicle registration or mobility fee will be assessed within the 12-county Metropolitan Planning Area boundary.
- By 2025, the state will have incrementally eliminated 80 percent of the diversions from the State Highway Fund. This does not include the portion of the gas tax that goes to fund education because this is protected by the state constitution.
- In 2030, both state and federal fuel taxes will be increased by 5 cents each.
- Over the life of the MTP, toll roads, managed lanes, comprehensive development agreements, public-private partnerships, and other innovative funding options will be used to implement projects.
- Over the life of the MTP, the state will address pavement conditions while the MPO will fund bridge replacements.
- Over the life of the MTP, regional transportation partners will continue to implement projects.
- Over the life of the MTP, there will be an increased reliance on local entities to fund projects locally.

Exhibit 2.4 provides a comparison between observed rates of change in taxes and fees used to fund transportation versus the assumptions made in Mobility 2035. As evident by the table, the revenue enhancements used in Mobility 2035 fall well within historical rates of change.

Exhibit 2.5 shows the breakdown of revenue sources for Mobility 2035. *Exhibit 2.6* illustrates the financial impacts of the previously mentioned assumptions compared to the Status Quo scenario.

Transportation Tax/Fee	Average Annual Growth Rate	
	Historic 1972 - 2010	Mobility 2035 2011 - 2035
State Fuel Tax	3.7%	1.7%
Federal Fuel Tax	4.1%	1.8%
Vehicle Registration Fee	2.8%	1.2%

Exhibit 2.4: Observed Growth Rates vs. Mobility 2035 Assumptions

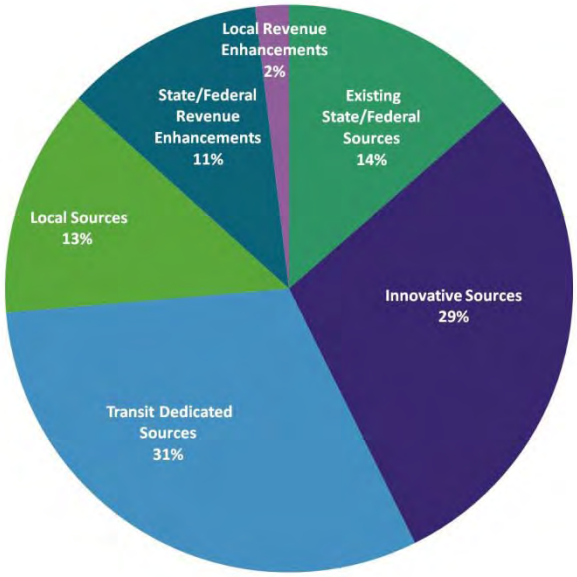


Exhibit 2.5: Mobility 2035 Revenue Sources

Revenue Initiatives

Demonstrating financial constraint does not tie Mobility 2035 to any specific revenue generation strategy. The financial assumptions contained within Mobility 2035 are merely an example of what could reasonably be expected to happen in the future. This allows for a more flexible approach to financial planning. However, while this approach is flexible, it puts an increasing burden on the RTC to monitor the financial situation of Mobility 2035 on a regular basis and to make adjustments accordingly. This is particularly true for traditional transportation funding sources like motor fuel taxes which are anticipated to decline over time. The RTC will continue to monitor state and federal initiatives regarding replacements for traditional fuel tax revenues and will encourage the development of alternative funding options. It is important to note that the RTC's adoption of the Mobility 2035 financial scenario was done in conjunction with their legislative program. In addition to the RTC's current legislative program, it is proposed that the following strategies be acted upon to ensure the realization of projected revenue:

- Continue RTC/Transportation Commission Partnership Program to leverage available funding.
- Pursue innovative project financing using tools made available by state legislature.
- Pursue congestion pricing opportunities through managed facilities in specific corridors identified through planning studies.
- Decrease project costs through streamlining the project development and process value engineering initiatives.
- Continue to pursue legislative actions aimed at increasing revenue through additional initiatives identified by the RTC.
- Continue to pursue tollway development where feasible.

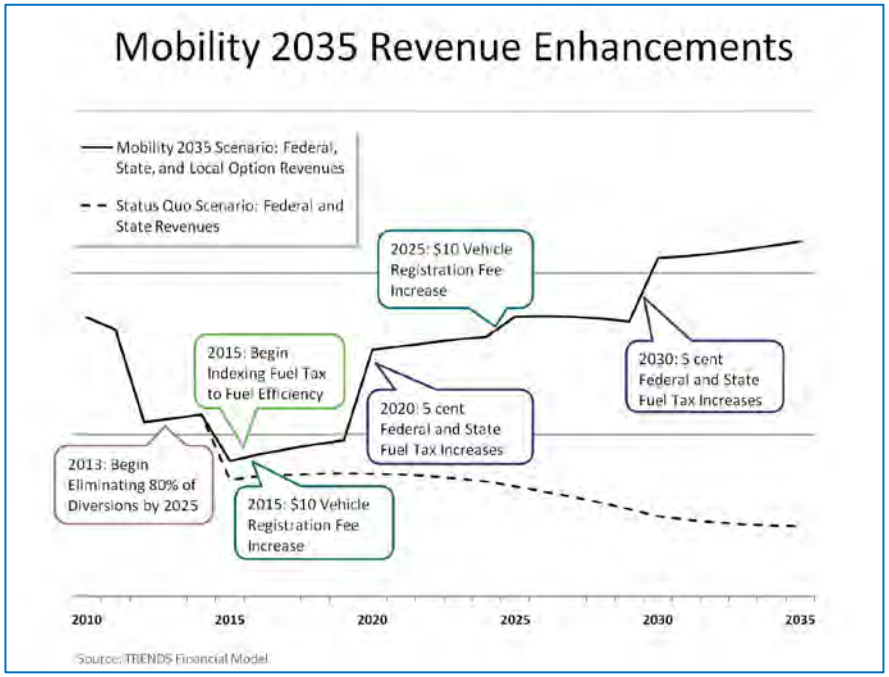


Exhibit 2.6: Impacts of Mobility 2035 Revenue Enhancements

The Region's Financial Reality

Despite the identification of $101.1 billion in transportation improvements, the region will continue to fall substantially behind in its ability to keep pace with a growing population and the resulting congestion between now and 2035. As mentioned earlier, the region will need approximately $395.3 billion to eliminate the worst levels of congestion between now and 2035. This represents a more than $294 billion shortfall. And while $101.1 billion is certainly a substantial investment, it's still over $44 billion less than what the previous MTP identified. The reality is as time passes, the region's transportation needs will continue to grow, but the availability of funding to build and maintain the transportation system will likely shrink. The consequence of this is an uncertain future for our regional transportation system.

Summary

Mobility 2035 represents a $101.1 billion blueprint for the continued maintenance and development of the regional transportation system over the next 20 plus years. Mobility 2035 complies with all federal requirements related to the financial aspects of the metropolitan transportation plan. *Exhibit 2.7* summarizes the anticipated revenues and expenditures for Mobility 2035. It is important to note that the source of funds for any given expenditure may change as projects develop. As the Dallas-Fort Worth region continues to grow, additional solutions will be imperatvie to comprehensively address the ever-increasing transportation needs.

Mobility 2035 Revenue and Expenditures *all values in millions* *values may not sum due to independent rounding*	Roadway Maintenance, Operations, Rehab, Safety	Freeway/Tollway	HOV/Managed Facilities	Regional Arterial System	Other Arterials	Congestion Management	Air Quality and Environment	Bicycle/Pedestrian Facilities	Sustainable Development and Transportation Enhancements	Transit Operations, Maintenance	Rail Capital and Transit System Expansion	Bus Capital	Paratransit Capital	Total
Commission Funds (cat 12)														$0.0
NHS Corridor (cat 2)		$286.2												$286.2
STP-MM (cat 7)		$1,042.1				$382.1	$312.6	$193.0						$1,929.9
CMAQ (cat 5)			$76.1			$393.1	$589.7	$152.4		$2.2	$299.1	$11.2		$1,523.8
Other TxDOT/Federal	$6,469.1	$1,532.7		$6.9	$6.1			$466.8	$156.7		$69.1			$8,707.4
Local Match	$250.5	$314.5	$19.0			$193.8	$225.6	$201.1		$0.5	$74.8	$2.8		$1,282.5
Toll System Revenue		$16,496.4												$16,496.4
CDA		$7,841.2												$7,841.2
Concession Payments	$1.4	$707.9	$571.9	$633.2	$273.0	$185.8		$51.0			$1.0			$2,425.2
Transit Public Private Partnership (iFi)											$2,664.3			$2,664.3
Transit Sales Tax	$396.0		$127.1							$10,917.6	$6,907.7	$1,132.4	$11.4	$19,492.2
FTA 5307 (formula)										$1,775.6	$214.5	$192.3	$12.5	$2,194.9
FTA 5309 (capital)											$761.7	$82.4		$844.0
Other Transit										$4,439.7	$4,288.3	$65.7	$0.5	$8,794.2
Local	$2,016.6			$4,244.1	$4,112.3	$1,766.2	$374.3	$131.8	$358.5		$176.6			$13,180.5
State/Federal Revenue Enhancements	$1,060.3	$6,857.4	$852.9	$172.9		$414.9	$1,728.8	$299.7	$138.3					$11,525.1
Local Revenue Enhancements											$1,934.7			$1,934.7
Total	**$10,193.9**	**$35,078.4**	**$1,647.0**	**$5,057.1**	**$4,391.4**	**$3,335.9**	**$3,231.0**	**$1,495.7**	**$653.5**	**$17,135.6**	**$17,391.8**	**$1,486.7**	**$24.4**	**$101,122.5**

Exhibit 2.7: Mobility 2035 Revenues and Expenditures


texas pedestrian crossing
social considerations
2035 mobility

Social Considerations

Mobility 2035 Supported Goals

- Assure all communities are provided access to the regional transportation system and planning process.
- Encourage livable communities which support sustainability and economic vitality.
- Preserve and enhance the natural environment, improve air quality, and promote active lifestyles.
- Provide for timely project planning and implementation.

Public Benefits of the Transportation System

The transportation system provides residents in the Dallas-Fort Worth area access to jobs, medical care, recreation, education, and public facilities and opportunities. The ease of accessing daily life activities and the availability of transportation options contributes to the overall quality of life of a region. Developing transportation infrastructure, focusing on the way people travel, and improving the connection between land use and transportation while maintaining sensitivity to diverse demographic and social needs is key to supporting vibrant and livable communities and enhancing quality of life for all residents.

Opportunities to walk instead of drive are linked to healthy communities or a community which includes elements that enable people to maintain a high quality of life and productivity. The benefits of walking – whether for utilitarian or recreational purposes – can be expressed in terms of improved environment and personal health, reduced traffic congestion, enhanced quality of life, and economic rewards, as well as other benefits.[1] The Centers for Disease Control (CDC) have linked the lack of physical activity as a major contributor to the rise in obesity, diabetes, heart disease, and several other chronic conditions in the United States.[2] The CDC Recommendations for Improving Health through Transportation Policy

[1] Pedestrian and Bicycle Information System, 2010, www.walkinginfo.org

[2] CDC Recommendations for Improving Health through Transportation Policy, www.cdc.gov/transportation

Social Considerations at a Glance:

Engaging the public and addressing their needs is of utmost importance in any public planning process. The North Central Texas Council of Governments proactively seeks to educate and engage North Central Texans in the transportation planning process. It is expected that by 2035 nearly ten million people will call North Central Texas home. Meeting the mobility needs of today and tomorrow requires coordination and collaboration of all stakeholders. Likewise, nondiscrimination plays a vital role in the transportation planning process. Through public outreach and analysis, the Regional Transportation Council seeks to understand and address the needs of the North Central Texas community.

In This Chapter:

Did You Know …

… by the year 2035, the 12-county Metropolitan Planning Area is forecasted to grow to 9.8 million residents; a 50 percent increase in the population of North Central Texas over the next 25 years?

… job accessibility will increase for protected populations by 64 percent if Mobility 2035 roadway and transit recommendations are built by the year 2035?

"Simple justice requires that public funds, to which all taxpayers of all races contribute, not be spent in any fashion which encourages, entrenches, subsidizes, or results in racial discrimination."

John F. Kennedy, 1963

outlined several transportation policies that have direct impacts on human health. A key recommendation of this report to improve the health of a community through transportation policy is to promote active transportation.

Mobility 2035 includes policies, programs, and projects that support a range of mobility options that contribute to livable communities. Through development of active transportation systems such as bicycle and pedestrian facilities, Mobility 2035 promotes active lifestyles that lead to healthy communities. Active transportation offers opportunities for residents to engage in physical activity while traveling to daily activities. Active transportation facilities create more equitable communities by providing transportation options for all residents. By providing a system that may be utilized by all residents regardless of income, age, or disability, active transportation has the ability to increase the social capital and economic health of a community. Active transportation elements such as bicycle and pedestrian options can be found in the Mobility Options chapter.

Considerations for healthy, livable, and sustainable communities should be integrated into the transportation planning process. The Environmental Considerations, Operational Efficiency, and Mobility Options chapters of Mobility 2035 recommend programs and projects that aim to support and lead to healthy, livable, and sustainable communities for the existing and future residents of the Dallas-Fort Worth area.

Regional Population and Employment Trends

Regional population and employment trends and forecasts determine where residents currently live, work, and carry out leisure activities and where they will be undergoing these activities in the future. This information is necessary for the transportation plan in order to provide facilities and connections that aim to meet the mobility and accessibility needs of existing and future populations.

The Dallas-Fort Worth-Arlington Metropolitan Statistical Area (MSA) was one of the fastest growing areas in the United States during the 2000s.[3] The MSA had the second largest increase in population after the Houston-Sugar Land-Baytown MSA. From 2000 to 2010, the Dallas-Fort Worth-Arlington MSA population increased 23.4 percent, an addition of 1.2 million residents (from 5,161,544 in 2000 to 6,371,773 in 2010).[4] According to the most recent American Community Survey, the MSA was listed as the fourth largest in the country.

The region continues to experience high levels of population growth and forecasts project this trend will continue through 2035. The continued growth in this region is important to transportation planners who strive to provide a system that meets the needs of a diverse population. Several key considerations for planners related to demographics and transportation include the density, size, and profile of the population. Population location and quantity impact where transportation improvements will be needed to curb congestion and have an effect on the land use/transportation connection. These two aspects are explored further in the Mobility Options chapter and the Sustainable Development portion of the Operational Efficiency chapter.

Historical Population Growth

In 2010, the 12-county Dallas-Fort Worth Metropolitan Planning Area (MPA) had a population of approximately 6.5 million.[5] By the year 2035, these same 12 counties are forecasted to grow to 9.8 million residents. This growth represents a 50 percent increase in the population of North Central Texas over the next 25 years. Historical population growth is important to understanding where populations will grow in the future.

Exhibit 3.1 shows the population distribution by county for 1990, 2000, and 2010. In 1990, Collin, Dallas, Denton, and Tarrant counties (core counties) had a combined population of 3.56 million, or 89 percent, of the 12-county population. In 2000, these core counties had grown to nearly 4.6 million, or 88 percent, of the regional population and in 2010, these four counties accounted for approximately 5.6 million, or 88 percent, of the 12-county population. *Exhibit 3.2* shows the changes in population share of each county of the 12-county region.

Looking more closely at the individual growth of each of these four counties provides additional perspective on regional growth. From 1990 to 2010, Dallas County's percentage of the 12-county region population decreased by nine percentage points while Tarrant County's population decreased by one percentage

[3] The Dallas-Fort Worth-Arlington MSA consists of Collin, Dallas, Delta, Denton, Ellis, Hunt, Johnson, Kaufman, Parker, Rockwall, Tarrant, and Wise counties.

[4] 2010 US Census, www.census.gov

[5] 2010 Census, www.census.gov

point. The population percentage of Collin County and Denton County increased by five percent and three percent, respectively, during the past two decades.

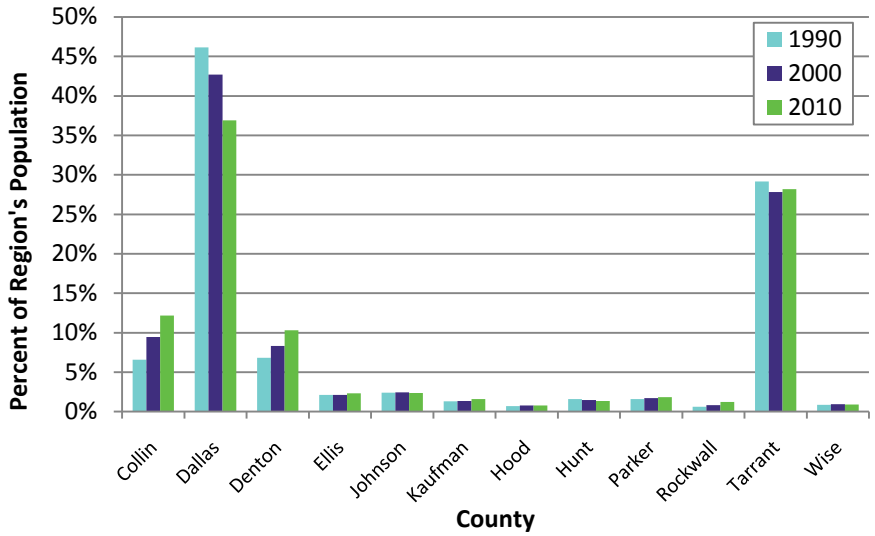


Exhibit 3.1: Historical Population Growth by County, 1990-2010 US Census Data

Additionally, more than 52 percent of the regional growth between 2000 and 2010 was accounted for by eight cities: Fort Worth, 17 percent; Dallas, 10 percent; Frisco, 6 percent; McKinney, 6 percent; Plano, 4 percent; Arlington, 3 percent; Grand Prairie, 3 percent; and Allen, 3 percent.

Population Forecasts

Mobility 2035 uses the North Central Texas Council of Governments (NCTCOG) 2040 demographic forecast to develop the transportation recommendations included in the Metropolitan Transportation Plan. The 2012 and 2035 population forecasts are used to model the regional transportation needs associated with roadways, transit, and other programs and projects. Using the population forecasts for 2012 and 2035, the total population of the MPA is projected to increase from 6,651,887 in 2012 to 9,833,378 in 2035. *Exhibit 3.3* represents this increase of 48 percent growth and the growth by individual counties in the MPA.

MPA County	Population					
	1990		2000		2010	
	Number	Percent	Number	Percent	Number	Percent
Collin	264,036	7	491,675	10	782,341	12
Dallas	1,852,810	46	2,218,899	43	2,368,139	37
Denton	273,525	7	432,976	8	662,614	10
Ellis	85,167	2	111,360	2	149,610	2
Hood	28,981	1	41,100	1	51,182	1
Hunt	64,343	2	76,596	2	86,129	1
Johnson	97,165	2	126,811	2	150,934	2
Kaufman	52,220	1	71,313	1	103,350	2
Parker	64,785	2	88,495	2	116,927	2
Rockwall	25,604	1	43,080	1	78,337	1
Tarrant	1,170,103	29	1,446,219	28	1,809,034	28
Wise	34,679	1	48,793	1	59,127	1
Total	**4,013,418**	**100**	**5,197,317**	**100**	**6,417,724**	**100**

Exhibit 3.2: Population Share of Counties of the 12-county Region, 1990, 2000, and 2010

MPA County	2012 Population	2035 Population	Growth	Percent Growth
Collin	806,425	1,404,149	597,724	74%
Dallas	2,444,148	3,125,282	681,134	28%
Denton	660,863	1,053,903	393,040	59%
Ellis	162,405	252,768	90,363	56%
Hood	67,688	97,805	30,117	44%
Hunt	98,791	148,451	49,660	50%
Johnson	173,741	272,061	98,320	57%
Kaufman	111,267	193,509	82,242	74%
Parker	122,372	193,730	71,358	58%
Rockwall	86,236	172,568	86,332	100%
Tarrant	1,848,779	2,823,535	974,756	53%
Wise	70,172	95,617	25,445	36%
Total	**6,651,887**	**9,833,378**	**3,181,489**	**48%**

Exhibit 3.3: 2040 Demographic Forecast Population Growth by County, 2012-2035

The highest magnitude of population growth among all counties is projected to occur in Tarrant County with the addition of 974,756 persons between 2012 and 2035. Dallas (682,134), Collin (597,724), and Denton (393,040) counties follow

Tarrant County as the next top three growing counties in terms of forecasted population growth between 2012 and 2035. Rockwall County has the greatest percent increase in forecasted growth with a doubling of the 2012 population in 2035 to 172,568 persons. Counties projected to grow by more than 50 percent in population include Collin, Denton, Ellis, Hunt, Johnson, Kaufman, Parker, Rockwall, and Tarrant.

Population Density

In addition to the forecasted population values by county and for the region, the population density is critical to the decision-making process regarding the needed and appropriate transportation facilities. For the Dallas-Fort Worth MPA, the population density is projected to increase from 2,058 to 3,143 persons per square mile between the years 2012 and 2035, respectively. *Exhibits 3.4, 3.5, and 3.6* show the population density by county and by traffic survey zone between 2012 and 2035.

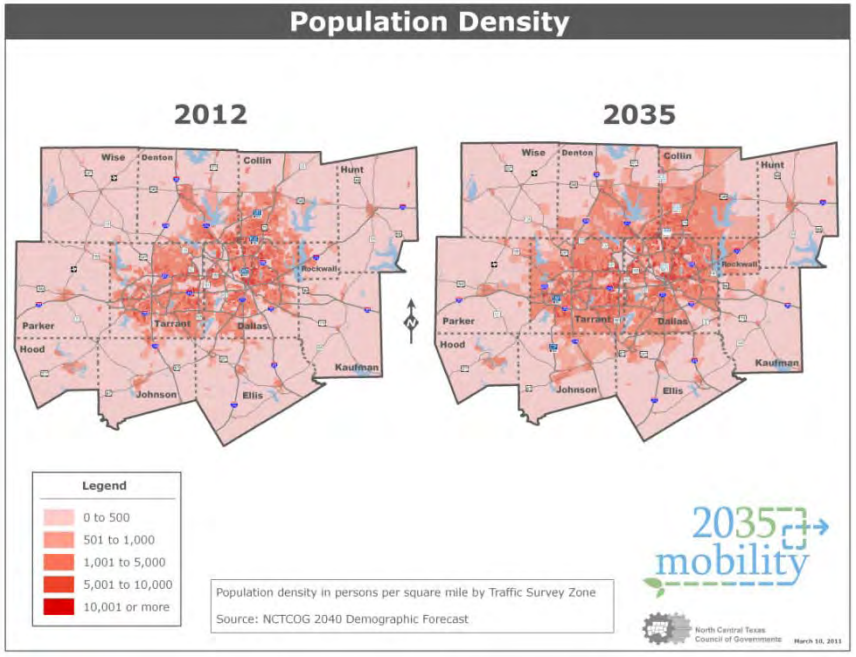


Exhibit 3.4: Increase in Population Density by County, 2012-2035

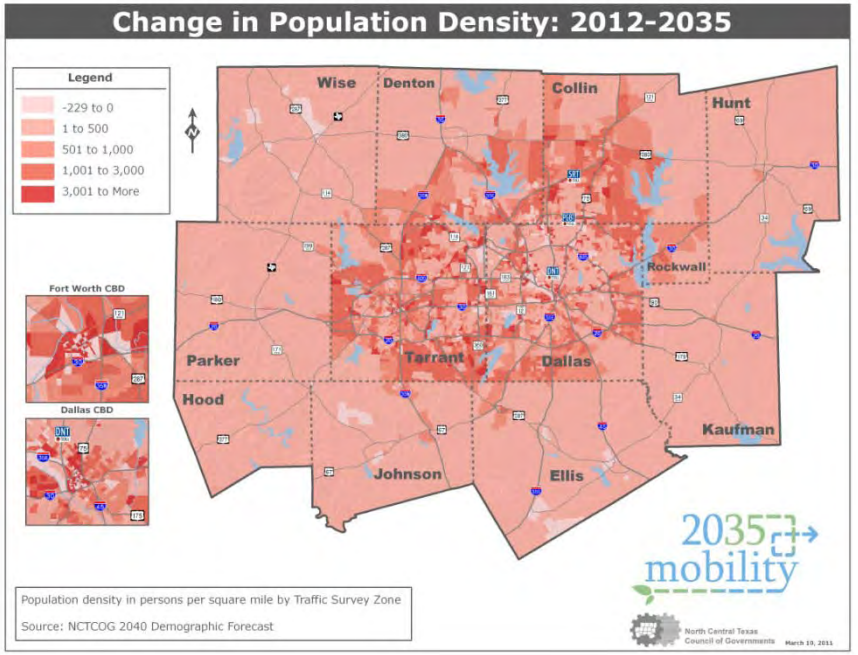


Exhibit 3.5: Population Density in the 12-county MPA, 2012 and 2035

As shown in *Exhibit 3.6*, density increases the greatest in Tarrant, Dallas, Collin, Rockwall, and Denton counties by 1,085; 750; 674; 580; and 410 persons per square mile, respectively, by 2035 (area shown in light blue). These increases result in the following top five densest counties in 2035: Dallas, Tarrant, Collin, Rockwall, and Denton counties at 3,438; 3,143; 1,584; 1,159; and 1,100 persons per square mile, respectively. The least dense county in 2035 is Wise County at 104 persons per square mile.

Employment Growth

North Central Texas is a major economic, social, and political center of both Texas and the United States. The Dallas-Fort Worth area represents 34 percent of the state's economy and is the twelfth largest metropolitan economy in the world. The region supports a diverse economy and is home to 24 Fortune 500 companies. By the year 2035, the region is expected to experience a 48 percent increase in population and a 47 percent increase in employment. The transportation system is central to this growth because it allows for the efficient movement of people and goods. Understanding not only population but employment growth is critical to the

transportation planning process and to providing the best system to move people to and from jobs.

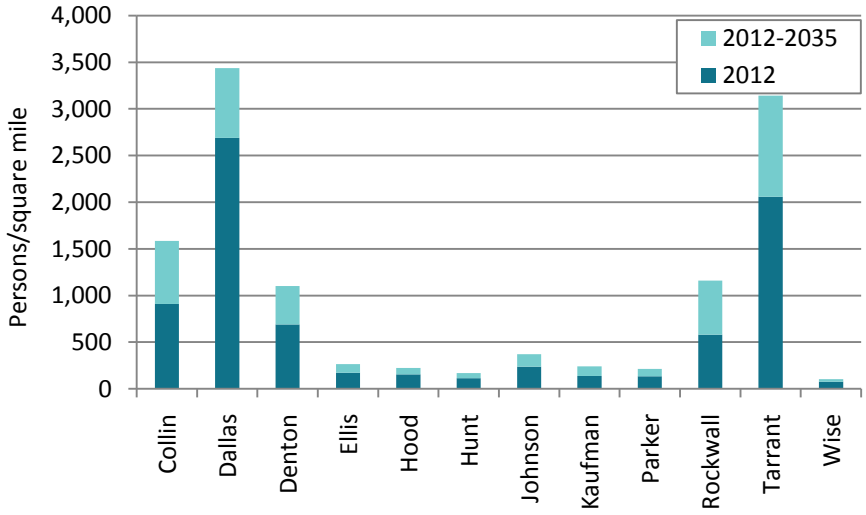


Exhibit 3.6: Change in Population Density in 12-county MPA, 2012-2035

Employment Forecast

Employment within the 12-county MPA is projected to increase 47 percent from 4,210,178 jobs in 2012 to 6,177,016 in 2035. During the same period, the average employment density is projected to increase from 446 to 654 jobs per square mile in the region. An increase of 36 percent in basic jobs, 45 percent in retail jobs, and 52 percent in service jobs is projected between 2012 and 2035.

Employment growth by county is shown in *Exhibits 3.7, 3.8*, and *3.9*. The highest increase in the number of jobs is projected to occur in Dallas County at 707,504; a growth rate of 33 percent. Dallas County is followed by Tarrant County which is projected to have 545,498 additional jobs or a 50 percent increase. Rockwall County is projected to have the highest employment growth rate at a 108 percent increase followed by Kaufman County at a 92 percent employment growth rate.

Growth in the region's employment plays an important role in forecasting population. Regions with job growth retain current residents and attract those moving for employment opportunities. Transportation planners use this information to forecast future revenue streams for transportation projects and determine areas that will need additional infrastructure. The region's employment forecasts show that employment opportunities will continue to grow, leading to long-term economic growth and vitality in North Central Texas.

County	2012 Employment	2035 Employment	Growth	Growth
Collin	380,184	628,349	248,165	65%
Dallas	2,146,783	2,854,287	707,504	33%
Denton	233,187	406,105	172,918	74%
Ellis	63,260	116,145	52,885	84%
Hood	21,035	37,036	16,001	76%
Hunt	48,140	78,163	30,023	62%
Johnson	70,283	132,917	62,634	89%
Kaufman	42,630	81,646	39,016	92%
Parker	49,360	91,660	42,300	86%
Rockwall	25,924	53,934	28,010	108%
Tarrant	1,098,965	1,644,463	545,498	50%
Wise	30,427	52,311	21,884	72%
Total	**4,210,178**	**6,177,016**	**1,966,838**	**47%**

Exhibit 3.7: Employment Growth by County, 2012-2035

North Central Texas Population Profile Changes

Planning for a demographically diverse region requires consideration for various transportation needs. Demographic trends indicate that the population will not have the same profile as it does today in terms of many factors such as race, ethnicity, income, and age. These are important elements that transportation planners must consider because they impact a variety of transportation needs. For example, an aging population requires planners to consider the enhanced safety and accessibility essential to those residents.

Historic Profile

Since the 1970s, both the overall and minority populations have increased dramatically in the region. Minority is defined as any person identified as African American, American Indian/Alaskan Native, Asian, Hawaiian/Pacific Islander, and Hispanic.

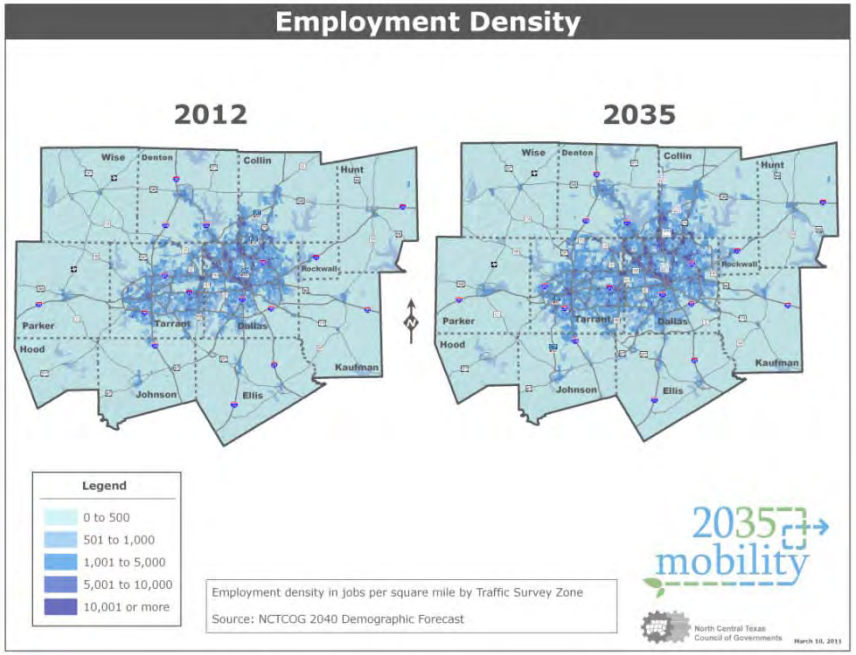


Exhibit 3.8: Employment Density in 12-county MPA, 2012 and 2035

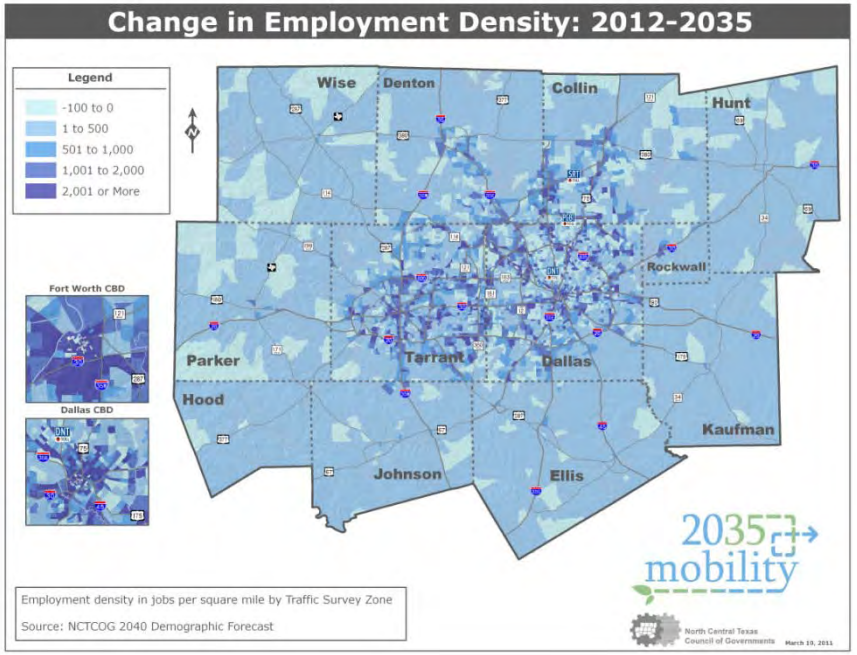
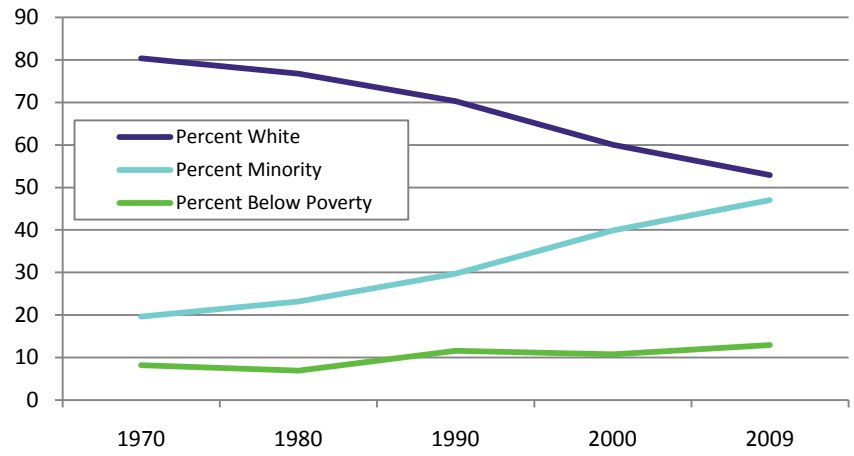


Exhibit 3.9: Change in Employment Density in 12-county MPA, 2012-2035

The overall population in the region has increased 150 percent from 2.5 million people in 1970 to 6.5 million in 2010. During the same period, the minority population has increased 500 percent from 500,000 in 1970 to 3.1 million in 2010.[6] *Exhibit 3.10* illustrates changes in the regional population profile over time.

Current Profile

During the last decade (2000 to 2010), the 12-county MPA's total population increased by 23 percent. At the same time, the minority population increased by 52 percent,[7] of which the Hispanic population grew by 59 percent. Today, the region is demographically diverse with a total minority population of approximately 48 percent. *Exhibit 3.11* illustrates the population profile of the North Central Texas region in 2010.

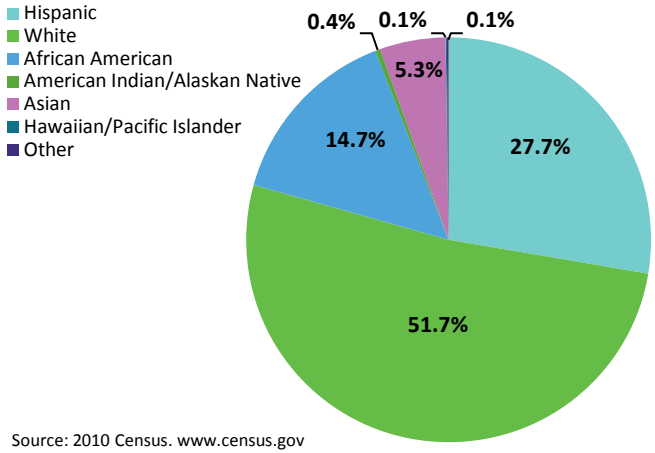


Source: www.nhgis.org

Exhibit 3.10: North Central Texas Population Change from 1970 to 2009

[6] 1970-2000 data: Minnesota Population Center, National Historical Geographic Information System: Pre-release Version 0.1, Minneapolis, MN: University of Minnesota 2004, www.nhgis.org, 2009 data: 2010 Census www.census.gov

[7] US Census Bureau, www.census.gov



Source: 2010 Census. www.census.gov

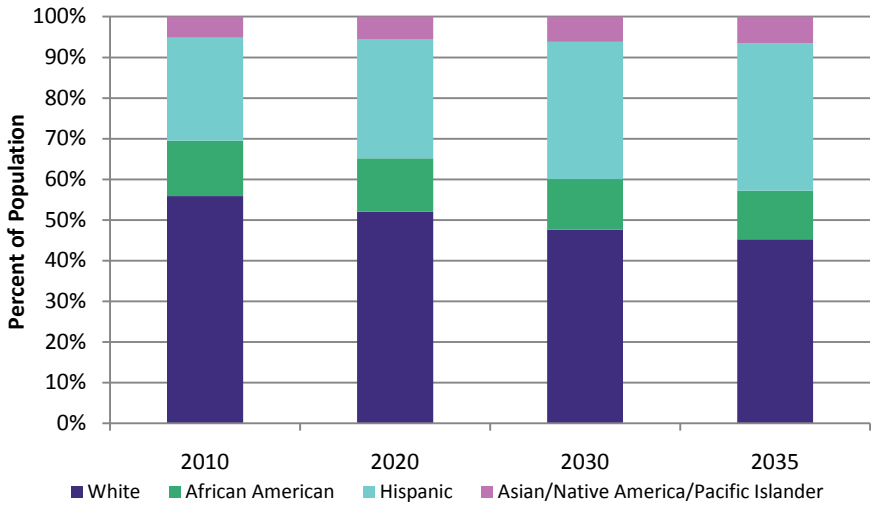
Exhibit 3.11: 2010 Population by Race and Ethnicity

Future Profile

Historically, the minority population has grown at a faster rate than the overall population. Based on current patterns in birth rates and migration, this trend is expected to continue into the future.[8] According to forecasts from the Texas State Data Center, non-white populations will make up a majority of the region's overall population by the year 2020 while white-non-Hispanics will experience a population decrease. Of the major racial/ethnic groups, Hispanics are expected to capture more of the overall population while the African American and Asian populations are expected to remain relatively stable. *Exhibit 3.12* represents how the demographic breakdown of the region is projected to change through 2035.

Changes in Language

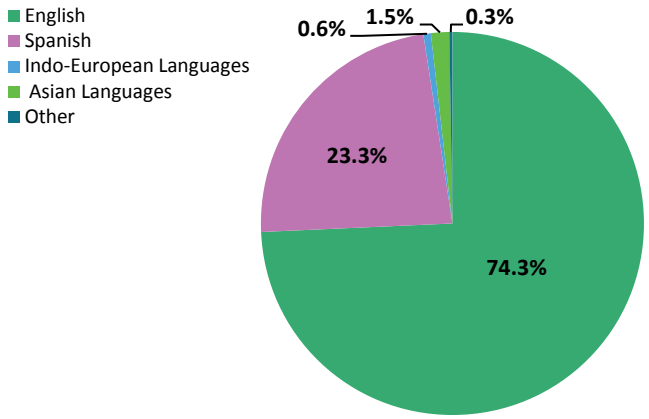
As North Central Texas continues to become a more diverse region, additional demographic changes will include the overall English proficiency of residents. The number of non-English speaking residents has increased over time. Persons who identify their ability to read, write, or speak English less-than-very-well are considered Limited English Proficient (LEP). According to 2007-2009 American Community Survey results, the largest LEP linguistic group in North Central Texas was Spanish speaking individuals at 23 percent of the region's total population.



Source: Texas State Data Center, February 2009

Exhibit 3.12: Percent of Total Population by Race/Ethnicity, 2010-2035

When all other languages are considered, approximately 26 percent of the total population has limited ability to read, write, or speak English. *Exhibit 3.13* represents the linguistic distribution of the region.



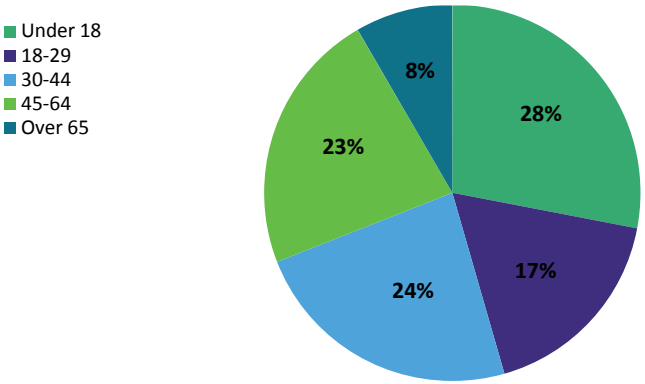
Source: 2007-2009 American Community Survey. www.census.gov

Exhibit 3.13: Languages Spoken in North Central Texas 12-county MPA, 2007-2009

[8] Regional Choices for North Texas, Vision North Texas, 2008, www.visionnorthtexas.org

Changes in Age

Changes in age are important for planners to consider as all age groups represent different transportation needs. *Exhibit 3.14* represents the age profile of North Central Texans. The distribution of age groups has remained relatively stable from 1990 to 2010; however, the over 65 age group has been a consistently growing segment of the population. As people age, their travel behavior, modal usage, and housing location preferences and service needs may change.



Source: 2007-2009 American Community Survey. www.census.gov

Exhibit 3.14: North Central Texas 12-county Age Group Distribution, 2007-2009

NCTCOG strives to understand the current and future demographics of the region to provide an effective transportation system that meets the needs of a diverse region. Aspects from how to engage the public to how people travel are dependent on a solid understanding of the region's demographics. Current trends, historical census data, population projections, and economic factors are used to inform the decision-making process.

Nondiscrimination Efforts

NCTCOG and the Regional Transportation Council are committed to providing an equitable transportation system for all residents. Throughout the development of Mobility 2035, nondiscrimination and environmental justice principles were incorporated so that no person is excluded from participation in, denied benefits of, or discriminated against in planning efforts. NCTCOG seeks to understand the impacts of programs and activities on the region and environmental justice populations through outreach and analysis efforts. NCTCOG holds nondiscrimination as a core principle in all efforts, including transportation planning.

The US Environmental Protection Agency defines environmental justice as "the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies … It will be achieved when everyone enjoys the same degree of protection from environmental and health hazards and equal access to the decision-making process to have a healthy environment in which to live, learn, and work."[9]

> **ENVIRONMENTAL JUSTICE** is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with regard to the development and implementation of plans, policies, and programs.

Several laws and regulations guide NCTCOG's nondiscrimination/environmental justice program. The first piece of nondiscrimination legislation that shapes NCTCOG's efforts is Title VI of the Civil Rights Act of 1964. Title VI stated that "No person in the United States shall, on the ground of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be subject to discrimination under any program or activity receiving Federal Financial Assistance."

The idea of environmental justice can trace its roots back to the civil rights movement of the 1960s. Title VI of the Civil Rights Act of 1964 was the basis by which nondiscrimination policies were formed. Title VI held all agencies that receive federal financial assistance accountable for their actions and mandated that those agencies ensure their policies and practices were not discriminatory in nature.

The environmental justice movement, as it is known today, started in the early 1980s when low-income and minority populations began to protest the siting of

[9] US EPA, www.epa.gov

toxic waste landfills in their neighborhoods. These efforts culminated in the signing of Executive Order 12898 in 1994 which mandated federal agencies incorporate environmental justice principles into their activities. This has evolved from protecting community human health to include social and economic health as well.

Under federal law, agencies must incorporate environmental justice into their activities. The three fundamental principles at the core of environmental justice are to:

- Avoid, minimize, or mitigate disproportionately high and adverse human health and environmental effects, including social and economic effects, on minority and low-income populations.
- Ensure the full and fair participation by all potentially affected communities in the transportation decision-making process.
- Prevent the denial of, reduction in, or significant delay in the receipt of benefits by minority and low-income populations.

NCTCOG seeks, at a minimum, to meet all state and federal regulations relating to nondiscrimination; however, it is the goal of the agency to go above and beyond basic requirements to create a transportation system that is beneficial to all residents of the region. The following goals guided the creation of Mobility 2035:

- Encourage community participation in the development of Mobility 2035, including traditionally underserved communities.
- Support data gathering and analysis of projects and programs to identify any potentially negative social, economic, health, or environmental impacts on communities.
- Seek to mitigate disproportionately high and adverse human health impacts when identified through analysis or public comment.

These goals are a reflection of NCTCOG's continual efforts to serve all members of the community throughout the transportation planning process.

Mobility 2035 Policies

Mobility 2035 supports the following nondiscrimination and public involvement polices:

EJ3-001: Evaluate the benefits and burdens of transportation policies, programs, and plans to prevent disparate impacts and improve the decision-making process, resulting in a more equitable system.

EJ3-002: Balance transportation investment across the region to provide equitable improvements.

PI3-001: Meet federal and state requirements to ensure all individuals have full and fair access to provide input on the transportation decision-making process.

PI3-002: Demonstrate explicit consideration and response to the public input received.

PI3-003: Use strategic outreach and communication efforts to seek out and consider the needs of those traditionally underserved by the transportation planning process.

PI3-004: Enhance visualization of transportation policies, programs, and projects.

PI3-005: Provide education to the public and encourage input and engagement from all residents on the transportation system and the transportation decision-making process.

Integrating Nondiscrimination Principles into the Planning Process

Nondiscrimination is an integral concern during the planning and project development process. NCTCOG strives to address the needs of protected populations and assess the impacts of activities throughout the span of a project from planning to implementation. Previous outreach efforts and analyses serve as the foundation of NCTCOG's decision-making process and guide further evaluations that address a multitude of social, environmental, and economic issues related to transportation planning.

NCTCOG understands that a one-size-fits-all transportation system does not exist; needs vary greatly from one group of users to another. For this reason, NCTCOG seeks to understand the needs of specific populations to develop a system that provides a high level of service to all populations. For example, minority populations (specifically Black and Hispanic populations) have historically had larger household sizes, lower incomes, and less vehicle ownership. Statistically Asians and

African Americans are more likely to use transit and Hispanics are more likely to carpool or walk.[10]

The North Central Texas Council of Governments does not plan specific projects based solely on the racial or ethnic makeup of a community. However, understanding how populations utilize the transportation system, coupled with the knowledge of demographics trends, planners are able to design a system that will accommodate current and future needs. The following discussion and analysis focuses on specific efforts to support nondiscrimination in all transportation planning programs, policies, and activities.

Identifying Protected Populations

Executive Order 12898 states that agencies must "collect, maintain and analyze information on the race, national origin, income level and other readily accessible and appropriate information surrounding facilities or sites expected to have substantial environmental or economic effect on surrounding populations." The magnitude and scope of the recommendations proposed in this plan require population patterns of the entire region be evaluated.

The first step in the process is to identify where the region's low-income and minority populations are located. These federally designated populations are referred to as environmental justice or protected populations and are displayed in *Exhibit 3.15*.

Additional groups are considered throughout the planning process in an effort to meet the requirements of Title VI including:

- Persons 65 years and older
- Persons with disabilities
- Female head of household (any female headed household with children present and no husband)

The Environmental Justice Index (EJI) is used by NCTCOG to aggregate low-income and minority populations for analysis efforts. Low-income and minority status are aggregated and analyzed together in an effort to examine the effects of recommendations in Mobility 2035 on the protected population as a whole. The EJI has been refined to reflect the demographic and development patterns of the North Central Texas region. Three variables, including percent below poverty, percent minority, and persons per square mile, are used to identify block groups with dense minority and low-income populations. The results are a tool for planners to easily identify populations for further analysis. *Exhibit 3.16* displays the EJI for the North Central Texas 12-county Metropolitan Planning Area.

Population	Definition
Black/African American	A person having origins in any of the Black racial groups of Africa
American Indian/Alaskan Native	A person having origins in any of the original peoples of North and South America who maintain tribal affiliation or community attachment
Asian	A person having origins in any of the original peoples of the Far East, Southeast Asia, or the Indian Subcontinent
Native Hawaiian or Pacific Islander	A person having origins in any of the original peoples of Hawaii, Guam, Samoa, or other Pacific Islands
Hispanic	A person of Mexican, Puerto Rican, Cuban, Central or South America, or other Hispanic origin.
Low-Income	A person whose household income is below the poverty line as determined by the US Department of Health and Human Services

Exhibit 3.15: Federally Designated Environmental Justice Population Definitions

Any block group with an EJI score above ten is considered an environmental justice protected block group for analysis purposes. This is used as the first filter in the environmental justice analysis to help determine if additional analysis needs to be conducted. Approximately 36 percent of all block groups have an EJI score above ten. This is reflective of the overall low-income and minority populations of the region which are 12 percent and 47 percent, respectively. All calculations are based on 2000 census data. *Exhibit 3.17* displays the number and percent of block groups that fall into each EJI category.

Identifying environmental justice populations is vital for system level analysis; however, this is only one step in the analysis process. Identifying individual populations allows planners to see how individual groups are impacted by plans, policies, and activities. The regional average of a specific population per block

[10] TR News, Demographic Changes Driving Change; Ensuring Mobility for all Safely, Efficiently, Equitably, Edition 264, September-October 2009.

group is established as the threshold for identifying a block group as having considerable numbers of protected populations. Any block group over the regional average is considered protected. *Exhibit 3.18* shows the regional average for each protected population. Appendix B includes maps displaying the protected populations by block group that are above the regional average.

