APPENDIX L

TxDOT STATEWIDE LONG RANGE TRANSPORTATION PLAN

Connecting Texas 2050

Statewide Long-Range Transportation Plan



Adoption Date: July 30, 2024



July 30, 2024

Dear fellow Texans,

On behalf of the Texas Transportation Commission, we are pleased to present *Connecting Texas 2050*, TxDOT's new statewide long-range transportation plan. *Connecting Texas 2050* establishes the vision, objectives, performance measures, and strategic recommendations for Texas' multimodal transportation system through 2050. It integrates numerous planning efforts conducted by TxDOT and its partners and serves as the cornerstone transportation planning document for the agency.

Connecting Texas 2050 identifies three key performance goals: Safety, Preservation, and Mobility, along with three strategic goals: Connectivity, Economic Vitality, and Stewardship. Among these, Safety is of utmost importance and requires a commitment and contribution from all of us. This includes agencies responsible for building and maintaining safe transportation facilities, law enforcement responsible for ensuring traffic safety laws and regulations are followed, and all system users who have a responsibility to obey those laws and use our state's infrastructure without distraction or otherwise compromising safety. Together, we will strive to make Texas' transportation system one of the safest in the nation.

Texas is growing rapidly with a population projected to exceed 40 million and freight tonnage expected to exceed 8 billion tons per year by 2050. To meet the needs and demands of the diversifying population and businesses across Texas, we must be good stewards and ensure that we maintain our current transportation assets while strategically leveraging technology and investing to increase access to safe, reliable, and connected transportation facilities and services statewide. We must continue to optimize current and future funding sources and investments that will be needed to achieve *Connecting Texas 2050*'s goals in the coming years.

Connecting Texas 2050 is the result of a robust partnership with TxDOT's key planning partners and stakeholders, including local governments, metropolitan planning organizations, transit agencies, advisory committees, federal agencies, and thousands of Texans who contributed to the successful process. Thank you to everyone who participated, especially those who attended open houses, completed surveys, and submitted comments. Through your efforts, *Connecting Texas 2050* is presented as our shared vision for the future of transportation in Texas.

Regards,

Marc D. Williams, P.E.
Executive Director

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Acronyms

AAM	Advanced Air Mobility
ACS	American Community Survey
ADA	Americans with Disabilities Act
ADS	Automated Driving System
AV	Autonomous Vehicle
BEV	Battery Electric Vehicle
BTT	Bicycle Tourism Trails
CAT	Cooperative and Automated Transportation
CAV	Connected and Automated Vehicle
CBD	Central Business District
CCTV	Closed-Circuit Television
CDS	Connected Driving System
CFR	Code of Federal Regulations
CPT	Corridor Prioritization Tool
CV	Connected Vehicle
DUI	Driving Under the Influence
EV	Electric Vehicle
eVTOL	Electric Vertical Take-off and Landing
FHWA	Federal Highway Administration
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
FY	Fiscal Year
GDP	Gross Domestic Product
GIWW	Gulf Intracoastal Waterway
GSP	Gross State Product
ICB	Intercity Bus
IH	Interstate Highway
IIJA	Infrastructure Investment and Jobs Act
ITS	Intelligent Transportation Systems
MPO	Metropolitan Planning Organization
MTA	Metropolitan Transit Authority
MTP	Metropolitan Transportation Plan
NEVI	National Electric Vehicle Infrastructure
NHFN	National Highway Freight Network
NHS	National Highway System
OMB	Office of Management and Budget
PHEV	Plug-in Hybrid Electric Vehicle
RPO	Regional Planning Organizations
RTD	Rural Transit District
RTP	Regional Transportation Plan
SHF	State Highway Fund
SHSP	Strategic Highway Safety Plan
SIB	State Infrastructure Bank
SLRTP	Statewide Long-Range Transportation Plan
SMART	Strengthening Mobility and Revolutionizing Transportation
STIP	Statewide Transportation Improvement Program
STRAHNET	Strategic Highway Network
TAMP	Transportation Asset Management Plan

TASP	Texas Airport System Plan
TCAP	Texas Comprehensive Accessibility Project
TDC	Texas Demographic Center
TERM	Transit Economic Requirements Model
THFN	Texas Highway Freight Network
TIM	Traffic Incident Management
TIP	Transportation Improvement Program
TMC	Traffic Management Center
TMF	Texas Mobility Fund
TMFN	Texas Multimodal Freight Network
TMS	Traffic Management System
TPP	Transportation Planning and Programming Division
TSMO	Transportation System Management Operations
TxDOT	Texas Department of Transportation
UAM	Urban Air Mobility
U.S.	United States
USD	United States Dollars
USMCA	United States-Mexico-Canada Agreement
UTD	Urban Transit District
UTP	Unified Transportation Program
V/C	Volume-to-capacity
V2X	Vehicle-to-Everything
VMT	Vehicle Miles Traveled
VRU	Vulnerable Road User
XSP	Exploratory Scenario Planning



1

Connecting Texas 2050 | Statewide Long-Range Transportation Plan

Introduction

Connecting Texas 2050 is the highest-level strategic policy document for transportation in the state of Texas. It sets the direction for Texas Department of Transportation (TxDOT) planning efforts and programming investments across the state over the next 25 years.