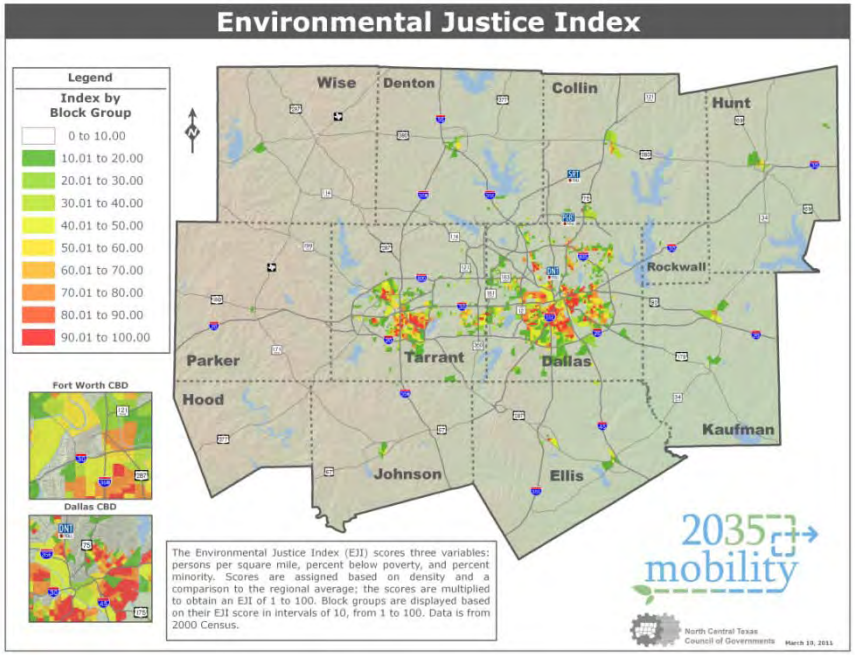


Exhibit 3.16: Environmental Justice Index for the 12-county Metropolitan Planning Area

Performance Indicators

Nondiscrimination principles are incorporated throughout the development of Mobility 2035; however, it is important to evaluate the final results to ensure that protected populations are not negatively impacted by the planned regional transportation system.

Mobility 2035 has identified $101.1 billion in transportation projects spread over approximately 9,500 square miles. Because of the magnitude of projects to be analyzed, a qualitative assessment of each project is infeasible. For this reason, the travel demand model is used to perform an environmental justice analysis on the Mobility 2035 roadway and transit recommendations.

EJI Score	Number of Block Groups	Percent of Block Groups
0-10	2306	64%
11-20	298	8.3%
21-30	113	3.2%
31-40	140	3.9%
41-50	163	4.5%
51-60	17	0.5%
61-70	140	3.9%
71-80	52	1.5%
81-90	118	3.3%
91-100	232	6.5%

Exhibit 3.17: Number of Protected Block Groups by EJI Score

Population	Regional Average
African American	14.9%
American Indian/Alaskan Native	0.6%
Asian	3.3%
Native Hawaiian/ Pacific Islander	0.2%
Hispanic	22.3%
Below Poverty	11.9%

Exhibit 3.18: 2000 Regional Averages for Protected Populations[11]

The goal of the transportation system is to allow people to reach their destinations in the most efficient and effective way. One of the goals of Mobility 2035 is to improve the availability of transportation options for people and goods. This is achieved through enhancing mobility and accessibility.

Mobility is the potential for movement or the ability to travel from one place to another. Examples of factors that impact mobility include road capacity, intelligent transportation systems, and design. Accessibility denotes how well the system provides access to locations and opportunities. Examples of factors that impact

[11] At the time Mobility 2035 was published, 2010 Census data did not contain poverty status. For consistency in the performance measure analysis of Mobility 2035, 2000 Census data was used to establish regional average until poverty status is made available.

accessibility include the cost in both time and dollars and the number of modal choices available to reach a location.[12]

Accessibility has a direct impact on a person's quality of life; for this reason Mobility 2035 environmental justice performance indicators focus on accessibility verses mobility. The performance indicators used to evaluate the Mobility 2035 recommendations are shown in *Exhibit 3.19*. These performance indicators allow the assessment of impacts on accessibility to several quality of life indicators including work, education, medical care, and recreation, as shown in *Exhibits 3.21 through 3.25.*

Accessibility	Mobility
•Number of jobs accessible within 30 minutes by automobile* •Number of jobs accessible within 60 minutes by transit* •Average travel time to special generators (universities, hospitals, regional shopping centers)	•Average level of congestion •Average travel time

*The travel time thresholds of 30 minutes by auto and 60 minutes by transit are based on regional travel patterns.

Exhibit 3.19: Mobility 2035 Environmental Justice Performance Indicators

Regional Environmental Justice Analysis

Nondiscrimination efforts are considered throughout the process from the long-range plan to the project implementation stage. Each level of analysis is performed to ensure no one population bears undue burdens of the transportation system.

Assessing the impacts at three different levels provides a greater understanding of how the project will impact a community on a macro and micro level. There are currently three levels of environmental justice analysis a project will go through, as shown in *Exhibit 3.20*.

[12]Accessibility-VS. Mobility-Enhancing Strategies for Addressing Automobile Dependence in the US, Handy, 2002.

Analysis	Regional Transportation Plan (Mobility 2035)	Regional Priced Facilities	NEPA
Scope	All projects proposed in Mobility 2035 on a regional level	All new priced facilities proposed in Mobility 2035 on a regional level	Project/corridor specific analysis
Results	Impacts on regional mobility and accessibility of proposed projects	Regional impacts on communities with the addition of all priced facilities	Localized impacts on a community due to the construction and operation of a project

Exhibit 3.20: Levels of Environmental Justice Analysis

Environmental Justice Methodology

Mobility 2035 recommendations were evaluated using the established performance indicators and the following four steps were used to complete the analysis:

Step 1. Identified Protected Populations: Traffic survey zones with an EJI score of greater than ten were identified as protected. In addition to the assessment of the EJI aggregated populations, individual populations were also analyzed. Traffic survey zones above the regional average for any single population identified in *Exhibit 3.18* were considered protected zones.

Step 2. Calculated Performance Indicators: Protected traffic survey zones were compared to non-protected traffic survey zones on the identified performance indicators. A detailed description of how the performance indicators were calculated can be found in Appendix B.

Step 3. Analyzed Network and Demographic Scenarios: Each of the five performance indicators were compared across several transportation network and demographic scenarios including:

- Current Network: Existing roadway and transit facilities with 2012 population
- 2035 Build Network: All Mobility 2035 recommended roadway and transit facilities with 2035 demographics
- 2035 No-build Network: Existing roadway and transit facilities with 2035 demographics

- 2035 Priced Facilities No-build Network:[13] All Mobility 2035 recommended roadway and transit facilities excluding priced facilities and 2035 demographics (results detailed in the Mobility Options chapter)

Step 4. Comparison of Results: Compared results of the Build to No-build scenarios and Current to Build scenarios.

The current network forms the baseline for assessing the impacts of building the Mobility 2035 roadway and transit recommendations. In the Dallas-Fort Worth area, the majority of the current system was built prior to the signing of Executive Order 12898. Because an environmental justice analysis was not performed on those roadways, the potential impacts to protected populations were not examined.

Re-routing current facilities is not a realistic option; therefore, a comparison between the Current and Build scenarios is conducted to see the rate at which any disparities are being perpetuated in future plans. Conversely comparing the Build and No-build scenarios establishes the effectiveness of the transportation system at increasing job accessibility while controlling for population growth. The results are compared across the different scenarios to provide a complete picture of how changes in the transportation system impact mobility and accessibility in North Central Texas.

Environmental Justice Results

As part of NCTCOG's commitment to provide a transportation system that is beneficial to all populations of the region, a system-level analysis was performed on the proposed 2035 network. The results of this analysis show that if built (2035 Build), the Mobility 2035 roadway and transit recommendations provide protected populations access to 21 percent more jobs by car and 92 percent more jobs by transit in the future when compared to the Current network. Both protected and non-protected populations experience a rise in the number of jobs accessible within 30 minutes by auto and 60 minutes by transit. *Exhibit 3.21* reflects the number of jobs accessible for both protected and non-protected populations between the three scenarios.

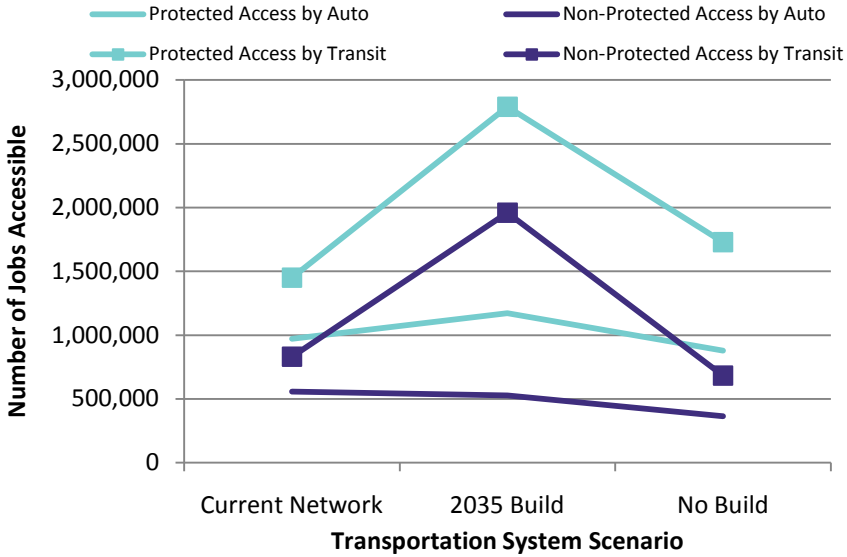


Exhibit 3.21: Job Access by Auto and Transit for Aggregate Protected Population Compared to Non-protected Populations for the Dallas-Fort Worth MPA

However, if the transportation system remains as it is today, the expected increase in population will cause congestion to worsen at a higher rate for protected populations. This will result in the protected populations experiencing a sharper decline in the number of jobs accessible than the non-protected populations.

When the Build and No-build scenarios are compared, the protected population and non-protected population both see an increase in access to jobs in the Build scenario and a decrease in access to jobs in the No-build scenario. Both groups experience a loss of mobility and accessibility from the Build to No-build scenario.

When comparing the impacts from the Current to No-build scenarios, the non-protected population sees a larger percent decline in access to jobs than the protected populations, with protected population experiencing an overall increase of 7 percent and the non-protected populations experiencing a 24 percent decrease. This can be attributed to current and future land uses and recommended transportation system improvements in the urbanized areas.

The decrease in access to jobs, specifically in the auto analysis, can be attributed to increased regional congestion. *Exhibit 3.22* displays congestion changes for protected and non-protected populations across the three scenarios. In the current

[13] Priced Facilities No-build network excludes all priced facilities currently under construction and CDAs under contract for construction.

transportation system, the protected populations experience less localized congestion than the non-protected population. This trend will continue in the Build scenario; however, congestion for the protected population will outpace the non-protected population in the No-build scenario. This is a direct result of the population forecasts that indicate increased population density in the urban core where the concentration of protected populations is the greatest. Appendix B provides the detailed Regional Environmental Justice Analysis results which includes performance indicator outcomes for the aggregate and individual protected populations.

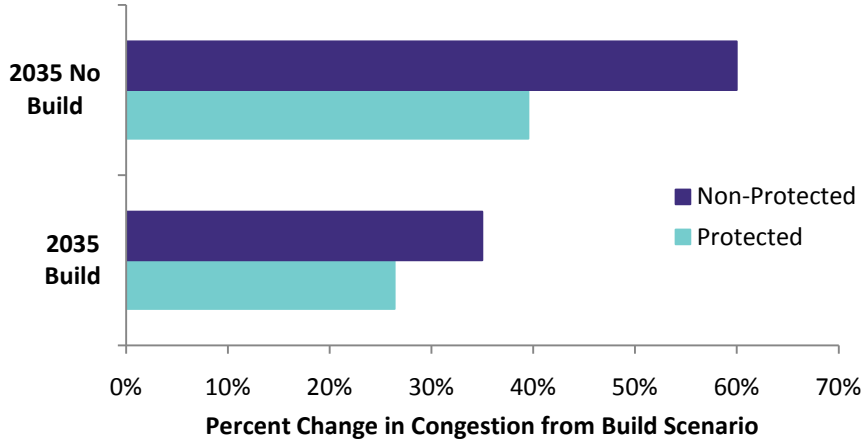


Exhibit 3.22: Localized Congestion Change across Scenarios for Protected and Non-protected Populations

While congestion increases for both the protected and non-protected populations in the Build and No-build scenarios, in both instances the non-protected population sees a much larger increase in localized congestion. With increased congestion, the length of time to travel a set distance increases. To relate the localized congestion displayed above to everyday travel, the average trip time and length for each scenario was determined. An average mile per hour was calculated to determine the time it would take both protected and non-protected populations to travel 20 miles across all three scenarios. Twenty miles was used as the threshold because it represents an average commute length in the Dallas-Fort Worth area.

The results in *Exhibit 3.23* are a direct reflection of how future transportation investments will be allocated. A large portion of planned projects are located in urbanized areas where the protected populations are primarily located. Therefore, overall congestion will decrease for those populations.

To determine accessibility to special generators, percent of populations within 30 minutes of a special generator was calculated. Results showed that over 90 percent of the protected population is 30 minutes from a hospital, university, or regional shopping center. This trend remains relatively constant across all scenarios while it decreases across all scenarios for the non-protected population as seen in *Exhibit 3.24.* While the transportation system cannot account for the freedom of choice for a specific university or hospital for its expertise, it does provide access to basic needs and services.

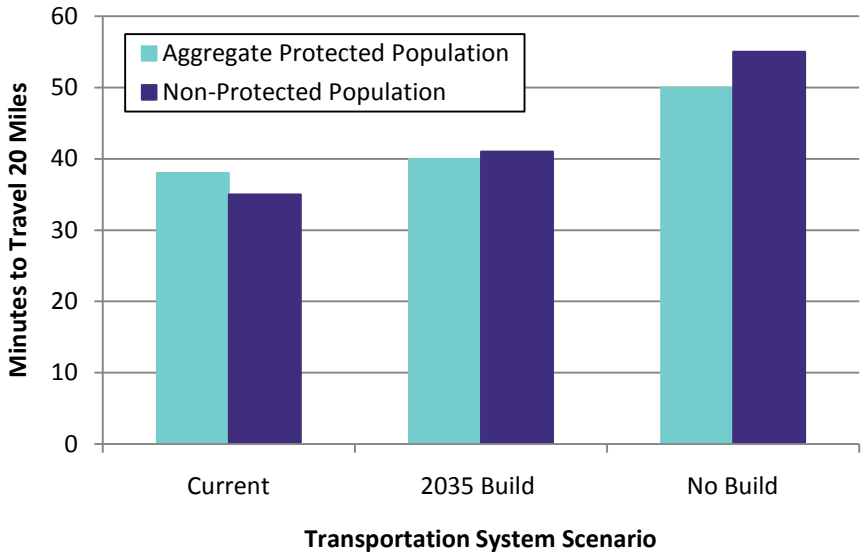


Exhibit 3.23: Average Time in Minutes to Travel 20 Miles

To assess the impacts of tolled and managed lane facilities recommended in Mobility 2035, the Priced Facilities No-build analysis was conducted. Results showed increased mobility and accessibility for protected populations with the addition of these priced facilities. The results and discussion of this analysis can be found in the Mobility Options chapter.

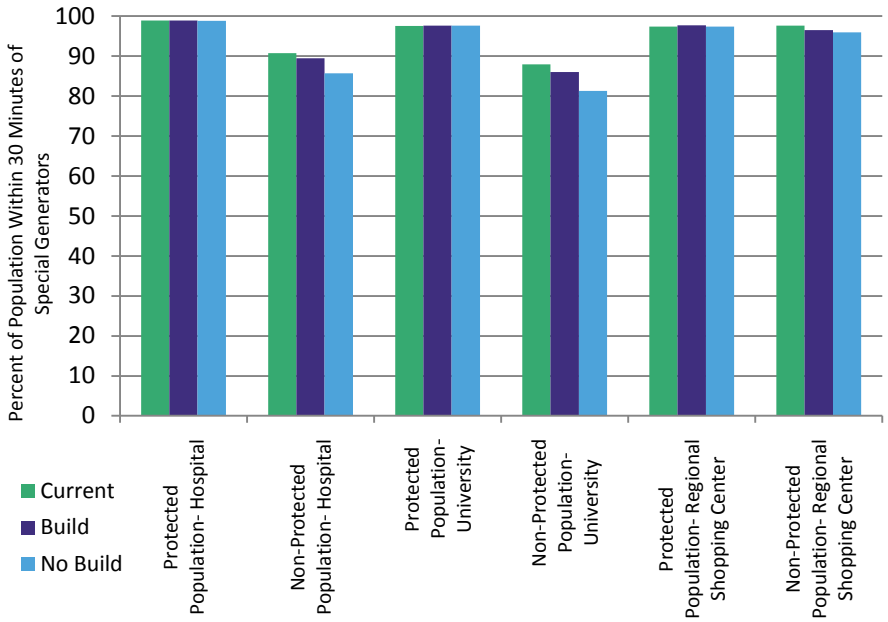


Exhibit 3.24: Percent of Population within 30 Minutes of a Special Generator (Hospitals, Universities, Regional Shopping Centers)

Summary

As a whole, the Mobility 2035 roadway and transit recommendations do not have disparate impacts on protected populations. Overall mobility and accessibility increase for the protected populations in the Build scenario. *Exhibit 3.25* illustrates the overall results of the three main performance indicators for the EJI Aggregated Population compared to the non-protected population. Appendix B contains the complete methodology and results for the environmental justice analysis.

Performance Measure	Population	Current Network	2035 Build	No-build	Percent Change (Build vs No-build)
	Protected	1,691,315	2,068,901	2,068,901	
	Non-protected	4,960,572	7,764,477	7,764,477	
	Total	*6,651,887*	*9,833,378*	*9,833,378*	
Number of Jobs Accessible within 30 Minutes by Auto	Protected	964,155	1,179,474	878,153	34.3
	Non-protected	549,205	525,644	364,362	44.3
	Difference	*414,950*	*653,830*	*513,790*	
Number of Jobs Accessible within 60 Minutes by Transit	Protected	1,454,972	2,991,784	1,729,265	73.0
	Non-protected	834,165	2,182,494	682,122	220.0
	Difference	*620,807*	*809,290*	*1,047,143*	
Percent of Lane Miles Congested	Protected	0.43	0.54	0.60	-9.50
	Non-protected	0.39	0.53	0.64	-17.1
	Difference	*0.04*	*0.01*	*-0.04*	

Exhibit 3.25: Mobility 2035 Environmental Justice Analysis Performance Results for EJI Aggregated Protected Populations Compared to Non-protected Populations

Public Involvement

Introduction

A proactive public participation process is vital to ensuring that the transportation planning process fosters meaningful involvement by all users of the system, including the business community, community groups, environmental organizations, freight operators, and the traveling public. Informing stakeholders of critical issues facing the region and providing opportunities to contribute ideas and offer input is important to developing a plan that represents a wide variety of interests and mobility needs.

The overall objective of the North Central Texas Council of Governments' public participation plan is that it is proactive, provides complete information, timely public notice, full public access to key decisions, and opportunities for early and continuing involvement. While federal laws and regulations provide some requirements for public involvement, NCTCOG strives to go beyond these requirements and provide a comprehensive program to ensure all residents of the region are provided an opportunity to participate in the decision-making process.

Public Participation Plan

The NCTCOG 2010 Transportation Public Participation Plan guides how and when public involvement will be carried out on various decisions made by the Regional Transportation Council.

Through the Language Assistance Plan, NCTCOG seeks to ensure that all residents have access to provide input on transportation decisions regardless of their ability to read, write, or understand English. The Language Assistance Plan includes a four-factor analysis to identify LEP populations and determine how these individuals are served or are likely to be served by NCTCOG Transportation Department programs. To better serve the LEP population, meeting notices and several key documents are translated into Spanish. Reasonable effort is made to accommodate language translation requests if provided sufficient notice.

The Public Participation Plan addresses the following:

- Public involvement requirements
- Timelines for public comment on various documents
- Environmental justice
- Public notifications
- Public participation and coordination procedures for environmental documents
- Provisions for holding public meetings with abbreviated comment periods of no less than 72 hours and longer
- Title VI complaint procedures
- Language Assistance Plan

Public Involvement Strategies

Public meetings are held throughout the region in varying times and locations to request input on upcoming decisions of the RTC and inform the public of other planning activities. The NCTCOG Transportation Department maintains a database of individuals and groups wishing to receive notice of public meetings. Notice is sent to these individuals before every meeting and meetings are also advertised in the Texas Register and in local and minority newspapers. The Transportation Department also publishes monthly and quarterly newsletters, various technical brochures, and required planning documents each year which are made available to the public in both print and online formats.

Providing information through the Internet is an important strategy and the Website is updated on a regular basis to ensure accurate and timely information is available. As needed, surveys are conducted to determine public awareness and/or sentiment with regard to certain planning issues. In addition, communication with the media serves as a strategy for disseminating information to the public via media releases or personal contact with reporters.

The Transportation Department also participates in community events to educate the public on transportation and air quality initiatives. Recently, the Transportation Department has joined social media networks in an effort to further expand opportunities to provide education and a forum to receive public comments.

Finally, visualization tools like animations, maps, renderings, photos, and others are used when possible online, in presentations, and in publications to increase understanding among all audiences. Visual elements can also be especially beneficial for LEP persons.

Public Involvement for Mobility 2035

A variety of strategies were used to encourage public participation during the development of Mobility 2035. Information such as financial scenarios and goals, involvement opportunities, and overall development was featured in publications, on the NCTCOG Website, within social media, and in e-mails sent to individuals who have expressed an interest in NCTCOG information. NCTCOG held several public meetings and gave presentations to numerous community groups; a list of meeting dates and locations can be found in Appendix B.

During some public meetings, surveys, also available online, were conducted to gather input on the goals and financial scenarios for Mobility 2035. In compliance with the Public Participation Plan, public meetings were held 60 days and 30 days prior to Regional Transportation Council approval of Mobility 2035. A listing of public meetings held and community events at which development of Mobility 2035 was discussed is included in Appendix B. A concerted effort was made to hold at least one public meeting in each of the 12 counties that make up the Metropolitan Planning Area. All public meeting notices and comments received during the meetings associated with Mobility 2035 and the subsequent air quality conformity determination, as well as related comments received through other means, are included in the 2011 Transportation Conformity. A listing of comments and responses related to Mobility 2035 are included in Appendix B.

2010 EPA Earthfest Source: NCTCOG

Tribal Coordination

The North Central Texas Council of Governments recognizes the unique government-to-government relationship that the Federal Highway Administration has with Indian Tribal Governments. *Exhibit 3.26* displays all the federally recognized tribes that have an interest in the North Central Texas region. NCTCOG coordinates with the Federal Highway Administration to reach out to Indian Tribal Governments to allow them the opportunity to participate in the transportation planning process. Tribal contacts receive all public meeting notices, as well as electronic copies of our Mobility Matters newsletter, to keep them involved in the transportation decision-making process and informed about transportation planning efforts and ongoing opportunities to be involved and provide input.

American Indian Tribal Interests in Dallas-Fort Worth Metropolitan Planning Area		
Absentee-Shawnee Tribe of Oklahoma	Apache Tribe of Oklahoma	Caddo Nation of Oklahoma
Choctaw Nation of Oklahoma	Comanche Nation of Oklahoma	Kialegee Tribal Town
Kickapoo Traditional Tribe of Texas	Kiowa Indian Tribe of Oklahoma	Mescalero Apache Tribe
Muscogee (Creek) Nation of Oklahoma	Poarch Band of Creek Indians	Pokagon Band of Potawatomi Indians of Michigan
Quapaw Tribe of Indians	The Delaware Nation	Thlopthlocco Tribal Town
Tonkawa Tribe of Indians of Oklahoma	Wichita and Affiliated Tribes	

Exhibit 3.26: Dallas-Fort Worth MPA Regional Tribal Interests

Summary

A transportation system that does not provide enhanced mobility and accessibility for all residents of the region is ineffective at improving the quality of life for residents and ensuring the economic vitality of the region. For this reason, the RTC uses several approaches to ensure the social considerations of Mobility 2035.

This multi-step process includes actively seeking the public's participation in the development of recommendations provided in Mobility 2035 and a thorough analysis of those recommendation's impacts on protected populations.

This process has guided recommendations that contribute to a quality of life for all residents and provides access to jobs and reduces congestion.

environmental considerations

2035 mobility

Environmental Considerations

Mobility 2035 Supported Goals

- 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.

Introduction

The Dallas-Fort Worth area is not only economically and socially diverse, but is also diverse in the natural environments that millions of people rely on for clean air and water and recreational opportunities. These resources are key to supporting a high regional and community quality of life and a healthy distribution of wildlife and habitats. Developing transportation infrastructure in ways that are more sensitive to the high priority environments in the region will support vibrant communities and habitats and enhance quality of life for all residents.

Transportation systems range from sidewalks and planes to highways and trains. How and where the transportation system is built impacts environmental resources that support not only humans but also wildlife. Sometimes the development of these facilities and services can negatively impact habitat and ecosystems. Continued growth, which is forecasted for the Dallas-Fort Worth area, could mean sustained or increased conflicts with air quality, water quality, wildlife habitats, the human (built) environment, and other resources in North Central Texas. Therefore, various components of the natural and built environment must be considered when planning and implementing transportation projects. Reducing the burden that transportation places on the environment through avoiding, minimizing, or mitigating impacts is the goal of Mobility 2035.

Healthy Communities

Promoting healthy or sustainable communities also promotes reduced motor vehicle use which contributes pollution to the air. Furthermore, the more cars

Environmental Considerations at a Glance:

Mobility 2035 outlines strategies to provide a transportation system that serves a diverse region. The region is diverse in not only economic and social structures, but also in the natural environments it relies on for clean air and water and recreational opportunities.

Implementing infrastructure projects for a growing region is necessary. However, major infrastructure improvements such as highways and transit lines can negatively impact habitat and ecosystems. Similarly, many small improvements can add up to have cumulative impacts on a scale larger than the size of individual projects. Making infrastructure more sensitive to wildlife and ecosystems through integrated planning and interagency cooperation is an initiative that promotes conservation priorities, sustainable uses, and explores a variety of mitigation options.

Mobility 2035 supports expediting the process to approve transportation projects while maintaining compliance with all applicable laws, safety, environmental health, and effective public involvement.

In this Chapter:

Did You Know …

… since 2005, regional programs such as the Dallas-Fort Worth Clean Cities has displaced over 58 million gasoline equivalent gallons of fuel through the use of alternative fueled vehicles?

… a 63 percent reduction in nitrogen oxide emissions from on-road mobile sources will occur between 2012 and 2035?

… Texas ranks second only to California in terms of overall biodiversity?

removed from the highways and streets means less highway congestion and improved safety as well.

The way people travel impacts the quality of life in communities in many ways. Opportunities to walk instead of drive are linked to healthy communities. The benefits of walking – whether for utilitarian or recreational purposes – can be expressed in terms of improved environment and personal health, reduced traffic congestion, enhanced quality of life, and economic rewards, as well as other benefits.[1] Physical activity such as walking promotes healthy lifestyles by helping maintain a healthy weight, reduce stress, sleep better, and feel better overall. More information related to the benefits of walking and biking is included in the Mobility Options chapter.

Southlake Town Square Source: NCTCOG

Access to open space and recreational opportunities is also central to the overall health and well being of communities. Additionally, drinkable water and concern for the overall natural environment is essential to creating an environment that is sustainable for years to come. All of these considerations should be integrated into the transportation planning process to implement transportation projects that support livable, sustainable, and healthy communities. These elements are considered in the following discussion.

Air Quality

Air quality is vital to a community's overall quality of life, and the negative impacts of polluted air can more deeply affect sensitive populations such as children and the elderly. Air quality impacts and health is a high concern in the Dallas-Fort Worth area. For example, a recent Community-Wide Children's Health Assessment and Planning Survey by Cook Children's Hospital[2] profiled children aged 0 to 14 in six North Central Texas counties and found that 18.1 percent, or about 111,000, of children had asthma. Survey data showed that children aged 6 to 15 have a higher percentage of asthma (as high as 25 percent for 9 year olds) than the state and nation at 13 percent and 16 percent, respectively. Regional statistics like this indicate a need to continue to improve air quality for those who have asthma or respiratory problems and are especially sensitive, and for people without respiratory problems or asthma who can also experience health effects from air quality pollution exposure.

HEALTHY COMMUNITY: A healthy community is one which includes elements that enable people to maintain a high quality of life and productivity. A healthy community includes elements including access to health care services; a safe community; the presence of roads, schools, playgrounds, and other services to meet the needs of people in the community; and a healthy community has a healthy and safe environment.

Healthy People in Healthy Communities A Community Planning Guide

There are many programs being implemented to improve air quality in North Central Texas. The North Central Texas Council of Governments (NCTCOG) is responsible for coordinating air quality planning in the federally classified nonattainment area. To accomplish this, NCTCOG, the Regional Transportation Council, and other stakeholders, including local governments and various public and private associations and coalitions, have taken an aggressive approach toward improving regional air quality that includes implementation of a variety of policies and programs that support and enhance federal and state planning efforts. These initiatives have primarily been focused on reducing nitrogen oxide (NO_x) emissions

[1] Pedestrian and Bicycle Information System, 2010, www.walkinginfo.org

[2] Cook Children's Community-Wide Children's Health Assessment and Planning Survey, 2008, www.cchaps.org

to attain the federal ozone National Ambient Air Quality Standards (NAAQS) as NO_X is the ozone precursor pollutant of primary concern in the Dallas-Fort Worth nonattainment area. However, as federal regulations become more stringent for other criteria pollutants, including particulate matter and nitrogen dioxide, and concern over greenhouse gas emissions increases, the air quality program has expanded its focus to consider multi-pollutant benefits to not only reduce ozone, but help improve overall air quality. Additionally, programs aimed at reducing consumption of tradtional petroleum-based fuels provide opportunities to improve air quality and promote energy and technological diversification in the transportation sector.

Mobility 2035 Policies and Programs

Mobility 2035 supports the following air quality policies:

AQ3-001: Pursue successful transportation conformity determinations of the Metropolitan Transportation Plan and Transportation Improvement Program consistent with federal and state guidelines.

AQ3-002: Provide technical assistance and analysis to attain and maintain NAAQS and reduce negative impacts of other air pollutants.

AQ3-003: Support and implement education, operations, technological, and other innovative strategies that improve air quality in North Central Texas including participation in collaborative efforts with local, regional, state, and federal stakeholders.

AQ3-004: Support and implement strategies that promote energy conservation, reduce demand for energy needs, reduce petroleum consumption, and/or decrease greenhouse gas emissions.

F3-002: Incorporate sustainability and livability options during the project selection process. Include additional weighting or emphasis as appropriate and consistent with Regional Transportation Council (RTC) policy objectives including, but not limited to, demand management, air quality, natural environment preservation, social equity, or consideration of transportation options and accessibility to other modes (such as freight, aviation, bicycle and pedestrian). *(While this is listed as a financial policy, it has specific implications for the air quality portion of the plan.)*

Mobility 2035 supports the following air quality programs:

AQ2 -001: Air Quality Communication Program

AQ2-002: Air Quality Demonstration Program

AQ2-003: Air Quality Enforcement Program

AQ2-004: Air Quality Regional Policies

AQ2-005: Air Quality Technology Improvements

AQ2-006: Air Quality Technical Planning and Analysis

Ozone

On April 15, 2004, the Environmental Protection Agency (EPA) designated nine North Central Texas counties including Collin, Dallas, Denton, Ellis, Johnson, Kaufman, Parker, Rockwall, and Tarrant counties as nonattainment under the 8-Hour Ozone NAAQS which was established in 1997. This area is outlined in *Exhibit 4.1* along with the NCTCOG Metropolitan Planning Area boundary.

Nonattainment status means that ground-level ozone concentrations in this area exceed the limit established by the EPA as being protective of human health and the environment. Ground-level ozone pollution is caused by a photochemical reaction of volatile organic compounds (VOCs) and NO_X, which are known as ozone precursors, in the presence of sunlight and heat.

Based on the magnitude of ozone pollution in a given area, the EPA classifies counties into one of the following categories which are listed in order of increasing severity: marginal, moderate, serious, severe 15, severe 17, and extreme. The Dallas-Fort Worth area is classified as a serious nonattainment area and has until June 2013 to attain the NAAQS ozone standard.

The region faces challenges in meeting increasingly stringent air quality standards. The Clean Air Act (CAA) requires the EPA to re-evaluate all criteria pollutant standards every five years. The EPA has announced plans to propose a new ozone NAAQS in July 2011. It is expected that the new regulations will lower the limit from 84 parts per billion (ppb) ozone to between 60 to 70 ppb to protect human health and create a new standard to protect sensitive ecosystems. *Exhibit 4.2*

illustrates both progress in reducing ambient ozone concentrations since 1998, as well as the level of previous ozone NAAQS and the range being considered by the EPA for the 2011 regulations.

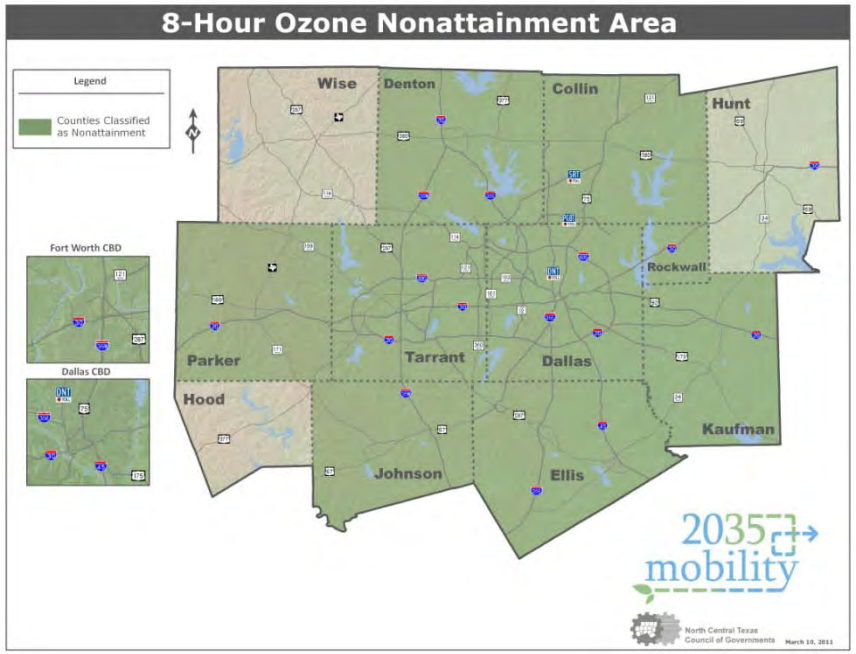


Exhibit 4.1: Metropolitan Planning Area Boundary and 1997 8-Hour Ozone Nonattainment Area

NCTCOG participates in a cooperative, collaborative process with local, state, and federal agencies to work toward improving air quality across the region. This partnership includes close coordination with the Texas Commission on Environmental Quality (TCEQ) for development of the State Implementation Plan (SIP). The SIP is a regional air quality plan developed by TCEQ and required by the Clean Air Act which outlines how ozone concentrations will be reduced in the nonattainment area to a level that complies with the federal standard.

The RTC has taken a proactive role in assisting with development of SIP revisions for the Dallas-Fort Worth area. This includes NCTCOG assistance with air quality technical planning and implementation of control strategies at the local level that enhance federal and state efforts. Numerous other stakeholders throughout the region, including local governments and business coalitions, also support this process and facilitate local implementation.

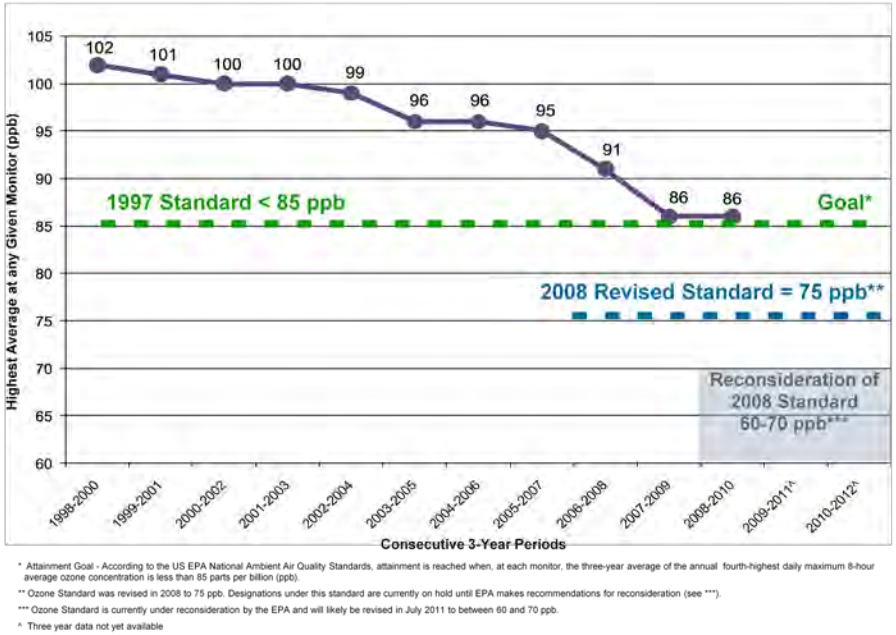


Exhibit 4.2: Eight-hour Ozone Trend Line (1998–2010) Source: NCTCOG

Energy Consumption and Associated Emissions

The programs and policies supported by Mobility 2035 not only aim at improving the efficiency of the transportation system, which in turn improves air quality, but also serve to reduce petroleum use. According to the Federal Highway Administration, the consumption of petroleum fuels by the transportation sector has increased 74 percent since 1960.

While the average fuel efficiency of motor vehicles has increased over time, so has the overall miles driven. Vehicle miles traveled is forecasted to grow from approximately 176 million miles per year in 2012 to 279 million miles per year in 2035, translating to a continued strong demand for traditional petroleum fuels. While technologies such as electric vehicles and increased availability of alternative fuels will provide options to reduce petroleum consumption and promote energy

conservation, fleet turnover and market penetration of these fuels will take time to make a difference.

Dallas-Fort Worth Clean Cities, which was established in 1995, became one of the first Clean Cities established under an Energy Policy Act provision for an organziation that promotes the use of alternative fuels and advanced vehicle technologies to lessen American dependence on foreign sources of petroleum. Programs and policies supported by Mobility 2035, such as the Dallas-Fort Worth Clean Cities Program, continue to evaluate solutions that improve energy conservation and reduce petroleum consumption in the transportation sector.

Greenhouse Gases

In the United States, transportation is the largest source of greenhouse gas emissions after electricity generation.[3] As *Exhibit 4.3* shows, there has been an increase in carbon dioxide (CO_2) emissions from the transportation sector nationwide from 1973 to 2009. Periods of decline in CO_2 emissions are evident; however, it is likely that transportation will continue to remain a large contributor of greenhouse gas emissions in the US in the near term.

Some greenhouse gases occur naturally in the atmosphere while others result from human activities. Naturally occurring greenhouse gases include water vapor, CO_2, methane, nitrous oxide, and ozone. Certain human activities, however, add to the levels of most of these naturally occurring gases:

- Carbon dioxide is released to the atmosphere when solid waste, fossil fuels (oil, natural gas, and coal), wood, and wood products are burned.
- Methane is emitted during the production and transportation of coal, natural gas, and oil. Methane emissions also result from the decomposition of organic wastes in municipal solid waste landfills and the raising of livestock.
- Nitrous oxide is emitted during agricultural and industrial activities, as well as during combustion of solid waste and fossil fuels.

Greenhouse gases that are not naturally occurring include by-products of foam production, refrigeration, and air conditioning called chlorofluorocarbons, as well as hydrofluorocarbons and perfluorocarbons generated by industrial processes.

[3] US Department of Transportation, www.climate.dot.gov

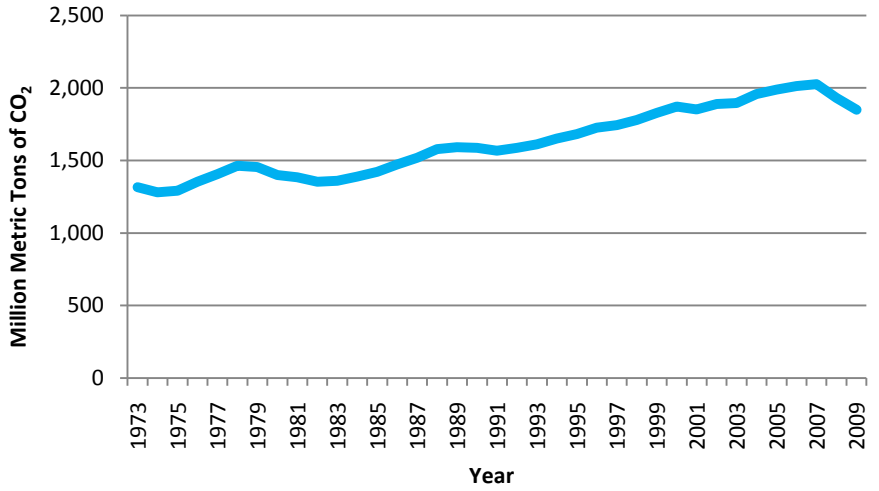


Exhibit 4.3: Total Energy Transportation Sector Carbon Dioxide Emissions (1973–2009)[4]

Greenhouse gases trap heat in the atmosphere and create a naturally occurring warming phenomenon called the greenhouse effect. With human activities and the increased burning of fossil fuels that produce greenhouse gasses such as CO_2 and methane, the atmosphere is trapping more heat and causing warming of the atmosphere. The induced changes resulting from the warming of the atmosphere are called climate change. The impact of climate change on the built and natural environment are potentially broad reaching and unpredictable at a regional level. Potential impacts to the North Central Texas region could include changes in precipitation levels, impacts to human health, and impacts to natural ecosystems.

Currently, scientists are unable to determine which parts of the US will become wetter or drier, but there is likely to be an overall trend toward increased precipitation and evaporation, more intense rainstorms, and drier soils. While the impacts of climate change on the Dallas-Fort Worth area are unknown at this time, the potential impacts of climate change are important to consider in the context of infrastructure design and future maintenance needs. For example, if temperatures and precipitation changes over time, this could impact flooding of roads and increase maintenance associated with weather events. Research has shown that an increase in average temperatures could also exacerbate ozone issues and increase the difficulty in attaining federal ozone standards.

[4] www.eia.gov, 2010

Adapting the transportation system to these potential changes is an initiative that is emerging at the federal transportation level. Adaptation planning could include strategies such as:

- Evacuation route planning
- Relocation of at-risk infrastructure and communities
- Extreme weather events (flooding, tornado activity, hurricanes) and associated transportation impacts

NCTCOG and other regional partners are providing resources to support transportation and climate change mitigation and adaptation as an additional benefit of implemented air quality programs. As the region begins to consider climate change in the planning process, greenhouse gas reductions, particularly reductions of CO_2, will be included in a multi-pollutant evaluation when making funding decisions regarding regional projects. Further guidance from the appropriate federal and state agencies will be incorporated as it is made available. Additionally, identification of resources, both natural and built, that are potentially sensitive to climate change impacts is essential to identifying mitigation strategies to adapt future systems to climate change impacts.

Exhibit 4.4 displays per capita on-road transportation emissions of CO_2 for the Dallas-Fort Worth area. As shown, the per capita emissions of CO_2 from on-road transportation sources will decline by 15 percent from 2012 to 2035.

Mobile Source Air Toxics

In addition to the criteria air pollutants for which there are NAAQS, the EPA also regulates air toxics. Most air toxics originate from human-made sources including on-road mobile sources (highway vehicles), non-road mobile sources (airplanes and construction equipment), area sources (dry cleaners), and stationary sources (factories and refineries).

Mobile Source Air Toxics (MSAT) are a subset of the 188 air toxics defined by the CAA. MSATs are compounds emitted from on-road vehicles and non-road mobile vehicles and equipment. Some toxic compounds are present in fuel and are emitted into the air when the fuel evaporates or passes through the engine unburned. Other toxics are emitted from the incomplete combustion of fuels or as secondary combustion products. Metal air toxics also result from engine wear or from impurities in oil or gasoline.

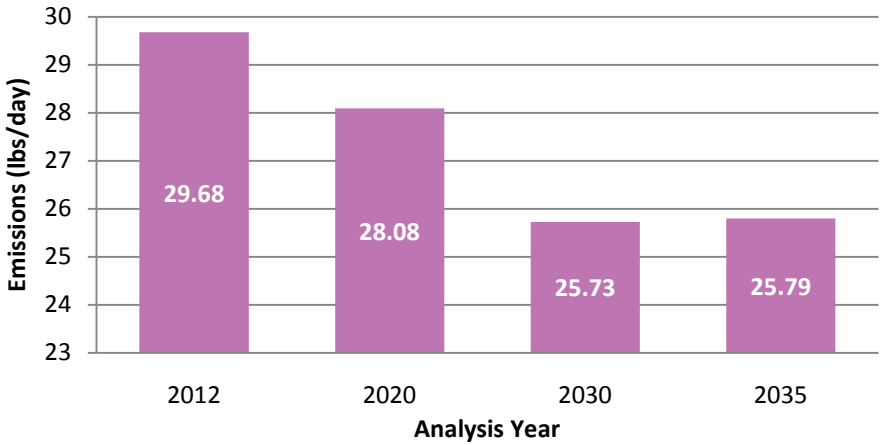


*Exhibit 4.4: On-road Transportation CO_2 Emissions (per capita) 2012–2035**

*Based on EPA Mobile 6.2 Emissions Factor Model for the 9-county Nonattainment Area, NCTCOG.

Exhibit 4.5 shows that over time, even while vehicle miles traveled dramatically increases, national MSAT emissions are expected to decline drastically as compared to 1999 levels. Reductions in MSAT emissions can be attributed to the use of cleaner fuels, as well as cleaner engines.

Air Quality Conformity

Due to the ozone nonattainment status of the Dallas-Fort Worth area, a federal requirement known as transportation conformity is necessary to continue approval and implementation of projects and programs within the nonattainment area. Under this federal requirement, NCTCOG is responsible for conducting transportation conformity for the counties that are designated as nonattainment.

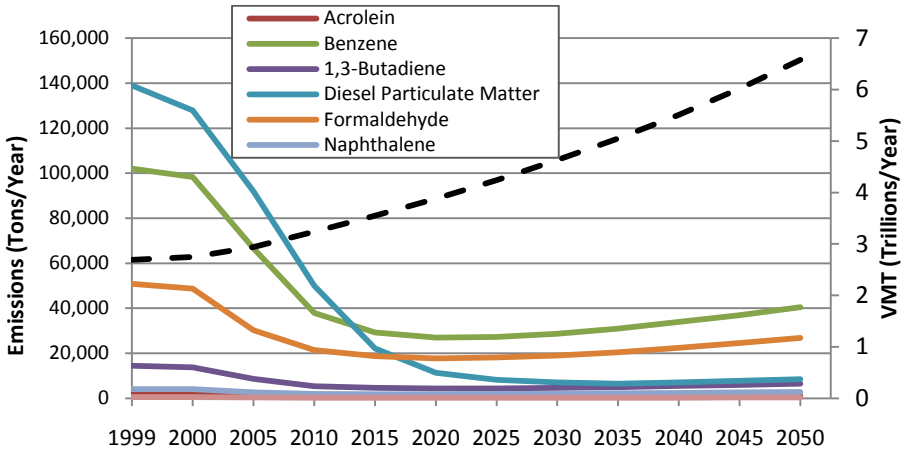


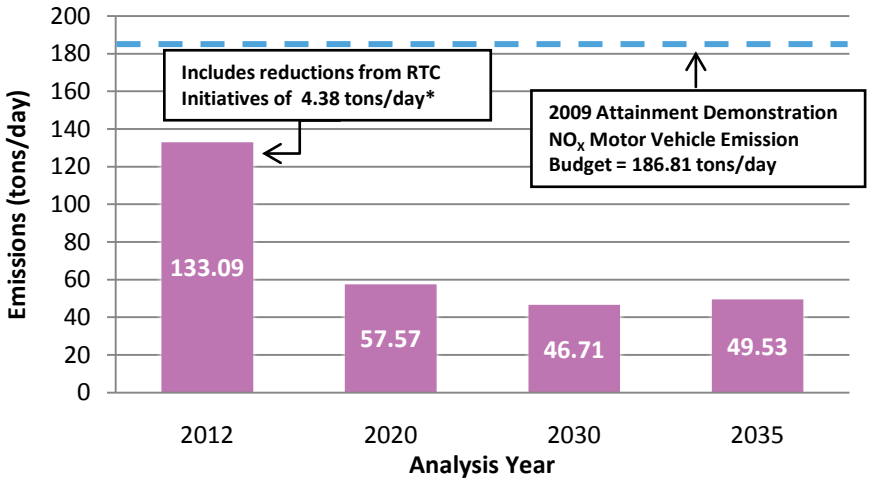
Exhibit 4.5: National MSAT Emission Trends 1999–2050 for Vehicles Operating on Roadways[5]

A conformity determination is a two-step process in metropolitan areas. In the first step, the RTC, as the Metropolitan Planning Organization policy body, makes the initial transportation conformity determination at the local level. In the second step, the Federal Highway Administration (FHWA) and Federal Transit Administration (FTA) make the final transportation conformity determination at the federal level. The conformity analysis does not measure ozone directly, but rather measures ozone precursors: VOCs and NO_X.

As part of the conformity analysis, a motor vehicle emission budget (MVEB) test is usually conducted if EPA-approved MVEBs, also known as budgets, are applicable at the time of analysis. Budgets for NO_X and VOCs are established in the regional SIP. Under the MVEB test, vehicle emissions for each analysis year must be less than the identified air quality budgets. The vehicle emission results documented in the 2011 Transportation Conformity document demonstrate that the nine-county Dallas-Fort Worth ozone nonattainment area meets the regional air quality conformity requirements of the budget test. The conformity analysis results are shown in *Exhibits 4.6* and *4.7*.

RTC initiatives, including Transportation Control Measures and other elements of the RTC Air Quality Program, were instrumental in meeting NO_X budgets in analysis year 2012. With RTC initiatives, NO_X emissions for 2012 were reduced by an additional 4.38 tons per day. The magnitude of emission reductions from RTC initiatives demonstrates the regional commitment and effectiveness at reducing vehicle emissions.

The results of the conformity determination demonstrate that Mobility 2035 meets the specific transportation air quality conformity requirements of the CAA (42 USC 7504, 7506(c) and (d)) and amendments, the applicable revision to the air quality plan (five percent Increment of Progress Plan), and the transportation conformity rule (40 CFR Parts 51 and 93). This conformity determination was approved by the RTC in March 2011 and approved by FHWA and FTA in June 2011. For additional transportation conformity information, refer to the 2011 Transportation Conformity document.[6]



*Local Initiative Benefits Shown Represent Post Processed Estimates, Source: NCTCOG

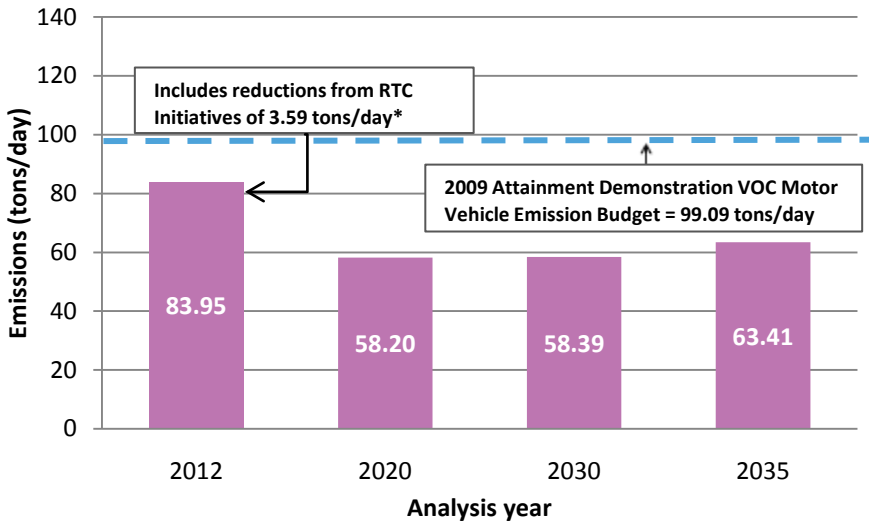
Exhibit 4.6: Dallas-Fort Worth Ozone Nonattainment Area Air Quality Conformity Analysis Results: Emissions of Nitrogen Oxides

Air quality impacts are, and will continue to be, integrated into regional planning factors that include emphasis on increasing mobility, supporting economic vitality, enhancing the environment, promoting energy conservation, and improving the

[5] FHWA, 2011, www.fhwa.dot.gov

[6] North Central Texas Council of Governments, 2011, Transportation Conformity, www.nctcog.org/trans/air/conformity

quality of life. Many programs, policies, and projects described in other chapters of this document result in air quality benefits through improved efficiency in the transportation system. Transportation-related emissions are reduced through various means including, but not limited to, mitigation of congestion caused by vehicle incidents, reduction of the number of commuters through the use of alternative transportation options, and improved roadway design that facilitates traffic flow.



*Local Initiative Benefits Shown Represent Post Processed Estimates, Source: NCTCOG

Exhibit 4.7: Dallas-Fort Worth Ozone Nonattainment Area Air Quality Conformity Analysis Results: Emissions of Volatile Organic Compounds

Many of these programs and projects are defined as Transportation Control Measures by the CAA and are included as air quality control strategies in the Dallas-Fort Worth SIP. In these cases, the primary goal of improved transportation system operation yields additional benefits in air quality. In addition to these transportation system improvements, the RTC has instituted many programs and policies that are developed with air quality as the primary goal. These efforts include measures to reduce emissions and energy consumption from a wide variety of emissions sources such as traditional transportation sources (on-road motor vehicles) and non-transportation mobile sources (construction equipment), while others are designed to reduce energy consumption as a way to reduce emissions from power plants and other stationary sources.

AIR NORTH TEXAS is a campaign created to educate North Texans on simple things they can do in their everyday lives to improve Air Quality. In 2010, the campaign started Clean Air Action Day on July 7. This annual awareness day will remind North Texans to try something new in their lives that will reduce emissions such as, but not limited to, taking transit, bringing their lunch to work, or combining errands, with the hope that individuals will continue these activities all year or at least during Ozone Season.

Numerous communication strategies, such as Air North Texas, are necessary to explain the importance of these measures to stakeholders and the public; this need has resulted in the development of additional education programs, as well as inclusion of outreach components in many strategies. This comprehensive approach to emission reduction strategies will become increasingly important as the region balances population and economic growth with the need to continue to reduce emissions.

All air quality policies, programs, projects, and maps are included in Appendix C.

Green and the Grey Infrastructure

Considering the green infrastructure that makes up our surroundings is important when developing transportation plans and projects. Green infrastructure, as defined, considers the open spaces including natural lands (open space) and working landscapes (agricultural) that promote natural ecosystem functions. Valuing green infrastructure is just as significant as valuing grey infrastructure or the man-made or built environment. The green and grey environments can both be developed strategically to enhance and promote each other.

Open spaces such as parks are key components of quality of life and healthy communities in North Central Texas. While open space is often associated with recreation opportunities for humans, it can serve as habitat for wildlife and

contributes to maintaining healthy water quality for human and wildlife consumption.

GREEN INFRASTRUCTURE: Strategically planned and managed networks of natural lands, working landscapes, and other open spaces that conserve ecosystem values and functions and provide associated benefits to human populations.

The Conservation Fund

ECOREGION: Ecological regions are areas of general similarity in ecosystems and in the type, quality, and quantity of environmental resources. They serve as a spatial framework for the research, assessment, management, and monitoring of ecosystems and ecosystem components.

Commission for Environmental Cooperation

As partners in the transportation planning process, assessing and integrating conservation priorities will produce transportation projects that are sensitive to the high priority environments in the region, better support healthy communities and habitats, and foster a high quality of life for all residents.

Mobility 2035 Policies and Programs

Mobility 2035 supports the following environmental resource policies:

ER3-001: Protect, retain, restore, or enhance the region's environmental assets through avoiding, minimizing, and/or compensating for the effects of transportation programs and projects.

ER3-002: Work cooperatively with regulatory and conservation partners to develop innovative approaches that meet their conservation priorities and expedite the delivery of transportation projects.

ER3-003: Encourage transportation programs and projects that provide access to the natural environment to support healthy lifestyles.

F3-002: Incorporate sustainability and livability options during the project selection process. Include additional weighting or emphasis as appropriate and consistent with RTC policy objectives including, but not limited to, demand management, air quality, natural environment preservation, social equity, or consideration of transportation options and accessibility to other modes (such as freight, aviation, bicycle and pedestrian). *(While this is listed as a financial policy, it has specific implications for the environmental resources portion of the plan.)*

Mobility 2035 supports the following environmental resource program:

ER2-001: Regional Ecosystem-based Approach to Mitigating Impacts

North Central Texas Natural Resources

Texas has many natural environments to offer for the enjoyment of the population. In fact, Texas ranks second only to California in terms of overall biodiversity.[7] While Texas offers many unique environmental aspects, there are many threats to maintaining these rich environments. According to Texas Parks and Wildlife (TPWD), land fragmentation is the number one threat to Texas' biodiversity. In the North Central Texas region, there are several natural environments including ecoregion and habitat types that are considered high priority for conservation. General descriptions and current status of a select number of ecoregions and habitat types are included in the following discussion. The potential transportation system impacts to these resources will be monitored over time.

Blackland Prairie

The TPWD Wildlife Action Plan identifies the Blackland Prairie as a Tier I High Priority Ecoregion.[8] The Blackland Prairie, as shown in *Exhibit 4.8*, covers about half of the Metropolitan Planning Area including portions of Collin, Dallas, Denton, Ellis, Hunt, Kaufman, Johnson, and Rockwall counties. The Blackland Prairie is the most severely altered of Texas' ecoregions due to conversion to crops or urban development. It is estimated that 95 percent of the original blackland prairies have been converted for agricultural uses and development. Currently, only 3,000 acres

[7] NatureServe's 2002 State of the Union: Ranking America's Biodiversity.
[8] Texas Parks and Wildlife Department, 2005, *Texas Wildlife Action Plan.*

of an original 12 million acre range remain in the Dallas-Fort Worth area (predominantly White Rock Lake and Cedar Hills State Park). All seven main habitat classes in this ecoregion are threatened by rapid population growth and fragmentation.

The Blackland Prairie is a stopover habitat for migrant songbirds and wintering raptors. The TPWD conservation priority for this ecoregion is to protect and restore any remaining remnant prairies. More information on potential mitigation strategies for the Blackland Prairie is provided in Appendix C.

Cross Timbers and Prairies

The TPWD Wildlife Action Plan identifies the Cross Timbers and Prairies ecoregion as a secondary priority ecoregion or Tier II. As shown in *Exhibit 4.8*, this ecoregion covers Denton, Hood, Johnson, Parker, Tarrant, and Wise counties. Conversion and fragmentation due to high projected population growth is a major threat to this ecoregion. Rivers and streams in this ecoregion have been altered by extensive reservoirs, inundating hundreds of miles of river forests reducing downstream flows. This ecoregion is home to only one rare plant, but provides nesting habitat for the federally endangered Black-capped Vireo and the Golden-cheeked Warbler. TPWD has identified protection of this ecoregion's prairies, woodlands, and remaining river corridors as the major priorities in the Cross Timbers and Prairies Ecoregion.

Individual habitat types that make up these larger regions are important to identify as smaller scale conservation priorities as they may support individual species populations or serve vital ecosystem functions.

Priority Habitat Types

While every ecoregion has individual habitats, communities, and species that are essential, the TWPD Wildlife Action Plan identifies priority habitat types as native prairies, grasslands, and riparian habitats that cross ecoregion boundaries. These habitats are the most important wildlife habitats, contain the highest numbers of rare species, and are often the most threatened.

Native prairies were once a significant portion of the Texas landscape; however, very little of this native habitat still exists today. With proper management, these habitats can be restored.

Habitats found along banks and floodplains of rivers, creeks, and streams are often the only place where trees and wildlife species are able to survive in times of drought. These riparian areas provide nutrients to streams and rivers, thereby improving water quality. They also slow the rate that water moves from land into streams. In the Dallas-Fort Worth area, there are many high priority riparian habitats, the most notable being the Trinity River and those riparian areas that contribute to the Trinity River Basin.

Exhibit 4.8: Texas Ecoregions and Metropolitan Planning Area Boundary.[9]

High Priority Species

Texas is the second most diverse state in the US in terms of species diversity. The Texas Priority Species List prioritizes five major groups of wildlife including birds, mammals, herptiles, aquatic species, and terrestrial invertebrates into low, medium, or high priority conservation need. For example, in the Blackland Prairie

[9] Data from TPWD, www.tpwd.state.tx.us. Map produced by NCTCOG.

and Cross Timbers and Prairies ecoregions, several bird species, including the Piping Plover, Interior Least Tern, Black-capped Vireo, and others are ranked as high priority. While some of these birds are federally endangered or threatened species consistent with the Endangered Species Act, some are also listed as state endangered or threatened species. Others are only listed as a species of concern at the federal or state level.

Federal and State Endangered Male Black-capped Vireo (Vireo atricapilla) Source: TPWD

The Texas Priority Species List also includes the associated habitats, problems and threats, conservation actions, and monitoring actions for each species. Additional information related to additional species included on this list in each wildlife group is available in the Texas Wildlife Action Plan.

Aquatic Resource Priorities

Water is a necessity for all life forms. Living in Texas presents challenges associated with water due to the wide variety of landscapes and a growing urban population. According to the TPWD Wildlife Action Plan, reduced water quality and decreased water quantity are the most significant challenges to both freshwater and saltwater systems. Continued population growth creates increased demands for water that affect the quality and quantity of water.

Point source and nonpoint source pollution contribute to nutrient loading of waterways which threatens fish and wildlife and human beings. One example of nonpoint source pollution related to the transportation system is highway runoff. This is water that cannot be absorbed through the pavement and runs off the roads into stormwater drains that drain to the streams, rivers, and lakes.

Several of the TPWD's fresh water conservation goals include maintaining or improving water quality, maintaining adequate water quantity, and protecting springs and wetlands.

Trinity River and Trinity River Basin

One of the most important water resources in the Dallas-Fort Worth area is the Trinity River. The Trinity River and its basin provide water to over half of the population of Texas. According to the Trinity River Authority,[10] the quality of the water is a major consideration throughout the Trinity River Basin because so many residents rely on its surface water. Continued population growth and increased urbanization of the area means that water quantity and quality issues will become more critical. Additionally, water quantity and quality are not just essential for the residents of the Trinity River Basin, but to wildlife as well. The TPWD's priority conservation strategy is to ensure water availability for wildlife. Additionally, TWPD encourages emphasis on the restoration of riparian and aquatic habitats that have been compromised over several decades due to human interference. TWPD supports projects that aim to rehabilitate river habitat back to its natural state.

Wetlands

Wetlands comprise less than five percent of Texas' total land area; however, Texas has the fourth greatest wetland acreage in the lower 48 states. Many wetland types exist in Texas and wetlands can be found along rivers, streams, lakes, and ponds; in upland depressions where surface water collects; and at points of groundwater discharge such as springs or seeps. Wetlands provide habitat, environmental quality, and socioeconomic value to the state.[11] Texas wetlands provide many benefits to society; however, approximately half of the historic wetland acreage has been converted to cropland and urban development. The Texas Wetlands Conservation

Trinity River and Floodplain near Downtown Dallas, TX Source: NCTCOG

[10] Trinity River Authority of Texas, 2010, *Trinity River Basin Master Plan*.
[11] Texas Parks and Wildlife Department, 1997, *Texas Wetlands Conservation Plan.*

Plan recommends conservation actions including supporting riparian and buffer protection, restoration and enhancement projects, implementing wetland restoration and enhancement needs and opportunities on state-owned property, encouraging voluntary broader application of mitigation banking programs to compensate for wetland losses in the same watershed, and incorporating wetlands into watershed-based management plans. Because wetlands provide value to the state and areas of the Dallas-Fort Worth area, conserving these unique water resources is fundamental to supporting healthy ecosystems.

Governing Regulations

Many federal, state, regional, and local agencies are tasked with regulating and ensuring the health of both human and natural environments. These agencies have many laws and regulations that must be adhered to when implementing transportation projects. For example, the Clean Water Act and its regulations are monitored and regulated by several federal and state agencies such as the Environmental Protection Agency, United States Army Corps of Engineers, and the Texas Commission on Environmental Quality. Other agencies such as Texas Parks and Wildlife and US Fish and Wildlife regulate other federal and state laws such as the Endangered Species Act. Agencies such as these, in addition to non-government organizations such as The Nature Conservancy, local municipalities, and special districts, collectively ensure that environmental laws, whether social or natural, are adhered to. Additionally, these agencies participate in and have the duty to ensure priority habitats and environmental resources of interest are sustained for the next generations. Appendix C, Exhibit C.1 provides a summary of relevant federal, state, and local resource agencies that are stakeholders in the transportation planning process and that have specific resources and regulations of interest during the development and implementation of transportation projects.

Ecosystem Approach to Developing Infrastructure Projects

Positive opportunities for environmental stewardship can be permanently lost when the traditional, project-specific approach to avoiding, minimizing, reducing, or compensating impacts is used for infrastructure projects.

For more than a decade, federal agencies have been encouraging the use of a coordinated approach to restore or sustain the health of ecosystems. This ecosystem approach supports collaboration and integrated planning among transportation and conservation planning agencies. The ecosystem approach also expands focus to a broader, ecosystem scale as opposed to one confined by project boundaries, allowing for more efficient and cost-effective avoidance and minimization strategies, as well as identification of more meaningful mitigation and conservation opportunities.[12]

The ecosystem approach is supported by the development of the North Central Texas Regional Ecosystem Framework (REF). NCTCOG, in consultation and coordination with resource agencies and regional stakeholders, has developed a REF. The REF can streamline infrastructure development by identifying ecologically valuable areas, potentially impacted resources, regions to avoid, and mitigation opportunities before new projects are initiated. It is intended to protect, sustain, and restore vital ecosystems while simultaneously providing recreational and mobility opportunities, and contribute to the positive health of people and communities in North Central Texas.

Through consultation with environmental resource agencies such as EPA, TPWD, and other conservation/regulatory agencies, ten Vital Ecosystem Information Layers (VEIL) have been selected to represent the first iteration of the REF. The ten VEIL layers include wetlands, surface waters, flood zones, agricultural lands, wildlife habitats, natural areas, impaired water segments, diversity, sustainability, and rarity. Each VEIL layer was calculated by subwatershed to develop a REF Composite Score as shown in *Exhibit 4.9.* Individual VEIL layer maps are included in Appendix C, Exhibits C.2 through C.12. The relative environmental vulnerability of each subwatershed is indicated by a composite score. Blue subwatersheds, or those scoring 26 to 37, indicate that resources of relatively high concern may be present and that additional review, documentation, and consultation with the applicable agency may be needed.

The REF can be utilized to identify natural and social resources earlier in the transportation planning process and to determine mitigation strategies that help advance preservation or restoration initiatives that complement resource agency partners' conservation priorities.

[12] US DOT/Volpe National Transportation Systems Center, 2006, Eco-Logical: An Ecosystem Approach to Developing Infrastructure Projects.

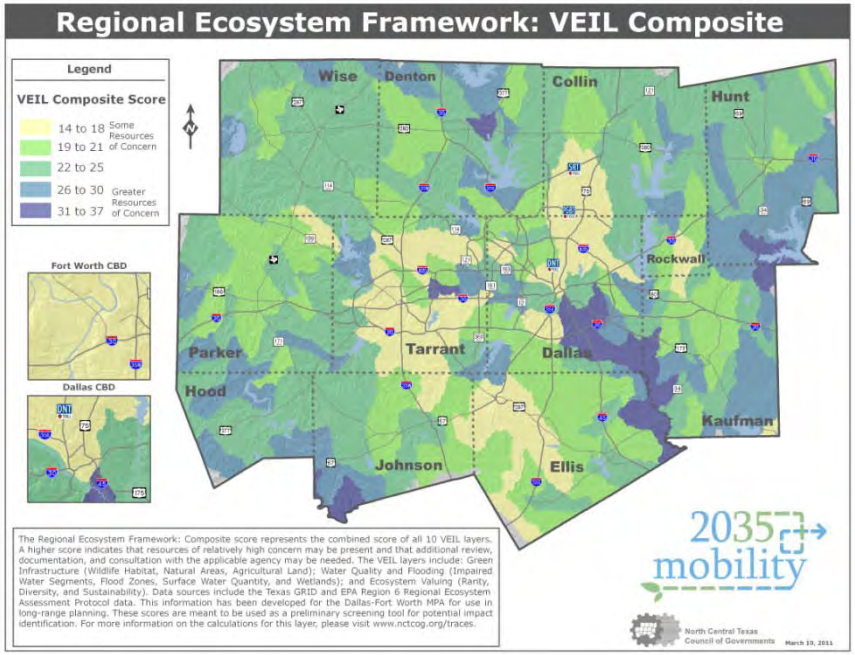


Exhibit 4.9: Regional Ecosystem Framework VEIL Composite Score by Subwatershed

Mobility 2035 has utilized the REF to identify subwatersheds, and the REF score for each roadway and transit corridor is shown on the Roadway and Transit Fact Sheets in Appendix G. These scores provide initial screening information for project level planning studies and may assist in the identification of key resources at the planning level that may warrant additional review during the project level planning process.

The subwatershed values provide a comparitive scoring tool that could assist in the development of mitigation strategies that promote and target unique conservation needs. Additional information on how the REF was developed can be found on the Transportation Resource Agency Consultation and Environmental Streamling Website.[13]

Mitigating Transportation Impacts

The operation of transportation systems is an obligation of local, state, and federal governments as they strive to provide their residents with the mobility needed to conduct business, transport goods, recreate, and carry out daily activities. Many times this involves major construction of transportation infrastructure that can negatively impact habitat and ecosystems. Mobility 2035 has incorporated a summary of mitigation strategies to develop and explore further as projects progress through the project development process. The environmental mitigation strategies and activities are intended to be regional in scope; however, mitigation may address and be applied for project-level impacts.

THE COUNCIL ON ENVIRONMENTAL QUALITY REGULATIONS DEFINE MITIGATION AS:

- ***Avoiding*** the impact altogether by not taking a certain action or parts of an action.
- ***Minimizing*** impacts by limiting the degree or magnitude of the action and its implementation. Rectifying the impact by repairing, rehabilitating, or restoring the affected environment.
- ***Reducing*** or eliminating the impact over time by preservation and maintenance operations during the life of the action.
- ***Compensating*** for the impact by replacing or providing substitute resources or environments.

ECOSYSTEM-BASED MITIGATION: The process of restoring, creating, enhancing, and preserving habitat and other ecosystem features in conjunction with or in advance of projects in areas where environmental needs and the potential environmental contributions have been determined to be greatest.[12]

Appendix C, Exhibit C.13 provides regional mitigation strategies that transportation agencies can employ to minimize, reduce, mitigate, or compensate for transportation project impacts that cannot be avoided.

NCTCOG supports coordination with federal, state, and local resource agencies to develop a regional ecosystem-based approach to mitigating transportation project impacts that expedites the delivery of transportation projects while encouraging

[13] TRACES Website, www.nctcog.org/traces

preservation and restoration of high priority ecosystems. Ecosystem-based mitigation extends existing compensatory mitigation options by offering a way to evaluate alternatives for off-site mitigation and/or out-of-kind mitigation in the ecologically most valuable areas as defined by interagency partners and the public. Development of the REF was the first step in promoting ecosystem-based mitigation in the Dallas-Fort Worth area and coordination efforts will continue with transportation and conservation planning agencies to integrate these concepts into transportation planning and projects.

Leveraging opportunities and combining planning efforts, or integrated planning, will support conservation priorities while maintaining compliance with applicable laws and developing needed infrastructure.

It is a requirement that as projects advance toward further planning and development stages such as the federal National Environmental Policy Act (NEPA), evaluations and equivalent state processes that detailed environmental analysis of individual transportation projects will occur. At this stage, project features may be narrowed and refined, and the environmental impacts and mitigation strategies are appropriately ascertained for individual projects.

Environmental Trends in Transportation

Transportation projects funded with federal transportation dollars must adhere to environmental review processes before construction. This review, conducted under the guidance of NEPA, documents the environmental, economic, and social impacts of a particular project. With this critical stage in mind, transportation planning is trending toward decision making that considers environmental, community, and economic goals early in the planning stage and then carries them through project development, design, and construction.

Additional trends occurring at the planning level include assessing environmental impacts or benefits associated with transportation projects on a cumulative or system-wide level, and integrating ecosystem approaches to mitigating impacts. For example, a discussion of potential impacts to environmental justice populations associated with the implementation of Mobility 2035 is included in the Social Considerations chapter. The air quality conformity process is another cumulative analysis that continues to advance both regionally and nationwide.

NCTCOG supports approaches to transportation decision making that consider environmental, community, and economic goals early in the planning stage and carry them through the NEPA review process, project development, design, and construction. This can lead to a seamless decision-making process that minimizes duplication of effort, promotes environmental stewardship, and reduces delays in project implementation. Decisions made early in planning and project development play a substantial role later in the NEPA environmental review process.

Environmental Scoring

In addition to providing Regional Ecosystem Framework subwatershed scores for transit and roadway corridors, environmental scoring was conducted for the Mobility 2035 transit and roadway recommendations. The resulting scores are found in Appendix C, Exhibits C.14 and C.15. The results include scores derived from two EPA analysis tools including NEPAssist and the Geographic Information System Screening Tool (GISST). For any one corridor, the questions presented in *Exhibit 4.10* are provided with a corresponding Yes or No answer or score. The answers provide insight into resources where there may be relatively high concern and further review, documentation, and consultation with the applicable regulatory or planning agency may be needed during the planning and project development processes. These scores are meant to be used as a preliminary screening tool for potential impact identification.

Summary

Mobility 2035 supports many programs that demonstrate adherence to federal air quality conformity requirements and will improve the region's air quality through comprehensive strategies and partnerships. In addition, Mobility 2035 supports and presents some new initiatives aimed at expediting project delivery while enhancing stewardship for key natural resources in North Central Texas. Developing transportation infrastructure in ways that are more sensitive to the high priority environments in the region will support healthy communities and habitats, and a high quality of life for all residents.

All environmental resource policies, programs, projects, and maps are included in Appendix C.

EPA Analysis Tool	Category	Question/Scoring Criterion	
NEPAssist Analysis	Facility	▪ Within 100/1000 meters of a hospital? ▪ Within 100/1000 meters of a Toxic Release Inventory site? ▪ Within 100/1000 meters of a regulated facility?	
	Water	▪ Within 100 year floodplain? ▪ Within 500 year floodplain?	▪ Within a NLCD wetland? ▪ Within 1000 meters of NLCD wetland?
	Ecology	▪ Within a federal/state park or wildlife area? ▪ Within 1000 meters of a federal/state park or wildlife area? ▪ Within a critical habitat area? ▪ Within 1000 meters of a critical habitat area? ▪ Within 100 meters of a REAP Composite area that is within the top 10% highest scores?	▪ Within 100 meters of a REAP Diversity area that is within the top 10% highest scores? ▪ Within 100 meters of a REAP Sustainability area that is within the top 10% highest scores? ▪ Within 100 meters of a REAP Rarity area that is within the top 10% highest scores?
	Other	▪ Within 100/1000 meters of a place on the NRHP? ▪ Within 100/1000 meters of a school? ▪ Within an air quality nonattainment area?	
GISST Analysis	Hydrological Unit Code Related	▪ Surface Water Use ▪ STORET Exceedances ▪ Unified Watershed Assessment	
	Other Water Related	▪ Distance to Water (feet) ▪ Surface Water Quantity ▪ % 100 Year Floodplain	▪ % 500 Year Floodplain ▪ Groundwater Probability ▪ Soil Permeability
	Land Cover Related	▪ % Wildlife ▪ % Agriculture	▪ % Wetlands ▪ Land Use Ranking

Exhibit 4.10: Environmental Scoring Categories and Questions


traffic signal
operational
efficiency
2035
mobility

Operational Efficiency

Operational efficiency is important to maintaining a reliable and safe transportation system that supports an improved quality of life for the traveling public. There are multiple strategies employed to promote efficiency of the transportation system by managing and reducing congestion. These strategies include addressing travel demand management, transportation system management, intelligent transportation systems, and sustainable development.

Mobility 2035 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.
- Assure all communities are provided access to the regional transportation system and the planning process.
- Preserve and enhance the natural environment, improve air quality, and promote active lifestyles.
- 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.

Operational Efficiency Strategies

The need to operate the regional transportation system as efficiently as possible is a top priority to provide a reliable and safe transportation system that will enhance the livability of North Central Texas. The Dallas-Fort Worth area is classified as a transportation management area (urbanized areas with a population over 200,000) and is required by federal law to develop a Congestion Management Process (CMP). The CMP is a systematic process for managing traffic congestion that provides information on transportation system performance and alternative strategies for alleviating congestion and enhancing the mobility of persons and goods.

Operational Efficiency at a Glance:

Mobility 2035 supports an efficient, safe, and secure transportation system that contributes to a high quality of life for the traveling public. Several initiatives improve operational efficiency of transportation systems, ranging from the use of technology to improving the connections and coordination between land use and transportation systems.

With a projected population increase of 48 percent from 2012 to 2035, the demands on the transportation system to carry people and goods will only become greater. With the existing financial climate, the reality is that the Dallas-Fort Worth region will not be able to build enough roads and rail lines to satisfy the demands and needs of this growing population.

The operational efficiency strategies discussed in this chapter provide alternatives to building high-cost infrastructure to reduce congestion.

In This Chapter:

Did You Know …

… by the end of 2010, 358 vanpools were operating in the Dallas-Fort Worth area and by the year 2035, 1,041 vanpools are anticipated?

… approximately 7,800 traffic signal improvements will be implemented by the year 2035, reducing congestion-related costs by approximately $269 million per year?

… over $120 million has funded sustainable development projects in the Dallas-Fort Worth area?

Operational efficiency strategies addressed in this chapter are part of the multi-faceted CMP. These strategies include travel demand management, transportation system management, and intelligent transportation systems. They are cost effective, quick implementation projects and programs that encourage the use of alternative travel modes and improve the efficiency of the transportation system. The Dallas-Fort Worth Congestion Management Process document complements these strategies outlined in Mobility 2035.[1]

Additionally, transportation system safety and security is a concern in a region with millions of people. Monitoring and evaluating the safety and security of the transportation system is a key priority.

Mobility 2035 Policies

Effective and comprehensive policies are an important element in the planning and implementation of programs and projects. Mobility 2035 promotes the following congestion management policies:

MO3-001: Ensure the efficient operation of the existing multimodal transportation system by evaluating and/or implementing maintenance, rehabilitation, enhancement, and/or operational type projects in order to maintain safe, efficient travel conditions.

MO3-002: Ensure the existing multimodal transportation system operates efficiently by constructing bridge replacements with approaches, new bridges, overpasses or underpasses for railroads, bicycle/pedestrian facilities, off-system roads, and non-regionally significant facilities.

Travel Demand Management

One of the key congestion management strategies is travel demand management (TDM). TDM promotes strategies that reduce the demand for drive-alone travel on roadways by offering alternatives to single-occupant vehicle driving. Program results should improve mobility, accessibility, and air quality within the region.

Examples of alternatives to drive-alone travel include rail and bus transit, ridesharing options like carpools and vanpools and bicycling which reduce the demand of the roadway capacity or supply. Fewer vehicles on the road, especially during peak travel periods, allow traffic to move more efficiently along a roadway. Aside from reducing single-occupant vehicle demand, higher-occupancy travel modes, such as rail transit and high-occupancy vehicles (HOV)/managed lanes, are more efficient in the context of person-carrying capacity.

The TDM strategies described and recommended are relatively low-cost, quick-implementation programs and projects that encourage alternate travel modes to driving alone. The higher cost and more complex TDM projects such as transit systems, HOV/managed lanes, and bicycle routes are described in the Mobility Options chapter.

TDM activities also address air quality concerns by reducing the number of vehicles on the roads. TDM programs that shift drive-alone travel from peak periods also serve to reduce vehicle emissions. In addition to mode shifts, other examples of TDM strategies that reduce peak-period travel include flexible work hours, compressed work weeks, and telecommuting.

IH 635 (LBJ Freeway) HOV Lane Source: DART

TDM also has a role in sustainable development because TDM strategies support high-occupancy modes, walking, and bicycling. In turn, sustainable land use and development can encourage utilization of alternative modes and TDM alternatives. Employers that locate their businesses in areas supported by transit and/or provide trip reduction strategies for their employees assist in the proliferation of alternative transportation modes.

[1] DFW CMP, http://www.nctcog.org/trans/cmp/, NCTCOG

Mobility 2035 Policies and Programs

Mobility 2035 supports the following policies associated with travel demand management:

TDM3-001: Support the Congestion Management Process which includes explicit consideration and appropriate implementation of travel demand management, transportation system management, and intelligent transportation system strategies during all stages of corridor development and operations.

TDM3-002: Support an integrated planning process that maximizes existing transportation system capacity before considering major capital infrastructure investment in the multi-modal system.

Mobility 2035 supports the following travel demand management programs:

TDM2-100: Employer Trip Reduction Program

TDM2-200: Regional Vanpool Program

TDM2-300: Park-and-Ride Facilities

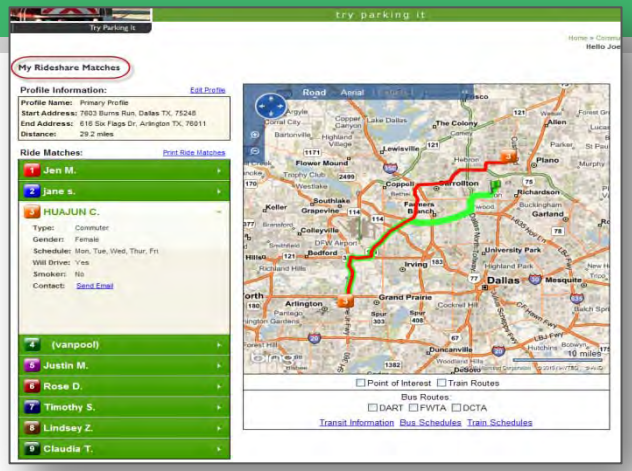
TDM2-400: Transportation Management Associations

Mobility 2035 also recommends the following TDM-related congestion management strategies.

Employer Trip Reduction Program

The Employer Trip Reduction (ETR) Program, a cooperative educational program between the North Central Texas Council of Governments (NCTCOG), Dallas Area Rapid Transit (DART), the Fort Worth Transportation Authority (The T), Denton County Transportation Authority (DCTA), and other public and private sector organizations, targets vehicle trips of employees working for large employers (defined as employers with 100 or more employees) in the region. The ETR Program is a voluntary program that markets alternatives to driving alone on a commute trip. The implementation of rideshare programs (such as carpooling and vanpooling), telecommuting, flexible work schedule programs, transit pass subsidies, and bicycle facilities are examples of travel demand management programs that are encouraged through this marketing effort.

TRYPARKINGIT.COM is a regional commuter-tracking system with rideshare features. It is an essential tool used within the Employer Trip Reduction Program. The Website provides a user-friendly Web interface for employees in the Dallas-Fort Worth area to log daily work commutes and locate various ridesharing options. It also aids regional planners to calculate the mobility and air quality benefits of employee trip reductions from using alternatives to single-occupant vehicle transportation and/or trip elimination strategies and aids in the development and evaluation of the regional transportation system. Commuters can find carpool and vanpool matches and determine availability of existing carpools and vanpools.



My Rideshare Matches Page, www.tryparkingit.com

As of April 2011, 564 employers in the region offer an ETR Program or alternative commute incentive. The degree of implementation within a company or organization varies greatly, but with most employers offering only a few types of commute-trip reduction programs, additional marketing of TDM programs is necessary. As regional commute options expand, such as transit services, employees and employers will have increased opportunities to utilize and implement trip reduction programs.

Employee Trip Reduction Program Policy Guidance

The ETR Program is a voluntary program that requires strong public support to ensure success. Public support is needed in recruiting employers and establishing Transportation Management Associations (TMAs), assisting employers with implementation of their trip reduction programs and training on-site employee transportation coordinators. Education and promotion is required from the public sector, as well as collection, assimilation, and maintenance of program performance data.

Public sector leadership is important and public sector employers within the region develop aggressive trip reduction programs for their employees. By establishing targets and programs in excess of average trip reduction efforts, monitoring their program's effectiveness, and sharing expertise and experience with private sector employers, the public sector can provide a model that is easily duplicated across industry sectors.

Employers that encourage higher-vehicle occupancy by promoting use of carpooling, vanpooling, and transit through trip-making incentives are strongly encouraged to develop policies. For example, parking management and pricing policies save employers' money, and the savings can be passed on to employees in the form of subsidized transit passes and guaranteed ride home programs. It is recommended that program goals of individual employers should target a minimum 20 percent reduction in vehicle commute trips. Creative employer policies that incorporate changes in employee scheduling of work hours, combined with incentives to use alternative travel modes, allows flexibility to achieve such goals.

Vanpool Program

Ridesharing programs are key TDM elements. The Vanpool Program is a popular commuter ridesharing alternative. Vanpools are aimed at increasing average vehicle occupancy during peak travel periods. To increase commuter ridesharing participation, vanpool programs should be aimed at longer commute trips – those home-based work trips of 25 miles or more in distance. The Dallas-Fort Worth area is expected to generate over 6.7 million home-based work trips daily in the year 2035, approximately one quarter of all trips. Gaining additional participants from this subset of trips is a key strategy of future vanpool programs.

The T Commuter Vanpool Source: FWTA

Employers, private interest groups, TMAs, and transportation/transit authorities may implement vanpools and transportation/transit authorities can assist large employers in setting up vanpool programs for employees. Federal funds can be applied to vanpool operating costs to assist participating employees and employers financially. Federal funds for vanpool subsidies are recommended not to exceed 50 percent of the operating costs. In recent years, NCTCOG and transportation/transit authorities have contributed funds needed to subsidize vanpool operating costs. The balance of the funds can come from various sources including employer subsidies, vanpool rider fare, private grants, advertisers, and other commercial sponsors.

> By the end of 2010, 358 vanpools were operating in the Dallas-Fort Worth area, and by the year 2035, 1,041 vanpools are anticipated to be operating.

Vanpool Program Policy Guidance

Vanpool program development is coordinated with existing public and private sector vanpool programs to limit competition amongst vanpools and to ensure the most efficient use of existing vanpools. Due to the region's air quality, targeting vanpools that remain in the ozone nonattainment area and using fuel-efficient or low-emitting vehicles when possible is another consideration. Regular performance reporting ensures standardization of subsidies and service delivery in the appropriate areas.

The coupling of ETR marketing with a public subsidy for vanpool operations should produce a program that captures nearly 17,130 vanpool riders per day in this region and reduces travel by over 30,776 vehicle trips per day. The program calls for a subsidy directed to the vanpool rider and targets resources to vanpool start-up programs.

Park-and-Ride Facilities

Park-and-ride facilities serve as collection areas for persons transferring to higher-occupancy vehicles. They are often located and designed to serve bus or rail transit, but many are used by car and vanpoolers as well. Park-and-ride facilities can be located near a central business district to serve public transit and pedestrian activity areas or in suburban areas to collect riders near the origin of their trips. Combined with HOV/managed lanes, park-and-ride facilities can be an effective incentive for increasing vehicle occupancy, thus reducing congestion and vehicle emissions.

Existing, planned, and candidate park-and-ride facilities are provided in *Exhibit 5.1.* While many park-and-ride facilities exist in transit service areas, other facilities are planned for counties in the nonattainment area that are not currently served by transit authorities. Federal and local funding has been identified for several projects occurring outside of transit service areas. The development of park-and-ride facilities in Hood, Hunt, and Wise counties may also be evaluated.

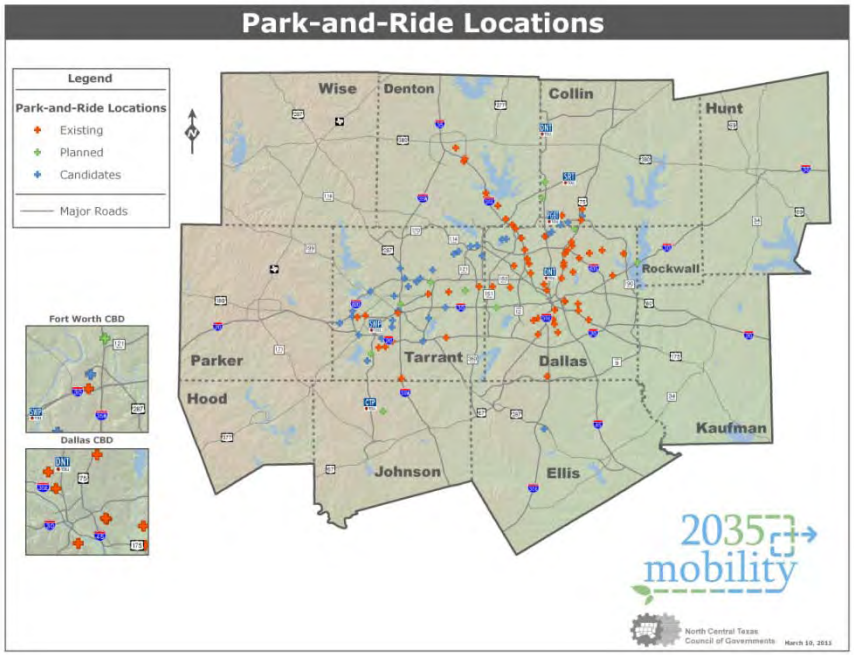


Exhibit 5.1: Existing, Planned, and Candidate Park-and-Ride Facilities

Considering investments in rail and roadway facilities by the year 2035 and the changes in travel behavior that should result, it is estimated that an additional 47 park-and-ride facilities serving nearly 18,200 users will be needed in addition to existing park-and-ride facilities. Technical studies, forecasted congestion levels, transit service planning and simulations, and local government initiatives are the main tools used to identify candidate park-and-ride facilities. Inventories and costs associated with the existing, planned, and candidate park-and-ride facilities are provided in Appendix D.

Transportation Management Associations

Transportation Management Associations, also known as Transportation Management Organizations, are private and public-private organizations that implement congestion mitigation strategies and work together on local transportation issues. Many are incorporated non-profit organizations; they tend to be membership organizations made up of employers, developers, building owners, and local government representatives. Most TMAs are located in areas of dense employment and focus on the TDM programs of public and private employers.

In recent years, TMAs have played increased roles in new areas including CMP development, intelligent transportation system initiatives, and in the development of residential and tourism travel markets. Usually, the principle role of a TMA is to involve the business community in transportation planning and to provide a forum for the private sector to impact strategy development and implementation. The following list demonstrates the variety of transportation activities in which TMAs can be involved:

- Advocacy on transit, roadway, bicycle, pedestrian, land use, and air quality issues
- Transit pass subsidy or voucher programs
- Shuttles or vanpools for employees, customers, or both
- Ride matching services and support for carpools and vanpools
- Parking management programs
- Guaranteed or emergency ride home programs
- Telecommuting/teleconferencing center(s) operation
- Employee transportation coordinator training
- Promotional programs and incentives for alternative travel modes
- Educational programs

Taking advantage of future rail transit and roadway system options, while partnering with transportation/transit authorities and other transportation agencies, will strengthen the influence of TMAs attempting to improve mobility and accessibility within and around major employment and activity centers. Two TMAs currently operate within the Dallas-Fort Worth area. The Central Dallas Association operates a TMA in the Dallas central business district and Downtown Fort Worth, Inc. functions as the TMA for the Fort Worth central business district. Candidate TMA locations have also been recommended through corridor and feasibility studies. Considerations used to identify these locations include employment densities in future years, as well as the location and magnitude of traffic congestion. The environmental process is a forum for further evaluation and refinement of candidate locations. Existing and candidate TMA service areas are listed in Appendix D.

Policy Guidance

Transportation Management Associations requesting start-up funds from the Regional Transportation Council (RTC) must provide a written business plan to access funding for two years. After the first two years, only primary and secondary transportation services are eligible for funding. Primary services reduce drive-alone or peak-period travel by either providing TDM services directly or by promoting the use of alternative travel modes. Secondary transportation services include the provision of information regarding TDM program options and advocacy of alternative travel modes.

Environmental Justice

Environmental justice is taken into account in TDM strategies. Many park-and-ride facilities are located in and around protected class population areas that offer the public alternatives to driving alone. Additionally, DART, The T, and DCTA operate regional vanpool programs that offer vanpool services in environmental justice protected class areas.

Summary

The choices travelers make regarding their mode and time of travel impacts the levels of mobility, accessibility, and air quality. By reducing the number of people driving alone (demand), the capacity of the transportation system (supply) is more efficiently utilized. The importance of TDM strategies cannot be overstated. Mobility 2035 recommends a set of low-cost, quick-implementation options that complement the various transportation system recommendations.

Changes in technology, the workplace, business travel, and personal travel will improve the effectiveness of TDM strategies. Future updates to the Metropolitan Transportation Plan will include revisions to existing strategies in addition to new and innovative approaches.

All travel demand management policies, programs, projects, and maps are provided in Appendix D.

Transportation System Management and Operations

In addition to TDM strategies, the regional CMP includes transportation system management strategies, also known as transportation system management and operations (TSM&O). This approach seeks to identify and implement cost-effective congestion mitigation strategies to improve traffic flow, safety, system reliability, and capacity. Compared to major capacity and infrastructure improvements, management and operational projects are usually low-cost improvements that can be implemented or constructed quickly and with minimal impacts to the transportation network.

TSM&O projects should be recommended and implemented during planning, engineering, construction, and operation stages of the corridor implementation process. Corridor studies assist in the refinement of transportation recommendations by conducting detailed analyses of travel characteristics and inventories of transportation infrastructure. Corridor studies offer an excellent opportunity to study the feasibility and implementation of TSM&O projects in a transportation corridor. TSM&O projects should be recommended as part of a comprehensive transportation infrastructure improvement strategy in a corridor and can complement the major capacity improvements and infrastructure by providing improved traffic flow on arterials and local streets. No corridor study should be approved without the proper consideration of TSM&O (and TDM) strategies. Appropriate implementation agencies should seek applicable funding sources for the recommended projects and programs.

Mobility 2035 supports the following TSM&O strategies to reduce recurring and nonrecurring congestion in the Dallas-Fort Worth area:

- Intersection improvements
- Traffic signal improvements
- Freeway and arterial bottleneck removal
- Work zone management
- Special events management

RECURRING CONGESTION: Congestion on roadway facilities during peak travel periods that occurs almost every day is "recurring" congestion. This is the type of congestion where the number of vehicles trying to use the roadway system exceeds the available capacity.

NONRECURRING CONGESTION: Nonrecurring congestion is traffic congestion due to nonrecurring causes, such as crashes, disabled vehicles, work zones, adverse weather events, and planned special events. Nonrecurring events dramatically reduce the available capacity and reliability of the entire transportation system.

Federal Highway Administration Office of Operations

Implementation of intersection traffic signal and bottleneck removal improvement projects improve safety and decrease travel time. This in turn results in decreased vehicular emissions and improved air quality. Identifying and eliminating bottleneck locations along the roadway system also reduces congestion. Effective incident management reduces incident clearance time which improves system reliability. Data from these types of projects will be aggregated and analyzed to develop performance measures to prioritize project investments at the regional level.

Mobility 2035 Policies and Programs

Mobility 2035 supports the following transportation system management and operations policies:

TSM3-001: Installation of pedestrian facilities by local agencies as part of intersection improvement and traffic signal improvement programs shall provide access to usable walkways or sidewalks.

TSM3-002: Require regional partners to coordinate during major special events or planned events to ensure minimal impact on the transportation system for individuals traveling to an event or through an event zone.

Mobility 2035 supports the following transportation system management and operations programs:

TSM2-001: Intersection Improvement Program

TSM2-002: Signal Improvement Program

TSM2-003: Bottleneck Improvement Program

TSM2-004: Special Events Management Program

TSM2-005: Bottleneck Program for Regional Corridors

Intersection Improvements

Arterials provide the link between local streets and roadways, aside from providing access to a variety of destinations. On an arterial system, intersections of arterials and other roads are points of traffic conflict as vehicles, pedestrians, and bicyclists engage in various movements. Thus, infrastructure improvements such as turning lanes, grade separations, pavement striping, signage and lighting, bus turnouts, and channelization of traffic can greatly improve traffic flow operation on arterials. It is encouraged that Americans with Disabilities Act compliant ramps installed by local agencies as part of intersection improvement projects shall provide access to useable walkways.

A total of 189 intersections are funded under the 2011-2014 Transportation Improvement Program (TIP). These projects include the installation of traffic control devices, traffic channelization, grade separations, and the addition of turning lanes.

It is projected that approximately 1,200 arterial intersection improvements will be implemented through the year 2035, thus enhancing arterial traffic flow in addition to reducing the propensity for accidents. The cost of implementing these intersection improvements is estimated to be $910 million. Estimated benefits include a reduction

in congestion delay of $171 million per year, which consequently will lower vehicle emissions as well.

Traffic Signal Improvements

The signalized intersection is one of the more complex features of a traffic system. As traffic control devices, signals are an effective means to control movement of traffic, bicycles, and pedestrians at intersections. Increases in vehicular, bicycle, and pedestrian traffic can cause older traffic control devices (and traffic signal plans) to become outdated as they cannot accommodate more sophisticated signal timing plans. Installation and operation of state-of-the-art traffic control equipment and implementation of optimized signal timing plans are cost-effective solutions resulting in improved traffic flow in many locations.

Intersection Improvement at Cooper Street and IH 20, Arlington, TX Source: NCTCOG

Computerized traffic signal systems and signal timing plan improvements greatly enhance traffic flow on arterial streets. Traffic signals at different intersections can be interconnected resulting in the improved flow of traffic along arterials. This interconnection allows signals to communicate with one another and operate more efficiently. Advances in communication and information technology over the past decade have provided tools to traffic engineers to manage signal systems more efficiently and effectively. The connection of signal systems to a centralized signal operations control center, commonly called a transportation management center, allows traffic operations engineers to respond in real time to high demand situations.

For example, within a coordinated network, traffic-adaptive systems provide several advantages over traffic control fixed-time systems because of their ability to monitor traffic conditions and implement appropriate timing plans that best serve the traffic needs at that time and location. Fixed-time systems are unable to accommodate variations in traffic flows associated with accidents, weather conditions, special events, or fluctuation in volumes. The inflexibility of the traditional systems warrants the implementation of traffic-adaptive signal systems that can accommodate not only recurring traffic congestion, but can also adjust signal timing for nonrecurring traffic congestion caused by incidents or random fluctuations in traffic patterns.

A total of 1,251 traffic signal improvements are currently funded for implementation in the 2011-2014 TIP. These projects include signal timing optimization, signal equipment upgrades, system interconnection, and adaptive systems. Additionally, the deployment of light emitting diode lamps into all new traffic signal projects and replacement projects is required.

It is estimated that approximately 7,800 traffic signal improvements will be implemented by the year 2035, reducing congestion-related costs by approximately $269 million per year. As advances in technology are made, it is expected that intelligent transportation system technology can increasingly be incorporated into traffic signal improvements, creating even greater travel time savings. Benefits also include the reduction of vehicle emissions because improved traffic signals reduce delays, braking and acceleration, and idling vehicles at intersections.

Freeway and Arterial Bottleneck Removal

Bottleneck removal strategies are low cost, quickly implementable solutions to improve locations of isolated congestion. These types of strategies include:

- The addition of travel lanes
- Restriping merging or diverging areas
- Reducing lane or shoulder widths to add a travel and/or auxiliary lane
- Providing bypass routes
- Modifying weave patterns
- Metering or closing entrance ramps
- Improving traffic signal timing on arterials
- Implementing HOV/managed lanes

Regional transportation providers coordinate with local governments in the identification and mitigation of bottlenecks. Corridor studies and subregional traffic management teams are forums to identify potential bottleneck locations and recommendations for improvements. The Roadway section in the Mobility Options

chapter of this document provides additional discussion on the Bottleneck Improvement Program on roadways.

In addition to the strategies, innovative active traffic management approaches are being pursued in the Dallas-Fort Worth area to alleviate bottlenecks. These could include:

- Temporary use of shoulder lanes during peak periods to add additional capacity.
- Extending laminar flow and the time of efficient travel to motorists.
- Queue warning to inform drivers of the reason for slower speeds.
- Dynamic merge, which gives priority to the lane with higher volumes, to prevent conflicts at merge and downstream queuing.

These approaches, coupled with TDM strategies, can most effectively maximize person throughput on the transportation system.

Additionally, bottlenecks may result from geometric roadway characteristics which may cause a decrease in travel speed and an increase in traffic accident potential. Identifying and eliminating geometric characteristics such as insufficient acceleration and deceleration lanes and ramps, sharp horizontal and vertical curves, or narrow lanes and shoulders is one element of the Bottleneck Improvement Program that can improve travel conditions and safety.

To identify traffic bottlenecks on limited-access facilities, a photographic inventory was conducted during morning and evening peak periods of travel in 2007. *Exhibits 5.2 and 5.3* identify the morning and evening bottleneck locations identified during this analysis. Short-term solutions to the identified bottlenecks will be considered as standalone projects or as part of larger corridor studies and improvement plans. When corridors undergo reconstruction the design phase of each project needs to address the identified bottlenecks.

The congestion locations identified from the aerial photos were compared to corridor projects currently in the TIP, corridors projected to be reconstructed by 2015, and corridors undergoing large-scale environmental analysis. A map of the non-peak bottleneck projects is displayed in *Exhibit 5.4* and a listing of these projects is provided in Appendix D. Identified bottleneck improvements will be considered and recommended in future funding initiatives.