1

Introduction

About *Connecting Texas 2050*

Transportation is vital to the state, regional, and global economies as the ability to move people and goods safely, efficiently, and reliably is critical to meeting the daily needs of Texas businesses and residents and to supporting the state's economic prosperity. Whether you bike to work, take the bus to a medical appointment, walk your kids to school, or travel across the state to enjoy skylines, coastal beaches, and wide-open prairies, transportation choices are an integral part of every Texan's daily life.

Texas has one of the most robust, multimodal transportation systems in this country. This system comprises extensive roadways, bridges, railroads, public transit systems, sidewalks and bikeways, airports, seaports and waterways, and border crossings, connecting communities and the economy. A forward-looking and innovative approach is critical to delivering transportation investments that preserve existing transportation assets while enhancing transportation options that will accommodate the current 30 million Texans and 13 million jobs, in addition to the more than 11 million new residents and six million new jobs projected by 2050.

This is where *Connecting Texas 2050*, the state's long-range transportation plan (SLRTP), comes into play. *Connecting Texas 2050* provides an overview of the state's transportation system for all modes, details the challenges and opportunities Texans face with the system, and identifies strategic recommendations to address those challenges in a manner that integrates efforts across all modes.

The plan:

Reinforces TxDOT's efforts to **improve safety** for the traveling public and for all modes of freight, including efforts to reduce fatal and severe injury crashes on Texas roadways.

Promotes the preservation of vital infrastructure and services, including roads, bridges, sidewalks, transit fleet and facilities, railways, airports, seaports, and border crossings.

Encourages more efficient, resilient, and reliable travel options to **enhance mobility** for the traveling public and freight across all modes.

Improves connectivity between all modes and all geographic areas, including urban areas, rural areas, and border regions.

Strengthens economic vitality by investing in the modernization of aging transportation infrastructure, leveraging innovative and technology-oriented solutions, expanding system capacity to accommodate growing freight demand, and promoting job creation.

Promotes stewardship that prioritizes fiscal responsibility, maintains funding, minimizes negative natural and cultural impacts, and improves the overall project delivery process.

What Are Our Challenges?

To prepare for the future of transportation in Texas, it is imperative to recognize the challenges our state faces at the local, regional, and statewide levels and to devise strategies to overcome them. The *Connecting Texas 2050* planning process entailed soliciting input from internal stakeholders, external stakeholders, partner agencies, and the public, to establish a framework that identifies the pressing transportation challenges Texans face.

Reducing fatal and severe injury crashes: The last day without a death on Texas roadways was November 7, 2000. Since that day, more than 75,000 people have died in crashes on Texas roadways. In 2023, Texas experienced a 6% increase in the total annual number of fatal crashes compared to the 5-year average between 2018 and 2022.[1] Trends in fatal and serious injury crashes are also rising for vulnerable road users (VRUs) in Texas. The highest priority for TxDOT is to reduce fatal and severe injury crashes on Texas roadways and make the transportation system safer for all users.

Managing growing demand and changing demographics: Rapidly growing population and economic activity are predicted to result in a 42% increase in total vehicle miles traveled (VMT) in Texas by 2050.[2] Urban and rural areas will face challenges offering safe, affordable, and reliable methods of transportation that support this growth. Changing demographics and generational shifts add to the challenges of providing a multimodal transportation system that meets everyone's needs.

Preserving and strengthening existing transportation assets: Texas has the largest network of transportation assets in the country, with over 50% more roadway lane miles than the state with the second largest network.[3] Preserving and maintaining the transportation system becomes more challenging as traffic volumes increase, asset inventories increase, and infrastructure ages, and considering extreme weather events have become more frequent and intense.

Addressing lack of connectivity and mode choices: Statewide and regional connections are a key challenge the public and stakeholders identified, given Texas' vast size and the diversity of the connection needs across the state. Challenges include gaps in effective mode integration, due to siloed modal approaches, and limited transportation options and access to various modal services, which negatively affect access to jobs, education, essential services, and recreational activities.