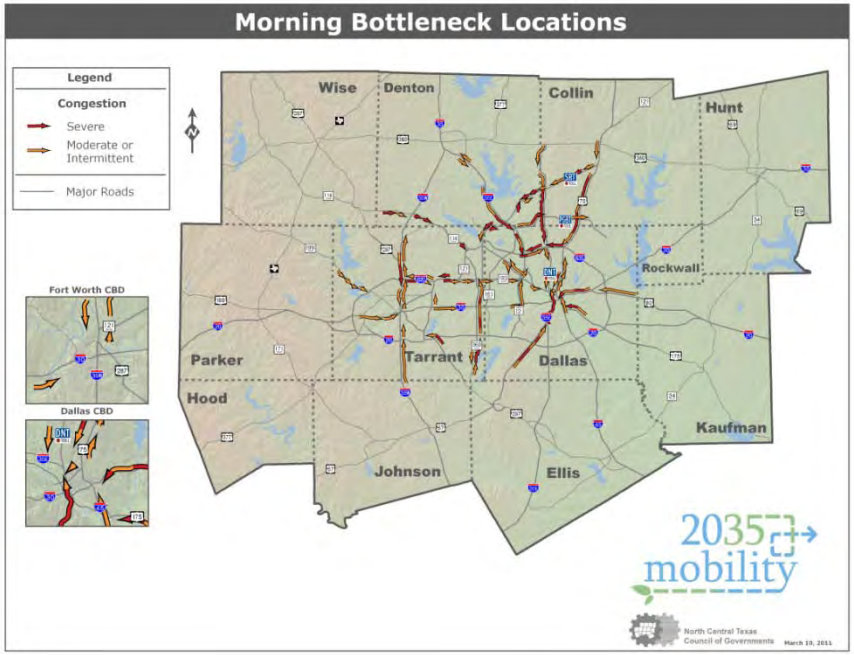


Exhibit 5.2: Morning Bottleneck and Congestion Locations

Additional bottleneck locations will be considered as corridors are reconstructed to provide better transitions from current to future projects and to allow for early implementation of larger corridor projects. The corridor improvement implementation will be monitored to provide early indications of congestion points at the corridor limits. All bottleneck removal projects will be designed to incorporate or transition into the larger permanent facility to reduce overall cost. This approach will help minimize the number of congestion points or bottlenecks in the short term and support the long-term build out of the transportation system.

The Bottleneck Removal Program is estimated to cost $310 million through 2035. Additional funding to support the bottleneck program will be available as part of the roadway infrastructure budget. These programs will result in improved level of service on roadways and parallel arterials.

Work Zone Management

The various activities required during construction normally cause some disruption to existing travel patterns. Work zone traffic management strategies should be

identified based on the project constraints, construction phasing/staging plan, type of work zone, and anticipated work zone impacts. Once strategies are implemented, they need to be consistently monitored and coordinated to ensure they are effective in mitigating work zone impacts. The frequency of crashes in work zones is disproportionately higher than at other locations. Because maintaining the full capacity and accommodation for all users is usually not possible during construction, improving alternate routes of travel, providing temporary facilities, staging work to occur during off-peak hours, and providing additional enforcement and advance information to travelers are strategies to reduce the impact of construction on roadway operations. Proper signage, safety devices, and lighting are necessary to ensure the safety of facility users and work crews.

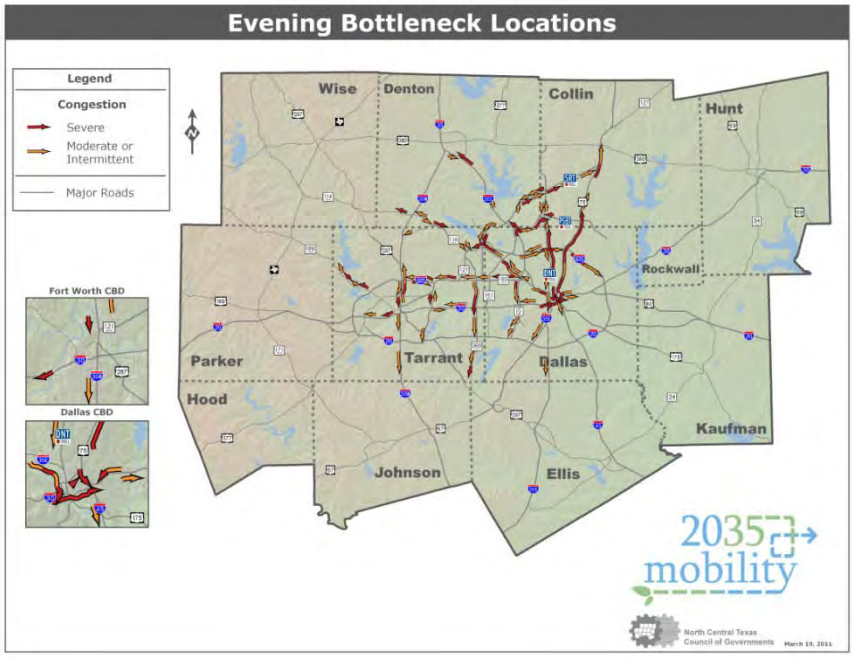


Exhibit 5.3: Evening Congestion Locations

Special Events Management

The Dallas-Fort Worth area is fortunate to be home to year-round major professional, collegiate, and amateur sporting teams and events, as well as cultural and social events and activities. Several major recreational facilities located in the region host multiple events each year. These urban and rural stadium events present special challenges to surrounding transportation systems and services. As major events approach, work groups are developed to deal with the management of traffic at and around event venues.

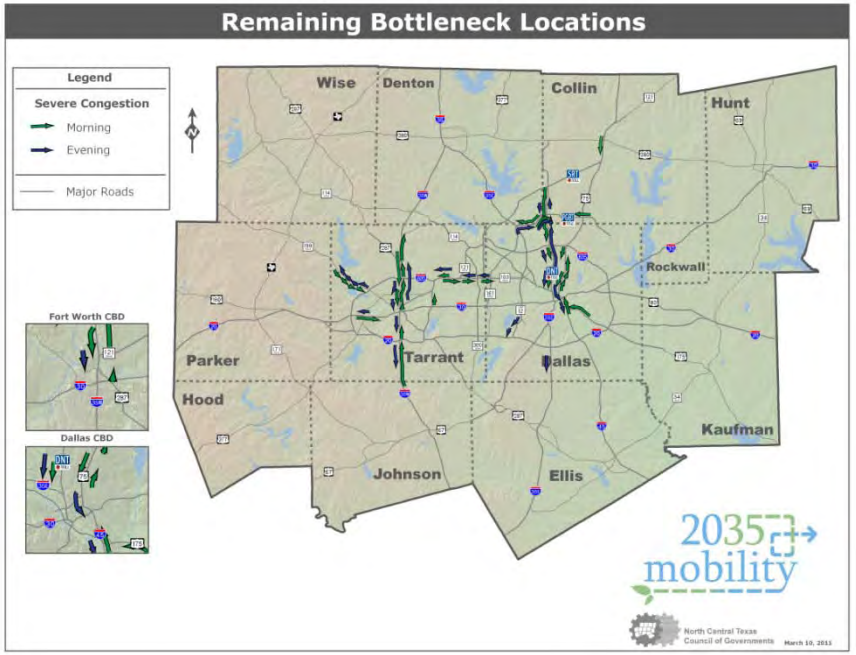


Exhibit 5.4: Remaining Bottleneck Locations

In addition, transit options are considered and implemented, if applicable, for all major special events. Other special events include street festivals, fairs, celebrations, parades, and marathons. The impact of an event is magnified if inclement weather occurs during the event.

In all of these special events, several factors can be identified to affect transportation system performance:

- Time and duration of the event
- Transportation system capacity
- Availability of parking
- Number of participants and/or spectators
- Transportation mode options
- Weather conditions

- Surface conditions
- Amount and type of event information available to drivers

Regional coordination and mitigation of special events can help increase the efficiency of transportation systems when an event occurs. An inventory of special events is maintained and provides detailed information about the event. Primary and secondary transportation impacts can be identified, including the magnitude and duration of those impacts. Follow-up of the special event should take place, including documentation of transportation impacts and an evaluation of mitigation efforts.

Several strategies can be used to minimize traffic disruption and enhance mobility before, during, and after special events. Traffic management, through the use of advanced traffic management systems, parking and lane assignment controls, and customized signal timing plans is essential. In addition, the implementation of three special event practices is recommended:

- Regional partners to coordinate during major special events or planned events to ensure minimal impact on the transportation system for individuals traveling to an event or through an event zone.
- Input from regional partners within the event zone to coordinate during work zone activities to minimize impacts.
- Major events organizers to pay for services such as HOV/managed lanes.

The use of en-route and pre-trip traveler information systems is also a method of addressing travel to special events. Another helpful strategy lies in the travel demand side of mitigating congestion such as use of transit and other high-occupancy modes. It is essential that incident management be addressed in advance in conjunction with special events; an incident occurring when the transportation system demand is already near or exceeding capacity has a far greater impact than during low traffic volumes. See the Transportation System Safety section in this chapter for more information.

Summary

The congestion mitigation strategies identified in Mobility 2035 include the most cost-effective TSM&O strategies. Additional TSM&O programs that are being considered for implementation are shown in *Exhibit 5.5.* In addition to improving mobility and reducing emissions, TSM&O strategies also address community and quality of life goals by supporting sustainable development practices. Access management and bicycle and walking trips are two examples of how designing the transportation system improves mobility and provides opportunities for improved safety and quality of life.

Result	TSM Program/Strategy
Divert Traffic Away from Congested Areas	▪ Auto-restricted Zones ▪ Residential Traffic Controls
Access Management	▪ Arterials Access Management ▪ Freeways Access Management
Traffic Calming	▪ Roundabouts ▪ Speed Reductions ▪ One-way Streets ▪ Speed Bumps

Exhibit 5.5: Future TSM Programs for Consideration

Intelligent Transportation Systems

In addition to TDM and TSM&O strategies, the regional CMP includes intelligent transportation system (ITS) strategies which seek to integrate advanced communications technologies into transportation infrastructure and in vehicles. ITS encompasses a broad range of wireless and wire line communications-based information and electronics technologies to improve travel conditions on the transportation system.[2]

Mobility 2035 Policies and Programs

Mobility 2035 endorses the following intelligent transportation system policies:

ITS3-001: Priority funding consideration will be given to projects that meet the regional ITS deployment initiatives as outlined in the Dallas-Fort Worth Regional ITS Architecture.

ITS3-002: ITS projects must be consistent with the architecture and standards described in the Dallas-Fort Worth Regional ITS Architecture.

ITS3-003: Encourage, evaluate, and deploy new energy-efficient, low-cost technologies for ITS and TSM projects.

[2] USDOT, http://www.its.dot.gov/

Mobility 2035 supports the following intelligent transportation system programs:

ITS2-001: Intelligent Transportation System Implementation

ITS2-002: Regional Intelligent Transportation System Architecture Program

ITS2-003: Advanced Traveler Information System Implementation Program

ITS2-004: Advanced Traffic Management System Implementation Program

ITS2-005: Advanced Public Transportation System Implementation Program

ITS2-006: Intelligent Transportation System Interoperability Program

North Texas Regional ITS Architecture

The Regional ITS Architecture has and will continue to guide ITS deployment and build regional consensus for multi-agency systems integrations in the Dallas-Fort Worth Metropolitan Planning Area. ITS projects funded through the highway trust fund must be consistent with the National/Regional ITS Architecture and applicable standards. Regional ITS Architecture must include the following eight requirements:

- A description of the region
- Identification of participating agencies and stakeholders
- Identification of the roles and responsibilities of participating agencies and stakeholders
- New and existing agreements are required for operations affecting intelligent transportation system project interoperability, utilization of ITS-related standards, and the operation of the projects identified in the Regional ITS Architecture
- System functional requirements
- System interface requirements
- Identification of ITS standards supporting regional and national interoperability
- A sequence of projects

The Regional ITS Architecture was developed based on the corresponding transportation services identified by the regional stakeholders in a three- to five-year timeframe. The North Texas Regional ITS Architecture[3] document expands upon the efforts associated with ITS deployment in the Dallas-Fort Worth area.

[3] North Texas Regional ITS Architecture, http://www.nortex-its.org/Architecture/ArchHome.htm

Additionally, subregional ITS plans have been developed to identify priority projects, corridors, and systems for ITS deployment. The implementation criteria for ITS systems development include:

- Filling gaps in the existing ITS communications infrastructure by completing critical system linkages.
- Leveraging transportation resources by targeting investment, where possible, to facilities undergoing reconstruction.
- Leveraging transportation resources by creating or enhancing public-private partnerships which will provide communications infrastructure for Regional ITS Architecture.

Implementing Regional Intelligent Transportation System

Communication infrastructure is being installed in portions of the Dallas-Fort Worth area. Traffic monitoring and incident detection and response systems are operating on portions of the freeway system in Collin, Dallas, Denton, and Tarrant counties. The Texas Department of Transportation (TxDOT) Dallas and Fort Worth Districts each manage and operate traffic management centers (TMCs) in Dallas and Tarrant counties. In addition, the North Texas Tollway Authority (NTTA) manages and operates the TMC for the tolled facilities. The intelligent transportation system components of the TxDOT and NTTA TMCs include closed-circuit television, lane control signals, dynamic message signs, mobility assistance patrols, and vehicle detectors on the limited-access facilities.

Dynamic Message Sign on IH 820 Source: NCTCOG

In addition to the TxDOT and NTTA TMCs, the region has existing and funded city TMCs and transit management centers throughout the region. City TMAs include closed-circuit television, dynamic message signs, lane control signs, and traffic signals on the arterial street system. Some cities in the region also include traffic signal preemption systems for emergency vehicles and for transit vehicle progression. The transit management center's ITS components include transit vehicle tracking,

in-vehicle navigation, integrated radio system/automated vehicle location, automated fleet maintenance system, and automated HOV/managed lane enforcement. User expectations, anticipated funding opportunities, agency policies, and existing investments in ITS infrastructure reveal that a regional, single-site, single-agency solution is not a viable ITS alternative for the Dallas-Fort Worth area. The recommended approach is a distributed model where data and video are a shared resource. Efforts are underway to establish sharing of communication infrastructure, data, and video among the regional partners.

The following regional intelligent transportation system programs are in place to implement ITS strategies:

- Exchange of data and video center-to-center software
- Advanced Traveler Information System
- Advanced Traffic Management System
- Advanced Public Transportation System

Exchange of Data and Video Center-to-Center Software

Current efforts in the region focus on an initiative to exchange data and video between agencies and systems. This initiative includes the development of center-to-center (C2C) software plug-ins and the design of the regional data and video communication system to allow dissimilar TMCs to communicate and exchange information.

The goals and objectives of the C2C software are outlined below:

- To provide a common repository for accessing and archiving traffic information for the Dallas-Fort Worth area.
- To provide an Internet-based graphical map to display traffic conditions in the Dallas-Fort Worth area.
- To provide an application that will allow agencies without a formal TMC to participate in the C2C infrastructure and information sharing.
- To provide a system which supports ITS C2C communications for command, control, and status of various ITS field devices including dynamic message signs, lane control signals, closed-circuit television cameras, and other ITS subsystems that may be deployed in the future.
- To utilize National ITS standards to implement the project.
- To provide a software system that is extensible to all local or regional partners. This would allow a local common repository to be created by linking individual partners, a regional common repository to be created by linking local common repositories, and a statewide common repository to be created by linking regional common repositories.

Regional partners have initiated sharing of infrastructure, data, and video components for transportation-related information through the Transportation Emergency Responders Uniform Communication System (TERUCS) project, which incorporates the attributes of Regional Data and Video Communication System and Emergency Responder Uniform Communication System. With TERUCS in place, emergency operations centers (EOCs) are provided access to live transportation data and video which allows them to improve incident response and clearance times, as well as make better operational decisions during EOC activation.

Advanced Traveler Information System

An Advanced Traveler Information System (ATIS) is recommended that will provide real-time information on traffic conditions and travel opportunities to travelers in the region. This will require the integration of current and future independent information systems across jurisdictional lines, creating a seamless traveler information system providing pre-trip and en-route traveler information to the public. Varied communication technologies will be explored and used in the region and linked to subregional transportation management centers, creating a virtual regional transportation management center. This decentralized approach will promote cost savings and maximize involvement of various agency groups while allowing technology to support face-to-face decision-making partnerships. The system is shown in red on *Exhibit 5.6* and covers essentially the entire freeway and tollway systems.

The specific communication system media is not indicated in this plan but will be a focus of the ITS planning groups which continue to meet in the region. The system will support future personal, public, and freight transportation in the region and will provide information via dynamic message signs, highway advisory radio, commercial radio and television, kiosks, and through Internet-based communications systems. Also shown on *Exhibit 5.6* are several city and transit TMCs which will be integrated into the ATIS.

A regional traveler card, or Smart Card, is also recommended to enable the actual transfer of electronic information from the transportation patron or client to the provider of the service. This may include the transfer of funds through means of an electronic payment instrument. The device may also hold and update the traveler's information such as personal profiles or trip histories.

Advanced Traffic Management System

Distributed traffic management centers will support traffic management and major incident response and clearance. The Advanced Traffic Management System (ATMS) includes the integration of roadways, managed facilities, and strategic arterials across jurisdictional lines. *Exhibit 5.6* displays the recommended ATMS on the freeway and tollway systems and includes operation of portable changeable message signs to divert traffic around traffic incidents and special events; closed-circuit television cameras for traffic monitoring; incident verification and clearance; lane control signals for traffic management and incident management; and may include automated ramp metering systems to regulate freeway system access during peak travel periods. Traffic control subsystems on arterials which intersect with, or are parallel to, the limited-access freeway and tollway facilities should be integrated with freeway and tollway intelligent transportation infrastructure to support seamless, multimodal traffic management during traffic incidents and peak travel periods.

The continuation of the Mobility Assistance Patrol Program (MAPP) is recommended and increased MAPP coverage should focus on congested systems and peak periods. *Exhibit 5.6* displays the MAPP recommendations for the limited-access systems. MAPP service is not recommended for arterial roadways. MAPP and other incident management tools are particularly critical in construction work zones and during special events and inclement weather. More information on MAPP can be found in the Transportation System Safety and Transportation System Security section of this chapter.

The substantial investment in freeway improvements represented in Mobility 2035 makes it imperative that operational plans be developed to manage and clear freeway incidents in a timely manner. The TxDOT Dallas and Fort Worth Districts and NTTA are encouraged to work closely with the Regional Transportation Council, NCTCOG, and affected local governments' transportation and law enforcement professionals to develop consistent, coordinated freeway operational plans which include quick incident clearance practices. These plans need to be in place prior to major freeway improvement expenditures in order to ensure that the expected mobility benefits are realized.

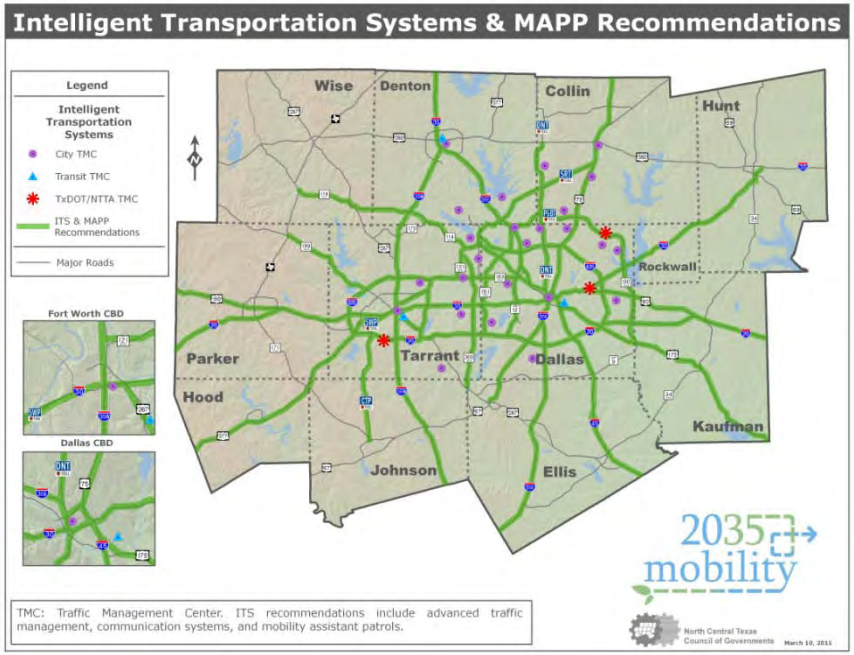


Exhibit 5.6: ITS and MAPP Recommendations

Advanced Public Transportation System

An Advanced Public Transportation System is recommended in Mobility 2035. Transit management centers as shown in *Exhibit 5.6* will serve as communications hubs for The T, DART, and DCTA, and will be integrated with state and local government transportation management centers. Automatic vehicle location technology, automated fare collection, transit signal priority, and transit security systems will enhance transit service, increase the safety of riders, and support greater levels of service to travelers. A more personalized public transportation service will allow more flexible routing and demand responsive service. More advanced communications technology will allow transit operators to monitor traffic conditions on the roadway, managed facilities, and rail systems; verify traffic incident type and severity; automate managed facilities occupancy verification; enforce managed facilities operations; and support special events.

Environmental Justice

Environmental justice was considered during the evaluation of traffic signal improvement, intersection improvement, and ITS deployment. The analysis included the review of TSM&O projects for areas determined to have a high concentration of protected class population. This is based on the total number of centerline miles with TSM&O compared to the total number of centerline miles adjacent to a specific protected class population. Future programming of TSM&O projects will include environmental justice as criteria in the selection of projects, in addition to safety, mobility, and air quality.

Summary

The TSM&O programs include TSM and ITS strategies. Capital costs for ITS and TSM strategies are estimated to cost $383 million and $1.7 billion, respectively. Operating costs for ITS are expected to be $39 million per year at full system implementation. TSM and ITS benefits include a reduction in recurrent traffic congestion of approximately 96,500 and 63,200 person hours per day regionally, respectively. A reduction in nonrecurrent traffic congestion is expected to be approximately 124,700 person hours per day regionally. In addition, benefits will include fuel savings and air pollution reductions, safer streets and highways, and system maintenance cost reductions.

All transportation system management and operations policies, programs, projects, and maps can be found in Appendix D.

Transportation System Safety and Transportation System Security

The safety and security of the North Central Texas transportation system is of vital importance. Therefore, the Transportation System Safety Program focuses on improving traffic safety throughout the region by supporting and coordinating planning efforts to develop safety policies, programs, and projects. The goal of transportation system security is to support ongoing local, state, and federal initiatives to address transportation system security and emergency preparedness planning in the North Central Texas region. These planning and coordinating efforts include partnerships between NCTCOG, TxDOT, local governments, and other partners to develop strategies for data collection, analysis, archiving, and supporting security programs in North Central Texas.

Mobility 2035 Supported Goals

- Ensure all communities are provided access to the regional transportation system and the planning process.
- Ensure adequate maintenance and enhance the safety and reliability of the existing transportation system.

Transportation System Safety

It is through four core concepts that the safety program strives to involve partners in the planning and implementation process of creating a safer transportation system and support the Mobility 2035 goals. The four core concepts include:

- Safety planning and implementation efforts
- Data analysis and information system development
- Safety education and training efforts
- Innovative funding and partnership agreements

Transportation System Safety at a Glance:

Data collection and analysis, training, education, enforcement, and engineering continue to be important aspects to improving transportation system safety in the Dallas-Fort Worth region. Additionally the safety improvements that reduce roadway crashes, fatalities, and injuries include a diverse set of activities implemented by a variety of transportation professionals.

Transportation System Security at a Glance:

Enhancing the security of our transportation system is one of the highest priorities of transportation agencies in the Dallas-Fort Worth region. Regional coordination of information sharing, response plans, response capabilities, and protection of critical infrastructure are key components to addressing transportation system security. Dialogue between local governments, transportation providers, and emergency responders build the ongoing partnerships to secure our system and respond quickly. The topics discussed in this section include:

- Regional Response Plans, Evacuation Plans, and Point of Distribution Plans
- Transportation and Emergency Responders Uniform Communication System

Mobility 2035 Policies and Programs

The safety policies that Mobility 2035 supports include:

TSSF3-001: Require implementation of safety strategies in work zones consistent with industry best practices.

TSSF3-002: Develop safety information partnerships with TxDOT, local governments, local police departments, and other organizations to encourage the sharing of regional/jurisdictional safety data (including, but not limited to, crash data, red light camera data, and incident response and clearance times data).

Mobility 2035 supports the following transportation system safety programs:

TSSF2-001: Freeway Incident Management Program

TSSF2-002: Regional Mobility Assistance Patrol Program

TSSF2-003: Regional Safety Information System

TSSF2-004: Safety Education and Training Program

TSSF2-005: Crash Causal Road Factors Program

All safety policies, programs, projects, and maps are provided in Appendix D.

Core Concept 1: Safety Planning and Implementation Efforts

Safety planning efforts include identifying safety-related issues to advance initiatives to preserve, maintain, and improve transportation safety in the Dallas-Fort Worth area and develop region-appropriate countermeasures that address crash types and locations. The programs also implement roadway safety improvements at high crash locations and projects that reduce the number of crashes and crash severity. Reducing incident clearance times for roadways and improving work zone safety are additional efforts supported to improve safety. Safety is important regardless of the mode of transportation and therefore safety programs associated with pedestrian, bicycling, transit, and freight movement operations are also important and are highlighted in the Mobility Options chapter.

To garner input and feedback from our regional partners, NCTCOG hosts and coordinates various safety related teams and activities. *Exhibit 5.7* is a summary of safety related subcommittees, task forces, and working groups hosted and coordinated by NCTCOG to implement safety programs.

Working Group	Members	Purpose
Regional Safety	Transportation professionals, TxDOT, FHWA	Develop regional safety policies, programs, projects, and activities.
Work Zone Safety	Transportation professionals	Investigate strategies to reduce the number of fatalities and injuries in work zones.
Mobility Assistance Patrols	Transportation professionals, NTTA, TxDOT, police, mobility assistance patrol representatives	Alleviate congestion and improve safety on congested corridors. Provide assistance to stranded/stalled motorists. Working group evaluates progress and effectiveness of program and maintains/develops routes.
Manual on Uniform Traffic Control Devices	Transportation professionals, emergency responders	Review pending changes to the Texas and federal MUTCD.
School Zones Policy	Transportation professionals, police, school district representatives	Develop and prioritize issues related to operating, maintaining, evaluating, and enforcing school zones. Improve communications between school districts and transportation communities.

Exhibit 5.7: Regional Safety Working Groups

Regional Mobility Assistance Patrol Program

The continued implementation of the Mobility Assistance Patrol Program is a recommendation included under the Intelligent Transportation System Program. The goal of MAPP is to assist in the alleviation of congestion and improve safety on congested highways/freeways in Dallas and Tarrant counties, as well as portions of Collin and Denton counties. MAPP provides assistance to stalled and stranded motorists by helping them to move disabled vehicles from the main lanes of regional highway/freeway facilities and ultimately getting the vehicles operating or off the facility completely. Assistance is also provided to law enforcement with traffic control when deemed necessary or when requested by law enforcement. Assistance is provided free of charge to the motorist and includes such services as assisting with flat tires, stalled vehicles, and minor accidents. MAPP is currently operated by staff from the Dallas County Sheriff's Office, the Tarrant County Sheriff's Office, and the North Texas Tollway Authority. A map of the recommended MAPP routes is included in *Exhibit 5.6.*

Core Concept 2: Data Analysis and Information System Development

Identifying, collecting, and analyzing safety data is important to improving safety in the Dallas-Fort Worth area. This data assists in the development of county-level and regional crash rates for limited-access facility roadways and includes three programs: the Regional Mobility Assistance Patrol Program, Regional Safety Information System, and the Automated Red Light Enforcement Inventory and Database.

Dallas-Fort Worth Regional Safety Information System

One near-term safety data and information system that will be operational within the next five years is the Regional Safety Information System (RSIS). Once developed, the RSIS will be a regional Geographic Information System-based, centralized database for regional traffic crash information system. RSIS will be used to identify regional high crash site locations and will allow end users to conduct online basic crash analyses based on crash data received from TxDOT's Crash Record Information System (CRIS) and other data sources. This system will provide the ability to determine the most prevalent types of fatal, injury, and property damage crashes stratified by type of roadway and identify locations with above average crash histories.

Until the RSIS is developed and operational, NCTCOG is analyzing, mapping, and reporting the regional crash and fatality incidents. CRIS, the National Highway Traffic Safety Administration-Fatality Analysis Reporting System, and the National Response Center data are used to develop regional crash rates for limited-access facilities. In the interim, a Crash Location and HazMat Incident Mapping Project is underway to map crash incidents that have occurred throughout the region. The HazMat Incident Mapping Project will assist in identifying possible roadway segments that are especially affected by hazardous materials carriers.

Automated Red Light Enforcement Inventory and Database

The Automated Red Light Enforcement Inventory and Database is a locally implemented project assisted, supported, and hosted by NCTCOG. The purpose of this program is to develop a database that has detailed information on camera specifics and intersections and catalogs city policies and procedures for the operation of red light cameras for cities with populations over 25,000. *Exhibit 5.8* is a map of the cities that have currently implemented an automated red light camera enforcement program.

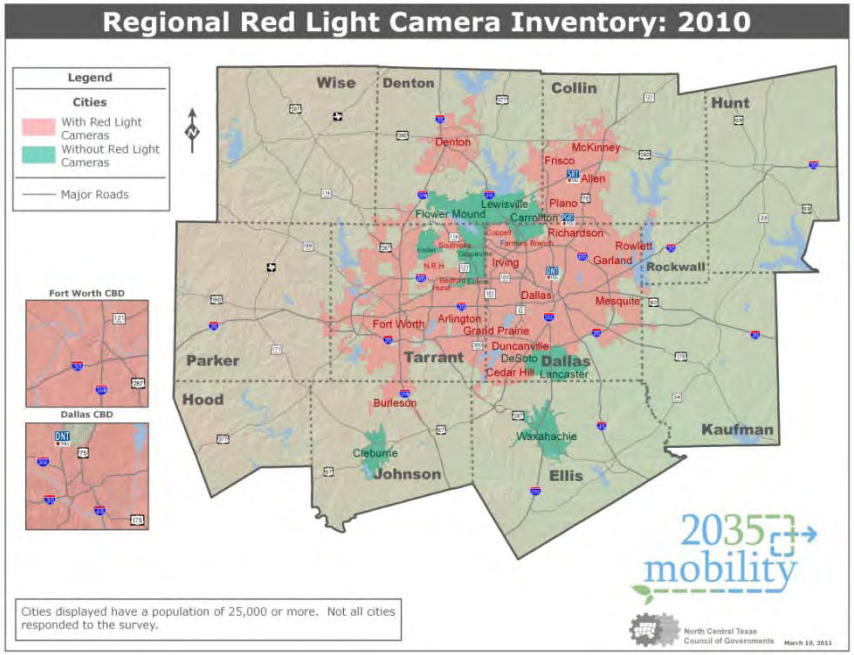


Exhibit 5.8: Map of Cities with Red Light Cameras

Core Concept 3: Safety Education and Training Efforts

Initiating and coordinating safety education and training courses for regional stakeholders and increasing public awareness about safety issues is important to promoting safety in the Dallas-Fort Worth area. Examples of regional safety education and training efforts are shown in *Exhibit 5.9.*

Core Concept 4: Innovative Funding and Partnership Agreements

Continuing to implement safety initiatives requires funding. The safety program continually seeks funding opportunities and promotes the development of public-private partnerships to fund new and innovative safety improvements.

Mobility 2035 supports additional NCTCOG safety related programs that contribute to improving safety and quality of life for all residents in the region, as summarized in *Exhibit 5.10*.

Summary

As the population continues to grow in the Dallas-Fort Worth area, implementing and funding safety initiatives including training, data collection, and various regional safety programs will become increasingly essential to improve reliability, efficiency, and maintenance of the transportation system.

Education/ Training Course	Training Goal	Training Outcomes	Audience
Freeway Incident Management	Initiate common, coordinated response to traffic incidents that builds partnerships, enhances safety for emergency responders, reduces upstream traffic accidents, improves system efficiency, and improves air quality.	Improves safety by notifying motorists of incidents, reducing rear-end collisions due to vehicle queue, and improves responder safety at scene.	First responders, managers, executive level policy makers
Photo-grammetry Training	Complements Freeway Incident Management training. Accident reconstruction and forensic measurements.	Uses image-based 3D system to calculate measurements from photographs and digital camera images.	Traffic incident responders
ITE Web Seminars	Provide training opportunities for regional professionals.	Varied based on topic.	Varied
Driver Safety Initiatives	Teens in the Driver Seat educational program to improve safety amongst teen drivers.	Focuses on driving at night, distractions, speeding, non-wearing safety belts, and drinking and driving.	Texas schools
Work Zone Safety	Work zone traffic control/qualified flagger, planning work zone traffic control, night road work planning and implementation, installation and maintenance of signs and pavement markings.	Varied based on topic.	City, county, TxDOT, NTTA staff

Exhibit 5.9: NCTCOG Supported Regional Safety Education and Training Opportunities

Program	Purpose	Outcome	Safety Component
Thoroughfare Assessment/ Regional Traffic Signal Retiming	Maximize existing roadway system capacity by implementing low-cost capital improvements on selected thoroughfares.	Audit thoroughfares, assess operational characteristics, estimate air quality benefits, implement recommendations.	Signage, restriping, pedestrian signals, signal coordination improvements.
Light-emitting Diode (LED) Traffic Signal Replacement	Replace traditional incandescent bulbs with LED lamps.	Improve management of system; improve air quality.	Improve signal visibility.
Bottleneck Program	Alleviate mobility and safety problems.	Collect data, evaluate freeway performance, identify bottleneck improvement locations.	Improve safety through bottleneck removal.
Intelligent Transportation System	Integrate traffic monitoring, incident detection systems, and traveler information systems.	Reduce congestion on regional roadways.	Reduce number of congestion-related crashes.
Traffic Signal/ Intersection Improvement Program	Improve traffic flow operation on arterials and intersections.	Infrastructure improvements and traffic signal improvements.	Enhance safety on arterials and intersections.
Bicycle/ Pedestrian Outreach	Increase bicycle and pedestrian mobility.	Collect safety data and conduct bicycle safety education.	Increase bicycle and pedestrian safety.
Regional Railroad Crossing Banking	Reduce number of at-grade crossings and amount of infrastructure.	Marketplace to collect credits for at-grade crossings that are eliminated.	Reduce crashes and fatalities at railroad crossings.
Railroad Crossing Reliability Partnership	Improve 2,000 at-grade railroad crossings.	Upgrade passive warning devices at railroad crossings.	Prevent crashes and reduce injury or death.

Exhibit 5.10: Additional Safety Related Programs

Program	Purpose	Outcome	Safety Component
Railroad Safety Education	Improve safety at rail crossings.	Educate children, driver education instructors, first responders.	Prevent crashes and reduce injury or death.
Truck Lane Planning	Evaluate needs for truck traffic flow, identify probable truck only lane corridors.	Remove trucks from left lane of highways.	Increase safety and mobility of non-truck and truck traffic.
Freight System Plan	Review of all freight facilities and long-term freight needs.	Freight System Plan	Evaluate freight-related safety concerns.
Hazardous Materials Routing	Ensure hazardous materials are not routed through high population/high traffic areas.	Reduce risk associated with hazardous material transport.	Improve safety associated with hazardous materials routing.
Regional General Aviation and Heliport Plan	Plan for and develop Regional Aviation System.	Develop aviation data, management system, forecasting model.	Improve safety associated with aviation and heliport facilities.

Exhibit 5.10: Additional Safety Related Programs Continued

Transportation System Security

The security of the transportation system is a national and regional priority. The goal of Transportation System Security (TSS) is to support ongoing local, state, and federal initiatives to address transportation system security and emergency preparedness planning in North Central Texas. Dialogue continues between local governments, transportation providers, and emergency responders in the region regarding the regional coordination of response plans, response capabilities, and emergency medical services in the event of a major incident or catastrophic event. In addition, critical transportation infrastructure elements are identified to increase surveillance of these systems.

Mobility 2035 Policies

Mobility 2035 supports the following transportation system security policies:

TSSC3-001: Support the regional Transportation Emergency Responders Uniform Communication System.

TSSC3-002: Transportation system security should be considered and mitigation strategies put in place during planning, engineering, construction, and operation stages of corridor implementation for corridors with identified critical infrastructure or key resources.

Mobility 2035 supports the following transportation system security programs:

TSSC2-001: Transportation System Security Improvements, Expansions, Management, and Operations

TSSC2-502: Transportation and Emergency Responder Uniform Communication System

TSSC2-504: Transportation Security Education and Training

TSSC2-506: Regional Response Plan Development

The region's intelligent transportation system infrastructure is an integral part of the TSS Program. Current and future transportation and transit management center ITS components include closed-circuit televisions, lane control signals, dynamic message signs, ramp meters, mobility assistance patrols, vehicle detectors, transit vehicle tracking, in-vehicle navigation, integrated radio systems and automated vehicle location, automated fleet maintenance system, and automated HOV/managed lane enforcement. These traffic monitoring, incident detection, and response systems are utilized in improving the security of the regional transportation system.

Transportation Resource Support for Mass Evacuation Events

NCTCOG and other regional partner agencies are working to establish coordination and organization procedures for using transportation resources for local and county agencies preparing for, responding to, and recovering from incidents which impact the residents of North Central Texas. Transportation support such as providing land, air, rail, or other resources for emergency response or assistance operations, and coordinating resources to facilitate an effective, efficient, and appropriate response and support are being assessed.

The Texas Homeland Security Strategic Plan 2010-2015 is a high-level roadmap for all homeland security efforts across the state. A regional goal that resulted from the Texas Homeland Security Strategic Plan was to provide an overwhelming response capability for any catastrophic incident that poses a significant threat to communities within the State of Texas. To focus on the Dallas-Fort Worth area, regional partners are working closely together to develop a Multi-agency Coordination Plan. This plan will address topics such as regional emergency management, comprehensive resource planning, readiness and response levels, regional coordination centers, situational awareness, pre-positioning of resources, and evacuations.

One example of regional readiness needs is the potential for accommodating hurricane evacuees. The region continues to prepare for possible hurricane evacuees from the Gulf Coast by participating in planned hurricane exercise projects. The Dallas-Fort Worth area roles include:

- Coordinate with the local jurisdictions and state operations centers through the shelter hubs to manage shelters in accordance with priorities established in state and local plans and procedures.
- Manage evacuation in accordance with state and local traffic management plans to ensure desired outcomes.

The regional ITS infrastructure is an integral part of the evacuation planning toolkit. Examples of evacuation planning tools are contra-flow, traveler information sources, signal timing for emergency conditions, ramp closures, supply of heavy equipment and barriers, and ITS components such as closed-circuit television cameras and vehicle detectors. While obtaining information about the status of the regional transportation facilities is critical, it is equally important to provide a mechanism to distribute information to the public. Several methods of disseminating information include dynamic message signs, Websites, a 511 system, and highway advisory radio.

PGBT and US 75 Interchange Source: NCTCOG

The Center for Disease Control and Prevention, the Texas Department of State Health Services, and the North Central Texas Council of Governments work with local jurisdictions to make full and effective use of the Strategic National Stockpile (SNS) in the event of a possible biological terrorist attack. The region is actively evaluating and planning transportation options for the distribution of SNS items should this occur. These planning efforts include traffic and transit conditions and usage analysis. The planning will ensure that the Dallas-Fort Worth area is prepared to respond within 48 hours of an event.

The region is also actively involved in planning for service distribution during major incidents that require emergency response efforts and delivery of goods. These planning efforts include traffic conditions analysis, transit system usage analysis, and variable assumptions analysis.

Transportation Critical Infrastructure

Annually, NCTCOG and regional transportation partners assess transportation and other regional components for nomination to the Critical Infrastructure Inventory/Key Resources. The US Department of Homeland Security establishes the criteria for the inventory which are subject to change based on the latest security and intelligence information. The confidential inventory is used in developing security measures for surveillance and protection of the identified regional assets.

Transportation and Emergency Responders Uniform Communication System

TERUCS enables network communication between EOCs and TMCs in the Dallas-Fort Worth area. TERUCS evolved from the 2007 Emergency Responder Uniform Communication System study which assessed the benefits of a regional data and video communication network to exchange information between TMCs and EOCs.

By utilizing the existing fiber optic infrastructure deployed by partner agencies, TERUCS provides a wide area network (WAN) for communication and video and data exchange allowing stakeholders to share resources and leverage funding. TERUCS also provides a template for the flow of data and video across vertical (local, state, federal) and horizontal (local EOC, police, fire, transportation) hierarchies. TERUCS includes the incorporation of data and video sharing a common information exchange protocol developed by transportation stakeholders

in the Dallas-Fort Worth area. This system allows for diverse TMCs to communicate information across a common protocol to share traffic related information.

Regional partners are implementing the TERUCS concept for the sharing of infrastructure, data, and video components for transportation related information. With TERUCS in place, EOCs will be permitted access to live transportation data and video to improve incident response and clearance times, as well as to make better operational decisions during EOC activation.

Participating jurisdictions have identified the primary EOC function as secured video teleconferencing communication. This function would provide the ability for region-wide briefings during regionally significant catastrophic events and other major special events.

The Ten Year TERUCS Fiber Connection Plan outlining participating agencies is displayed in *Exhibit 5.11*. Agencies connected to TERUCS are indicated by asterisks.

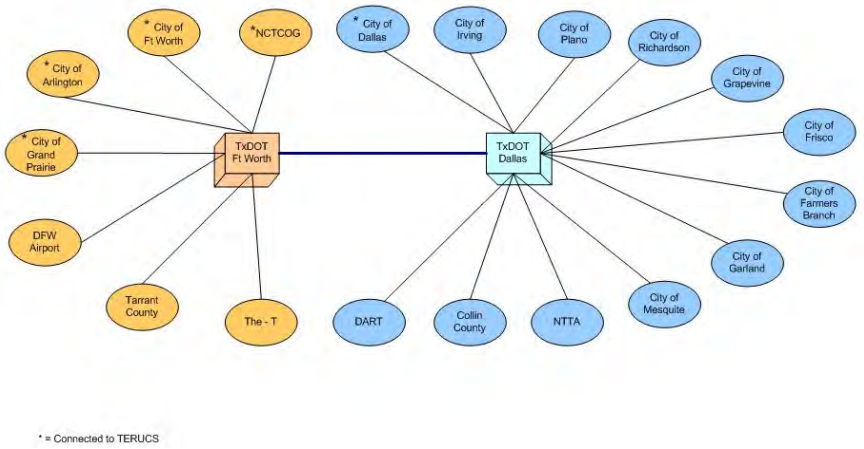


Exhibit 5.11: 10 Year TERUCS Fiber Connection Plan

Summary

The primary goal of transportation system security is to support ongoing local, state, and federal initiatives that address transportation system security and emergency preparedness. The policies and programs discussed in this section are intended to improve the security of the transportation system in the North Central Texas region.

All security policies, programs, projects, and maps are provided in Appendix D.

Sustainable Development

Mobility 2035 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.
- Assure 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.

Regional Growth Trends and Forecasts

From 2000 to 2010, the Dallas-Fort Worth Metropolitan Statistical Area (MSA) had the second largest population increase in the nation after the Houston MSA.[4] The population of the Dallas-Fort Worth area grew by 23.4 percent over the past decade. According to North Central Texas Council of Governments' demographic forecasts,[5] the total population of the Metropolitan Planning Area is projected to increase 48 percent from 2012 (6,651,887 persons) to 2035 (9,833,378 persons). This considerable population growth over the next 25 years is important to the long-term viability of the region and local economies. Accommodating this growth with an efficient and effective transportation system is important to maintaining a high quality of life. However, considering the financial realities associated with funding additional transportation capacity, the choices that existing and new residents make about where they live, not just how many live in the region, is a critical piece of development of the future transportation and development pattern.

From 2000 to 2010, 52 percent of the regional growth in the Dallas-Fort Worth area was in eight cities. These cities and their respective percentage growth include:

[4] 2010 US Census, www.census.gov
[5] NCTCOG, 2040 Demographic Forecast, www.nctcog.org/ris/demographics/forecast.asp

Sustainable Development at a Glance:

Livable communities have been defined as diverse, mixed-income, and mixed-use communities designed at a pedestrian scale. Residents can live, work, and raise their families in a sustainable and affordable community.[6] The following Sustainable Development program goals were developed to make the Dallas-Fort Worth area more livable.

Improve the economic, environmental, and social sustainability of developments through sustainable transportation.

The purpose of sustainable transportation is to provide for people's mobility needs without offsetting the balance of the three Es: *economic*, *environmental*, and *equity*.

Promote the land use/transportation connection.

Because it is not possible to build enough transportation facilities to eliminate congestion or to completely meet future mobility needs, an integrated, multi-modal transportation system is necessary to support balanced job and household growth. This system must also take into account the linkages between housing, employment, retail, education, health, and recreational opportunities.

Fort Worth, 17 percent; Dallas, 10 percent; Frisco, 6 percent; McKinney, 6 percent; Plano, 4 percent; Arlington, 3 percent; Grand Prairie, 3 percent; and Allen, 3 percent. Regional forecasts indicate that population density (persons per square mile) for the 12-county Metropolitan Planning Area will increase by 52 percent between 2012 and 2035; from 2,058 to 3,143 persons per square mile. As shown in *Exhibit 5.13*, regional forecasts indicate that a higher magnitude of population growth is projected to occur in Collin, Dallas, Denton, and Tarrant counties (four core Dallas-Fort Worth counties). The higher population growth in these core counties reflects an increase in density and promotes more sustainable development patterns. Increases in the amount of infill development and the feasibility of transit options become strategies that can be supported by these types of growth trends. Potential results of growth occurring in the four core Dallas-Fort Worth counties as forecasted include reduced greenfield development, reduced amount of agricultural land converted to urban development, decreased vehicle miles traveled, and improved safety and air quality. Mobility 2035 emphasizes multi-modal mobility options and policies, programs, and projects that support sustainable development and transportation; strategies that are integral to facilitating the movement of 9.8 million people in 2035. Additional discussion of regional demographic and growth trends is included in the Social Considerations chapter.

Sustainable Development and Transportation

Sustainable development is an important tool that can be used to increase mobility and improve air quality in the Dallas-Fort Worth area. Sustainable development can generally be defined as "development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs".[6]

Sustainable development, as it specifically relates to transportation, can be defined more specifically as:

- Land use and transportation practices that promote economic development while using limited resources in an efficient manner.
- Transportation decision making based on impacts on land use, congestion, vehicle miles traveled, and the viability of alternative transportation modes.
- Planning efforts which seek to balance access, finance, mobility, affordability, community cohesion, and environmental quality.

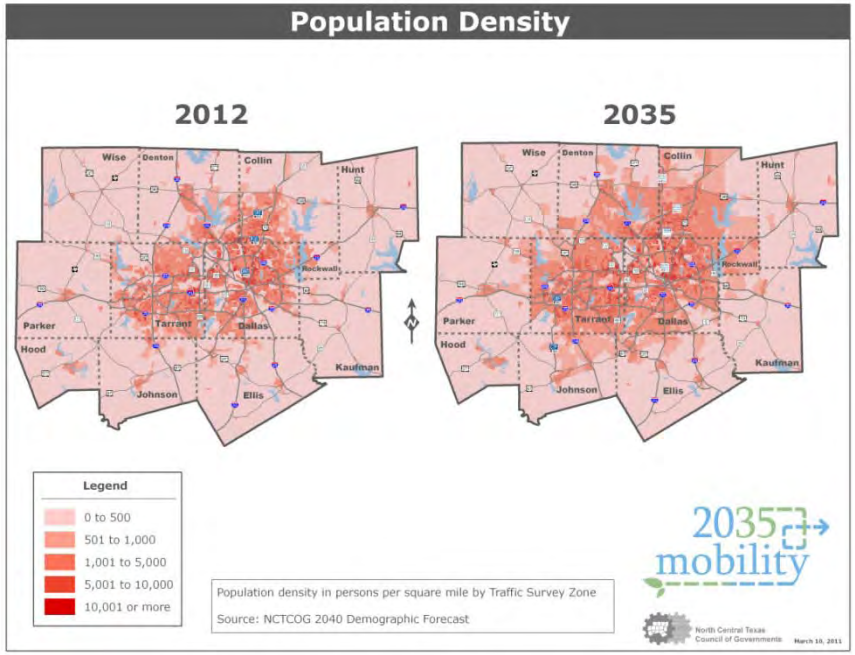


Exhibit 5.13: Regional Population Density Changes from 2012 to 2035

Sustainable development encompasses a holistic approach to growth which combines economic development, environmental protection, and social equity – also known as the three Es: economic, environmental, and equity.

The goal of sustainable transportation is not just moving people and goods, but arriving at the most sustainable way to provide for people's mobility needs without negative impacts. Traditional mobility options, such as single-occupant and auto-oriented transportation, lead to adverse economic effects such as traffic congestion, longer commutes, and higher accident rates. Auto-oriented transportation also has various environmental effects such as the increase of pollution, depletion of natural resources, and even health related concerns. Auto-oriented transportation also limits the mobility choice of lower income and persons

[6] World Commission on Environment and Development (WCED), Our Common Future (First ed.), Oxford: Oxford University Press, Oxford and New York, 1987.

with disabilities, and impacts social equity.[7] Alternatively, sustainable transportation strategies, such as multi-modal transportation systems, enable travelers to choose from various modes, location, and pricing options, particularly those that are resource efficient, affordable, healthy, and accommodate non-drivers.

Additionally, alternative transportation services provide affordable options so that households spend a lower percentage of their household income on transportation. According to the Center for Neighborhood Transportation, these figures are 33 percent of household income on housing expenses and 57 percent of household income on housing and transportation expenses for the Dallas region; and 32 and 59 percent, respectively, for the Fort Worth-Arlington region in 2000.[8] The US Department of Housing and Urban Development (HUD) defined cost burden as households spending over 30 percent of household incomes on a monthly mortgage or rent. Policies that support compact, mixed, connected, multi-modal land use development improve land use efficiency, accessibility and livability, and promote cost reductions associated with housing and transportation.