Supporting goods movement and resilient supply chains: The Texas freight network plays a vital role in supporting the state's supply chain, with key industries relying on its safe and reliable transportation services to keep business operations running smoothly. Texas freight volume across all modes is forecasted to double by 2050. Nearshoring trends in manufacturing have the potential to significantly increase the forecasted volume of freight crossing the Texas-Mexico border.

Navigating the uncertainties of transportation technology integration: New transportation technologies, such as connected and automated vehicles (CAVs), are anticipated to have a variety of positive and potentially disruptive impacts throughout the transportation systems. The use of zero- and low-emission vehicles has gained momentum. The Texas Department of Motor Vehicles estimates that Texas would reach 1 million electric vehicles (EVs) by 2031, which quadruples the total number of EVs registered in Texas as of 2023.[4] Policy and funding considerations will need to be addressed to maximize these new technologies' benefits.

What Are Our Opportunities?

As we endeavor to adapt our transportation system to meet the challenges that lie ahead, numerous opportunities demand our attention. TxDOT divisions and districts, together with several advisory committees comprising industry experts, external partner agencies, and the public collaborated to identify the most promising opportunities to address these challenges. These opportunities, if harnessed effectively, have the potential to enhance Texas' ability to address stakeholder priorities.

Leveraging technology and innovation: Statewide efforts are underway to prepare for emerging transportation technologies, such as CAVs, and to support EV adoption, including investing in EV infrastructure. TxDOT's Cooperative and Automated Transportation (CAT) program consists of over 50 initiatives to integrate CAT technologies across the department.[5] There is opportunity to leverage smart infrastructure, artificial intelligence, and freight logistics technologies over the coming years.

Strengthening collaboration and partnerships: A close working relationship with agencies, organizations, communities, and private industries will foster the cooperation and coordination essential to implement this plan. Expanding TxDOT's continuous, comprehensive, and cooperative multimodal planning process will help to ensure that transportation planning and programming efforts align with community needs and support the state's growth.

Supporting economic competitiveness: The state's employment is projected to grow by 50% to nearly 20 million jobs by 2050.[6] Freight value is projected to increase 151% by 2050.[7] Transportation investments should be prioritized to align with projected growth. Border and seaport infrastructure must be positioned to capitalize on the incredible opportunities brought by the U.S.-Mexico-Canada Agreement (USMCA) and other global trade relations.

Optimizing multimodal transportation funding: Multimodal transportation infrastructure provides a range of benefits, including reduced carbon emissions, improved air quality and public health, and diversified transportation choices that lead to a more resilient system. The Texas Legislature provided general revenue funds to assist in providing additional multimodal funding to high-priority, non-roadway projects, such as the Port Capital Investment, Ship Channel Improvement Revolving Fund, Aviation Facility Grants, and funding to sustain state transit program per capita funding levels.[8]

Promoting education and training: Continuing education for the transportation community at the state, regional, and local levels is critical to developing a workforce with the skills needed to design, operate, and maintain a safe and efficient transportation system. Communicating with the public, stakeholders, and businesses about mobility issues, emerging technologies, resilience, and the multimodal transportation system's role can facilitate meaningful public participation.

Developing the long-range planning cycle: *Connecting Texas 2050*, in coordination with plans, programs, and initiatives across the agency, sets the stage for short-term and long-term strategies and activities, building pathways for implementation. Performance accountability helps deliver a better performing transportation system that supports connected and productive communities. TxDOT is committed to enhancing project planning, design and engineering, and efficient project delivery to ensure future investments address the unique and diverse transportation needs and challenges across the state.

How to Use the Plan?

Connecting Texas 2050 defines the long-term transportation vision, goals, and objectives (**Chapter 2**), describes the multimodal transportation system (**Chapter 3**), describes the key trends, system performance, and needs of the state transportation system (**Chapter 4**, **Chapter 5**, and **Chapter 6**), and identifies the actions to be taken between now and 2050 to successfully achieve our goals and maximize opportunities (**Chapter 7**, **Chapter 8**, and **Chapter 9**). *Connecting Texas 2050* readers can expect the plan to provide opportunities for:

- **TxDOT Leadership and State Officials:** Exploring key trends, challenges, and opportunities for Texas' future transportation system and identifying policy implications.
- **TxDOT Divisions and Districts:** Understanding how statewide strategic planning connects with other plans and programs and providing a common focus on long-range (beyond 10 years) needs, recommendations, and statewide priorities.
- **External Partner Agencies:** Aligning their plans and projects to statewide goals and recommendations and considering the long-range implications explored in the scenario planning component.
- **Public:** Understanding how transportation affects communities and the economy and future opportunities for transportation to better connect people.
- **Industry:** Learning about opportunities TxDOT is envisioning to better connect industries across Texas and with the global economy.

For further information, and the full range of technical analysis conducted for *Connecting Texas 2050*, please see the *Connecting Texas 2050* project website: Statewide Long-Range Transportation Plan (txdot.gov). Technical reports available on the website include:

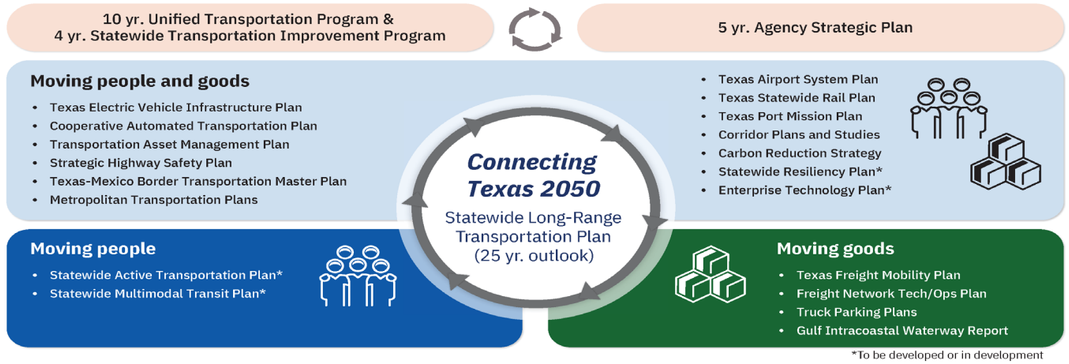
- Planning Context
- Goals, Objectives, and Measures
- Trends and Planning Implications
- Needs Identification
- Priority Corridor Performance Identification and Analysis
- Scenario Planning
- Funding Analysis
- Strategy Development

How Do Plans Integrate?

Connecting Texas 2050 is TxDOT's cornerstone multimodal transportation planning document. **Figure 1** illustrates the connection between *Connecting Texas 2050* and other TxDOT planning efforts.

- The SLRTP aligns with TxDOT's Agency Strategic Plan and other federally required performance-based plans (e.g., Strategic Highway Safety Plan [SHSP] and Transportation Asset Management Plan [TAMP]).
- TxDOT's planning and programming activities, such as the Unified Transportation Program (UTP) and Statewide Transportation Improvement Program (STIP), link goals, measures, and targets of the SLRTP with specific projects as they move through the development and implementation process.
- The SLRTP builds on ongoing planning efforts, including TxDOT's Texas Freight Mobility Plan, Texas Port Mission Plan, Texas-Mexico Border Transportation Master Plan, Texas Airport System Plan, Texas Statewide Rail Plan, Statewide Multimodal Transit Plan, and Statewide Active Transportation Plan, as well as Metropolitan Transportation Plans (MTPs) developed by partner agencies.
- The SLRTP serves as a reference point for future updates to agency plans and studies regarding demographics, transportation trends and issues, economics, technology, resilience, and sustainability.

Figure 1: TxDOT Family of Plans



*To be developed or in development

As the guiding document for statewide and regional transportation planning, *Connecting Texas 2050* builds on previously adopted plans. In addition, TxDOT has worked to closely align the plans that are currently being developed with *Connecting Texas 2050*, including the Statewide Resiliency Plan, Statewide Active Transportation Plan, and Statewide Multimodal Transit Plan, ensuring a unified vision for Texas' multimodal transportation system through 2050.



Texas Strategic Highway Safety Plan
Provides an assessment of data trends and crash analysis, and modifications of strategies and targets to improve safety in the state.
Traffic Safety Division



Transportation Asset Management Plan
Provides a framework to improve and preserve the condition of pavement, bridges, and system performance in the state.
Maintenance Division



Texas Delivers 2050: Texas Freight Mobility Plan
Outlines the goals for freight mobility, assesses economic impacts, and identifies key trends, needs, and challenges in the freight industry.
Transportation Planning and Programming (TPP) Division and Texas Freight Advisory Committee



Freight Network Technology and Operations Plan
Expands on the 2018 Freight Mobility Plan goals and proposes strategies for technology and operations investments on the Texas Multimodal Freight Network (TMFN).
TPP Division and Texas Freight Advisory Committee



Texas Port Mission Plan
Identifies important port projects for investment, incorporates maritime interests into TxDOT planning, and promotes Texas ports for economic development.
Maritime Division and Port Authority Advisory Committee