> Residents in the Dallas Region spend 33 percent of their household income on housing expenses and 57 percent of household income on housing and transportation expenses combined. These figures are 32 percent and 52 percent for Fort Worth-Arlington area.
>
> CNT Housing and Transportation Affordability Index, 2000

The coordination and integration of transportation, housing, and environmental policies has renewed the attention of the federal, state, and local governments. In 2009, HUD, the US Department of Transportation (DOT), and the Environmental Protection Agency (EPA) partnered to form the Interagency Partnership for Sustainable Communities. The partnership has and will continue to offer federal housing, transportation, and environmental policy, programs, and funding for various programs that will advance the following six Livability Principles:

- **Provide more transportation choices:** Develop safe, reliable, and economical transportation choices to decrease household transportation costs, reduce our nation's dependence on foreign oil, improve air quality, reduce greenhouse gas emissions, and promote public health.
- **Promote equitable, affordable housing:** Expand location and energy-efficient housing choices for people of all ages, incomes, races, and ethnicities to increase mobility and lower the combined cost of housing and transportation.
- **Enhance economic competitiveness:** Improve economic competitiveness through reliable and timely access to employment centers, educational opportunities, services, and other basic needs by workers, as well as expanded business access to markets.
- **Support existing communities:** Target federal funding toward existing communities through such strategies as transit-oriented, mixed-use development, and land recycling to increase community revitalization, improve the efficiency of public works investments, and safeguard rural landscapes.
- **Coordinate policies and leverage investment:** Align federal policies and funding to remove barriers to collaboration, leverage funding, and increase the accountability and effectiveness of all levels of government to plan for future growth, including making smart energy choices such as locally generated renewable energy.
- **Value communities and neighborhoods:** Enhance the unique characteristics of all communities by investing in healthy, safe, and walkable neighborhoods – rural, urban, or suburban.

The goals and programs in Mobility 2035 support and echo these six Livability Principles and are additionally supported by regional policy and programs.

Mobility 2035 Policies and Programs

Mobility 2035 supports the following sustainable development policies:

SD3-001: Support mixed-use, infill, and transit-oriented developments that utilize system capacity, reduce vehicle miles of travel, and improve air quality through improved rail mobility and access management.

[7] Todd Litman and David Burwell, Issues in Sustainable Transportation, Victoria Transport Policy Institute, February 2003.

[8] Lipman, B., A heavy load: The combined housing and transportation burdens of working families, Center for Housing Policy, October 2006.

SD3-002: Promote livable communities that offer safe, reliable, and economical transportation choices; contain equitable and affordable housing; and enhance economic competitiveness which support the HUD-DOT-EPA Interagency Partnership Principles of Livability.

SD3-003: Plan and implement multimodal transportation options that connect and compliment a variety of land uses while serving diverse demographic groups.

SD3-004: Encourage sustainability through a cooperative process of preservation, integration, and development of land which support healthy transitions between ranges of development possibilities from natural areas to the urban core.

Mobility 2035 supports the following sustainable development programs:

SD2-001: Alternative Future Program

SD2-002: Center for Development Excellence

SD2-004: Sustainable Development Funding Program

SD2-005: Transit-oriented Development Implementation Program

SD2-005: Brownfields Revolving Loan Fund

SD2-006: Resource Efficiency and Sustainable Growth Management

SD2-007: Land Use/Transportation Connection

SD2-008: Livability and Transportation

Land Use, Transportation, Air Quality Connection

Integration of land use, transportation, and air quality policy is a key strategy of Mobility 2035. Transportation and land use are intrinsically linked; transportation provides connections between land uses and the way the land is used imposes demands on the transportation system.

When integrated, land uses have dynamic effects on air quality because the clustering of land uses in proximity decreases the need for automobiles to access the uses. The effects are amplified if the land use cluster includes a residential component. Traditional land use and transportation planning practices encourage segregated land uses connected by a single mode of transportation. This leads to congestion, pollution, funding shortfalls, and the unsustainable consumption of resources.

Multimodal transportation options and a reduction in auto-oriented vehicular traffic can alleviate the problems such as congestion and pollution resulting from traditional land use and transportation planning. Facilitating transit, bicycle, and pedestrian activity within communities requires supporting infrastructure including transit (rail or bus) improvements, bicycle trails, pedestrian amenities, and landscaping.

West Village and McKinney Avenue Trolley Source: NCTCOG

The transportation component is important to reducing congestion, but so is the land use component. Because most transportation trips are home based, providing employment or office space, retail, restaurants, and entertainment within walking distance of residential options, single or multi-family, reduces vehicle miles traveled and provides air quality benefits through reducing automobile emissions.[9] Providing viable housing choices in urban, mixed-use centers reduces the number of residential units constructed in greenfield suburban areas, thus reducing the overall mileage traveled from suburban areas to employment locations and other major trip generators in the central city.

Land use strategies can be used to not only reduce vehicle miles traveled, but also to improve quality of life and reduce transportation costs. Supporting the combination of interdependent land uses such as residential, retail, and office within walking distance of schools and neighborhood parks is more sustainable, cost efficient, and provides for a better quality of life. These relationships are displayed in *Exhibit 5.14*.

[9] Deborah Degang and David Early, Transportation-Related Land Use Strategies to Minimize Motor Vehicle Emissions: an Indirect Source Research Study, Air Research Board, 1995.

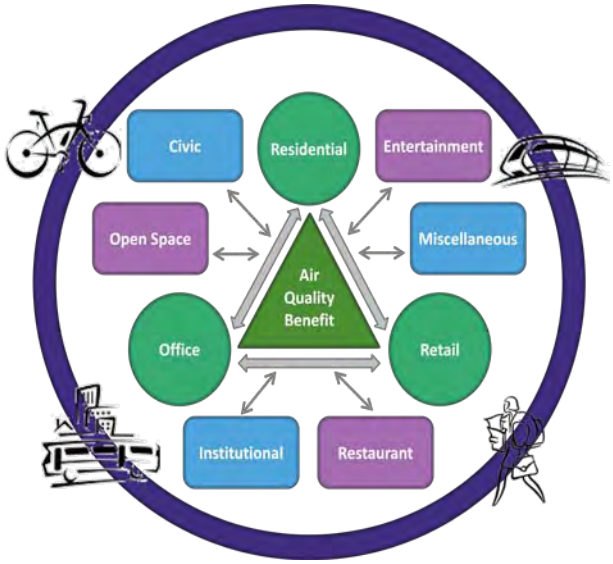


Exhibit 5.14: Mixed-use and Transit-oriented Development

Many developments in the Dallas-Fort Worth area incorporate sustainable strategies such as mixed-use development, transit-oriented developments served by multi-modal transportation options, infill developments that conserve resources, and unique communities with a sense of place. These trends contribute to the increasing emphasis on sustainable development and the likelihood of reaching regional air quality attainment goals.

Sustainable Development in North Central Texas

The North Central Texas Council of Governments supports a number of programs related to developing the region in a more sustainable fashion. Through NCTCOG's sustainable development programs, planning support for a diverse range of mobility options such as transit, automobiles, bicycling, and walking, local governments can present a range of development opportunities to the private sector to encourage a sustainable growth pattern.

Focusing on the responsibilities of the Metropolitan Planning Organization, the Regional Transportation Council established a sustainable development policy with four basic policy directions as shown in *Exhibit 5.15*:

- Utilize existing system capacity
- Improve rail mobility

Sustainable Development Definitions

Mixed-use Development: Contain both commercial (office and retail) and residential uses in the same building vertically, or commercial developments with office and retail within a quarter mile of residential. A mixed-use development should meet all the following criteria:

- A mix of residential and office and/or retail uses
- Mix of uses can be vertical or horizontal mix
- If horizontal mixed use, the residential use should be within a quarter mile of the commercial use
- Different land uses should have pedestrian linkages in the mixed-use development
- Should not develop industrial uses
- Should provide a significant portion of each use within the mix

Mixed-use developments should exclude, for example, the following types of developments: single-family detached development with standalone shopping centers, standalone hotel/residential, studio/light industrial combination, auto-only oriented development, parking structures without ground floor retail, single-use dominant developments with minimal auxiliary uses.

Transit-oriented Development: A style of land planning and building orientation that is encourages pedestrian activity that results from a passenger rail station. The boundary of a transit-oriented development can extend at least from a quarter- to half-mile radius around a passenger rail station depending on the walkability of the area. As shown in *Exhibit 5.14*, the ideal development is mixed use and the area is designed to encourage biking/walking from the station and surrounding area to the development. A network of roadways, bike lanes, and sidewalks connect the developments to the station.

- Promote mixed use
- Improve access management

Additionally, NCTCOG's Center of Development Excellence promotes quality growth in the region through the following Principles of Development Excellence. These principles guide cities, counties, school districts, and other public agencies and the private sector as they plan and create future development and redevelopment in the region:

- **Development Options:** Provide a variety and balance of development options and land use types in communities throughout the region.
- **Efficient Growth:** Foster redevelopment and infill of areas with existing infrastructure and promote the orderly and efficient provision of new infrastructure.
- **Pedestrian Design:** Create more neighborhoods with pedestrian-oriented features, streetscapes, and public spaces.
- **Housing Choice:** Sustain and facilitate a range of housing opportunities and choices for residents of multiple age groups and economic levels.
- **Activity Centers:** Create mixed-use and transit-oriented developments that serve as centers of neighborhood and community activity.
- **Environmental Stewardship:** Protect sensitive environmental areas, preserve natural stream corridors, and create developments that minimize impact on natural features.
- **Quality Places:** Strengthen community identity through use of compatible, quality architectural and landscape designs and preservation of significant historic structures.
- **Transportation Efficiency:** Develop land uses, building sites, and transportation infrastructure that enhance the efficient movement of people, goods, and services.
- **Resource Efficiency:** Provide functional, adaptable, and sustainable building and site designs that use water, energy, and material resources effectively and efficiently.
- **Implementation:** Adopt comprehensive plans and ordinances that support Development Excellence and involve residents and stakeholders in all aspects of the planning process.
- **Educational Opportunity:** Provide opportunities for all of North Texas to have access to schools, people, and technology they need for success in learning throughout their lives.
- **Healthy Communities:** Identify and support sustainable infrastructure and institutions that offer North Texas access to affordable nutritional foods, opportunities for physical activity, and access to wellness and primary care services.

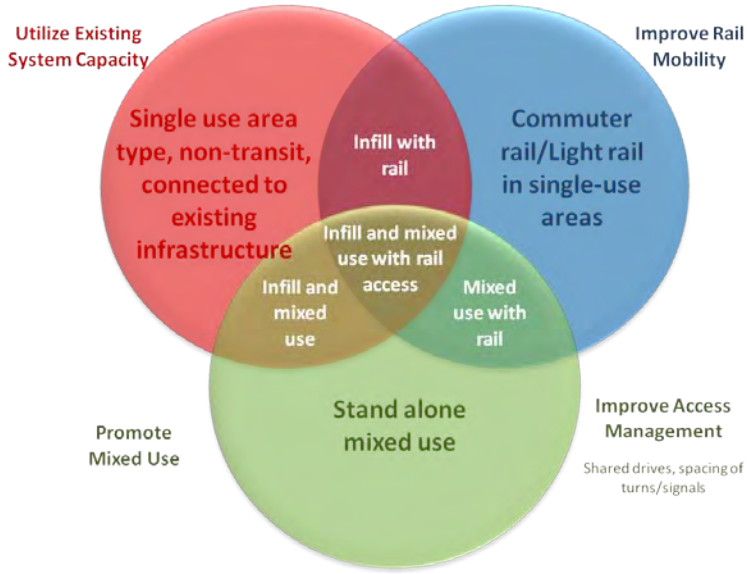


Exhibit 5.15: Regional Transportation Council Sustainable Development Policy Direction

Implementing Sustainable Development

As the region continues to grow and demand for housing and transportation options change, sustainable development principles that promote density and diversity, improve the economic, social, and environmental vitality of communities will become more important.

Implementing sustainable development strategies in the Dallas-Fort Worth area is important to demonstrating the outcomes of investing in new approaches to living and traveling in the region. The Mobility 2035 sustainable development policies are supported by the following initiatives:

- Respond to local initiatives for town centers, mixed-use growth centers, transit-oriented developments, infill/brownfield developments, and pedestrian-oriented projects.
- Complement rail investments with coordinated investments in park-and-ride and bicycle and pedestrian facilities.

- Encourage local government regulations that promote mixed-use, infill, and transit-oriented developments.
- Promote interaction between planning and zoning officials, development community, and transportation interests.
- Coordinate with transit agencies and the development community to incorporate access to facilities early in the design process.
- Incorporate livable communities factors as criteria in funding programs.
- Encourage multimodal transportation options including transit, bicycle, and pedestrian activities and programs.
- Encourage elements that reduce traffic congestion and pollution and offer traffic calming impacts which result in safer environments for pedestrians.
- Encourage mixed-use zoning and form-based codes including Smart Growth[10] and New Urbanism Principles.[11]

Sustainable Development Funding Program

Plano Transit-oriented Development – Funded through Sustainable Development Funding Program Source: NCTCOG

NCTCOG's Sustainable Development Funding Program is one of the best examples of regional programs supporting Livability Principles in the region. NCTCOG's Sustainable Development Funding Program was created by the Regional Transportation Council to encourage public-private partnerships that positively address existing transportation system capacity, rail access, air quality concerns, and/or mixed-land uses. By allocating transportation funds to land-use projects promoting alternative transportation modes or reduced automobile use, regional partners are working to address escalating air quality, congestion, and quality of life issues. Three calls for projects have been conducted over the past decade that have resulted in many projects supporting Livability Principles, Mobility 2035 sustainable development policies, and other regional and national goals. *Exhibit 5.16* summarizes the three calls for projects under the Sustainable Development Funding Program.

Program Year	Sustainable Development Project Type	Program Funding	Funding Source
2001	Infrastructure and Planning Projects	$40 Million	CMAQ/STP-MM
2006	Infrastructure, Landbanking, and Planning Projects	$40 Million	RTC Local Funds
2011	Infrastructure and Planning projects	$44 Million	RTR/CMAQ/STP-MM/RTC Local Funds

Exhibit 5.16: Sustainable Development Funding Program Calls for Projects Summary

Exhibit 5.17 illustrates the 2011 Sustainable Development Program Areas of Interest. For this funding program, eligible projects included those located within walking distance to an existing or potential future rail station; in an area with a concentration of unemployed persons, high-emitting vehicles, or low-income households; and/or in historic downtowns with multiple contiguous street block frontage of pedestrian-oriented developments. Eligible projects were also required to have zoning in place that allowed the project to be built by right. Providing higher access to sustainable development projects for environmental justice communities was a goal that was incorporated into the selection process through both eligibility and scoring criteria. By taking into account project characteristics related to access to transit, access to jobs, access to housing, provision of workforce housing, provision of jobs in areas of high unemployment, the match between employment and household income, pedestrian connectivity, and overall high unemployment rates, this goal was met.

Vision North Texas

Vision North Texas (VNT), a public-private partnership aiming to improve the future quality of life, economic desirability, and long-term sustainability of the 16-county NCTCOG region, conducted analysis of development patterns in the region. The VNT effort provided Alternative Development scenarios that were compared to a Business as Usual scenario to assess what changing development patterns in the Dallas-Fort Worth area could mean to future sustainability. Appendix D and

[10] Smart Growth Network, About Smart Growth, http://www.smargrowth.org, accessed October 19, 2010.
[11] New Urbanism, Principles of Urbanism, http://www.newurbanism.org/newurbanism/principles.html, accessed October 19, 2010.

the North Texas 2050[12] provide methodologies and results of the alternative demographic scenarios. In summary, the results of the Alternative Development analysis showed that changes in development patterns can reduce travel time, change commuting patterns, and alter infrastructure needs.

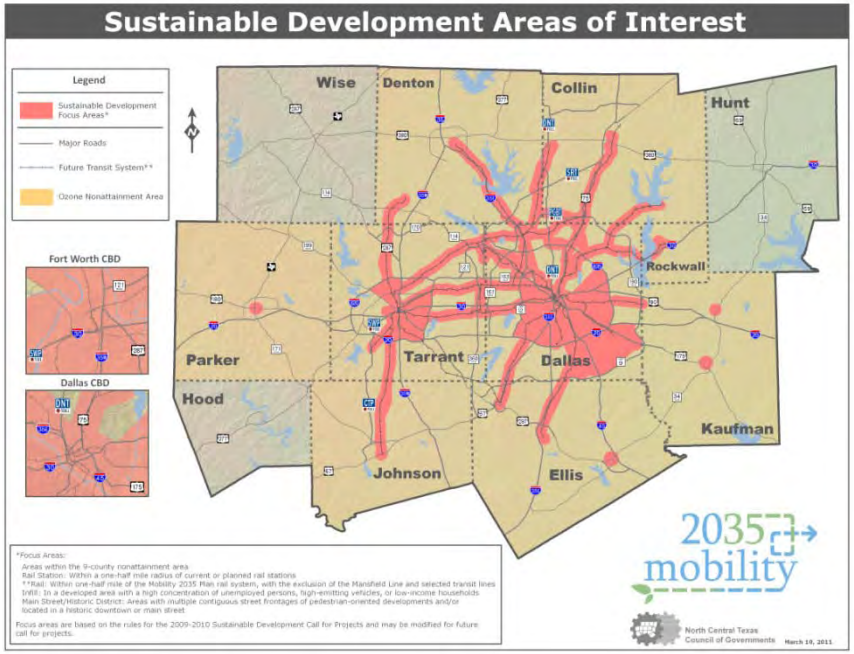


Exhibit 5.17: Sustainable Development Funding Program Focus Areas

Environmental Justice

One of the main components of sustainable development is social equity. Social equity and environmental justice are synonymous with each other. Environmental justice is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies.

Fair treatment means that no group of people, including racial, ethnic, or socioeconomic group, should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of federal, state, local, and tribal programs and policies.

Many low-income or minority communities are abandoned, targeted for Locally Unwanted Land Uses (LULUs), such as public works maintenance facilities, power plants, and half-way houses.[13] LULUs not only deter economic development initiatives, but endanger the general health, safety, and welfare of communities. Environmental justice issues, such as housing, employment, transportation, zoning, land use, and public investment in traditionally marginalized areas are often not addressed. Many smart growth initiatives, designed to reinvest in central city neighborhoods, gentrify low-income and/or minority communities and raise the cost of housing beyond the income of longtime residents. Homeowners often have to sell their homes because they can no longer afford the tax rates in their communities due to increased property values. This is because the issue of equity has not been fully integrated into the smart growth movement.

Encouraging housing, commercial, and retail to be compactly developed around transit stations allows people to access these services through various mobility means. This allows people to use their cars less or not at all and therefore spend less money on a vehicle and reduce their contribution to congestion on the roadways, leading to improved air quality.

As the region continues to grow and become more diverse, NCTCOG will utilize sustainable development principles to promote density and diversity, and improve the economic, social, and environmental vitality of communities. More information regarding environmental justice can be seen in the Social Considerations chapter.

Summary

The North Central Texas region has experienced unprecedented growth over the last decade. As the Dallas-Fort Worth area becomes home to millions more people and jobs by 2035, the demand placed on the transportation system will continue to grow. Encouraging and implementing sustainable growth patterns will be extremely important to supporting and maintaining a high quality of life. Sustainable development and the land use/transportation connection is a key initiative supported by Mobility 2035 to create an efficient transportation system that supports a livable and sustainable region.

[12] North Texas 2050, Vision North Texas, www.visionnorthtexas.org/main.html, accessed 2010.

[13] Bullard, Robert D. ed., Growing Smarter: Achieving Livable Communities, Environmental Justice, and Regional Equity. (Massachusetts: Massachusetts Institute of Technology, 2007)

NCTCOG, in coordination with federal, state, and local government partners; the development community; and other stakeholders, will strive to improve the economic, environmental, and social sustainability of developments through sustainable transportation and promoting the land use/transportation connection. Providing the tools for creating livable communities is the goal and vision for the future of the region in 2035.

All sustainable development policies, programs, projects, and maps are provided in Appendix D.

trinity railway express

mobility options

2035 mobility

Mobility Options

The Dallas-Fort Worth area is a large, diverse place and the mobility needs of residents and businesses vary greatly across this 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 2035 recommendations maps contained within this chapter can be found in Appendix E, 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 Dallas-Fort Worth 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 one military airfield in the region?

… Dallas-Fort Worth is home to the nation's largest inland port?

… Mobility 2035 recommends that the Regional Veloweb expand to nearly 1,670 miles?

… Mobility 2035 calls for approximately 460 miles of passenger rail?

… by 2035 the region will have nearly 570 miles of HOV/managed lanes?

Aviation

Mobility 2035 Supported Goal

Improve the availability of transportation options for people and goods.

The Importance of Regional Aviation Planning

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

Corporate jet readies for takeoff at a local airport Source: NCTCOG

Due to the over $4 billion of estimated economic impact of aviation, the Regional Transportation Council has the planning goal that landside access not be a limiting factor for growth at the region's airports. Ideally these airports should be able to grow to their airside limit without delays due to roadway congestion. This includes intermodal connectors as defined by the National Highway System which provide access for intermodal shipments to airports.

Mobility 2035 Policies and Programs

Policies are an important element in the planning for and implementation of programs and projects. Mobility 2035 supports the following policies associated with aviation:

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

Aviation at a Glance:

The goal of regional aviation planning in the Dallas-Fort Worth area is to promote, maximize, protect, and advance regional aviation infrastructure to accommodate future growth in North Central Texas.

NCTCOG Aviation Initiative Goals

1. Update general aviation and heliport regional plans.
2. Maintain the Air Transportation Technical Advisory Committee.
3. Develop new policies, partnerships, plans, and programs for aviation.
4. Examine the market and timing for:
   - Additional air carrier aviation facilities
   - Additional air cargo facilities
   - New intercity high-speed rail access to aviation
   - Improving 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 Technical Advisory Committee

The Air Transportation Technical Advisory Committee is comprised of airport managers, city managers, aviation industry representatives, and aviation experts from throughout the region. This committee provides a regional forum for discussion of aviation needs related to general aviation and heliports. During the Regional General Aviation and Heliport System Plan process, the Air Transportation Technical Advisory Committee serves as the Project Review Committee and performs 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 will NOT address the following: 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.

AV3-002: 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.

Mobility 2035 supports the following programs associated with aviation:

AV2-005: Aviation Surface Access Planning

AV2-006: Data Collection and Performance Tracking

AV2-007: Continuous System Planning

AV2-009: Encroachment Prevention and Compatible Land Use Planning

Aviation Program Performance Measures

Performance measures allow progress to be tracked and help identify areas for future improvement. In order to improve regional aviation planning, the following items are suggested for future evaluation:

- Increase compatible land use surrounding airports.
- Add additional airside and landside capacity at regional airports to meet future demand.
- Reduce airport and airspace congestion.
- Maintain acceptable level of service for airport ground transportation accessibility.

Aviation Planning in Context

There are various levels of planning needed in order to meet the demands on our airport systems. The following explains system planning efforts at all levels of government and the role they play in maintaining our 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 NPIAS identifies more than 3,300 airports that are of national significance and thus 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.

Aviation Terms to Know

Airside: The part of an airport directly involved in the arrival and departure of aircraft.

Landside: The part of an airport farthest from the aircraft, the boundary of which is the security check, customs, passport control, etc. and involves passenger arrival via ground transportation.

- At the state level, the Texas Airport System Plan (TASP) provides an overview of needed capacity and a statewide aviation activity forecast. The TASP covers 300 aviation facilities and seeks to recommend how these airports will be able to serve the transportation, business, and economic development functions which will benefit the state of 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 (MPO) for the Dallas-Fort Worth region, the North Central Texas Council of Governments (NCTCOG) is responsible for providing surface access and air quality improvement services to aviation facilities, processing data summary requests related to the Airport Improvement Program and Environmental Protection Agency programs, and monitoring capacity and use at the region's major airports to include air cargo and Foreign Trade Zone activity.

Aviation Facilities in North Central Texas

The 16-county region of North Central Texas is home to a variety of public and private aviation facilities including the following:

- 2 primary commercial service airports
- 11 reliever airports

- 14 general aviation airports
- 1 existing military training airfield
- Over 200 private use facilities
- Over 100 heliports

These facilities are shown on the map in *Exhibit 6.1*.

Exhibit 6.1: Aviation Facilities in North Central Texas

Data Collection and Performance Tracking

One of NCTCOG's roles is that of monitoring aviation trends at the region's commercial and cargo airports. These trends depict the level of activity in the region and highlight the importance of aviation as North Central Texas' connection to national and global markets. The data shown in the following two graphs (*Exhibits 6.2* and *6.3*) illustrates recent trends in passenger volumes and cargo volumes at the region's major aviation facilities. These trends generally show a decline associated with the events of September 11, 2001 and the recent economic recession of 2008. However, recent growth indicates that the industry may be showing signs of recovery, prompting the need to keep a close eye on future demands. NCTCOG staff will continue to monitor this data on an ongoing basis and assess associated impacts on infrastructure needs at the regional level.

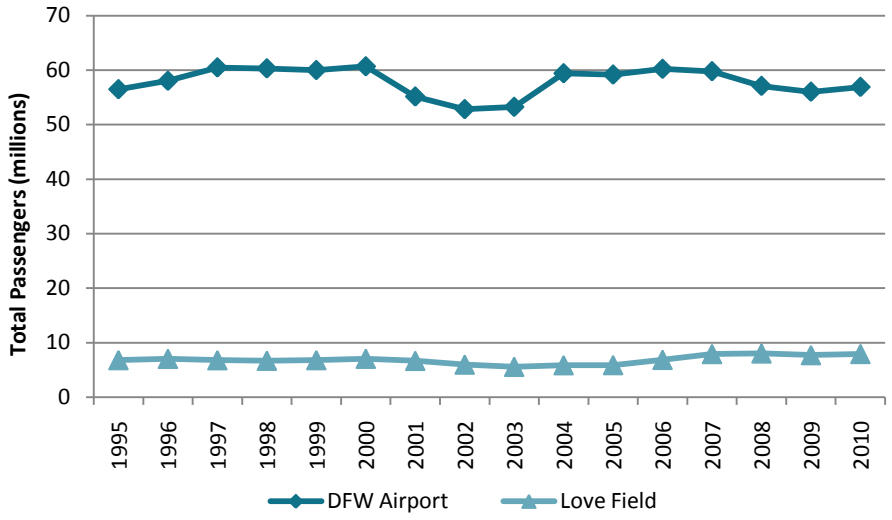


Exhibit 6.2: Air Passengers Volumes

Surface Access to Aviation

The efficiency of air passenger and cargo mobility is affected by capacity at airports and on the surrounding highway system. Congestion in the air or on the ground can significantly impact air cargo operations and efficiency. How well the surface transportation network connects with the region's air passenger and cargo facilities is vital to the needs of both national and international trade. The map in *Exhibit 6.4* displays the travel times to/from Dallas/Fort Worth International Airport. Similar maps for Dallas Love Field and Fort Worth Alliance Airport are located in Appendix E. This analysis was performed based on an average peak-period traffic scenario as represented by the travel demand models under year 2035 conditions, taking into account current plan recommendations.

Fulfilling the role of the MPO, NCTCOG performs this analysis of surface access to regional aviation facilities. Future iterations of this plan will include an inventory of specific improvements on the roadways surrounding the region's aviation facilities. These inventories will be created to assist decision makers in prioritizing and funding these important connectors.

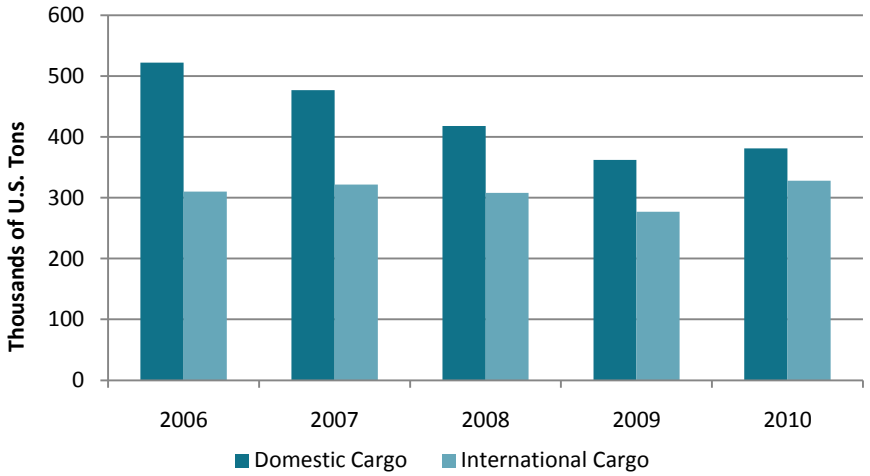


Exhibit 6.3: Total Regional Air Cargo Transported Annually

Continuous System Planning

In addition to traditional MPO roles described above, NCTCOG has been working with the Federal Aviation Administration to finalize a multi-year effort to produce a Regional General Aviation and Heliport System Plan for the 16-county NCTCOG region and surrounding areas. This effort will include a thorough update to the regional inventory, development of an aviation data management system, and analysis of current and forecast system demand. It is also anticipated that this study will include an exploration of market demand, system deficiencies, needed improvements, and economic impacts of the regional general aviation and heliport system. This work will entail increased coordination with federal and state level planning agencies to ensure that regional priorities are being considered in planning and funding decisions at those levels.

Aerial view of Dallas Love Field Source: NCTCOG

In addition, the most recent North Central Texas aviation system plans were performed prior to the construction of Fort Worth Alliance Airport and the closure of Naval Air Station Dallas, implying further impacts on the region's aviation system which need to be incorporated into regional planning documents.

Increases in passenger and air cargo activity, as well as the advent of business jets as viable travel options, raise the question of regional airspace constraints and highlight the need to capture an accurate picture of the region's aviation system so that growth constraints and industry trends are fully understood, both landside and airside. In particular, the impacts of new technologies on the aviation system have yet to be studied and understood on a regional level.

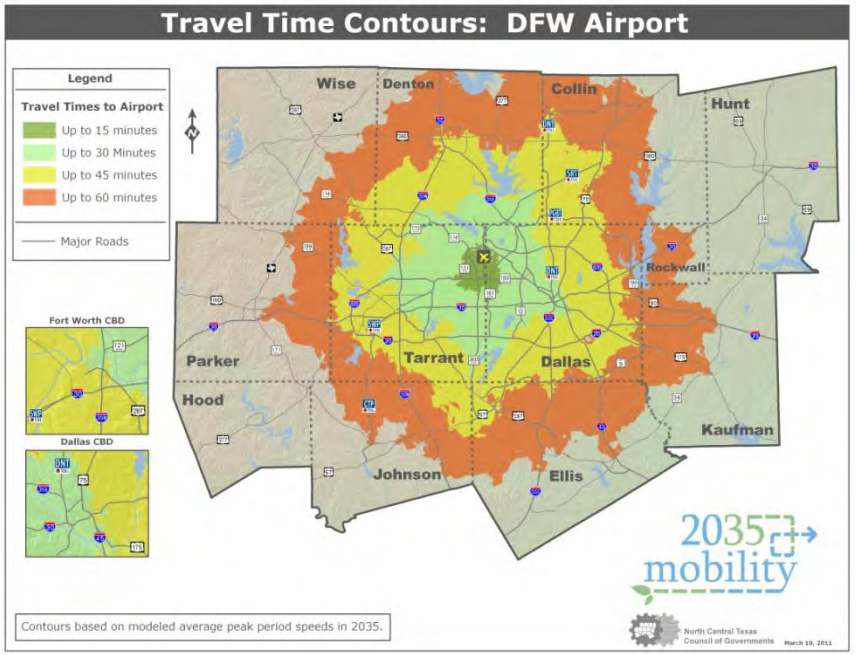


Exhibit 6.4: Surface Travel Time Contours for the Dallas/Fort Worth International Airport in 2035

Findings will be defined and recommendations will be formulated on how to improve the aviation system in North Central Texas. Strategic coordination with city officials, the public, and aviation stakeholders can then occur to ensure that recommendations are implemented and the regional aviation system continues to be enhanced. This work will be accomplished under the Regional General Aviation and Heliport System Plan effort previously described.

Factors Affecting Airport System Planning

Physical Considerations
Consider geographical and engineered location of a new airport or the expansion of an existing airport.

Operational Considerations
One of the primary operational considerations in airport system development is airside and landside access.

Environmental Considerations
Take into account regulatory guidelines and mandates. These considerations include air quality, noise, and surrounding land use.

Economic Considerations
Look into 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
Include publicly asking the question, "Will the idea and delivery of a development of new projects work for the surrounding community and our region?"

Encroachment Prevention and Compatible Land Use Planning

As urban development pressures continue to increase, land use compatibility will continue to be of critical importance to the region's aviation facilities. Because of noise associated with airfields, some land uses are not compatible in close proximity to aviation facilities. These land uses include housing, schools, offices, and other public gathering places. Noise disrupts the quality of life for airport neighbors, and safety is also a concern – particularly in close proximity to the ends of the runways. When noise and safety concerns are voiced by airport neighbors, the results can sometimes include restrictions on flight schedules, costly modifications by airports, and in extreme cases, political pressure to close airports. Due to the high level of public investment in aviation facilities, it is the goal of regional government to promote compatible land use planning and land development controls which will assist in the long-term preservation of the region's aviation system. This effort will be of particular interest as the region continues to experience rapid population growth.

Regional Military Compatible Land Use Planning

In 2006, the Naval Air Station Fort Worth, Joint Reserve Base (NAS Fort Worth, JRB), surrounding communities, and NCTCOG initiated the Joint Land Use Study (JLUS) to identify actions to ensure the long-term viability of the base. NAS Fort Worth, JRB Regional Coordination Committee (RCC) is an initiative by the cities of Benbrook, Fort Worth, Lake Worth, River Oaks, Westworth Village, and White Settlement, in conjunction with Tarrant County, to implement the recommendations of the JLUS. The RCC is a collaborative effort to develop, implement, and monitor programs and projects to ensure that future development in the region around the installation is compatible with current and future operations of the base. The RCC enables enhanced communication and cooperation among the participants and constant monitoring of proposed development in the area. The committee reviews current development, as well as future land use plans, for compatibility with the installation's mission. RCC participants work together to 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. The goal of the committee is to encourage compatible development that may improve opportunities to expand operations at NAS Fort Worth, JRB in the next Base Realignment and Closure process.

Integrated Aviation Education System

Despite its preeminence in the aviation industry and the demonstrated need to train additional aviation professionals, the region lacks a public university with a comprehensive four-year college program for students who would like to pursue an aviation career. This was first documented by a Texas Transportation Institute report (2003) and later by NCTCOG's New Technology and Industry Trends Report

(2007). Planning to coordinate with regional industry and academic partners to form a complete and thorough aviation academic program in the region is being conducted. It will address the needs at the university, community college, trade school, high school, and junior high levels to create a strong regional aviation education system.

Summary

As regional aviation planning activities continue to grow at NCTCOG, there will be a need for new projects, programs, and policies to support these efforts. These projects, programs, and policies will allow NCTCOG's Executive Board and the Regional Transportation Council to continue to support important regional aviation goals throughout the Dallas-Fort Worth area.

See Appendix E for a complete listing of policies, programs, projects, and maps related to aviation.

Freight

Mobility 2035 Supported Goal

Improve the availability of transportation options for people and goods.

Freight Planning

Freight transportation is a key component in the Dallas-Fort Worth regional economy. IH 35, the North American Free Trade Agreement (NAFTA) Superhighway, runs through the heart of the region, providing crucial connections to the national Interstate Highway system. As a result, 98 percent of the US population can be reached from the Dallas-Fort Worth region within 48 hours by truck.[1] The region is also a major crossroads in the national railroad system. Fort Worth is home to Tower 55, one of the busiest and most congested rail intersections in the country. In addition to truck and rail facilities, the region hosts both national and international air cargo facilities. These facilities allow the region to serve as a major national logistics center.

Freight is vital to the Dallas-Fort Worth regional economy, as well as the Texas economy. In 2008, the region accounted for 32 percent of the Texas Gross Domestic Product.[2] The North Central Texas region represents one of the largest inland ports in the nation where freight is moved, transferred, and distributed to destinations across the state and around the world. The region has one of the most extensive surface and air transportation networks in the world, providing extensive trade opportunities for the more than 700 motor/trucking carriers and freight forwarders that operate within the region.

NCTCOG has several goals related to regional freight planning:

- 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.
- Promote safety, mobility, and accessibility.

[1] DFW Airport, http://www.dfwairport.com/cargo/index.php

[2] North Texas Commission, 2009 Profile of North Texas, http://www.ntc-dfw.org/publications/profile2009.pdf

Freight at a Glance

The goal of freight planning in the Dallas-Fort Worth area is to enhance the regional freight system while working with regional partners to perform operational and site specific analyses regarding air cargo, freight rail, truck, and utilities activities.

As outlined in the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users, the freight initiatives within Mobility 2035 seek to support economic vitality, increase the accessibility and mobility of people and freight, and enhance the integration and connectivity of intermodal transportation.

Terms to Know

Intermodal Transportation: The use of multiple modes to transport a particular element of freight.

Inland Port: An inland site operating in a similar capacity to that of a seaport.

Class I Railroads: Freight railroads having annual carrier operating revenues of $250 million or more after adjusting for inflation.

Truck Lane Restrictions: Restrictions along roadways where trucks with three or more axles are prohibited from using the inside left lane except when passing traffic.

Key Regional Freight Transportation Facilities

- Burlington Northern Santa Fe Railway Intermodal and Carload Transportation Center at Alliance
- Union Pacific Railroad Dallas Intermodal Terminal in Wilmer
- Union Pacific Railroad Auto Facilities in Mesquite and Arlington
- Dallas/Fort Worth International Airport and Alliance Airport air cargo terminals
- Four foreign trade zones
- Various freight facilities located at private firms, pipeline terminals, and industrial parks

- Reduce air quality impacts of freight movements.
- Seamlessly incorporate freight considerations in transportation projects.

Achievement of these goals will result in better planning for the transportation needs of freight transportation facilities and the freight sector as a whole. Regional freight transportation facilities are shown in *Exhibit 6.5.*

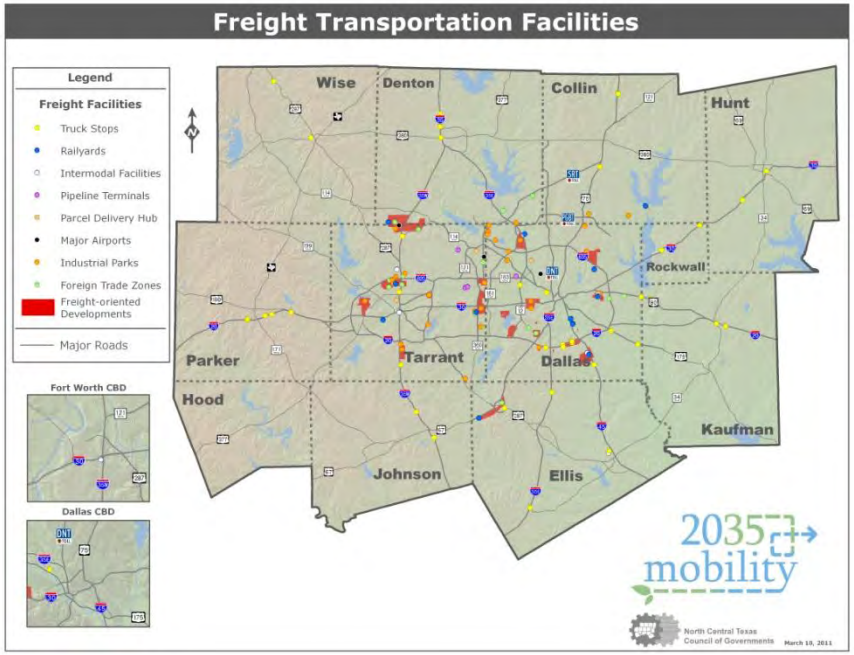


Exhibit 6.5: Freight Transportation Facilities

Mobility 2035 Policies and Programs

Policies are an important element in the planning and implementation of programs and projects. Mobility 2035 supports the following policies associated with freight:

FP3-001: Improve efficiency, safety, economic development opportunities, and air quality related to freight movement.

FP3-002: Support planning related to truck and freight rail enhancements including feasibility studies and project implementation.

FP3-003: Support freight data collection and monitoring including the placement of Automated Traffic Recorder station sensors on all new/improved freight corridors.

Mobility 2035 supports the following programs associated with freight:

FP2-110: Freight Route Planning

FP2-120: Hazardous Materials Routing

FP2-130: Truck Lane Planning

FP2-330: Freight Outreach Activities

FP2-340: Freight Data Collection

FP2-350: Freight Rail Planning

FP2-360: Freight System Planning

Freight Program Performance Measures

Performance measures allow progress to be tracked and help identify areas for future refinement or improvement. To improve regional freight planning, the following items are suggested for future evaluation:

- Improved and increased relationships with the freight community.
- Reduced at-grade railroad crossing and trespass fatalities and incidents.
- Increased travel speeds for non-truck traffic.
- Decreased annual number of accidents involving trucks and non-trucks.
- Improved safety, mobility, and air quality of the region through truck lane restrictions.
- Improved effectiveness of truck lane restrictions without enforcement.
- Reduction in nitrogen oxides along the corridors with truck lane restrictions.

Rail Planning

Three Class I railroads operate within the region: Burlington Northern Santa Fe Railway, Kansas City Southern Railway, and Union Pacific Railroad. Additionally, several short-line railroads operate in the region including the Dallas, Garland, and Northeastern Railroad and the Fort Worth and Western Railroad. These rail lines combine to serve all 48 contiguous states, Alaska, Canada, and Mexico. Each railroad works cooperatively with trucking firms and ocean shippers to expedite intermodal movements.

In 1991, the Federal Railroad Administration adopted a goal of closing 25 percent of all at-grade highway railroad crossings in the United States. This was done in an effort to reduce the number of at-grade crossing accidents and fatalities, as well as to reduce the amount of infrastructure being maintained. Rail safety is one component of the efficient movement of freight through the region. In 2003, a call for projects was held for at-grade crossing improvements at eligible crossings throughout the region. In 2004, additional crossings along the Dallas Area Rapid Transit and Trinity Railway Express rail lines were also selected. Additional information regarding all of NCTCOG's freight rail programs can be found in Appendix E.

Located beneath the IH 30 and IH 35W interchange in downtown Fort Worth, Tower 55 is a vital intersection for the national rail network. This intersection provides connectivity for freight and passenger rail travel between the West Coast, Midwest, Gulf Coast, and the Southeastern United States, in addition to intercontinental movements between Canada and Mexico. As a result of these linkages, Tower 55 has become one of the busiest and most congested rail intersections in the country. Due to the high volume of rail traffic at Tower 55, each train must come to a complete stop prior to passing through the at-grade intersection, creating significant traffic delays. NCTCOG began a study of Tower 55 in 2006 with the purpose of developing a set of structural and/or operational improvements within and around the existing rail infrastructure. This study identified a set of mid-term improvements. In October 2010, the Tower 55 project received a funding award of $38 million through the Transportation Investment Generating Economic Recovery II Grant Program.

Truck Planning

In 2007, trucks moved more than 51 million tons of freight worth $45 billion each day on US highways.[3] Additionally, long-haul truck traffic (trips over 50 miles) is projected to nearly double by 2035.[4] Population increases, the deregulation of the trucking industry, the passage of NAFTA, reductions in rail service, and growth in time-sensitive freight have increased the number of trucks on the nation's roadways.

IH 30 Truck Lane Restriction Sign
Source: NCTCOG

Truck travel characteristics are monitored to enable the Regional Transportation Council (RTC) to identify routes being used for the movement of freight and to assist in the prioritization of recommended projects and infrastructure improvements. Inventorying and monitoring truck movements allows the North Central Texas Council of Governments to review the impact of proposed projects on the movement of freight so that those effects may be considered during project selection. As additional and more precise data is collected and monitored, commodity flow forecasting models may be used to evaluate changes to the transportation system to enhance long-range planning.

Within the Dallas-Fort Worth region there are five significant truck transportation issues including:

- Inadequate highway infrastructure
- Growing congestion on regional roadways
- Limited productivity gains, specifically the restriction of Longer Combination Vehicles
- Safety issues
- Air quality implications

The region has two main hazardous materials routes, one for transuranic radioactive waste cargo and the other for all other types of hazardous materials. The designated routes can be seen in *Exhibit 6.6.*

[3] FHWA, "Freight Facts and Figures 2010", http://ops.fhwa.dot.gov/freight/freight_analysis/nat_freight_stats/docs/10factsfigures/pdfs/fff2010_highres.pdf

[4] FHWA, "Freight Facts and Figures 2009", http://ops.fhwa.dot.gov/freight/freight_analysis/nat_freight_stats/docs/09factsfigures/pdfs/fff2009_highres.pdf

Exhibit 6.6: Hazardous Materials Truck Routes

In June 2009, staff completed the Truck Lane Restriction Expansion Study[5] for the expansion of truck lane restrictions along IH 20, IH 30, IH 45, and IH 820. The corridors included in this study built upon the test segments along sections of IH 30 in Tarrant County and IH 20 in Dallas County put in place during the Truck Lane Pilot Study in 2005/2006. *Exhibit 6.7* illustrates the impact of truck lane restrictions on average speed for vehicles on these segments. On October 29, 2009, the Texas Transportation Commission approved the expansion of truck lane restrictions within the region; these expanded restrictions were operational by summer 2010. The long-term plans for expanding the network of truck lane restrictions within the region are included in Appendix E.

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

Exhibit 6.7: Analysis of Truck Lane Restrictions

Summary

From the Dallas-Fort Worth region, goods are moved, transferred, and distributed to destinations across the United States and around the world via truck, train, and aircraft. Making accommodations and planning for freight is crucial to the region's economy and is a vital element to consider in multimodal transportation planning. Mobility 2035 recommends a variety of polices, programs, and projects to support the efficient, safe, and reliable movement of freight in the region.

See Appendix E for a complete listing of policies, programs, projects, and maps related to freight.

[5] Truck Lane Restriction Expansion Study, http://nctcog.org/trans/goods/trucks/TruckLaneRestrictionExpansionStudy _June_2009_ Revised_July_2009_FINAL_REPORT.pdf

Active Transportation

Mobility 2035 Supported Goals

- Improve the availability of transportation options for people and goods.
- Preserve and enhance the natural environment, improve air quality, and promote active lifestyles.

Introduction

Active transportation, or bicycle and pedestrian elements, is an integral component of Mobility 2035. In a rapidly growing region that has limited resources available to expand the existing transportation system, planning efforts have shifted from expansion to maintaining and enhancing the existing system. Active transportation offers numerous options to improve our existing transportation system efficiently and cost effectively through a variety of systematic enhancements while simultaneously providing benefits to all road users.

The automobile has dictated investments in transportation facilities over the past several decades. However, in recent years we have become increasingly aware of the effects of these decisions in the Dallas-Fort Worth region, from congestion and poor air quality due to increased vehicle miles traveled, to chronic disease and obesity as a result of limited facilities that encourage active transportation options such as bicycling and walking. In a region that is culturally diverse, ranging from low-income populations to individuals with disabilities, it is important to remember that bicycling and walking are the primary forms of independent mobility for many residents. Bicycling and walking 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.

According to the 2001 National Household Travel Survey, in urban areas 50 percent of all trips were less than three miles and 28 percent of all trips were less than one mile. These trips are ideal for biking, walking, transit, or a combination of these alternative modes of travel. By encouraging investments in facilities that support these forms of transportation, the region increases the potential to shift community members to walk or bike for short trips. This could have significant impacts on a

Active Transportation at a Glance:

Active travel is an important element in the regional transportation system. The following goals form the cornerstone of the active transportation recommendations, and were developed in coordination with the Bicycle and Pedestrian Advisory Committee and various stakeholders throughout the region. The policies, programs, and projects identified in this section aim to realize these goals for the region.

Increase accommodation and planning for active transportation.
Promote the integration of complete streets, context sensitive solutions, and other relevant initiatives into roadway planning, design, implementation, and maintenance policies so that all roadways safely accommodate all users including bicyclists, pedestrians, transit riders, children, older individuals, disabled individuals, and motorists.

Improve safety and mobility for active transportation.
Improve 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 by promoting enforcement of traffic laws to reduce bicycle and pedestrian-related conflicts.

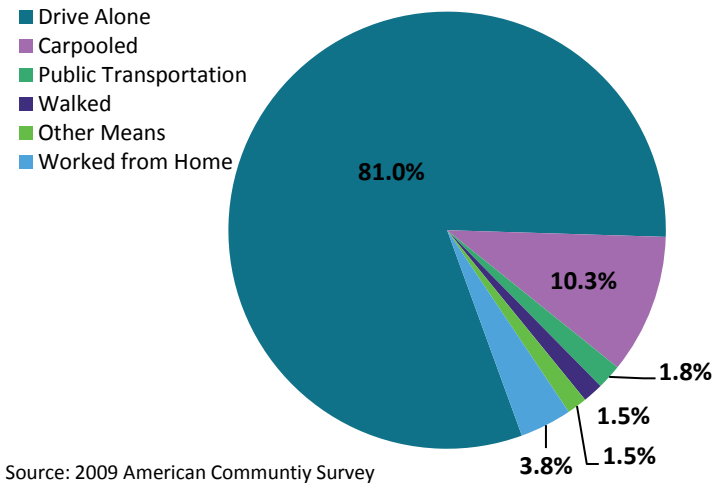
Increase active travel in the North Central Texas Council of Governments' region as an alternative to motor vehicle trips.
Increase active travel for all trip purposes through consistent support of programs and infrastructure projects that address the five Es:

- *Engineering*: Refers to changes to the built environment through engineering improvements.
- *Education*: Outreach campaigns that disperse information in a variety of formats in an effort to increase the effectiveness of bicycle and pedestrian facilities.
- *Encouragement*: Seeks to alter social norms and offer incentives for community members to utilize active transportation facilities.
- *Enforcement*: Programs that target unsafe driving behaviors and reinforce safe walking and bicycling behaviors.
- *Evaluation*: A critically important component in determining the scope and success of a project as it establishes baseline data that can be compared to project results.

The five Es apply to all active transportation components and are all equally important in determining the long-term success of a project.

region that has ozone levels that in 2010 were classified as nonattainment by the Environmental Protection Agency.

The current levels of active transportation in the NCTCOG region (shown in *Exhibit 6.8* below) may not reflect the potential it has, but are indicative of the existing commuting modes of a region that has largely focused on motorized transportation. An integrated active transportation infrastructure system is essential in increasing the levels of trips taken by non-motorized transportation.



Source: 2009 American Communtiy Survey

Exhibit 6.8: Method of Commuting to Work in North Central Texas

To realize the potential of active transportation, special attention should be paid to the current barriers this region is experiencing. These include the lack of a complete network of bicycle and pedestrian facilities, consistent design guidelines, funding, regional continuity, and the lack of importance placed on bicycle and pedestrian transportation in public agency planning and federal funding programs. In addition, land use and the built environment play a crucial role to the success of active transportation. While it is often thought that transportation facilities should move people from A to B, what happens between A and B is often just as significant. Therefore, this section seeks to address these barriers and offer a variety of solutions in an effort to support and advance active transportation in the NCTCOG region.

Active Transportation Planning Efforts

As federal and state directives begin to place a greater importance on accommodating the needs of bicyclists and pedestrians, including more closely examining the use of waivers to exclude bicycle and pedestrian accommodations based solely on funding or right-of way constraints, NCTCOG's role is to further support such directives.

Historically, bicycle and pedestrian planning and policies have been established at the local level. While that remains largely true, planning at the regional level provides an opportunity to improve coordination and connectivity between communities and across borders. NCTCOG serves as an information clearinghouse for bicycle and pedestrian data and has a variety of initiatives that ensure and reinforce regional coordination. In addition, the Bicycle and Pedestrian Advisory Committee (BPAC) was assembled to provide technical expertise, public outreach support, review of regional bicycle and pedestrian planning, and assistance in the selection of bicycle and pedestrian projects funded by the Regional Transportation Council and the Executive Board of NCTCOG on an as-needed basis. Regularly scheduled BPAC meetings provide an opportunity for local governments to share best practices, success stories, and discuss common issues in an effort to improve local initiatives and enhance regional coordination.

Bicycle and Pedestrian Planning at the Federal Level

Since 1999, Federal Statutes have mandated that MPOs include bicycle and pedestrian facilities in the overall Metropolitan Transportation Plan. In addition, in 2005, the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) mandated that "the metropolitan planning process for a Metropolitan Planning Area shall provide for consideration of projects and strategies that will increase the safety and security of the transportation system for non-motorized users and enhance the integration and connectivity of the transportation system, across and between modes."

The US Department of Transportation (DOT) has become increasingly active in their recommendations to accommodate bicyclists and pedestrians and funding opportunities to facilitate these accommodations. As the US DOT continues to offer direction on active transportation, it will become an increasingly important component in transportation planning and design at the state, regional, and local levels.

Bicycle and Pedestrian Planning at the State Level

The Texas Department of Transportation (TxDOT) has long supported the integration of bicycle and pedestrian facilities into the overall transportation system. Beginning in 1992, the Intermodal Surface Transportation Efficiency Act of 1991, Section 1033, required state DOTs to designate a state bicycle and pedestrian coordinator. In 2001, TxDOT appointed district bicycle coordinators to ensure that bicycles are acknowledged as a viable mode of transportation on roadway facilities where use by bicyclists is feasible. Texas Statute now requires both a state coordinator and coordinators in each regional office.

Additionally, TxDOT has updated relevant planning documents and design manuals that outline bicycle and pedestrian requirements and recommendations as listed in *Exhibit 6.9.*

TxDOT *Roadway Design Manual*
TxDOT *Landscape and Aesthetics Design Manual*
TxDOT *Project Development Process Manual*
TxDOT *Transportation Planning Manual*
TxDOT *Texas Transportation Plan*
TxDOT *Statewide Transportation Plan*
TxDOT Transportation Mulitmodal Systems Manual
Texas Transportation Code

Exhibit 6.9: State of Texas Bicycle and Pedestrian Transportation Guidance

The Transportation Enhancement (TE) Program – formerly referred to as the Statewide Transportation Enhancement Program – is a federally funded program administered by TxDOT which allocates funds to non-traditional transportation related activities. To be eligible for TE funds, projects must demonstrate a relationship to the surface transportation system and incorporate at least one of 12 categories, one of which is bicycle and pedestrian facilities. The TE Program is the largest funding initiative for bicycle and pedestrian facilities administered by TxDOT. These collective actions formalize the state's commitment to include, accommodate, and consider the needs of bicyclists and pedestrians in the transportation planning, design, and implementation processes.

Bicycle and Pedestrian Planning at the Local Level

Cities and counties within the NCTCOG region are responsible for the planning, development, and implementation of bicycle and pedestrian transportation infrastructure and amenities within each respective city and county. While NCTCOG plans for bicycling and walking facilities in coordination with local cities and counties, it is ultimately up to local governments to determine feasibility and ensure implementation of said planning efforts. While several local governments in the Dallas-Fort Worth region have adopted bicycle master plans, not all have had the necessary resources to undertake such a plan. Therefore, in May 2010, NCTCOG partnered with the city of Dallas to update the "1985 Dallas Bike Plan". As part of this initiative, a regional template will be designed for local governments to adopt "in lieu of" their own city- or county-wide plan upon its completion. The regional template will offer facility design guidelines, best practices, and emerging innovations in bicycle and pedestrian transportation. While this plan will not identify specific locations for facilities within a jurisdiction, it will identify ideal roadways for each facility type and roadway types that are best suited for bicycle and pedestrian transportation.

Bicycling

Many local cities and counties have developed bicycle master plans, trail master plans, or a combination of both, resulting in a hiking and biking plan. In addition, many cities have adopted policies at the local level to enforce and encourage bicycling as a legitimate form of transportation. These documents are used in regional planning efforts to ensure regional connectivity and continuity. There are many components that should be considered in advancing bicycle transportation. The majority of these issues are discussed in the following sections.

Types of Bicyclists

As part of the planning, design, and implementation of roadway treatments for bicyclists, the needs of all bicyclists should be addressed. Roadway treatments should accommodate existing bicyclists and encourage increased bicycle use; therefore, any roadway treatments intended to accommodate bicycle use must address the needs of both experienced and less experienced riders. Bicyclists are

typically grouped into one of three riding styles: Group A – Advanced, Group B – Basic, and Group C – Children.

Group A – Advanced Bicyclists

- These are experienced riders who can operate under most traffic conditions.
- They prefer direct access to destinations via the existing street and highway systems and like to operate at maximum speed with minimum delays.
- They favor sufficient operating space on the roadway or shoulder to reduce the need for either the bicyclist or the motor vehicle operator to change position when passing.

Group B – Basic Bicyclists

- These are casual or new adult and teenage riders who are less confident of their ability to operate in traffic without special provisions for bicycles.
- They prefer comfortable access to destinations, usually by a direct route, using either low-speed, low traffic-volume streets or designated bicycle facilities.
- They favor well-defined separation of bicycles and motor vehicles on arterial and collector streets or separate bike paths.

Group C – Children

- These are pre-teen riders whose roadway use is initially monitored by parents.
- They prefer residential streets with low motor vehicle speed limits and volumes.
- They typically need access to key destinations surrounding residential areas, including schools, recreation facilities, shopping, or other residential areas.
- They favor well-defined separation of bicycles and motor vehicles on arterial and collector streets or separate bike paths.

Types of Facilities

To facilitate bicycle travel on roadways, facility types are generally grouped into one of three classes: Class I Bikeways, Class II Bikeways, and Class III Bikeways. It is emphasized that the designation of bikeways as Class I, II, and III should not be construed as a hierarchy of bikeways; that is, that one is better than the other. Each class of bikeway has its appropriate application.

Class I Bikeway

Typically called a bike path, a Class I Bikeway provides bicycle travel on a paved right-of-way completely separated from any street or highway. Generally, bike paths should be used to serve corridors not served by streets and highways or where wide right-of-way exists, permitting such facilities to be constructed away from the influence of parallel streets. Bike paths should offer opportunities not provided by the road system. They can either provide a recreational opportunity, or in some instances, can serve as direct high-speed commute routes if cross flow by motor vehicles and pedestrian conflicts can be minimized. Another common application of Class I facilities is to close gaps to bicycle travel caused by construction of freeways or because of the existence of natural barriers (rivers, hills, etc.).

Examples of Class I Bikeways include:

- Shared-use paths
- Sidepaths

It is important to note that bicycles are permitted on all roads in the State of Texas (with the exception of access-controlled freeways or where otherwise explicitly prohibited by law). The designation of certain roads as Class II or III bicycle facilities is not intended to imply that these are the only roadways intended for bicycle use, or that bicyclists should not be riding on other streets. Rather, the designation of a network of Class II and III on-street bikeways recognizes that certain roadways are optimal bicycle routes for reasons such as safety, directness, or access to significant destinations.

Class II Bikeway

Often referred to as a bike lane, a Class II Bikeway provides a striped and stenciled lane for one-way travel on a street or highway. Bike lanes are established along streets in corridors where there is significant bicycle demand and where there are distinct needs that can be served by them. The purpose should be to improve conditions for bicyclists in the corridors. Bike lanes are intended to delineate the right-of-way assigned to bicyclists and motorists and to provide for more predictable movements by each.

Examples of Class II Bikeways include:

- Bike lanes
- Buffered bike lanes
- Cycle tracks
- Climbing lanes

Class III Bikeway

Generally referred to as a bike route, a Class III Bikeway provides for shared use with motor vehicle traffic and is identified by signing and/or pavement markings. Bike routes are shared facilities which serve either to: 1) provide continuity to other bicycle facilities (usually Class II Bikeways) or 2) designate preferred routes through high demand corridors. As with bike lanes, designation of bike routes should indicate to bicyclists that there are particular advantages to using these routes as compared with alternative routes. Normally, bike routes are shared with motor vehicles. The use of sidewalks as Class III Bikeways is strongly discouraged.

Examples of Class III Bikeways include:

- Signed bike routes
- Shared lane markings
- Paved shoulders

Design Guidelines

Well-designed bicycle facilities are those that are safe, attractive, convenient, and easy to use. They minimize user conflicts and promote good riding habits. As such, well-designed facilities are popular community amenities and are heavily used. Poor bicycle facilities are those that few use, are used irresponsibly because of poor design, or have not been designed for ease of maintenance. Inadequate facilities discourage users from bicycling on a regular basis, waste money and resources, and make future bicycle improvements less favorable with the general public. The best way to ensure good facility design is to include the needs of bicyclists at the inception of a transportation project or improvement so that the bicycle improvement is integrated into the total design of the project. Design guidance at the national and state level encourages the development of bicycle facilities according to the recommendations established by American State Highway and Transportation Officials and TxDOT. For the latest guidance, consult the appropriate organization's Websites.

There are various other documents that should be consulted during the design and development process, including city and county roadway design manuals, and other relevant planning and design manuals as applicable. These guidelines are required on federal and state roadways, and on roadways constructed with federal or state funding initiatives. Recommendations at the regional level follow the aforementioned national and state guidelines. In addition, as previously mentioned, a Regional Design Guideline document will be produced in the future through coordination with the Dallas Bike Plan and NCTCOG bicycle and pedestrian planning efforts. This document will outline bicycle and pedestrian facility recommendations in more detail in an effort to follow state and federal directives, and provide for continuity of facilities within the region. It is important to note that variations exist among the design guidelines for bicycle facilities and therefore a range of options may be considered. In addition, certain design guidance relies on an engineer's best judgment and final decisions are based on location and other relevant circumstances at the local, state, and/or federal level(s). Different types of streets and their associated characteristics necessitate different types of bikeway designs. Different design treatments need to be considered for arterial streets, collector or minor arterial streets, and local streets. A detailed table outlining specifics of the facility types is presented in Exhibit E.1 of Appendix E, as well as information related to innovative bicycle facilities and facility implementation.

Additional Considerations

The planning, design, and implementation of bicycle facilities remains the strongest indicator for bicycle transportation. However, there are several other components that should be considered for a successful bicycle system including bicycle end-of-trip facilities, maintenance activities, and signal operations for bicyclists, each of which is discussed in further detail in the following sections.

End-of-Trip Facilities

The term bicycle end-of-trip facilities refers to parking and complementary infrastructure for bicycles.

Bicycle Parking Infrastructure: Includes stands or racks that support bicycles and shelters or enclosures that protect parked bicycles from vandalism, theft, and the elements.

Complementary Infrastructure: Includes lockers for stowing helmets, bicycle clothing, and other personal belongings; change rooms and showers; air pumps; and sometimes even bicycle parts and maintenance shops. Public-private partnerships are encouraged to provide complimentary infrastructure at major destinations such as employment and shopping centers, transit stations, schools, etc.

Maintenance Activities

On-street bicycle facilities require maintenance activities similar to those that apply to vehicular roadway facilities. There has been a long-standing debate on the practicality of on-street bicycle facilities due to the lack of regular maintenance provided by municipalities for these facilities including routine sweeping of bike lanes. However, when routine maintenance is provided for these facilities, there is a general consensus that on-street facilities are greatly favored over the alternative.

Signal Operations for Bicyclists

Signal operations for bicyclists is a major issue as many traffic signals are not set to detect bicyclists. All signals on roadways that allow bicycle travel should be set to detect bicyclists, either through setting adjustments (new signals) or through the installation of a bicycle detector in the pavement (older signals).

Recommended Off-street Network: The Regional Veloweb

The Regional Veloweb is a network of off-street shared-use paths designed for use by bicyclists, pedestrians, and other non-motorized forms of transportation. The Veloweb serves as the regional expressway for bicycle transportation. Facilities of this type have a proven track of attracting users and provide recreational, air quality, health, economic development, and mobility benefits to communities across the nation. Linking high quality facilities together to provide intraregional routes which favor bicycle travel will encourage increased use of the bicycle for utilitarian trip purposes. The primary design considerations of the Veloweb include:

Shared-use Path, North Richland Hills, TX
Source: NCTCOG

- Minimum 12-foot width for heavily traveled shared-use paths.
- 16- to 24-foot Veloweb sections or separated facilities for pedestrians and bicyclists may be warranted along portions of the Veloweb experiencing high-peak pedestrian volumes due to the proximity to transit stations, sporting events, and/or other major venues; Veloweb sections should be sized with a pedestrian level of service analysis to meet those demands.
- Markings and travel speed to meet minimum safety standards for simultaneous bicycle and pedestrian traffic.
- Long-lasting impervious surface.
- Grade-separated crossing of roadways with significant traffic flows.
- Traffic circle intersections with minor roadways where conflicts are a concern.
- Few, if any, signalized or stop sign intersections.
- Easy access from roadways, particularly on-street bicycle facilities.
- Easy access to common trip destinations.

Every section of the Regional Veloweb may not achieve all these elements, but each is an important consideration in providing a favorable bicycle route for utilitarian trips.

Analysis

The original Regional Veloweb map was developed in 1997 based on an extensive study conducted by the NCTCOG Bicycle and Pedestrian Transportation Task Force.

In 2008, work began to update the Regional Veloweb alignments based on feedback received by local governments and community members and the general need to reassess the functionally and alignment of the Veloweb.

Results

The results of the Regional Veloweb update include approximately 1,024 miles of added facilities, bringing the total Veloweb to approximately 1,668 miles. For a detailed breakdown of the facilities, please refer to *Exhibit 6.10*.

Additionally, connections to over 60 cities and 6 counties that did not have previous Veloweb connections were identified, as illustrated in *Exhibit 6.11*.

Facility	Miles
Regional Veloweb, Existing	237
Regional Veloweb, Funded	31
Regional Veloweb, Planned	1,400
Total	**1,668**

Exhibit 6.10: Regional Veloweb Miles by Facility Status

	1997 Regional Veloweb	2011 Regional Veloweb Update
Length	644	1,668
Cities	50	116
Counties	4	10

Exhibit 6.11: 1997 and 2011 Regional Veloweb Facility Connections

Exhibit 6.12 indicates locations for the Regional Veloweb. For an inventory of trails included as part of the Regional Veloweb, please refer to Appendix E.

Recommended Veloweb Projects

Recommended routes and trails included in the Regional Veloweb are considered high priority projects and are often used as part of the evaluation process when funding becomes available for various Regional Transportation Council programs.

Costs

Costs will vary along different sections of the Veloweb. Numerous sections of the Veloweb are already constructed, programmed, or expected to be funded through a variety of funding sources. Some sections may require extensive bridgework while others may not require any. Additional costs for landscaping and amenities such as lighting and maintenance are not calculated into the overall Veloweb construction costs of $800,000 per mile. *Exhibit 6.13* outlines estimated costs for the Regional Veloweb.

The total funding required to complete all Regional Veloweb projects is estimated at $1.12 billion. A variety of funding sources that can be utilized to implement bicycle and pedestrian transportation projects, including those identified as part of the Regional Veloweb, are further outlined in Exhibit E.2 of Appendix E. These funding programs have varying funding cycles and apply to projects in various stages of development. Additional considerations related to costs for the Regional Veloweb can be found in Appendix E.

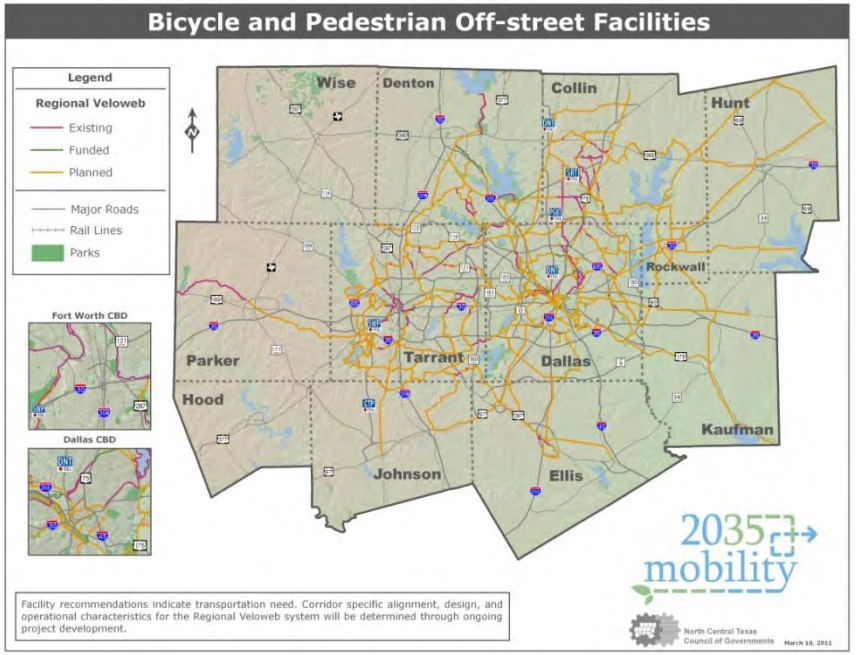


Exhibit 6.12: Regional Veloweb

Facility	Estimated Costs/Miles
12' concrete	$400,000
Right-of-way	$50,000
Retaining wall, bridges, or other major structures	$200,000
Other costs	$150,000
Total	**$800,000**

Exhibit 6.13: Veloweb Construction Costs

Walking

Pedestrian facilities are unique facilities that must accommodate a wide variety of user types, needs, and abilities. Pedestrians also tend to be the most vulnerable road users; therefore, special attention should be paid to pedestrian facility design

and implementation to increase the safety and effectiveness of these facilities as all users are pedestrians at some point in each journey. In addition, the Americans with Disabilities Act of 1990 mandates guidelines for public buildings and facilities for users with disabilities.

Sidewalk, Dallas, TX Source: NCTCOG

Specific pedestrian design guidelines included in the following documents are often utilized by local governments within the North Central Texas region: the US Department of Justice *2010 Americans with Disabilities Act Standards for Accessible Design,* the federal *Americans with Disabilities Act Accessibility Guidelines*, *Texas Accessibility Standards*, and the *Manual on Uniform Traffic Control Devices*. It is important to note that variations exist among the federal, state, and local codes relevant to design guidelines for pedestrian facilities, and new construction and improvements are required to comply with the code that offers the greatest access or protections to individuals with disabilities. Examples of items that should be considered related to pedestrian access include:

- Pedestrian sidewalks
- Curb ramps
- Pedestrian signals
- Signal timing
- Accessible pedestrian signals
- Pedestrian crosswalks
- Maintenance of pedestrian facilities

Policies, Programs, and Performance Indicators

The following policies and accompanying policy actions, programs, and performance indicators are intended to support and advance active transportation within the NCTCOG region. Each element plays an integral role in meeting shared regional goals and needs, from the policies that guide decision-making processes, to the programs that compose the framework, to the performance measures that maintain accountability.

Mobility 2035 Policies and Policy Actions

The following policies are broad in language, but have the ability to guide decision-making processes with the support of the accompanying policy actions. The policy actions are intended to represent strategies that can be utilized to further implement the over arching policies.

BP3-001: Promote bicycle and pedestrian transportation, safety, and education.

- Policy Action 3-001.1: Through the NCTCOG Bicycle Pedestrian Advisory Committee, provide continued guidance on the use of bicycle-friendly designs and innovative treatments through updates to a regional bicycle facility design manual and through other means of communication with local jurisdictions.
- Policy Action 3-001.2: Encourage reallocation of roadway rights-of-way where appropriate to accommodate bicycling and walking and bicycle and pedestrian facilities.
- Policy Action 3-001.3: Support and create programs 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.
- Policy Action 3-001.4: Support and create marketing and public awareness campaigns aimed at promoting bicycling and walking and improving safety.
- Policy Action 3-001.5: Support Bike to Work Month promotional activities and events.
- Policy Action 3-001.6: Monitor and evaluate the North Central Texas region's bicycling and walking efforts by collecting bicycle and pedestrian count data, collecting bicycle and pedestrian crash data, conducting a regional non-motorized travel survey, and publishing findings.
- Policy Action 3-001.7: Support programs aimed at increasing bicycle and walking trips by providing incentives, recognition, or services that make bicycling and walking more convenient transportation modes.
- Policy Action 3-001.8: Encourage enforcement efforts that target unsafe bicyclist, pedestrian, and motorist behaviors and the enforcement of laws that reduce bicycle/motor vehicle and pedestrian/motor vehicle collisions and conflicts.

- Policy Action 3-001.9: Encourage local jurisdictions to install end-of-trip facilities within the public right-of-way and on public property, and incentivize building owners and employers to provide end-of-trip facilities where density warrants.
- Policy Action 3-001.10: Encourage local jurisdictions to adopt bicycle parking ordinances and zoning standards that are conducive to encouraging bicycle and pedestrian modes of travel.
- Policy Action 3-001.11: Provide current and relevant information to bicyclists and pedestrians regarding existing and planned facilities, existing bicycle and pedestrian amenities, and safety and education throughout the region through a variety of formats.
- Policy Action 3-001.12: Encourage development of local bicycle and pedestrian plans.
- Policy Action 3-001.13: Consider development of a region-wide Complete Streets policy and guidelines manual.
- Policy Action 3-001.14: Encourage local jurisdictions to adopt a Complete Streets policy to include in their general plans.
- Policy Action 3-001.15: Provide Complete Streets and other pertinent training to transportation-related professionals.
- Policy Action 3-001.16: Provide appropriate bicycle and pedestrian facilities and enhancements as routine accommodations for all new roadway construction or reconstruction.
- Policy Action 3-001.17: Support bicycle and pedestrian improvement projects that close gaps, either by implementing specific projects recommended in the plan or through other treatments.
- Policy Action 3-001.18: End or strongly curtail the use of waivers for bicycle and pedestrian facility requirements during the development process including implementation of sidewalks at a minimum of five feet wide.
- Policy Action 3-001.19: Encourage, fund, and implement local government bicycle and pedestrian projects that connect local facilities to the Regional Veloweb.
- Policy Action 3-001.20: Promote consistent signage that directs bicyclists to destinations and increases visibility of the Regional Veloweb per the *Manual on Uniform Traffic Control Devices* guidelines.
- Policy Action 3-001.21: Request local governments include the Regional Veloweb and connections to the Regional Veloweb in the municipal Thoroughfare Plan, Park Plan, and Comprehensive Plan.
- Policy Action 3-001.22: Promote the preservation of bicycle and pedestrian access within all roadway rights-of-way, as well as the development of innovative, safety-enhanced on-street facilities.
- Policy Action 3-001.23: Support the development of bicycle and pedestrian facilities that provide access to regional and local public transit services wherever possible.
- Policy Action 3-001.24: Coordinate with transit providers to ensure accessibility through on-street bicycle facilities and sidewalks, the preservation of right-of-way to support the construction of parallel bicycle and pedestrian facilities within fixed-route transit corridors, and encourage station designs to include end-of-trip facilities.
- Policy Action 3-001.25: Continue the RTC Local Funding Program initiatives, including the Local Air Quality and Sustainable Development Funding Programs, which direct funds to local governments to improve and expand bicycle and pedestrian facilities and programs throughout the North Central Texas region.
- Policy Action 3-001.26: Encourage local governments to preserve right-of-way for future trail expansion and development, especially in master planned development locations within proximity to the Regional Veloweb network trail system.
- Policy Action 3-001.27: New developments, redevelopments, and transit-oriented developments should be responsible to the Regional Veloweb plan and implement new points of access to add continuity to the Regional Veloweb.
- Policy Action 3-001.28: Local governments/agencies should modify local transportation plans and standards to provide for on-street bicycle access and connections to off-street trail networks.
- Policy Action 3-001.29: Conduct a study of 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.
- Policy Action 3-001.30: Encourage local governments/agencies to provide usable sidewalks whenever there is an installation of American with Disabilities compliant curb ramps for any traffic intersection improvement project.

F3-002: Incorporate sustainability and livability options during the project selection process. Include additional weighting or emphasis as appropriate and consistent with RTC policy objectives including, but not limited to, demand management, air quality, natural environment preservation, social equity, or consideration of

transportation options and accessibility to other modes (such as freight, aviation, bicycle and pedestrian). *(While this is listed as a financial policy, it has specific implications for the bicycle and pedestrian portion of the plan.)*

Programs

Programs form the framework of bicycle and pedestrian initiatives at the regional level. Each program was created to target a specific component to meet regional bicycle and pedestrian transportation goals and needs. Programs can be directly related to funding initiatives such as the Local Air Quality Program, or they can offer support in attaining regional goals and needs such as the Bicycle and Pedestrian Outreach Program.

BP2-001: Bicycle and Pedestrian Program: Provide technical support in the area of bicycle and pedestrian planning including coordinating regional planning events, promoting multi-modal planning, assisting with prioritization of funds, and other tasks related to the advancement of bicycle and pedestrian transportation.

BP2-002: Spot Improvement Program: Prioritize, fund, and implement projects that connect existing bicycle and pedestrian facilities and improve the efficiency of the entire bicycle and pedestrian network.

BP2-003: Bicycle and Pedestrian Outreach: Provide bicycle and pedestrian education and outreach to community members and local governments including, but not limited to, safety and education materials. Continue to support the Bicycle and Pedestrian Advisory Committee.

BP2-004: Regional Design Guidelines: Produce regional bicycle and pedestrian design guideline recommendations to improve local and regional conformity and continuity.

BP2-005: Special Studies: Include bicycle and pedestrian facility strategies as part of the overall systematic approach in addressing current and future transportation demands in transportation corridor planning.

BP2-006: Legislation/Local Law: Improve safety and mobility for bicyclists and pedestrians by supporting and incorporating federal and state directives, as well as implementing policies related to bicycle and pedestrian safety and mobility at the local and regional level.

BP2-007: 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.

BP2-008: Public Health: Coordinate with public health associations to improve physical activity within the region. Encourage compact land-use patterns and the development of bicycle and pedestrian facilities.

BP2-009: Safe Routes to School (SRTS) Program: Provide information and updates to member governments on the SRTS Program and encourage all municipalities and school districts to adopt a SRTS plan. Encourage the development of non-infrastructure projects in addition to infrastructure projects. Track local SRTS implementation projects that have been selected for funding.

BP2-010: Transportation Enhancement Program: Continue to designate bicycle and pedestrian projects as priority and rank projects according to regional criteria for TE funds at the state level. Increase competitiveness of projects at the state level. Track local TE implementation projects that have been selected for funding.

BP2-011: Local Air Quality Program: Continue to program implementation funds to bicycle and pedestrian projects that demonstrate an air quality benefit.

BP2-012: Regional Veloweb: Prioritize bicycle and pedestrian projects that connect multi-jurisdictions and expand the regional network. Improve coordination, connectivity, and continuity between counties and communities.

BP2-013: Sustainability and Livability: Support sustainability and livability initiatives that encourage bicycle and pedestrian transportation.

BP2-014: Data Collection and Mapping: Continue and improve data collection and analysis for bicycle and pedestrian facilities, trip characteristics, and injuries/fatalities on roadways and provide to local governments. Continue mapping efforts related to the compilation of the data.

BP2-015: Complete Streets: Encourage design guidelines that consider the needs of all roadway users in the planning and development process of a roadway or transportation project, from young to elderly, healthy to disabled, pedestrians to school buses, for new construction and retrofit projects alike.

BP2-016: Access to Rail: Provide accessibility to transit for bicyclists and pedestrians through improved infrastructure and the inclusion of end-of-trip facilities at transit stations.

BP2-017: Pedestrian Facilities: Prioritize, fund, and implement sidewalks and other pedestrian facilities such as crosswalks, median islands, signage, and pedestrian signals as part of all new roadway construction or reconstruction projects, new developments and re-developments, and in high pedestrian traffic locations.

BP2-018: Safety Countermeasures: Prioritize, fund, and implement projects that improve safety for bicyclists and pedestrians including, but not limited to, trail/roadway crossings, intersection improvements, and projects located in high pedestrian and/or bicycle crash areas.

BP2-019: On-street Bicycle Facility Initiative: Provide accessibility to bicyclists through the implementation of appropriate on-street bicycle facilities and enhancements as routine accommodations for all new roadway construction or reconstruction, and encourage the update of local government plans and standards to provide for on-street bicycle access and connections.

BP2-020: Congestion Mitigation and Air Quality Improvement Program/Surface Transportation Program-Metropolitan Mobility: Utilize funds aimed at improving air quality within the region, as well as discretionary funds, to advance bicycle and pedestrian transportation. Track projects that have been selected for funding.

Performance Indicators

In an effort to increase accountability for the active transportation initiatives outlined throughout this section, several performance indicators have been developed. These performance indicators are all considered essential to improve and encourage active transportation in the NCTCOG region. The following is a list of baseline data that will be evaluated to then quantify improvements as specified. Performance indicators will be evaluated in future Metropolitan Transportation Plans.

- Number of bicycle and pedestrian facilities and accommodations within the region.
- Bicycle and pedestrian accessibility to transit, major employers, and other major destinations.
- Bicycle and pedestrian use within the region.
- Number of public outreach materials and resources made available.
- Bicycle and pedestrian facility gaps and missing connections.
- Parks, open space, and bicycle and pedestrian infrastructure and amenities built in an effort to increase physical activity and improve quality of life within the region.
- Amount of local governments that are actively involved in bicycle and pedestrian facility planning, design, and implementation.
- Safety enhancements for bicyclists, pedestrians, and motorists through infrastructure improvements.

Financial

Developing a strategy for implementation of the Regional Veloweb and other regionally significant active transportation projects, and the programmatic components identified earlier in this section, includes a financial assessment of projects and programs. Because the Metropolitan Transportation Plan must be constrained to available financial resources, not all of the desired active transportation improvements can be funded. Mobility 2035 has identified approximately $1.5 billion of potential funding for active transportation improvements between now and 2035. Additional funding opportunities will be pursued as needed. Appendix E, Exhibit E.2 identifies examples of potential federal funding sources for active transportation programs and projects.

In addition to federal resources, there are a number of state, local, and private revenue sources that can be used for active transportation accommodations in Texas. Examples of these potential sources include, but are not limited to:

- State and local general revenue collected through taxes, bond sales, etc.
- The Rails-to-Trails Conservancy
- Developer/impact fees
- “In lieu of” payments
- American Hiking Society’s National Trail Fund
- Bikes Belong Coalition grants
- The Robert Wood Johnson Foundation

Summary

Active transportation is an important element to providing for the region’s diverse transportation needs. While there are numerous advantages including, but not limited to, improving health, the environment, and the economy, these modes of

travel are vastly underutilized within our region. The recommendations made within Mobility 2035 seek to increase active transportation as a viable mode for the residents of North Central Texas.

See Appendix E for a complete listing of policies, programs, projects, and maps related to active transportation.

Public Transportation

Mobility 2035 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.
- Assure all communities are provided access to the regional transportation system and the 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.

Introduction

Multiple transportation options are desired by residents in North Central Texas. Public transportation can provide commuters with a safe, reliable, stress-free way to work. In addition, it can assist in serving the transportation needs of people without personal automobiles including the elderly or those with disabilities. The regional financial situation impacts the level of investment that can be made for infrastructure. Transit is no different. The transit authorities are cutting back on future projects due to lower than normal sales tax revenues. Although this may continue in the near term, it is likely that the economy will improve during the life of this transportation plan.

Transit Authorities

Public transportation services throughout the Dallas-Fort Worth Metropolitan Area are provided by small and large transit focused organizations. The three largest organizations include Dallas Area Rapid Transit, Denton County Transportation Authority, and the Fort Worth Transportation Authority. Other more local organizations provide complementary services that coordinate transit operations and human services in less densely populated areas in North Central Texas. There are an additional 80 known public, private, and specialized transportation service

Public Transportation at a Glance:

Transit Authority Statistics

Dallas Area Rapid Transit

Member Cities: 13

1. Addison
2. Carrollton
3. Cockrell Hill
4. Dallas
5. Farmers Branch
6. Garland
7. Glenn Heights
8. Highland Park
9. Irving
10. Plano
11. Richardson
12. Rowlett
13. University Park

Service Area: 689 square miles

Service Area Population: 2.4 million

Source: 2009 National Transit Database

Denton County Transportation Authority

Member Cities: 3

1. Denton
2. Highland Village
3. Lewisville

Service Area: 157 square miles

Service Area Population: 235,000

Source: 2009 National Transit Database

Fort Worth Transportation Authority

Member Cities: 3

1. Blue Mound
2. Fort Worth
3. Richland Hills

Service Area: 350 square miles

Service Area Population: 730,000

Source: 2009 National Transit Database

providers in North Central Texas. This offers residents of the region a variety of options to meet their transportation needs. These providers have differing service areas, hours of operation, client eligibility requirements, and available trip types. In an effort to improve travel across the region, the transit agencies have coordinated their fare structures to provide riders seamless connections between service providers and modes. The following briefly summarizes the largest of the providers.

Dallas Area Rapid Transit

Within the nearly 700 square mile Dallas Area Rapid Transit (DART) service area are a broad range of transportation services, from modern bus and rail services to high-occupancy vehicle (HOV)/managed lanes, ridesharing programs, and corporate transportation demand management programs. DART adds and upgrades transit facilities throughout the region by reviewing bus routes to maximize efficiency, especially with regard to the orientation of feeder bus routes to rail station destinations. Local feeder routes improve the potential for increased rail ridership by providing reliable connections from residential areas to rail stations. DART system planners evaluate current routes and design improved cross-town and radial routes to serve current and future rail stations and major destinations. Express routes improve commute time to major destinations by utilizing HOV/managed lanes and major highways with limited stop time. Express routes serve both transit centers and park-and-ride lots. DART consists of 13 member cities who contribute a one cent sales tax for services.

Denton County Transportation Authority

Denton County Transportation Authority (DCTA) is a coordinated county transportation authority currently providing service between the cities of Denton, Highland Village, and Lewisville. The service plan includes rail service on the A-train between the cities of Denton and Carrollton which opened in June 2011. Other aspects of the service plan are a park-and-ride transfer network along the rail corridor to connect to all planned services, regional connector bus service as an interim measure where rail service will eventually be implemented, local fixed-route bus services operating in Denton and Lewisville serving the most dense portions of the county, demand response service to member cities for the elderly and disabled, and a local assistance program to help improve traffic mobility in the near term. DCTA is funded by three cities that each pay one-half cent sales tax for services.

The Fort Worth Transportation Authority

The Fort Worth Transportation Authority (The T) provides fixed-route bus service, express bus service, and Rider Request services throughout the cities of Fort Worth, Richland Hills, and Blue Mound. These cities contribute a half-cent sales tax for services. The Intermodal Transportation Center provides easy access to The T's fixed-route bus service and to the Trinity Railway Express. The T operates the Trinity Railway Express jointly with DART to provide regional rail service between Fort Worth and Dallas through the mid-cities.

The Rider Request routes offer the choice of having a bus arrive where and when requested as long as travel is within the route's designated service area. The T's Mobility Impaired Transportation Service (MITS) offers door-to-door transportation anywhere within The T's service area. MITS is a transportation service for persons with a verified disability that prevents them from riding fixed-route bus service.

The T is in the process of conducting a rail corridor analysis for the Tarrant Express rail corridor, formerly the Southwest-to-Northeast rail corridor. This rail line would provide rail access between Fort Worth, Grapevine, and the Dallas/Fort Worth International Airport. The city of Grapevine has agreed to contribute to the project a three-eighth cent sales tax to guarantee rail access for its residents.

Mobility 2035 Policies

To implement the public transportation recommendations and to continue the development of programs and projects, policy is needed. A listing of policies is provided in the following text and in Appendix E. As opportunities arise to move projects along towards implementation, innovative techniques related to funding, project staging and phasing, and operations will be utilized.

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 RTC 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-non-profit transit providers (consistent with RTC Policy P09-03)
- Elimination of gaps in service to establish a minimum level of service
- Service expansion

TR3-003: Existing 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 RTC, should the entity choose to not continue as a member of that authority.

TR3-005: Support the planning and development of high/higher speed rail and additional interregional passenger rail corridors including state and federal initiatives as appropriate.

TR3-006: Maximize the efficient use of public transportation resources in North Central Texas including public, private-non-profit, 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 event 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 New Starts Program.

Types of Public Transportation

Public transportation services are provided by several distinct modes. These include rail, high/higher speed rail, bus, bus rapid transit, and other transit modes.

Rail

The rail mode is comprised of many different types of vehicle technologies. Rail serves an important part of moving people around, to, and through the region. Some technologies are used to move people very short distances while other technologies are used to move people significantly longer distances. The speeds, station spacing, and propulsion vary as well. This plan identifies the most reasonable vehicle technology in its recommendations. *Exhibit 6.14* outlines the different rail technologies in Mobility 2035. As the recommended projects are developed further, the use of a specific vehicle technology, station locations, and specific alignments may change. The location of rail stations do not represent specific recommendations, but are used for analysis purposes to indicate transportation needs. New facility locations also indicate transportation needs and do not represent specific alignments. Corridor specific design and operational characteristics and funding for the intercity passenger, regional passenger, and freight rail systems will be determined through the project development process.

High/Higher Speed Rail

The recommendations for Mobility 2035 include high/higher speed rail in the region. Although some of the planning work will be done between major metropolitan areas, Mobility 2035 must prepare for the eventuality of this type of rail in the region. The RTC has discussed where stations would initially be located and identified three points of interest including Fort Worth, Dallas/Fort Worth International Airport, and Dallas. Access includes corridors between North Central Texas and Austin, Houston, Oklahoma City, and Little Rock. The alignment for high/higher speed rail has not been determined for any route. The Federal Railroad Administration identified potential corridors through the High-Speed Intercity Passenger Rail Program, as shown in *Exhibit 6.15*. TxDOT, through the Texas Transportation Institute, has identified priority corridors for the state. *Exhibit 6.16* shows a map prepared for TxDOT in a study titled Potential Development of an Intercity Passenger Transit System in Texas.

Technology Name	Speed Range (mph)	Station Spacing (miles)	Typical Right-of-Way	Typical Headway (peak/off-peak) (minutes)	Power Source	Estimated Cost per Mile (millions)
High Speed Rail – Express	>150	200	Dedicated, grade separated, no freight sharing	60/60	diesel, electric	$80-$100
High Speed Rail – Regional	110-150	100	Dedicated, grade separated, minimal freight sharing	60/60	diesel, electric	$80-$100
Higher Speed Rail	79-110	100	May operate in freight railroad corridors , advanced grade crossing protection required	60/60	diesel, electric	$40-$50
Intercity Rail (aka Amtrak)	<79	30-100	May operate in freight railroad corridors	Once Daily	diesel	$20-$25
Regional Rail (aka Commuter Rail)	<79	3.0-5.0	May operate in freight railroad corridors	20/40	diesel	$20-$25
Light Rail	<60	0.5-2.0	Dedicated, street running	10/20	electric	$60-$70
Light Rail – New Technology (aka Next Generation Rail)	<79	3.0-5.0	May operate in freight railroad corridors	20/40	diesel, electric	$12-$15
Streetcar	<30	2 to 3 blocks	Dedicated, street running	10/10	electric	$20

Exhibit 6.14: Types of Passenger Rail Technologies

The RTC has identified a need to plan for connections outside of the region but has not selected corridors at this time. Contrasting plans indicate a need for rail service but should be refined to continue the planning process. Flexibility is built into these plans to allow time to refine the vision. *Exhibit 6.17* shows a generalized depiction of areas that may be connected in the future by high/higher speed rail.

The connection between Fort Worth, Dallas/Fort Worth International Airport, and Dallas would be a unique corridor providing two types of rail service. It is conceived that when the high-speed rail service is not delivering passengers from points outside the region that a regional rail service could provide service to residents within the region. Using the corridor in this manner could be a cost effective way of providing two different types of services for one overall cost. *Exhibit 6.18* shows the high/higher speed passenger rail recommendations for the region that were agreed on by the Regional Transportation Council's Multimodal/Intermodal/High Speed Rail/Freight Subcommittee.

Exhibit 6.15: High-speed Intercity Passenger Rail Program

Interaction with Freight

Many of the corridors for which recommendations are identified are in active freight rail corridors. Project sponsors will work with corridor owners to find suitable ways to accommodate passenger rail service in corridors of need. Although passenger rail service is recommended in these corridors, it is not the intent of the RTC to degrade current or future freight rail service, but to enhance the transportation options for the traveling public. Negotiations between the freight rail service and passenger rail service providers will explore many options to implement passenger rail and maintain freight rail service.

Bus

The bus system recommendations assume a mature bus system throughout the transportation authority service areas. This includes local and/or express buses

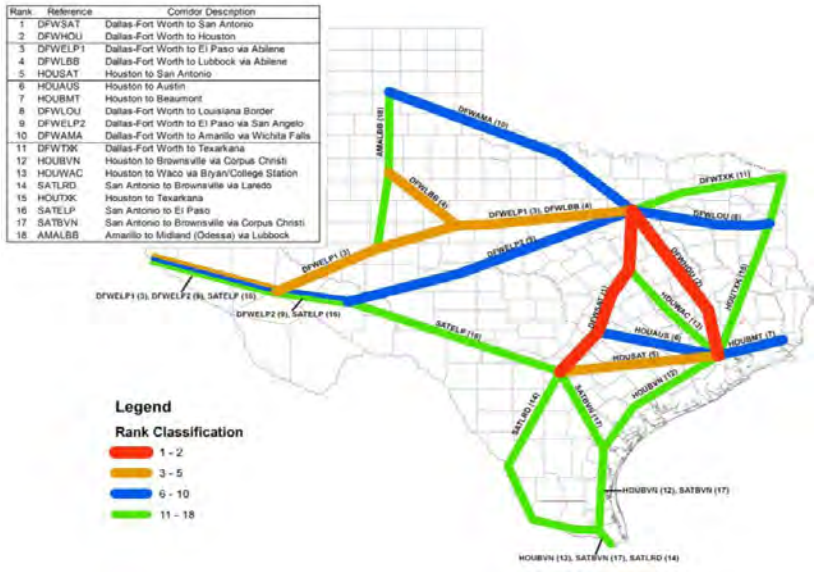


Exhibit 6.16: Potential Development of an Intercity Passenger Transit System in Texas

designed to utilize the HOV/managed lanes and service rail stations, park-and-ride locations, and transfer centers which are ultimately included in transit recommendations. *Exhibit 6.19* provides a breakdown of typical bus service types utilized in this plan. The location and timing of buses depend on the location of people and business and can change as needed to meet system and community needs. The transit authorities are responsible for bus route planning and modifications. Transit system improvements, expansions, and management and operations remain important to the Dallas-Fort Worth Metropolitan Area. Efforts will be made to improve bus stop amenities like shelter, lighting, and benches. Bus stops should provide a basic level of service that improves the transit experience. The need for a seamless transit system in North Central Texas is very important. A seamless system would include interaction between all modes of public transit from passenger rail to vanpools. A supplemental bus system is anticipated to compliment the rail routes.

Bus Rapid Transit

Bus Rapid Transit (BRT) is a service type that can be in a fixed guide-way similar to a rail line with the flexibility to utilize the existing roadway when needed. Decreased travel times are achievable by signal prioritization, priority queuing, and a fixed guide-way. BRT buses are typically different from the rest of the fleet and are more like a passenger rail vehicle. BRT has a wide range of applications. BRT may provide a staged approach financially and physically to future fixed-rail guide-way systems. BRT routes are more regional in nature and are therefore included in the public transportation recommendations for Mobility 2035.

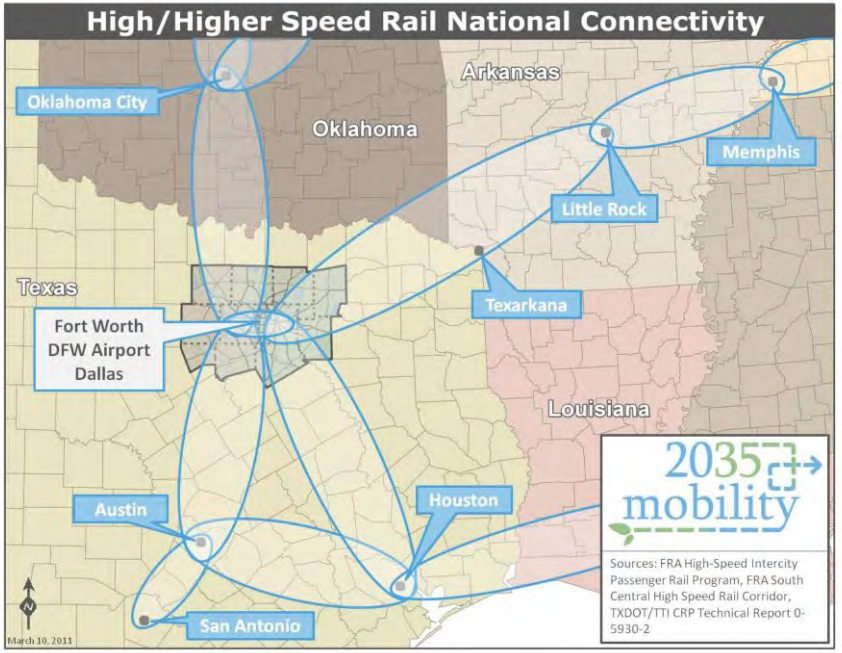


Exhibit 6.17: Areas that may be Connected in the Future by High/Higher Speed Rail

Other Rail Modes

Although the recommendations made in this section identify specific vehicle technologies, they are not intended to be the only technologies explored for implementation. The MPO encourages other modes as long as they fit into the policies set forth by the RTC and provide the seamless interconnectivity desired.

There may be opportunities to improve accessibility and circulation to localized areas and reduce demand on the roadway system. Potential locations include hospital districts, large retail areas, and the concentration of education facilities. Specific modes are not indicated in this plan and implementation would promote a seamless public transportation system.

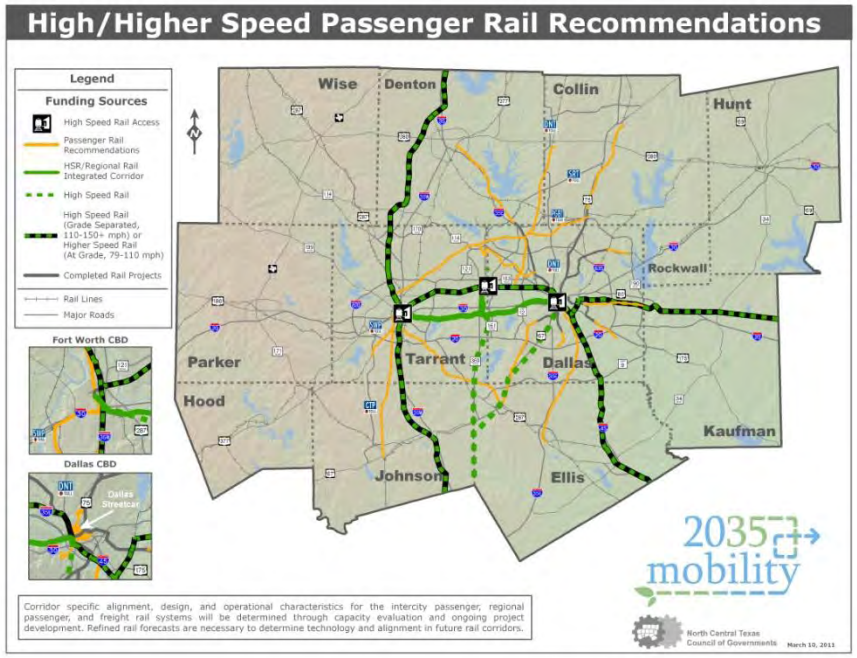


Exhibit 6.18: High/Higher Speed Passenger Rail Recommendations

Automated People Mover

There are currently two Automated People Movers (APMs) in the region, one at Dallas/Fort Worth International Airport called SkyLink and the other in Las Colinas in Irving. The APMs are computer controlled to serve specific points along a given route. These routes are elevated and are always in dedicated rights-of-way.

Expansion of these systems and development of other systems are encouraged in the region. Potential exists in areas with high congestion and an inherent need to move people around quickly.

Monorail

Monorail is a technology that has not yet been implemented in the Dallas-Fort Worth area. Similar to APM in many respects, it is designed for longer distances and to carry more people. There is potential for pilot studies and test tracks in the region for this type of technology for both passenger and freight services.

Type	Typical Right of Way	Number of Stops	Route Length (miles)	Bus Stop Amenities
Express	Freeway and HOV/managed lanes	1-2	>15	Park-and-ride locations
Bus Rapid Transit	Dedicated or street running	Limited	10-15	A range between bus shelters to light rail station elements
Local Bus (aka Fixed Route)	City streets	Numerous, depends on length of route	varies	Limited, some with shelters
On-demand	City streets	Limited, as needed, coordinated with other requests	Dependent on location of pick-up and drop-off	N/A
Flexible Route	City streets	Numerous, depends on length of route, allows for deviation from published route	Varies	Limited, some with shelters
Paratransit	City streets	Limited, as needed, coordinated with other requests	Varies	N/A
Elderly and Disabled	City streets	Limited, as needed, coordinated with other requests	Varies	N/A

Exhibit 6.19: Types of Bus Technologies

Financial

Funds needed to implement the public transportation recommendations come from various sources including state, federal, local sales taxes, fare box, and private funds. Total project costs for each rail corridor have been estimated and coordinated with local transit authorities. The total cost, shown in *Exhibit 6.20*, for the rail and bus systems are $17.4 billion and $1.5 billion, respectively. Cost components include, but are not limited to, vehicles, track, rail stations, bus stops, and right-of-way. Additionally, transit authorities will continue to update the system as a whole with improvements that provide better accessibility and mobility for passengers. For more information on transportation funding, see the Financial Reality chapter.

2010-2035 (Actual $, M)	Total
Rail Capital and System Expansion	$17,391
Bus Capital	$1,484
Paratransit Capital	$24
Transit Operations/Maintenance	$17,135
Total	**$36,034**

Exhibit 6.20: Total Costs – Rail and Bus

Fare integration between transit authorities would promote continuation of service use for passengers. The recommendations identified in this plan reflect a robust future rail system that reaches many parts of the region.

RAPID Card

The RAPID Card (Regional Area Access/Payment Interchange Device) is a device that provides for improved transit fare collection methods and development of an intelligent regional transportation system based upon accurate real time, user data provided via the RAPID Card. The implementation of a RAPID Card system is important to optimize the transportation system for all forms of public transportation and associated transportation services. Potential select retail opportunities coupled with the card would enhance its use and effectiveness for users. The intermodal and retail implementation of this device has been in place for the past decade in other global metropolitan transportation systems.

The implementation of the RAPID Card system would be needed for optimization of fare structuring specifically for the Cotton Belt corridor but may be used system wide. The usage of the RAPID Card would enable implementation of a differential fare system that may include variables like distance, destination, time of day, passenger characteristics (student, disabled, economically disadvantaged, etc.), or regional equity (in-system resident or out-of-system resident).

The regional optimization of transportation systems via the RAPID Card could include, but not be limited to, public transportation, toll systems, parking concessions (cities, Dallas/Fort Worth International Airport, and DART station areas), retail vendors (station areas, card recharge locations, rental vehicle concessions, etc.), taxis, and limousines. Some agencies within the region have been approached by providers of this type of system. These potential vendors have expressed interest in analysis and provision of systems concessionaire financing opportunities.

Recommendations

Technical tools are used to determine route ridership in the recommended corridors. Certain route attributes like station location, speed, and type of technology are assumed to measure route potential. Station locations do not represent specific locations unless identified from a completed study, but are used for analysis purposes to indicate transportation needs. The recommended rail system and its various components are shown in *Exhibit 6.21*. Additionally, Appendix E provides a rail rate ridership map that shows the number of riders forecasted on the rail system. Approximately 460 miles of rail is identified in these recommendations. Of that, 117 miles are existing service, 81 miles are programmed projects and projects currently under development, and the remaining 265 miles are projects utilizing funding identified through other sources. Corresponding tables describing recommendations by corridor, limits, and mode are shown in Appendix E.

Management, Operations, and Other System-wide Improvements

The funding of management and operations, transit system improvements, and expansions are included as part of the development of specific recommendations of Mobility 2035, and of the entire transit system as a whole, including the existing rail, bus, and paratransit networks. Project examples would include, but are not limited to, double tracking, rail station improvements, bus stop improvements, and system modernization and safety improvements for the system and rail/road crossings.

Transit Operations and Human Services Coordination

The goal of the Transit Operations and Human Services Coordination is to work with local governments and transportation providers to move toward more coordinated, efficient, environmentally friendly, and accessible transportation services that eliminate waste and promote use by the general public. As part of this effort, the program oversees the development of the North Central Texas Regional Public Transportation Coordination Plan which guides the region's coordination efforts.

The coordination plan is also intended to satisfy newly enacted state and federal requirements related to coordination.

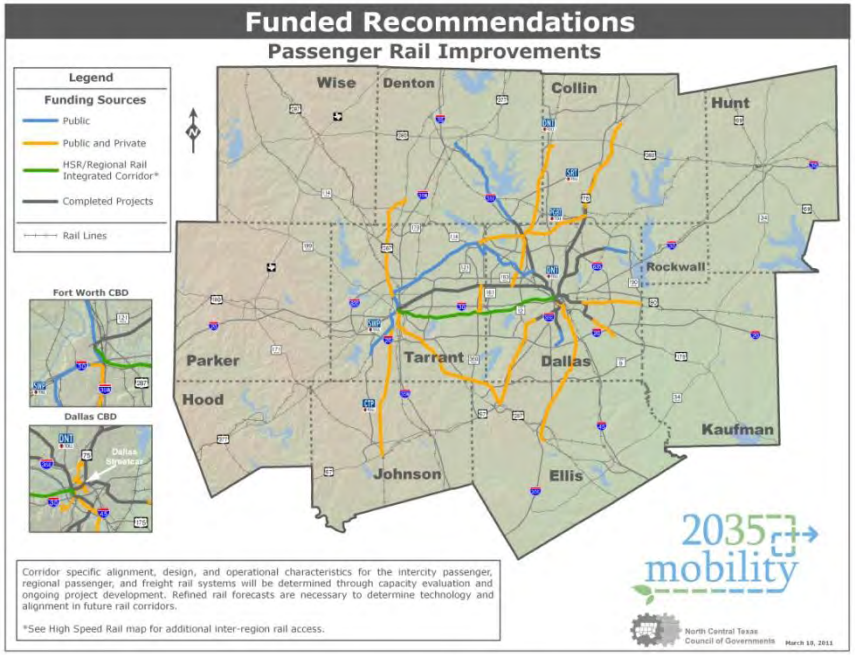


Exhibit 6.21: Passenger Rail Recommendations

Consistent with Executive Order 13330, SAFETEA-LU requires the establishment of a locally developed, coordinated public transit-human services transportation plan for the following human service transportation programs funded through the Federal Transit Administration:

- Section 5310: Elderly Individuals and Individuals with Disabilities Program
- Section 5316: Job Access and Reverse Commute Program
- Section 5317: New Freedom Program

Projects selected for funding under these programs are required to be derived from a region's locally developed, coordinated public transit-human services transportation plan. Furthermore, the plan is to be developed through a process that includes representatives of public, private, and nonprofit transportation and human service providers and participation by the public.

Requests for funding under the previous Federal Transit Administration programs will be reviewed for consistency with both the Metropolitan Transportation Plan and the North Central Texas Regional Public Transportation Coordination Plan. Projects shall be considered consistent with the Metropolitan Transportation Plan if they are consistent with, or embody the goals, policies, or strategies of the North Central Texas Regional Public Transportation Coordination Plan.

Americans with Disabilities Act Certification

As required by the Americans with Disabilities Act, implementing regulations issued by the US Department of Transportation, public entities operating a fixed-route system shall provide paratransit or other special service to individuals with disabilities that is comparable to the level of service provided to individuals without disabilities who use the fixed-route system. Projects funded through the Federal Transit Administration will be consistent with the requirements outlined in the American with Disabilities Act, as well as other federal, state, and local regulations.

Summary

As the region anticipates an influx of nearly three million people over the next 25 years, all modes of transportation will need to be enhanced just to keep pace with growth. Increases in population and job creation will continue to place additional strain on an already congested transportation system and will create additional air quality concerns. Identifying the appropriate tools to improve mobility is critical as growth continues. Public transportation offers an alternative that adds capacity while reducing the number of vehicles on the roadways. The North Central Texas Council of Governments will continue to study and examine the implementation of an expanded transit system to help alleviate traffic congestion by enabling seamless service throughout the region without the need for a personal automobile. Public transportation provides benefits to the region in terms of both congestion mitigation and air quality improvement. *Exhibit 6.22* shows the vision of rail transit in North Central Texas and the rail corridors that will be examined for expansion opportunities in future mobility plans. Further refinements to the current recommendations may be based on this vision.

See Appendix E for a complete listing of policies, programs, projects, and maps related to public transportation.

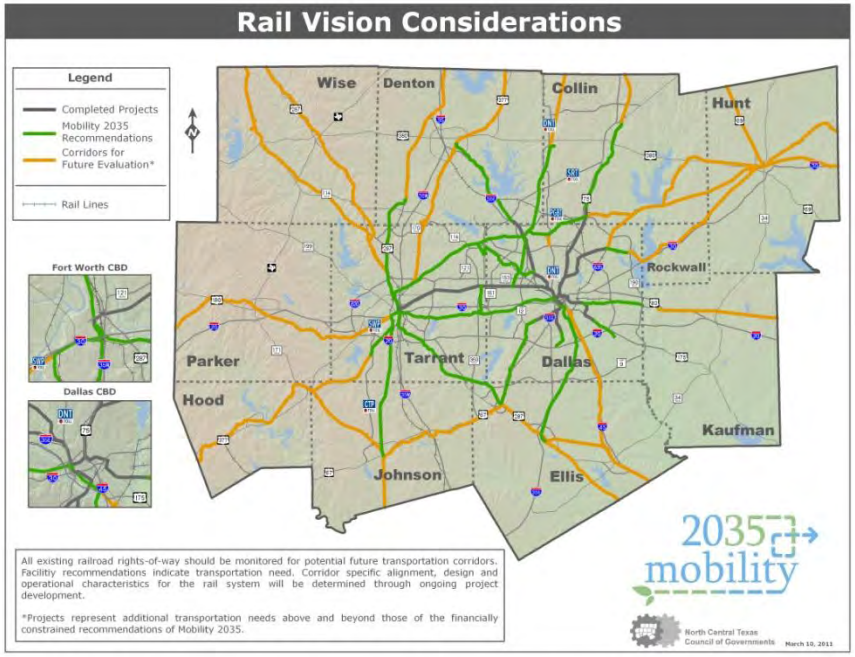


Exhibit 6.22: Rail Corridors for Further Evaluation

Roadway

Mobility 2035 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.
- Assure 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.

Controlled-access Roadways

The freeways and tollways in North Central Texas are critical elements in the regional transportation system. These roadway facilities are characterized by controlled-access general purpose lanes, HOV lanes, managed lanes, and frontage roads. The freeway and tollway system accounts for a small percentage of the total roadway lane miles in the Dallas-Fort Worth Metropolitan Area, but carries nearly half of all vehicular travel in the region. Forecasts indicate this pattern is expected to continue through 2035. As a crucial element in the region's multi-modal transportation system, there will continue to be significant demand placed on freeways and tollways to accommodate regional traffic. This current and expected traffic demand will require strategic bottleneck removal, enhancement and reconstruction of critical corridors, active demand management, expansion of capacity where warranted, and continual system monitoring and improvement.

Regional Roadway Agencies

Freeways and tollways in the Dallas-Fort Worth region are constructed, operated, and maintained by both public and private agencies. The majority of freeways in the region are managed by the Texas Department of Transportation whose Dallas District, Fort Worth District, and Paris District encompass the North Central Texas

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

Roadway System Figures

Source: Expanded Dallas-Fort Worth Regional Travel Model

Freeway/Tollway Lane Miles per County

County	Year 2012	Year 2035
Collin	404	693
Dallas	1,959	2,539
Denton	354	521
Ellis	344	506
Hood	0	0
Hunt	123	123
Johnson	122	186
Kaufman	226	237
Parker	157	160
Rockwall	70	70
Tarrant	1,308	1,712
Wise	12	12

HOV/Managed Lane Miles Per County

County	Year 2012	Year 2035
Collin	14	8
Dallas	110	250
Denton	6	90
Tarrant	5	218

Freeway/Tollway Vehicle Miles of Travel per Day

Source: Expanded Dallas-Fort Worth Regional Travel Model

Year 2012	80,415,819
Year 2035	123,001,320
Total Change	42,585,501
Percent Change	53%

area. Additionally, the region's toll road network has been constructed and is managed by the North Texas Tollway Authority (NTTA). These public agencies work independently and in collaboration in the improvement of existing roadways and development of new corridors to meet the growing demand for regional travel.

TxDOT and NTTA have limited legislative authority to enter into public-private partnerships in the development of new roadway corridors or redevelopment of existing roadways. TxDOT has entered into public-private partnerships contracts to provide for the reconstruction of corridors in both Tarrant and Dallas counties. Under public-private partnerships arrangements, public agencies maintain the ownership of roads while the private sector brings additional funding and resources for the construction and maintenance of major regional roadway facilities.

Roadway Classifications

The controlled-access roadways discussed in this section are described as freeways, tollways, or HOV/managed lanes. Freeways are facilities that are generally funded with gas tax revenues and do not charge a toll for usage. Tollways, or toll roads, and HOV/managed lanes are defined as corridors built and maintained through user fees, or tolls. On a tollway, drivers on all general purpose lanes pay a toll while HOV/managed lanes are typically constructed in the medians of existing corridors and drivers only pay a toll to use the managed lanes, not the parallel general purpose lanes. Currently, tolls on local tollways vary only by vehicle type and are fixed throughout the day for all drivers. However, Mobility 2035 and RTC policies both allow and encourage variable pricing on tollways and HOV/managed lanes based on the time of day, congestion level of the facility, and the occupancy level of each vehicle. Vehicles with three or more occupants will be eligible for a toll discount while one- and two-occupant vehicles will pay the full toll.

IH 635/US 75 High Five Interchange Source: NCTCOG

Mobility 2035 Policies and Programs

The implementation of improvements to the regional freeway and tollway system is guided by the following policies which can also be found in Appendix E. These policies direct the planning and development of roadway facilities 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 RTC 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 RTC policy.

FT3-007: Additional and improved interchanges, 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 to aid in strategic decision making regarding long-term 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.

Mobility 2035 supports the following programs associated with the roadway system:

TSM2-005: Bottleneck Program for Regional Corridors

NRSA2-001: Non-regionally Significant Arterial Program

Funding

The nature of extensive freeway and tollway system improvements requires high-cost initial elements including right-of-way acquisition and construction, as well as expensive long-term costs of maintenance, operation, and rehabilitation. Mobility 2035 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, the North Central Texas region has come to rely more heavily on tolls and innovative financing to satisfy the demand for the construction and maintenance of new roadway facilities and the expansion of existing corridors.

At the state level, the Texas Transportation Commission has also recognized the need to depend on tolls to provide funding for roadway construction and maintenance. The Texas Transportation Commission has directed TxDOT to evaluate potential projects during any phase of development or construction for consideration as a tollway including new location and highway expansion projects. State law allows TxDOT to study, design, construct, operate, expand, enlarge, or extend a tollway project as part of the state highway system.

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, population increases, traffic demand, inflation, and increasing vehicular fuel efficiency have outpaced the ability of this traditional finance mechanism to fully fund necessary transportation improvements. Developing projects as tollways is necessary to bridge the gap between transportation needs and financial resources.

Over the past decade, bills passed by the Texas Legislature, including House Bill 3588 and House Bill 2702, created new and innovative tools for TxDOT and local toll authorities, including NTTA, to allow public-private partnerships to finance, build, and operate tollways and tolled managed lane facilities. The legislation also enables toll bonds, concession fees, and excess revenues to fund supplemental roadway projects that are either adjacent to those new corridors or of greatest need in the TxDOT districts where the corridors are constructed. Senate Bill 792, passed in 2007, updated the public-private partnerships guidelines previously set by the State Legislature. Key provisions in Senate Bill 792 include:

- Ensuring that local toll authorities have the first option to build new toll projects and may use state rights-of-way as needed.
- Allowing local toll authorities to propose that needed state roads be built as toll roads; previously only TxDOT could initiate such a proposal.
- Requiring local toll authorities and TxDOT to agree to certain business terms such as toll rates when a project is first proposed and to perform a Market Valuation Study based on those terms to determine a road's total value.
- Modifying public-private partnerships by limiting their terms to a maximum of 50 years, mandating that the state's future buyback cost be stipulated in the public-private partnerships agreement, clarifying that competing tax-funded freeways cannot be built within four miles on either side of a public-private partnerships toll road, and requiring public-private partnerships revenue to be used only for other projects in the region in which it is generated.
- Allowing TxDOT to issue $3 billion in bonds to borrow against future gas tax revenue; this provision allows TxDOT to use these bonds as toll equity for state toll roads.

Tolling Policies and Business Terms

While it has been the Regional Transportation Council's policy since 1993 to evaluate toll feasibility for all new controlled-access facilities in new rights-of-way, as well as for additional capacity in existing freeway/tollway corridors, the legislative activity of the past decade, combined with the ability for multiple entities to become involved in tollway construction and operation, has compelled decision

makers to expand regional policies for tolled facilities. The RTC currently asserts that no existing freeway general-purpose lanes – non-HOV/managed lanes – will be converted to toll lanes and this is consistent with Texas Department of Transportation policy.

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 *Exhibit 6.23*. The terms were established to enable more local participation over the review and selection process for public-private partnerships toll projects, set limits for toll rates and toll rate adjustments to maintain equity between various toll projects, and help introduce the region to a concept known as variable time-of-day pricing. This type of pricing establishes a premium for toll rates charged during the peak periods of the day as an incentive to facilitate increased carpool/vanpool and transit usage, and it encourages telecommuting or flexible work hours so that single-occupant travelers may switch to using toll facilities more often during off-peak periods.

These efforts would likely aid in improving peak-period level of service, congestion, and the region's air quality. In September 2004, the RTC adopted policies related to excess revenue sharing from toll projects sponsored by TxDOT. These policies were later modified by the RTC in April 2006 and September 2006 and do not apply to managed lane facilities. The purpose of this set of policies was to establish a framework for the allocation of future toll revenues from projects in the North Central Texas region. Excess toll revenue is defined as annual toll revenue after the annual debt service is paid and after annual reserve funds have been set aside to cover facility operational costs, anticipated preventative maintenance activities, assigned profit and related expenses for the public-private partnerships, and the expected cost of rehabilitation or reconstruction of the toll facility.

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.

1. Maximum weekday peak period toll rate in 2010 was 17 cents per mile. The weekday peak period is currently defined as 6:30 am to 9:00 am and 3:00 pm to 6:30 pm. The Regional Transportation Council would need to approve any changes to this definition.
2. The maximum off-peak toll rate was 12.5 cents per mile in 2010. The off-peak period is defined as the period outside of the weekday peak period.
3. These peak and off-peak rates will average approximately 14.5 cents per mile.
4. Transit vehicles are exempt from toll charges.
5. Toll rates will be adjusted sooner and later in time using the "all items" Consumer Price Index and "average household income." For Consumer Price Index values of three percent and under, the Index will be used and calculated applying annual compounded rates. For values over three percent, the "average household income" growth rate will be used. Toll rates will be adjusted every two years. If the Consumer Price Index or the "average household income" growth rates are negative for a two-year period, the growth rate will be set at zero and no adjustments to toll rates will be permitted.
6. Widening of SH 121 and SH 161 will need to meet the adopted Mobility Plan lane specifications and managed lane policies.
7. Excess revenue will be paid 75 percent up front and 25 percent over time.
8. The Texas Department of Transportation has requested that local governments participate in and monitor the Comprehensive Development Agreement procurement process. The Regional Transportation Council requests that local governments assign representatives to this procurement process.
9. The Regional Transportation Council requests that the Texas Transportation Commission reiterate that Comprehensive Development Agreement projects will not contain a "no compete" clause. This will permit additional mobility improvements over time without conflict with this agreement.
10. Duration of a Comprehensive Development Agreement should be less than 51 years.
11. Tolls will remain on projects after Comprehensive Development Agreement duration.
12. Competitive proposals from the private and public sector will be evaluated against the same objective evaluation criteria to be determined by the Regional Transportation Council.
13. The peak and off-peak toll rates will be set at 14.5 cents per mile for an initial interim period. The North Central Texas Council of Governments will conduct a pilot "before" and "after" study in a corridor within the region with the approved "time-of-day" pricing schedule. Results will be presented to the RTC before region-wide implementation of time-of-day pricing. The pilot study and subsequent action will be completed by 2012.

Exhibit 6.23: Business Terms for TxDOT-sponsored Toll Roads on State Highways

- 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 facilities, either on or off of the state highway system, to be improved or reconstructed with excess toll revenue funds, and much input from local governments will be considered in determining which projects should receive funding. The RTC'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 which would be delayed if they were funded strictly with traditional revenue sources.

Managed Lane Business Terms

US 75 HOV/Managed Lane *Source: NCTCOG*

TxDOT and the RTC have developed additional business terms for HOV/managed lane facilities which continue to support regional goals such as HOV and transit incentives and travel reliability while also ensuring revenue for public-private partnerships concessionaires and compliance with toll bond covenants. These policies provide flexibility within specific guidelines in setting toll rates using a concept known as dynamic pricing. This type of pricing allows operators to set market-based toll rates based on corridor demand and real-time congestion levels, and those rates could fluctuate at any time throughout the day in response to changing traffic conditions.

The business terms for managed facilities, as shown in *Exhibit 6.24*, were approved by the RTC in May 2006 and modified in September 2006 and September 2007.

Separately, new policies regarding excess toll revenue for managed facilities were also approved by the RTC in June 2005. While nearly identical to those established for

1. A fixed-fee schedule will be applied during the first six months of operation; dynamic-fee pricing will be applied thereafter.
2. The toll rate will be set up to $0.75 per mile during the fixed-fee schedule phase. The established rate will be evaluated and adjusted, if warranted, with Regional Transportation Council approval.
3. Toll rates will be updated monthly during the fixed-fee schedule phase.
4. Market-based tolls will be applied during the dynamic-fee pricing phase. During dynamic operation, a toll rate cap will be established. The cap will be considered "soft" during times of deteriorating performance when a controlled rate increase above the cap will be temporarily allowed.
5. Transit vehicles will not be charged a toll.
6. Single-occupant vehicles will pay the full rate.
7. Trucks will pay a higher toll rate, and no trucks will be permitted in the LBJ tunnel.
8. High-occupancy vehicles of two or more occupants and vanpools will pay the full rate in the off-peak period.
9. High-occupancy vehicles of two or more occupants will receive a 50 percent discount during the peak period (six hours per weekday: 6:30 am - 9:00 am and 3:00 pm - 6:30 pm). This discount will phase out after the air quality attainment maintenance period. Regional Transportation Council-sponsored public vanpools are permitted to add peak-period tolls as eligible expenses. Therefore, the Comprehensive Development Agreement firm will be responsible for the high-occupancy vehicle discount and the Regional Transportation Council will be responsible for the vanpool discount.
10. The toll rate will be established to maintain a minimum average corridor speed of 50 miles per hour.
11. During the dynamic-pricing phase, travelers will receive rebates if the average speed drops below 35 miles per hour. Rebates will not apply if speed reduction is out of the control of the operator.
12. Motorcycles qualify as high occupancy vehicles.
13. No discounts will be given for "Green Vehicles".
14. No scheduled inflation adjustments will be applied over time.
15. Every managed lane corridor will operate under the same policy.
16. Adoption of this policy will have no impact on the Regional Transportation Council Excess Revenue Policy previously adopted.
17. The Regional Transportation Council requests that local governments and transportation authorities assign representatives to the Comprehensive Development Agreement procurement process.
18. The duration of the Comprehensive Development Agreement should maximize potential revenue.
19. Tolls will remain on the managed lanes after the Comprehensive Development Agreement duration.

Exhibit 6.24: Business Terms for TxDOT-sponsored Managed Lane Facilities

TxDOT-sponsored tollways, the policies differ in one notable exception. For managed lane projects, local governments and transportation authorities shall be given the right to invest in a managed lane project as a means to fund the facility, as well as to generate local revenue. Shares offered by the RTC would be allocated into air quality related and sustainable development programs. These shares would also be used to leverage federal transportation funds.

Active Management of the Roadway System

As the North Central Texas area continues to experience population growth and traffic congestion, more emphasis will be placed on the strategy of actively managing the capacity of major roadway facilities. Technological advancements allowing for the increased ability to monitor and operate facilities using new hardware and software technologies will enhance reliability of tax-supported roads, toll roads, and HOV/managed lanes.

Managed lanes are proposed as part of the improvement of existing free roadways in corridors across the urban core of the Dallas-Fort Worth area. Drivers will have the choice of paying a toll to use the managed lanes or traveling for free on the parallel general purpose lanes or frontage roads. All existing free lanes will be maintained in corridors where managed lanes will be constructed, and in some cases, additional free lanes will also be built. The tolls collected from managed lanes will help finance the expansion/reconstruction and operation of not just the tolled lanes, but all elements of the roadway. Because of limited transportation funding, the reconstruction and expansion of the existing facilities would not occur without tolling the managed lanes.

The managed facility concept maximizes the efficiency of a roadway's capacity through the introduction of tolls and time-of-day pricing. This concept can be applied differently depending on the type of corridor being studied for implementation of active management:

- In the conversion of HOV lanes to HOV/managed lanes, excess capacity may be available to allow vehicles with one or two occupants to access the lanes by paying a toll.
- In selected toll roads, the capacity could be managed through incentives to encourage increased auto occupancy or through the introduction of congestion pricing where the toll would vary based on the time of day.
- In freeway corridors where additional capacity is warranted, the added capacity could be managed through a combination of toll, vehicle type, and auto occupancy restrictions by time of day while existing lanes remain free.

Management of Tollways

Managed lane policies adopted by the RTC are intended to be applied region wide to all managed facilities including tollways. For those roadways which are developed as stand-alone tollways, especially in the early years of operation where revenue streams are critical, occupancy management and congestion pricing may not be feasible. However, operators of tollways should phase in operational strategies such as occupancy management or congestion pricing as the roadway matures and volumes increase. These strategies would work in lieu of, or in conjunction with, future roadway widening. This concept, including a congestion management pilot study, will initially be applied as part of the widening of the Sam Rayburn Tollway (SH 121) recommended in this plan. This congestion management pilot study will collect necessary before and after traffic data to determine the system wide and corridor effect on meeting regional goals of improved mobility, increased safety, system reliability, additional traveler choice, and air quality benefits. The results of this initial pilot study could help to shape and refine the introduction of congestion management strategies in future corridors as improvements are warranted.

For existing tollways with bond covenants, the Regional Transportation Council has committed to serve as a financial backstop to offer assurances and to hold bond holders harmless if revenues are negatively impacted through the introduction of congestion management techniques. NTTA Board approval would be necessary prior to the implementation of any congestion management strategy on all projects impacting their system. It should be noted that there may be geometric or other constraints that could make active management infeasible on certain facilities; however, consideration should be given to exploring alternative application methods such as off-site declaration or new occupancy and enforcement technologies.

Management of HOV/Managed Lanes

When applied in HOV corridors, the managed lane policies are specifically intended for the ultimate recommendations identified in Mobility 2035. However, through a combination of occupancy management and toll structure policy, the managed lane concept will also be applied on the existing interim HOV facilities where possible. It

is not intended that each facility would be treated separately, but the impacts on the entire HOV system should be considered before application in a specific corridor. Geometric and design constraints in some facilities could make pricing impractical.

The HOV facilities in operation today are considered part of an interim system and are based on the more traditional two plus occupancy requirement. Over time, many of these interim HOV facilities have matured to the point where all available capacity is taken, particularly during the peak periods of travel. For this reason, it is intended and recommended that in order to better manage the available capacity in these corridors and to promote reliability of the overall system, the existing interim HOV corridors would evolve, either all together simultaneously or separately over time, into an HOV/managed lane system.

The key components of an integrated HOV/managed lane system are based on maximizing all available capacity, ensuring reliability of the system, and monitoring conditions throughout the day to achieve prescribed travel time goals. This will be accomplished by moving from a two plus auto occupancy requirement to a three plus auto occupancy requirement starting in the year 2012. In addition to occupancy requirements, additional management tools will be employed including time-of-day or dynamic pricing. This HOV/managed lane concept is intended to be fully implemented system wide during the timeframe of this plan with a goal of reaching full conversion prior to the opening of permanent managed facilities on the DFW Connector (SH 114/SH 121), LBJ Express (IH 635), and North Tarrant Express (IH 820/SH 121/SH 183) corridors if required regional policies and management agreements can be adopted by that time.

IH 30 East R.L. Thornton Corridor Source: NCTCOG

Mobility 2035 contains recommendations for an extensive and interconnected managed facility system. This system recommendation is the result of analyses of the current and proposed freeway/tollway network in conjunction with the proposed managed facility system. There is recognition that the freeway, tollway, and managed facilities work together and are therefore analyzed in that manner when developing and implementing proposed corridor and system improvements.

Existing Interim HOV Facilities

The proposed managed facilities are different than the existing HOV facilities in operation today. HOV lanes on IH 30, IH 35E, IH 635, US 67, and US 75 are considered immediate action or interim facilities. These are considered temporary solutions where a permanent facility is anticipated to be constructed in the future concurrent with freeway widening or reconstruction. Immediate action initiatives do not require the freeway facility to be reconstructed or improved due to the temporary status.

The existing interim HOV lane network includes the following corridors:

- IH 30: East R.L. Thornton Freeway
  - Contra-flow lane with a moveable barrier
  - Limits: Dallas central business district to Northwest Drive in Mesquite
- IH 30: Tom Landry Highway
  - One- to two-lane reversible, barrier-separated facility
  - Limits: Center Street in Arlington to Sylvan Avenue in Dallas
- IH 35E: Stemmons Freeway
  - One lane concurrent flow in each direction, buffer-separated facility
  - Limits: IH 635 in Dallas to FM 3040 in Lewisville
- IH 635: LBJ Freeway
  - One lane concurrent flow in each direction, buffer-separated facility
  - Limits: IH 35E to Oates Drive/Galloway Avenue in Mesquite
- IH 35E/US 67: South R.L. Thornton Freeway/Marvin D. Love Freeway
  - One reversible, barrier-separated lane on IH 35E and part of US 67
  - One lane concurrent flow in each direction, buffer-separated on US 67
  - Limits on IH 35E: Dallas central business district to US 67
  - Limits on US 67: IH 35E to IH 20
- US 75: Central Expressway
  - One lane concurrent flow in each direction, buffer-separated facility
  - Limits: IH 635 in Dallas to Bethany Drive in Allen

Development of Roadway Recommendations

The process to identify specific recommendations on controlled-access facilities for Mobility 2035 is detailed in *Exhibit 6.25*. As this exhibit shows, programs and projects which maximize the existing transportation system are the first to be evaluated for potential inclusion in the plan. Only after these strategies are reviewed and incorporated into the plan are strategic infrastructure projects including rail lines, HOV/managed lanes, and freeways and tollways considered. This approach ensures that regional travel demand is first addressed through those projects and strategies that have the most air quality benefits and are generally more cost effective than adding single-occupant vehicle capacity to major roadway corridors.

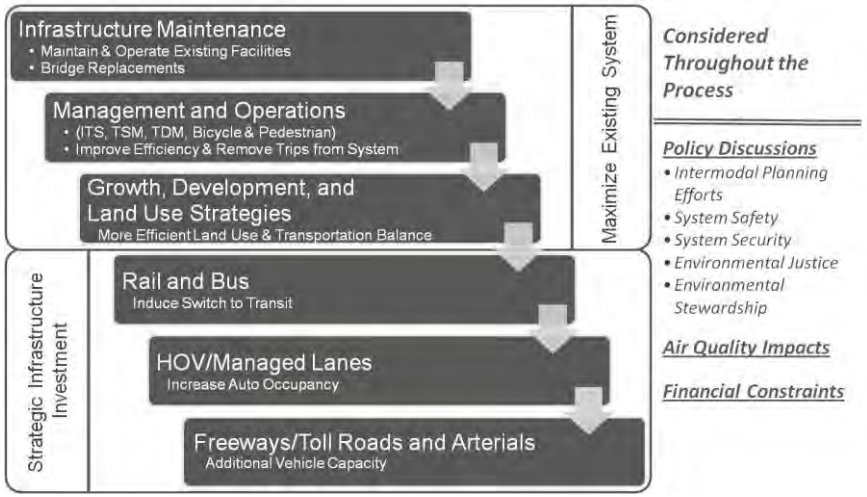


Exhibit 6.25: Prioritization of Improvements

To begin evaluating freeway and tollway projects for inclusion in the plan, the recommendations from previous Metropolitan Transportation Plans (MTPs) are reviewed. Discussions with TxDOT and NTTA are conducted to determine potential modifications so that the recommendations can be updated to include the latest results from ongoing corridor studies, environmental assessments, environmental impact statements, and advanced planning studies. Following the identification of potential projects, technical, environmental justice, and financial analyses are conducted as inputs in the evaluation, selection, and prioritization process for controlled-access facilities.

Technical Analysis

The technical analysis of controlled-access facilities 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, HOV/managed lanes, arterial, etc.)
- Number of lanes
- Area type (urban, suburban, rural)

Due to a lack of financial resources, it is not possible to plan for uncongested level of service conditions, forcing an acceptance of a higher level of congestion in the planning and project selection process.

Regional Toll Analysis

Tolled and managed facilities play an integral role in the recommendations of Mobility 2035. As part of the nondiscrimination efforts detailed in the Social Considerations chapter, analyses are performed to determine if protected populations experience disproportionate negative impacts associated with the addition of these priced facilities. Environmental justice is accounted for at three levels:

- System wide within the MTP
- System wide for the entire proposed tollway and managed lane system
- At the corridor level for each project

At the MTP level, performance indicators are evaluated for a base year and for the MTP Build versus No-build scenarios. These indicators of performance analyze employment accessibility via automobile and transit, average travel time to regional facilities including universities and hospitals, average level of congestion, and overall average travel time. Through these indicators of performance, results are calculated for each protected class versus the non-protected population, and the region as a whole, to determine potential impacts. This analysis is shown in the Social Considerations chapter which details social considerations. The results indicate that implementing the policies, programs, and projects of the MTP do not have disproportionate impacts on environmental justice populations.

For the system-wide tollway and managed lane analysis, origins of trips for drivers are estimated and reviewed to determine whether protected populations experience similar levels of mobility and accessibility with the proposed system compared to the non-protected population. This analysis is performed for the No-build versus Build scenarios for the toll road and managed lane system. System level performance such as overall congestion, vehicle miles of travel, and speeds, are reviewed to determine the regional impacts if the tollways or managed facilities were not constructed. The results of these analyses are shown in *Exhibit 6.26* which details travel information for traffic survey zones (TSZ) identified as having a majority of the population either below poverty, belonging to a protected class, or not belonging to a protected class. For each of these TSZ categories, *Exhibit 6.26* shows the number of jobs within 30 minutes by automobile, the average roadway speed in the zones, and the number of minutes it would take to travel 20 miles from the zones.

As *Exhibit 6.26* shows, for all commuters in North Central Texas, a No-build scenario of the toll and managed system would degrade the entire transportation network affecting all commuters. For all population classes, a Build scenario of the toll and managed system results in more jobs within 30 minutes by car, higher average speed, and shorter times required to travel 20 minutes. These results indicate that construction of this toll and managed system creates no disproportionate impacts on environmental justice populations.

	Traffic Survey Zone Category					
	Below Poverty		All Protected Classes		Non-protected Class	
	No-build	Build	No-build	Build	No-build	Build
Jobs Within 30 Minutes by Automobile	904,452	963,835	1,098,098	1,170,663	492,339	526,696
Average Speed (mph)	24	29	28	30	29	31
Minutes to Travel 20 Miles	50	41	42	40	41	39

Exhibit 6.26: Results of Regional Toll Analysis

Trips are also analyzed at the corridor level for individual roadway studies using an origin-destination method. Build versus No-build scenarios are compared for new environmental documents while Build versus Non-toll alternatives are examined for National Environmental Policy Act re-evaluations where the project was originally cleared as a freeway and is now being pursued as a tolled facility.

Financial Analysis

Constraints due to construction costs and available funding had a greater effect on the evaluation of potential controlled-access facility improvements for Mobility 2035 than for any other preceding MTP in North Central Texas. Despite the additional tools and resources made available by the State Legislature for tollways and managed facilities, many important transportation projects will be deferred from Mobility 2035 due to a lack of funding for their construction. Additionally, unit costs for major construction elements such as concrete and steel have increased tremendously over the past decade. Although these cost increases have since slowed and become more stable, major roadway construction still remains extremely expensive.

The reality of roadway construction costs, coupled with an environment of exceptionally limited sources of traditional funding, prompted a new systematic approach to the analysis, prioritization, and recommendation of controlled-access facility improvements throughout the Dallas-Fort Worth Metropolitan Area.

Project Evaluation, Selection, and Prioritization

Because of the extremely limited funding available for roadway capacity improvements and the need to be very selective and strategic in how those limited resources are allocated, a technically based scoring and ranking system was developed and applied to all potential candidate roadway projects and corridors. This methodology incorporated six broad screening elements and numerous sub-criteria, as highlighted in *Exhibit 6.27*.

All freeway and tollway corridors were scored and ranked based upon these evaluation criteria and preference was given to projects which were under construction but still needed additional funding for completion, or projects which were nearly completely funded but had a small remaining balance left to be funded. Such projects would need to meet at least one of the following conditions:

- Funding is identified in the TxDOT Unified Transportation Plan (the state's ten-year funding and programming document for all projects on the state highway system).
- Funding is identified in the regional Transportation Improvement Program.

- Local government commitment is identified in the Regional Partnership Program or Regional Toll Revenue Program.
- Funding is identified through potential toll bonds, concession fees, or excess revenue that would offset potential construction costs for tollways or managed facilities pursued by TxDOT, NTTA, or a public-private partnership process.

Evaluation Category	Scoring and Ranking Criteria
Functional Importance	▪ Priority given to components of the National Highway System ▪ Priority given to projects along hazardous materials routes ▪ Priority given to projects along NAFTA routes ▪ Priority given to critical infrastructure needs – those identified on the congestion management critical infrastructure list ▪ Priority given to projects with high levels of project dependency and co-dependency
Operational Sufficiency	▪ Bridge sufficiency – number of bridges rated at 50 or below ▪ Pavement rating ▪ Age of current facility versus design life of concrete and materials ▪ Lack of parallel facility capacity and level of service of parallel routes ▪ Availability of frontage roads ▪ Percent truck traffic ▪ ITS infrastructure completion and support
Economic Sustainability	▪ Support of NAFTA routes ▪ Inland port access ▪ Foreign trade zone access ▪ Airport access ▪ Freight facilities/goods movement ▪ Major activity centers ▪ Population densities ▪ Employment densities
Environmental Sustainability	▪ Percent undeveloped land adjacent ▪ Status of environmental study/document/federal approval ▪ Air quality benefits resulting from short-term implementation
Corridor Utilization	Analysis of morning, afternoon, and off-peak period modeled levels of service for 2010 (current year) and 2035 (plan year)
Cost Effectiveness	Analysis conducted based on the base year cost for the improvement, the calculated cost per mile and cost per VMT, current funding status, and preference given to tolled and managed lane facilities

Exhibit 6.27: Mobility 2035 Project Evaluation, Selection, and Prioritization

Projects were selected and identified for funding based upon this set of criteria and were required to fit within the limited financial constraints of this plan. The number of needs by far exceeded the amount of available funding to the region.

Controlled-access Roadway Recommendations

The map displayed in *Exhibit 6.28* indicates the final controlled-access facility recommendations for Mobility 2035. The total cost for the implementation of this freeway, tollway, and managed facility improvements is $36.8 billion. Costs from the plan are based on current planning and engineering studies, were reviewed by TxDOT and NTTA, and represent total project cost reflected in year of expenditure dollars consistent with federal planning requirements.

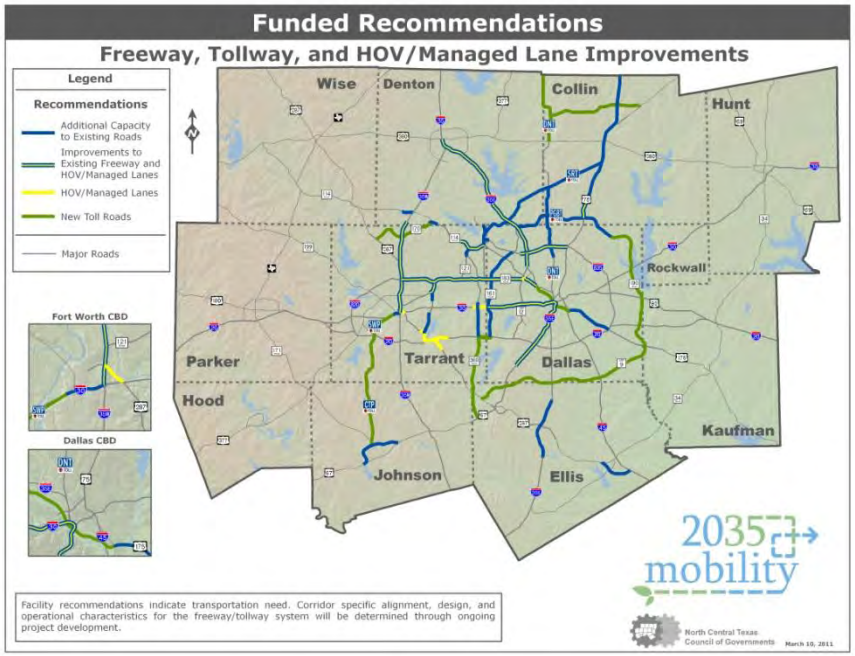


Exhibit 6.28: Mobility 2035 Controlled-access Facility Recommendations

Recommendation locations displayed on this map correspond to the corridor fact sheets listed in Appendix G. These corridor fact sheets outline and document corridor-specific recommendations resulting from either the most current information from a planning study, an approved locally preferred alternative, or a federal action being taken on a project such as a Record of Decision or a Finding of

No Significant Impact. The recommendations detailed on the roadway fact sheets should be used as a reference in identifying the design concept and scope for each of these corridors.

Priced Facilities

As detailed in the funding and financial analysis sections of this report on roadway recommendations, the development of Mobility 2035 relies to a significant extent upon the ability to construct and expand toll road and managed lane facilities to meet the growing transportation needs in the region. To counter reductions in traditional transportation funding, the planned network of these priced facilities is necessary to allow construction of new and expanded transportation facilities while also allowing the opportunity for more efficient management of corridor demand using tools including variable pricing and dynamic pricing.

The map shown in *Exhibit 6.29* displays the network of priced facilities that is recommended as part of Mobility 2035. The network shown in this map includes the existing toll road system managed by NTTA, new tollways which are expected to be constructed by local toll authorities, regional mobility authorities, and TxDOT; and the managed lane system that is being developed cooperatively between NCTCOG, TxDOT, NTTA, and local transit authorities.

Unfunded Roadway Needs

The development of Mobility 2035 required a re-evaluation of expected funding sources that were included in previous MTPs. This re-evaluation has resulted in the removal of nearly $45 billion of funding from the plan which has required the prioritization of needed projects and the deferral of many key controlled-access roadway projects necessary for the management of existing and future congestion.

For the freeway and tollway corridors deferred from Mobility 2035, the reality that they cannot be incorporated into the plan based on projected financial constraints should not diminish the fact that significant congestion will increase in these corridors over time and large-scale improvements will be required at some point in the future. These corridors have been deferred from the plan due to a funding situation that does not allow needed transportation projects to be constructed despite an expectation of growing traffic and worsening congestion.

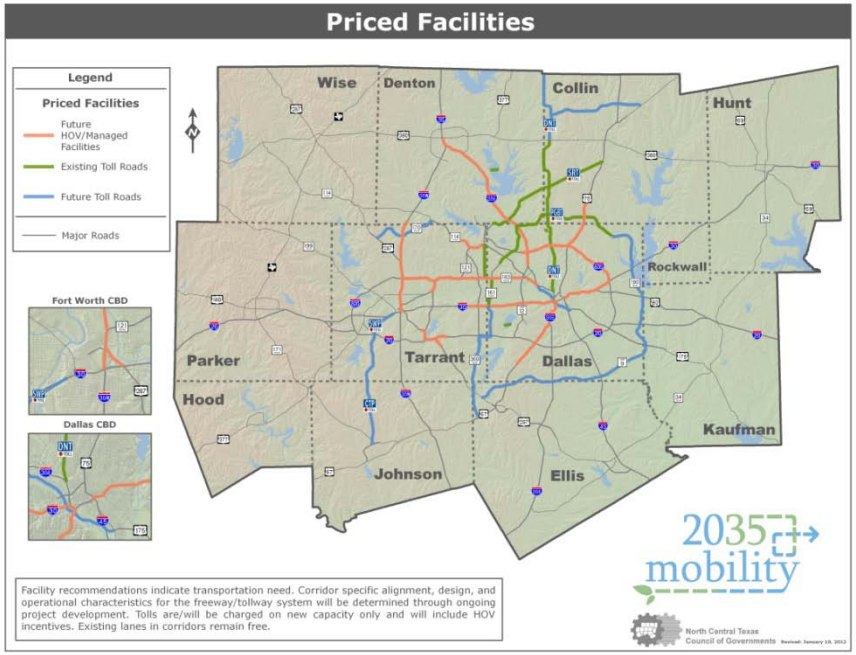


Exhibit 6.29: Priced Facilities

One of the important goals in this document is to include the recommendations from as many of the ongoing transportation studies as possible to ensure that potential regional projects can continue to move forward in their planning, feasibility, and implementation phases. The expectation is that as development and traffic continue to increase in these corridors, major studies will progress to a point where warranted and cost-effective solutions can be included in future transportation plans.

Exhibit 6.30 is an illustrative map of those freeway and tollway projects and corridors which were unable to be funded in Mobility 2035 due to financial constraint. These projects are still warranted and needed but must be deferred until additional regional funding can be identified.

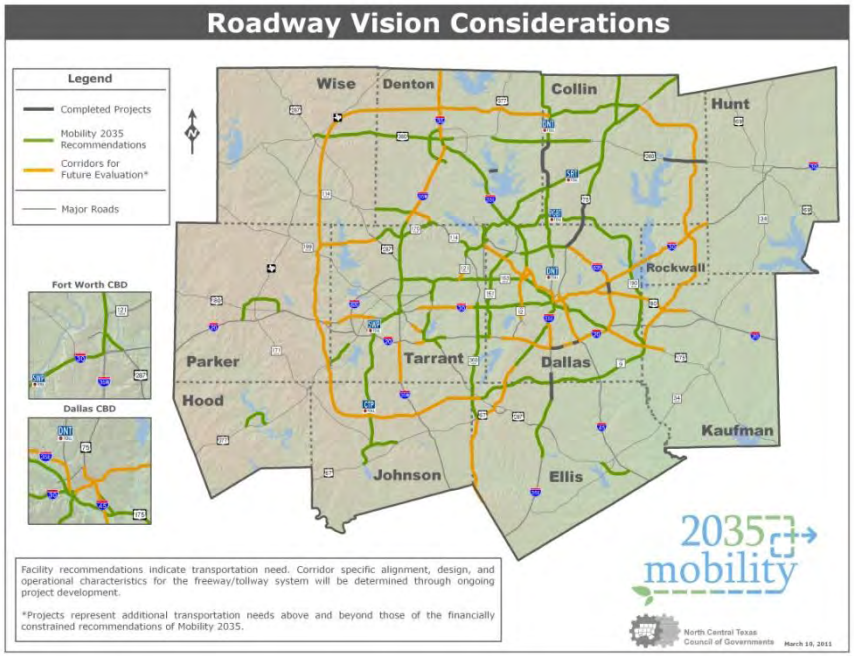


Exhibit 6.30: Roadway Vision Considerations of Unfunded Controlled-access Facility Needs

The removal of many key projects across the region has the potential to create bottlenecks in locations where one or more complementary projects are now being deferred while others are continuing towards implementation. Therefore, while full corridor reconstructions may be deferred, a program of strategic bottleneck improvements will be pursued to ensure practical transitions between roadway projects, to manage isolated locations of capacity-related congestion, and to implement key elements of corridor improvement plans which provide the highest level of regional benefit. Additionally, innovative strategies will be explored to resolve other specific locations of severe congestion across the region as they are identified. These approaches may involve the implementation of additional roadway capacity through interim widening projects, new connector facilities, bottleneck removals, short bypass routes allowing specific traffic movements to avoid congested locations, and other strategies as corridor needs are identified and addressed.

Statewide Planning Initiative for IH 35

In 2008, a group of Texas residents were appointed by the Texas Transportation Commission to assess the short- and long-term needs of the IH 35 corridor and to develop a vision plan of potential solutions that would accommodate those needs. In November 2008, the IH 35 Corridor Advisory Committee (CAC) issued the *Citizens' Report on the Current and Future Needs of the IH 35 Corridor* which concluded that the existing statewide capacity of IH 35 was insufficient to meet future mobility and economic demands, that additional capacity through multiple modes would be needed, and that strong community and inter-agency involvement was essential in successfully planning the evolution of the IH 35 corridor. In the following year, the IH 35 CAC created additional committees and initiated numerous public involvement and education efforts to develop the *My-35 Plan*, a grassroots-level comprehensive planning and implementation tool to guide future development of the IH 35 corridor.

Approved by the Texas Transportation Commission in 2011, the *My-35 Plan* relies heavily upon MTPs and other planning documents from various entities as a basis for its recommendations. The *My-35 Plan* recommendations are primarily focused upon the identification of broad solutions that would best meet local/regional needs in the corridor through the year 2050. Mobility 2035 includes projects recommended as near-term elements of the *My-35 Plan* such as the IH 35E segment of the LBJ Express project and the IH 35W segments of the North Tarrant Express project. Other *My-35 Plan* recommendations are illustrated as needs-based projects requiring further evaluation with the expectation that as new or additional funding becomes available, the ultimate feasibility, right-of-way requirements, environmental constraints, and construction priorities may be studied and verified. This serves as a bridge between local and state planning efforts, ensuring continuous refinement of a collective and cooperative process between residents, government, and transportation providers that increases overall communication and interaction, streamlines project delivery, and more readily achieves mobility, economic, and quality of life goals.

Regionally Significant Arterials

In addition to freeways, tollways, and HOV/managed lanes, regionally significant arterials are identified and included in Mobility 2035 based on their role to complement and enhance the major roadway and transit systems by providing the necessary transportation support and access to and from local land uses. This system of arterials is forecast to carry approximately 20 percent of all vehicular traffic in the region.

The North Central Texas system of regionally significant arterials, as included in this plan, is shown in *Exhibit 6.31*. This network is comprised of several key components including facilities which serve regional transportation needs, provide service to regional activity centers, aid in intra-community connectivity, and maintain access to and from areas outside of the region.

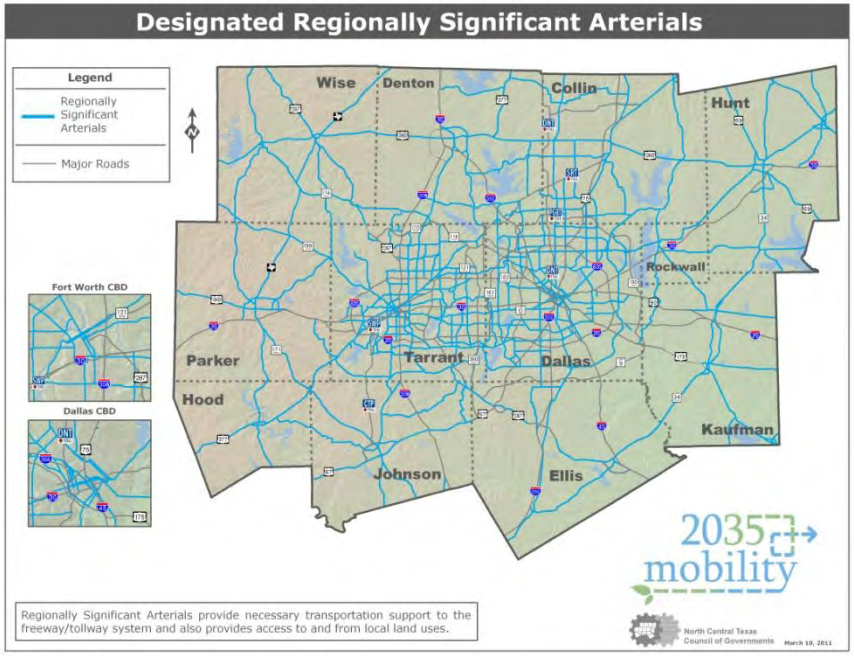


Exhibit 6.31: Regionally Significant Arterials

The regionally significant arterials that are currently funded for improvement, or anticipated to be funded within the timeframe of Mobility 2035, are shown in *Exhibit 6.32*. Mobility 2035 has designated $5 billion for arterial improvements; a majority of this funding will come from local sources.

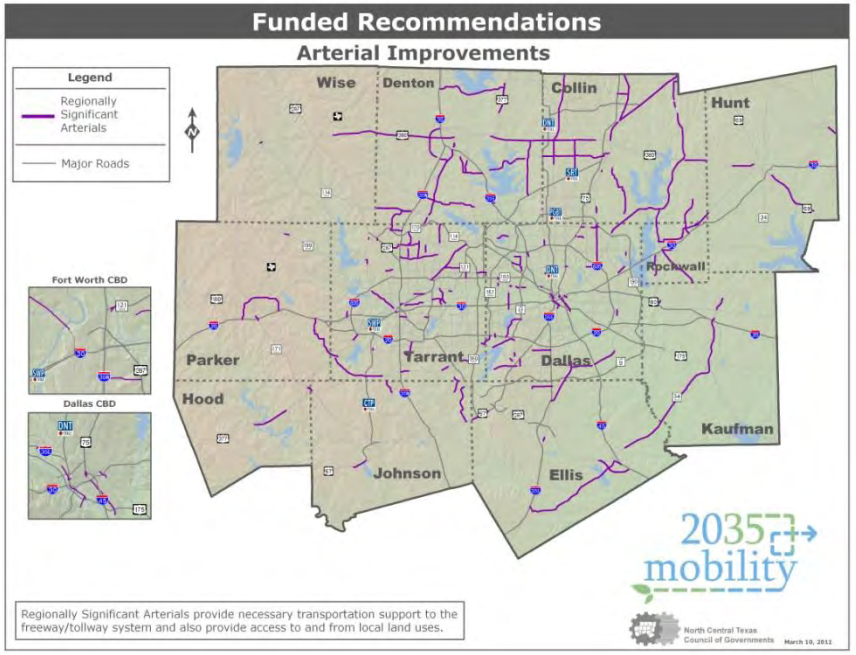


Exhibit 6.32: Funded Arterial Recommendations

Non-regionally Significant Arterials

In addition to regionally significant arterials, Mobility 2035 includes a program of improvement for non-regionally significant arterials which is also reflected in the financial component of the plan. The timing identification of specific funding sources for each facility is reviewed on a quarterly basis in conjunction with development and/or modification of the Transportation Improvement Program (TIP) project programming process. These projects go through a public involvement and an administrative approval process as part of the TIP amendment process.

Summary

The recommendations detailed in Mobility 2035 for the roadway system in North Central Texas amounts to a $46.2 billion investment in improvements, expansion, management, and new capacity. *Exhibit 6.33* displays the funded roadway

recommendations found in Mobility 2035, focusing on freeways, tollways, HOV/managed lanes, frontage roads, and selected regionally significant arterials. Managing congestion as North Central Texas continues to grow and develop over the next 25 years will require strategic and ongoing investment in these identified corridors which form the foundation of the regional roadway system and serve millions of travelers every day.

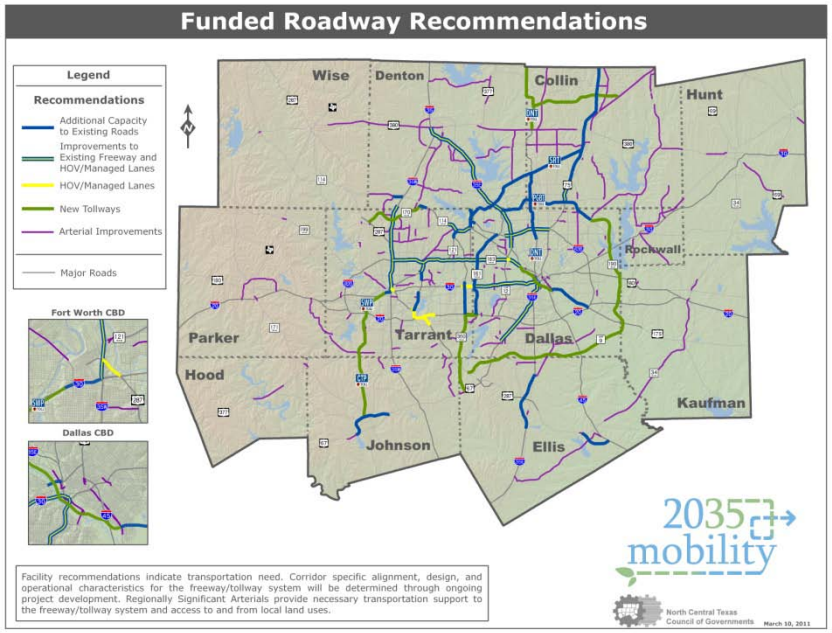


Exhibit 6.33: Funded Roadway Recommendations

See Appendix E for a complete listing of policies, programs, projects, and maps related to roadways.

regional performance

2035 mobility

Regional Performance

Introduction

Measuring the performance of the region's transportation system is an important step in reaching the desired outcomes of the Metropolitan Transportation Plan. Mobility 2035 was developed around a series of goals that are categorized into four overarching themes; these themes include mobility, quality of life, system sustainability, and implementation. While the policies, programs, and projects contained within Mobility 2035 strive to meet these goals, the success of these elements requires regular evaluation and monitoring. This chapter examines the performance of the region's existing and planned transportation system as it relates to addressing the goals outlined for Mobility 2035.

Mobility 2035 Goal Themes

Regional Performance at a Glance:

The Dallas-Fort Worth region is expected to see continued growth between now and 2035. This continued growth will result in:

- 3.2 million additional residents, which is the equivalent of adding the total current population of the cities of Arlington, Dallas, Fort Worth, Grand Prairie, Garland, Irving, and Plano
- 2.0 million additional jobs
- 103 million more vehicle miles of travel daily
- 124 percent increase in vehicle hours spent in delay

Performance Measurement: Mobility

The primary purpose of Mobility 2035 is to accommodate the multimodal mobility needs of a growing region. The specific goals developed for Mobility 2035 related to the theme of mobility include:

- Improve the availability of transportation options for people and goods.
- Support travel efficiency measures and system enhancements targeted at congestion reduction and management.
- Assure all communities are provided access to the regional transportation system and planning process.

There are a variety of system-level performance measures provided from the travel demand model that assess the relative mobility of the region by evaluating travel at the regional transportation system. The travel demand model is able to evaluate how the region's transportation system functions as a cohesive unit. However, it should be noted that there are a number of programs and modes that are not accounted for in this model and their performance must be tracked through other methods. *Exhibit 7.1* provides a brief summary of the regional transportation system's performance. This table illustrates current conditions, future conditions with the Mobility 2035 recommendations implemented, and future conditions if the Mobility 2035 recommendations were not implemented (No-build).

Regional Performance Measures	2012	2035	No-build
Population	6,651,887	9,833,378	9,833,378
Employment	4,210,178	6,177,016	6,177,016
Vehicle Miles of Travel (Daily)	176,461,914	279,426,796	252,669,404
Hourly Capacity (Miles)	42,331,524	50,525,839	41,938,766
Vehicle Hours Spent in Delay (Daily)	1,112,877	2,490,143	2,980,988
Increase in Travel Time Due to Congestion	31.5%	44.8%	58.1%
Annual Cost of Congestion (Billions)	$4.5	$10.1	$12.1

Exhibit 7.1: Regional System Performance

The deferral of nearly $45 billion in needed transportation improvements, coupled with continued growth, will cause travel conditions to deteriorate over time. Currently, travel throughout the region takes approximately 32 percent longer to make due to congestion. By 2035, with Mobility 2035 recommendations implemented, trips will take nearly 45 percent longer to complete due to congestion. While this is a decline in performance, if no improvements are made, by 2035 the average trip would take 58 percent longer to complete. In order to reverse this trend and improve travel conditions in the region, substantial investments would be required. The region, as a whole, will experience an increase in congestion; the exact conditions experienced by users will vary by location. See Appendix F for details regarding the transportation system's performance for each of the 12 counties in the Metropolitan Planning Area for years 2012 and 2035.

Regional congestion levels are graphically shown in *Exhibits 7.2, 7.3,* and *7.4*. These maps depict current and future peak-period congestion levels with and without the Mobility 2035 recommendations in place.

LOS ABC
A LOS of A, B, or C represents a relatively uncongested facility. Vehicles can move freely with little interference.

LOS DE
A LOS of D or E represents a relatively congested facility. Vehicles can move with some interference.

LOS F
A LOS of F represents the worst level of congestion. Vehicles are unable to move freely without interference.

Source: NCTCOG

Exhibits 7.2 through *7.4* provide an area-based analysis of congestion focused on region-wide travel conditions. Additional analytical techniques are used to illustrate facility specific performance. A level of service (LOS) analysis measures the operational performance of a roadway during the most congested times of the day. LOS is expressed using a scale from A to F. Vehicles operating on a roadway performing at a LOS of A, B, or C will be able to travel at posted speeds with little interference from other vehicles. Vehicles driving on roadways operating at LOS D or E can experience speeds much slower than the posted speed limits. When the

volume of traffic on a roadway exceeds the actual capacity, the result is a LOS F condition, causing vehicles to experience stop and go or standstill conditions.

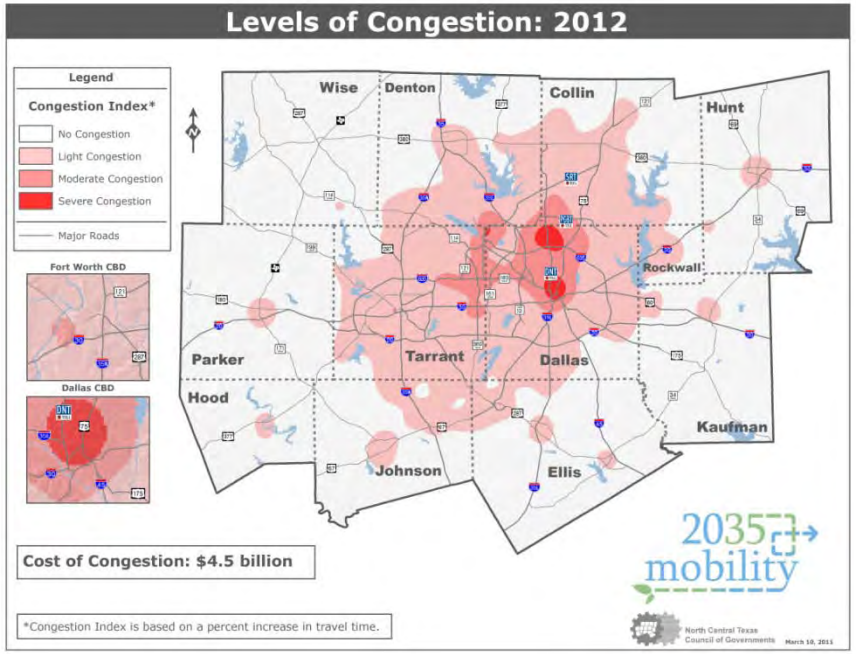


Exhibit 7.2: 2012 Peak-period Congestion Levels

Exhibit 7.5 illustrates the percentage of lane miles with LOS conditions of ABC, DE, and F for the Current, 2035 Build, and 2035 No-build scenarios. The charts show that LOS conditions of ABC will decrease and LOS conditions of F will increase while conditions of DE remain relatively constant. An additional LOS analysis was performed on the region's major roadway corridors. This analysis included an evaluation of LOS and lane warrants based on forecasted volume to capacity ratios.

The results of this analysis, along with maps showing LOS conditions for the region's roadway system, are provided in Appendix F.

Meeting the mobility-oriented goals outlined in Mobility 2035 is of critical importance. Despite a number of constraints, efforts are being made, and will continue to be made, to implement projects that will have a positive impact on travel conditions in the region.

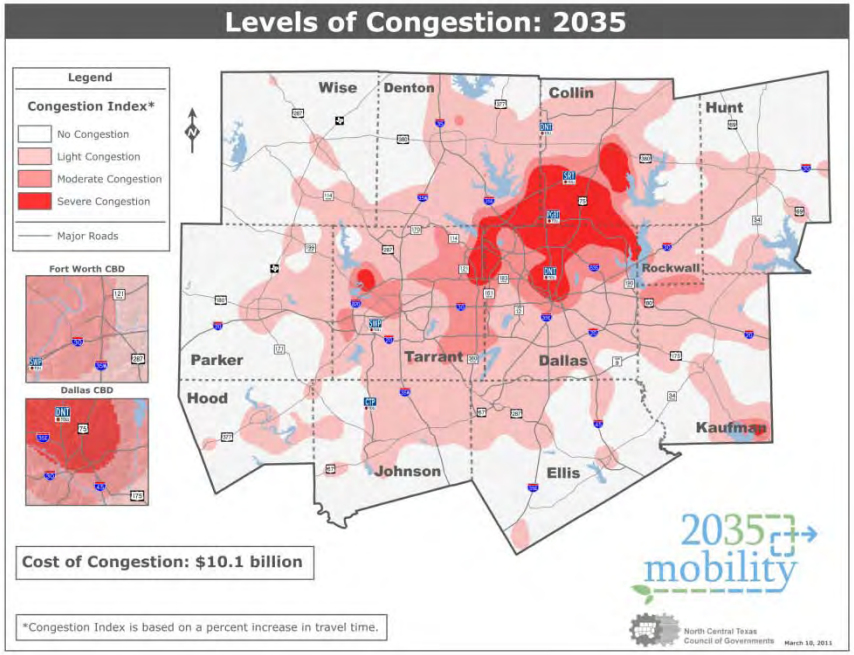


Exhibit 7.3: 2035 Peak-period Congestion Levels with Planned Improvements

Performance Measurement: Quality of Life

The Dallas-Fort Worth region has experienced considerable growth over the last 40 years; since 1970, the region's population has grown by 156 percent. This growth can largely be attributed to the region's diverse economy, favorable business climate, and low cost of living. These elements, among others, factor into the region's high quality of life. Maintaining and improving quality of life for the region's residents is central to Mobility 2035. The specific goals developed for Mobility 2035 related to the theme of quality of life include:

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

- Encourage livable communities which support sustainability and economic vitality.

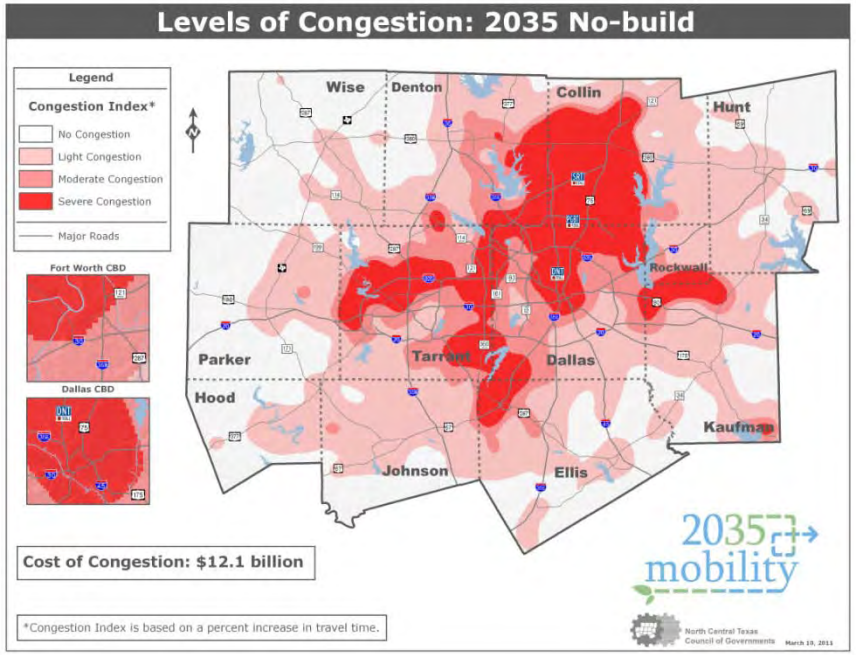


Exhibit 7.4: 2035 Peak-period Congestion Levels without Planned Improvements

There are a variety of ways that the transportation system, and more specifically the recommendations made in Mobility 2035, can impact quality of life. Mobility itself can be very influential on the quality of life an individual experiences. The ability to easily move from one place to another allows people to live where they want; to access jobs, education, and healthcare; and provides a means to cultural and recreational activities. Having a choice in the way one travels is an important factor to improving quality of life.

Access to public transportation can be a substantial quality of life benefit for residents of the region. The Regional Transportation Council has made public transportation a high priority for the region. The recommendations in Mobility 2035 strive to maximize public transportation and to increase access to this mode throughout the Metropolitan Planning Area. *Exhibit 7.6* estimates the number of people living in and out of the region's current transit provider's service area over

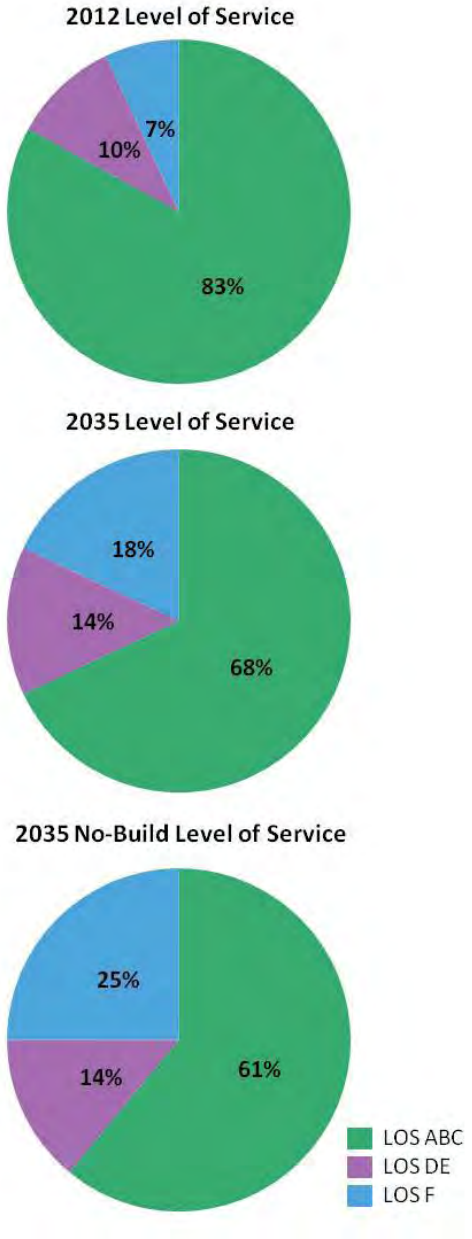


Exhibit 7.5: Lane Miles at Level of Service ABC, DE, and F

the life of Mobility 2035. While the absolute number of people living within the existing service area will increase, the total percentage declines over time. However, there are two important considerations that should be given. First, this analysis assumes that the existing service area would remain static over time. If the authorities are able to grow their service areas, these numbers would be positively impacted. The second consideration is that a number of the public transportation recommendations contained in Mobility 2035 reach areas outside of existing public transportation service areas. This means that residents outside of existing service areas will have access to public transportation.

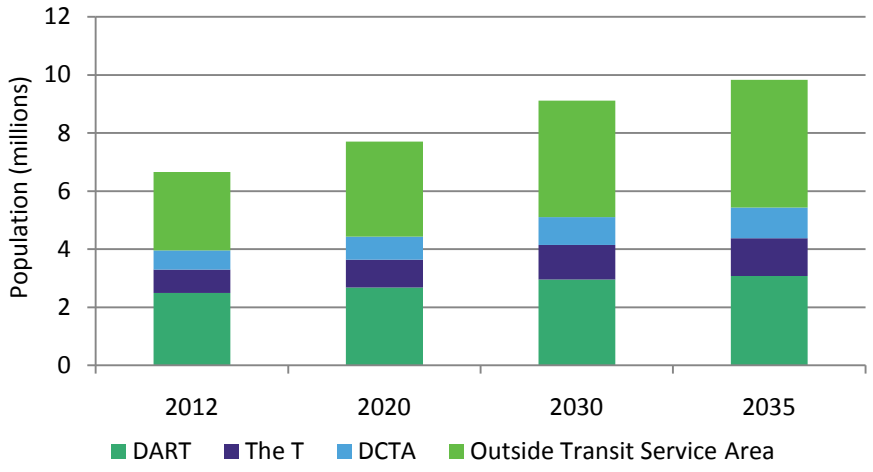


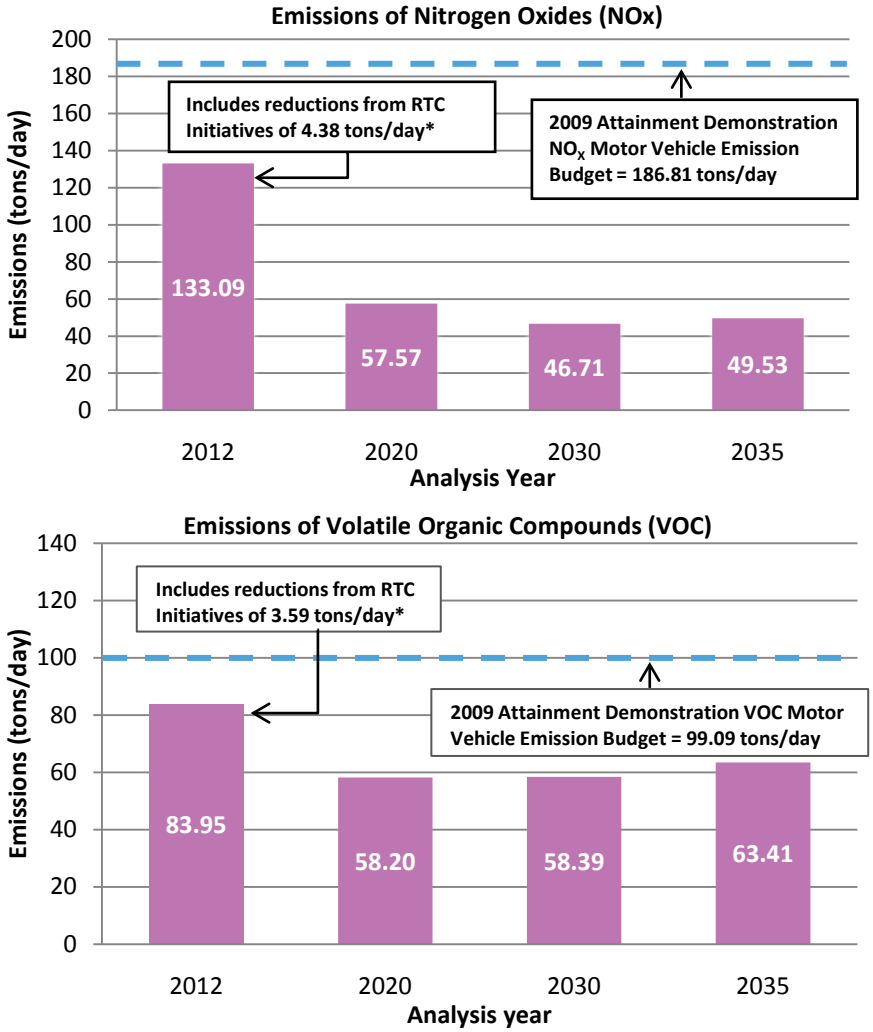
Exhibit 7.6: Population within Existing Transit Service Areas

The Regional Transportation Council has long recognized that the region will not be able to solve its transportation problems by simply building more roads. Public transportation provides a way to move large amounts of people in a safe and efficient manner. Analysis shows that by 2035, over three million people will live within one mile of a transit stop or rail station and more than three million jobs will be located within one mile of a transit stop or rail station. As the region continues to grow, public transportation will be an increasingly viable travel option. Increasing opportunities for and access to public transportation will improve quality of life for the region's residents.

Active transportation modes, which include bicycling and walking, also have a positive impact on one's quality of life. Not only are these modes a practical means of travel, but they also can reduce congestion, improve air quality, and enhance health. These elements all factor into a high quality of life. The Regional Veloweb is a network of off-street shared-use paths designed for use by bicyclists, pedestrians, and other non-motorized forms of transportation. The Regional Veloweb currently has 237 miles of existing paths, and by 2035, the system is expected to reach 1,668 miles. This is over a 600 percent increase in miles of paths available for travel throughout the region. The Regional Veloweb will directly service 10 counties and 116 cities in the Dallas-Fort Worth Metropolitan Planning Area.

Providing a variety of transportation choices is not the only way that the quality of life goals outlined in Mobility 2035 are addressed. Mobility 2035 includes recommendations that seek to improve air quality and enhance the environment. *Exhibit 7.7* demonstrates how air quality in the region will improve over time as a result of a variety factors including implementation of the Mobility 2035 recommendations.

In addition to improvement in air quality, Mobility 2035 calls for increased consideration for the natural environment during the development of projects. Mobility 2035 represents the first Metropolitan Transportation Plan in the Dallas-Fort Worth region that utilized the North Central Texas Regional Ecosystem Framework (REF) as part of the evaluation for major infrastructure improvements. Detailed information regarding the REF can be found in the Environmental Considerations chapter. The REF process is intended to protect, sustain, and restore vital ecosystems while simultaneously providing recreational and mobility opportunities, and contribute to the positive health of people and communities in North Central Texas. This, in turn, enhances quality of life for the region's residents. Because this is a new approach in the region, the performance of this method will be tracked and reported in future planning efforts.



*Local Initiative Benefits Shown Represent Post Processed Estimates, Source: NCTCOG

Exhibit 7.7: Dallas-Fort Worth Ozone Nonattainment Area Air Quality Conformity Analysis Results

The economy is a critical component in assessing quality of life. In 2008, the region accounted for 32 percent of the Texas Gross Domestic Product.[1] To remain a key player in the state and national economy, the Dallas-Fort Worth region must continue to provide facilities that allow for the steady flow of people and goods. Data collection and monitoring efforts have been established to aid in addressing and ensuring adequate capacity for the region's logistical centers. For example, in 2006, the region's major aviation facilities moved more than 832,000 tons of air cargo; by 2010, this number had decreased to 709,000 tons. This decline can be attributed to the recent economic downturn; however, it does show that the region can accommodate additional air cargo. Cargo is also transported throughout the region on the area's rail and roadway system. Travel model data shows that currently nearly 650,000 truck trips are made daily; by 2035, this number is expected to increase to almost 983,000. It is important that this type of data be monitored, evaluated, and considered as the transportation system is developed and improved. The continued efficient movement of goods will have a positive impact on the region's economy and the quality of life experienced by the region's residents.

The examples outlined in this section illustrate how the recommendations made in Mobility 2035 seek to improve the quality of life for the region's residents by providing transportation choices, promoting environmental stewardship, and accommodating economic growth.

Performance Measurement: System Sustainability

The theme of system sustainability touches upon several elements that are critical to Mobility 2035. These elements include creating a transportation system that is safe, reliable, and well maintained. In order to provide for these, an adequate and stable source of funding is required. These elements work in partnership to advance a transportation system in the region that is sustainable. The specific goals developed for Mobility 2035 related to the theme of system sustainability include:

- 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.

A well functioning transportation system requires regular maintenance and modernization to allow for the safe and efficient movement of people and goods. A stable and sufficient source of revenue is needed in order to execute improvements in the system. Taxes collected on motor fuels are the primary source of funding for

[1] North Texas Commission, 2009 Profile of North Texas, http://www.ntc-dfw.org/publications/profile2009.pdf

many transportation improvements. The state gasoline tax is 20 cents per gallon and the federal gasoline tax is 18.4 cents per gallon. For many years, fuel taxes have been a steady and ample source of revenue to fund transportation improvements; however, in recent years a number of factors have contributed to the diminished capacity of this source of revenue to adequately fund the transportation system. Two of the most influential factors include the impacts of inflation and improved fuel efficiency. State and federal fuel taxes were last increased in 1991 and 1993, respectively. Over the last 20 years, the cost of building and maintaining the region's transportation system has increased substantially and existing fuel taxes are no longer enough to sufficiently fund the system. Further exacerbating this situation is improved fuel efficiency. As vehicles become more fuel efficient, they require less fuel to travel the same distance. This relationship is illustrated in *Exhibit 7.8*. While there are many societal benefits to improved fuel efficiency, it negatively impacts funding for transportation. Motor fuel taxes are collected on a per gallon basis, so no matter how much fuel costs, the amount of tax collected remains the same. As fuel consumption decreases, tax revenue also decreases. Over time, the funds available to build and maintain the region's transportation system will decrease considerably. For these reasons, a more sustainable revenue stream is required to ensure that the region's transportation system can be maintained and improved. *Exhibit 7.9* illustrates how the financial recommendations made in Mobility 2035 perform compared to a status quo situation. For more information on the financial aspects of Mobility 2035, see the Financial Reality chapter.

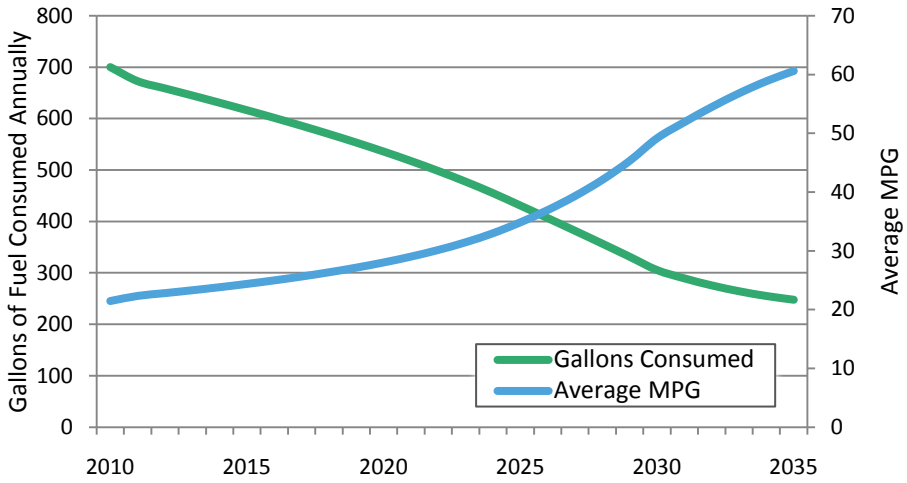


Exhibit 7.8: Relationship between Fuel Efficiency and Fuel Consumption

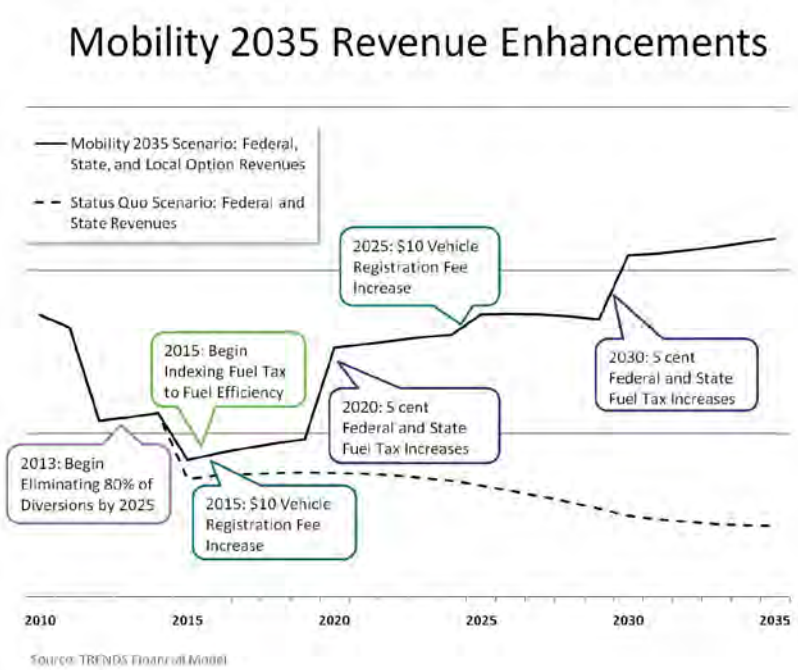


Exhibit 7.9: Impact of Mobility 2035 Financial Recommendations

Because funding is, and will be, a sizeable concern into the foreseeable future, a number of low-cost but highly effective improvements are recommended to improve the safety and efficiency of the regional transportation system.

The implementation of vanpools is one way in which the region will seek to improve the efficiency of the transportation system. Vanpools allow people traveling to similar destinations to ride together, thus reducing the number of vehicles on the road. Currently there are 358 vanpools operating in the region; by 2035, this number is expected to reach 1,041. This represents an increase of more than 190 percent.

Minor improvements to the region's arterial system can translate into more efficient travel, improved air quality, and major cost savings. Mobility 2035 calls for 1,200 arterial intersection improvements in addition to those identified in the arterial roadway improvements. These improvements are estimated to reduce the cost of congestion and save the region approximately $171 million annually. Likewise, traffic signal improvements, which may include retiming and synchronization, can have similar benefits. Mobility 2035 recommends 7,800 signal improvements over the life of the plan. These improvements are expected to reduce congestion related costs by $269 million annually.

Maintenance of the region's transportation system is also an important factor for the theme of system sustainability in that implemented improvements must be maintained to ensure their reliability and to maximize their useful life. Approximately 27 percent of the funding identified in Mobility 2035 is dedicated to the maintenance of the region's transportation infrastructure. Like other elements of Mobility 2035, maintenance had an overall reduction in spending from the previous metropolitan transportation plan by nearly $9 billion. As a result of this reduction in spending, elements such as pavement condition will decline. It should be noted that provisions were made to assure that the region's bridges would be adequately maintained and improved. Information related to the region's bridges is included in Appendix F.

The system sustainability goals included in Mobility 2035 are addressed through a variety of initiatives aimed at improving safety, enhancing reliability, ensuring maintenance, and increasing the availability of funding for the region's transportation system. These initiatives will be continually monitored and evaluated over the life of the Metropolitan Transportation Plan.

Performance Measurement: Implementation

The ultimate goal of any planning process is to see the recommendations reach the implementation stage. It is through the implementation of projects, programs, and policies that the other goals outlined in Mobility 2035 can be realized. The specific goals developed for Mobility 2035 related to the theme of implementation include:

- Provide for timely project planning and implementation.
- Develop cost-effective projects and programs aimed at reducing the costs associated with construction, operating, and maintaining the regional transportation system.

The nature of the transportation planning process, in conjunction with federal and state requirements, often means that many years pass from the time a project is conceptualized until the time it is constructed and available for use. There are a number of factors that impact project development and delivery. *Exhibit 7.10* illustrates approximately how long it takes a typical roadway or transit project to go through the planning process.

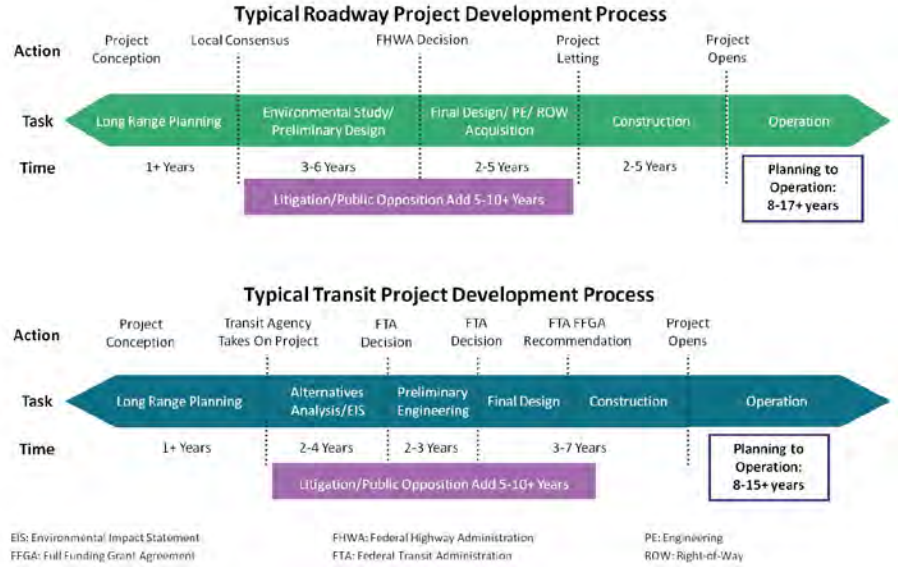


Exhibit 7.10: The Typical Project Development Process for Roadway and Transit Improvements

Identifying innovative methods to plan for and fund transportation improvements can expedite project delivery. Expediting project delivery not only reduces the project's overall costs, but it also aids in improving congestion because facilities are available for use sooner. *Exhibits 7.11* and *7.12* illustrate major roadway and transit projects, respectively, that have recently reached or are in the implementation stage.

Mobility 2035 calls for $101.1 billion worth of transportation projects and programs over the life of the plan. More than 6,100 new lane miles of roadways and 346 new miles of rail will be added to the region's transportation system between now and 2035. Implementing these improvements is key to increasing mobility, maintaining a high quality of life, and creating a sustainable transportation system.

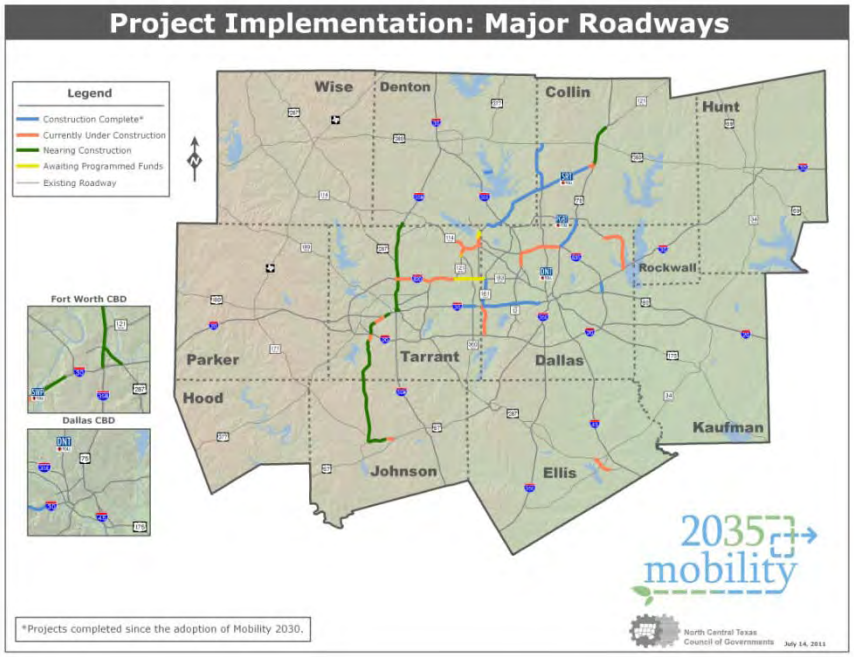


Exhibit 7.11: Recently Implemented Roadway Projects

Summary

The goals identified in Mobility 2035 focus on improving mobility, enhancing quality of life, creating a sustainable transportation system, and implementing recommendations. These major themes are not mutually exclusive; they complement each other and work together to create a desirable outcome. In order to attain these goals, regular evaluation of the region's transportation system and the recommended policies, programs, and projects contained within Mobility 2035 is necessary.

The data regarding the regional transportation system's performance shows that conditions will not improve over time; however, it is important to note that the

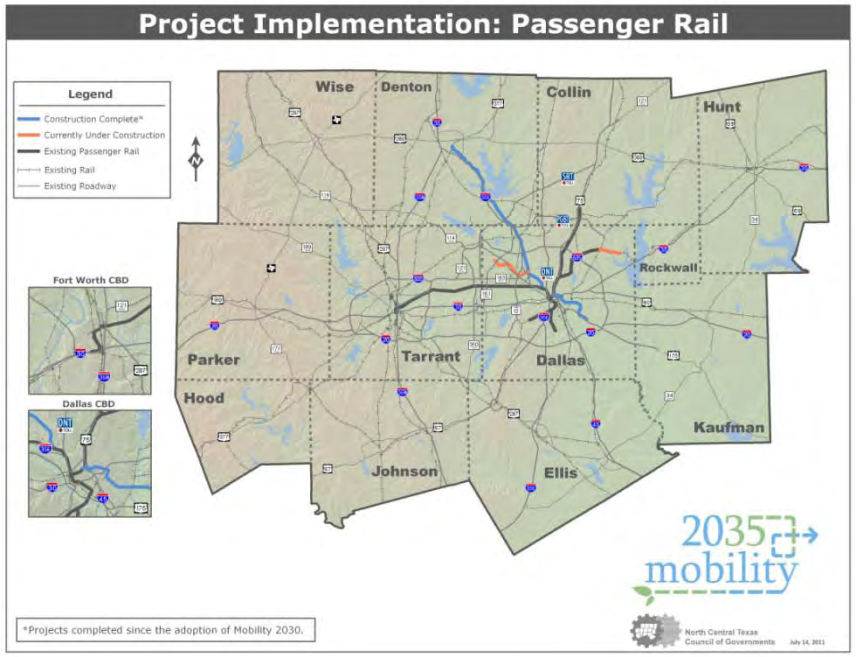


Exhibit 7.12: Recently Implemented Transit Projects

investment of $101.1 billion identified in Mobility 2035 only represents the improvements that are reasonably expected to be funded over the life of the plan. It is currently estimated that the region would require approximately $395.3 billion in improvements to eliminate the worst levels of congestion. Despite the overall decline in travel conditions in the region, the improvements identified in Mobility 2035 will have a positive impact versus if they were not implemented. The challenge now and into the future will be to implement transportation improvements that will have a lasting positive impact for the region while working in the face of continued growth and declining financial resources. The continual evaluation and monitoring of the region's transportation system will allow the most beneficial and effective projects and programs to be implemented.

See Appendix F for additional information related to performance of the regional transportation system.


bass performance hall, fort worth
conclusion
2035
mobility

Conclusion

Increased Growth and Demand for Transportation

The North Central Texas region has experienced rapid growth in recent decades, resulting in a metropolitan area with a current population of approximately 6.5 million people. This growth is continuing and population projections show that by 2035 the Dallas-Fort Worth area will be home to 9.8 million people. With the addition of 3.3 million new residents, a greater demand to move people and goods will be placed on an already stressed and aging transportation system.

Doing More with Less

Targeted and strategic use of limited funding is fundamental to maintaining a vibrant economic and social environment. Financial realities are making it increasingly clear that North Central Texas will not be able to build its way out of congestion problems. Even with a $101.1 billion investment in projects and programs over the next 25 years, travel time will increase by nearly 45 percent due to congestion. Insufficient funding for transportation improvements to meet growing demands is a constraint that requires strategic investments. Funding for new or expanded transit and roadways, along with maintenance and operations, is becoming increasingly scarce, placing a burden on an existing system that in many corridors is already very congested.

Changes in the way North Central Texans travel will be integral in maximizing limited funds and the existing capacity of the transportation system. The projects that have been selected for implementation are expected to provide the optimal improvement to regional mobility compared with their cost. Mobility 2035 emphasizes growth management and land use/transportation connection strategies that contribute to housing and job location efficiencies and encourages livable communities. Additionally, programs and projects aimed at eliminating or reducing vehicle trips, shortening trips, and maximizing the existing capacity of the system are key strategies supported by Mobility 2035 that will accommodate additional growth in light of reduced funding. *Exhibit 8.1* provides a summary of Mobility 2035 expenditures by project type.

2035 mobility

The Metropolitan Transportation Plan for North Central Texas

Mobility 2035 Recommendations	Expenditures ($ Billions)
Infrastructure Maintenance	**27.3**
Transit Operations, Maintenance	17.1
Roadway Maintenance	10.2
Management and Operations Strategies	**4.8**
Congestion Management	3.3
Bicycle/Pedestrian Facilities	1.5
Growth, Development, and Land-use Strategies	**3.9**
Air Quality and Environment	3.2
Sustainable Development and Transportation Enhancements	0.7
Public Transportation	**18.9**
Rail Capital and Transit System Expansion	17.4
Bus Capital	1.5
Paratransit Capital	0.02
Freeway, Tollway, HOV/Managed Lane, and Arterial System	**46.2**
Freeway/Tollway	35.1
Regional Arterial System	5.1
Other Arterials	4.4
HOV/Managed Facilities	1.6
Total	**101.1**

Values may not sum due to independent rounding.

Exhibit 8.1: Mobility 2035 Expenditure Categories

Meeting Mobility 2035 Goals

Mobility 2035 supports implementation of a transportation system that contributes to the region's mobility, quality of life, system sustainability, and continued project implementation goals.

Exhibit 8.2 displays the five Mobility 2035 expenditure categories compared with the nine Mobility 2035 goals that each of the categories collectively strives to meet, as indicated throughout Mobility 2035. In addition, these values are compared with the percent change in expenditures by category between Mobility 2030 and Mobility 2035. The percent change from Mobility 2030 to Mobility 2035 shows that Mobility 2035 allocates 86 and 55 percent more funds to growth, development, and land-use strategies, and management and operations strategies, respectively, over Mobility 2030. The largest percent decrease in funding from Mobility 2030 to Mobility 2035 is in the freeway, tollway, high-occupancy vehicle/managed lane, and arterial system projects. This is indicative of funding constraints, but also supports a focused effort in the region to fund strategic, low cost, highly effective congestion management strategies such as congestion management and sustainable development. Mobility 2035 includes multiple policies, programs, and projects that strive to meet the four major Mobility 2035 Goals of Mobility, Quality of Life, System Sustainability, and Implementation. A few examples are provided to assess how each of these four broad goals are supported with Mobility 2035 recommendations.

Mobility: The selected Mobility 2035 recommendations are expected to provide the greatest improvement to regional mobility compared with their cost and within the constraints of available funding. While the costs of congestion and travel time will increase in the year 2035, accessibility will be enhanced through recommendations that support a multi-modal transportation system that provides travel options to North Central Texans. Accessibility measures such as access to jobs indicate that while congestion increases, Mobility 2035 recommendations provide access to 21 percent and 92 percent more jobs by auto and transit, respectively, for protected populations over the current system.

Quality of Life: Denser development lends itself to strategies that support livable communities and improve quality of life. Mobility 2035 recommendations will lead to communities and a region that provides housing and transportation options, supports decreased household transportation costs, reduces our nation's dependence on foreign oil, improves air quality, reduces per capita greenhouse gas emissions, and promotes public health. Shifting away from development in greenfields, which serve a vital role in sustaining environmental quality, also supports a more efficient use of the existing transportation system instead, and reduces the need to build new infrastructure to outlying areas.

System Sustainability: More efficient management of the existing transportation infrastructure, along with targeted efforts at sustainable development to better coordinate land use and transportation investments, improves the sustainability of the transportation system. The region is projected to become more dense by the year 2035, meaning more people will be living closer to the major city centers of

Fort Worth and Dallas. This is a shift in the past trend of populations moving outward to the peripheral counties. This denser development supports opportunities to manage the transportation system in a more efficient way, making strategic investments in the existing system instead of building new facilities to serve growth outside the urban counties.

Implementation: Developing cost-effective projects and programs aimed at reducing the costs associated with constructing, operating, and maintaining the regional transportation system will be supported through a process of regular communication with state and federal review agencies, coordination with transportation providers in the region, and input from the public.

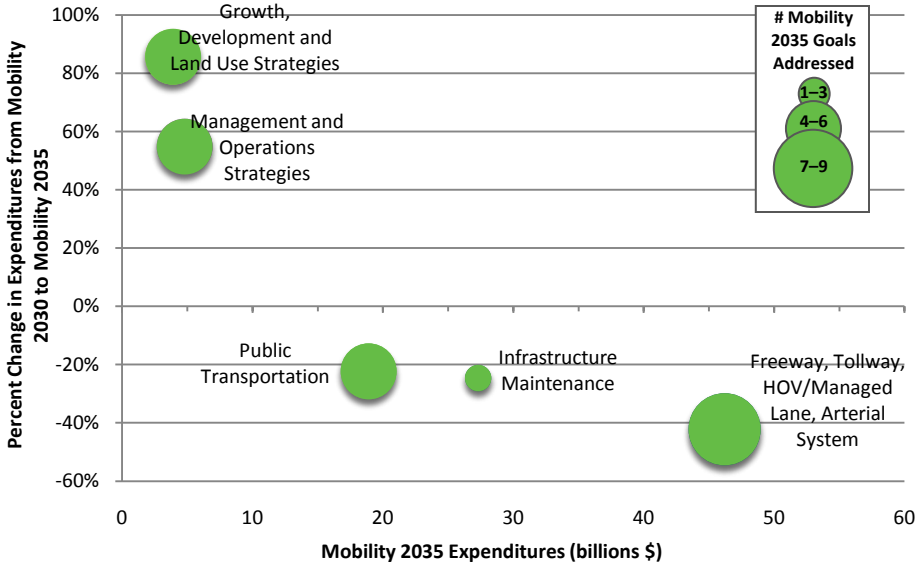


Exhibit 8.2: Mobility 2035 Expenditure Categories and Goals Assessment

The Mobility 2035 policies, programs, and projects described provide relevant and useful information about the planned transportation system for North Central Texas. Through a process of prioritization and analysis of mobility improvements, Mobility 2035 recommendations seek to meet the transportation demands of existing and future residents through innovative solutions to maintain a high quality of life for North Central Texans.

Transportation Beyond 2035

While Mobility 2035 recommends strategic programs and projects that provide transportation improvements throughout the region, the ultimate transportation needs of the Dallas-Fort Worth area will still not be met. Transportation investments totaling $395.3 billion over the next 25 years are needed to eliminate the worst level of congestion in 2035. Mobility 2035, however, recommends programs and projects totaling $101.1 billion because of financial constraints. The unfunded needs may be addressed through a variety of modal and management solutions. Major rail and roadway corridors that require future evaluation are included in the Mobility Options chapter. The unfunded needs highlight the importance of maintaining a vision for the transportation system beyond 2035. As projects are constructed and completed, the corridors included in the vision will become the recommendations of future Metropolitan Transportation Plans. The planning process is continuous and is modified to account for changes to financial assumptions, project design concept and scope, and legislative influences.

The necessity for additional funding mechanisms and continued implementation of strategic programs, projects, and partnerships to manage the increasing and unmet transportation demands in North Central Texas is evident. Providing a transportation system that supports continued economic growth opportunities and an enhanced quality of life for North Central Texas residents is a continued priority of the Regional Transportation Council and the Metropolitan Planning Organization.