Texas Electric Vehicle Infrastructure Plan
Describes a multi-year plan to enable current and future drivers of EVs to confidently travel across the state for work, recreation, and exploration.
TPP Division and Strategic Initiatives and Innovation Division



Texas-Mexico Border Transportation Master Plan
Outlines current and future cross-border transportation needs, challenges, opportunities, and investment strategies to boost the state's trade competitiveness.
TPP Division and Border Trade Advisory Committee



Texas Airport System Plan
Aims to improve access to air mobility options and ensure timely development and maintenance of the airport system.
Aviation Division



Texas Statewide Rail Plan
Describes the state's vision for rail and identifies opportunities for future improvement.
Rail Division

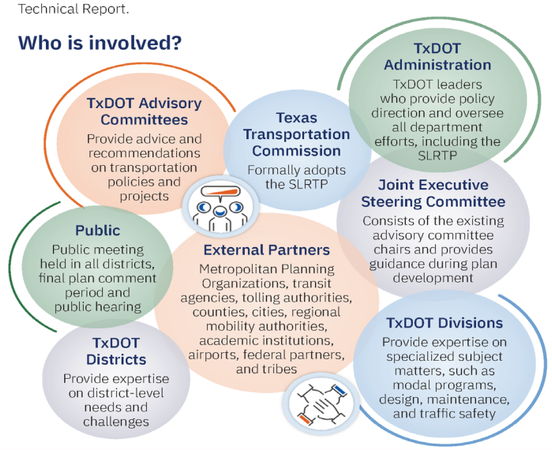


Cooperative Automated Transportation Strategic Plan
Provides a framework to prepare TxDOT for emerging cooperative and automated transportation (CAT) technologies, maximize benefits of CAT, and position TxDOT as a national leader in CAT technologies and innovation.
Traffic Safety Division and Connected and Automated Vehicles Task Force; Strategic Initiatives and Innovation Division is leading the CAT Program implementation

Public and Stakeholder Involvement

Public and stakeholder involvement was crucial to developing *Connecting Texas 2050*. By engaging the public and stakeholders, TxDOT ensured that the SLRTP reflects the needs and priorities of the state's diverse communities. In the spring of 2023, TxDOT focused on gathering input from the public and stakeholders to understand transportation needs and challenges in different regions. In the fall of 2023, TxDOT shifted its focus to gathering public and stakeholder feedback to prioritize strategies to fulfill the identified needs. Further detail on public and stakeholder input can be found in the Public and Stakeholder Involvement Technical Report.

Who is involved?



What We Heard from the Public:

- Texans desire safer, accessible, and affordable transportation options, with emphasis on enhancing public transit for aging and low-income populations.
- Texans are concerned about the environment, including extreme weather, air quality, traffic noise, and animal crossings.
- Texans advocated for proactive planning to accommodate future growth, maintain roadways, relieve congestion, enhance active transportation, improve public health, and prepare for emerging technologies such as EVs.

Public feedback was also collected through a statewide statistically valid Transportation Visioning Survey. The survey asked a randomly selected representative sample of over 4,500 residents to consider the state's transportation system needs through the year 2050, and it sought to understand attitudes towards various transportation topics. The findings from the survey helped identify Texans' needs, challenges, and priorities. Key findings include:

- **82%** of respondents believe it is critically important or very important to **promote safety** for the traveling public. Nearly **79%** of respondents said it is critically important or very important to **improve the existing highway/roadway network**.
- Respondents indicated that future transportation **funding should be greater for all transportation modes**, with highway and freight receiving the top priority. **Nearly 31%** of respondents indicated that at least 20% or more of the state transportation budget should be allocated to passenger/commuter rail service.
- **58%** of respondents stated they expect increased or significantly **increased home delivery** in the future, likely resulting in increased traffic levels.

TxDOT Advisory Committees represent a wide range of interests, including bicycle/pedestrian, border trade, freight, advanced air mobility, ports, public transportation, CAVs, and even specific corridors, such as I-27. Advisory Committees were consulted throughout the *Connecting Texas 2050* development process to gather input and recommendations on specific transportation topics. *Connecting Texas 2050*'s Joint Executive Steering Committee, which comprises the committee chairs of each Advisory Committee, provided strategic and collaborative direction throughout the planning process.

What We Heard from the Joint Executive Steering Committee and TxDOT Advisory Committees:

- Leverage autonomous vehicle (AV) technology to remove human error. AV adoption requires education for all users, including drivers, pedestrians, and bicyclists.
- Infrastructure design and speed management should prioritize safety, including the separation of different types of traffic.
- Preservation of infrastructure is a focus, with an emphasis on improving maintenance and ensuring the resiliency of the transportation network.
- Provide diverse transit options, maximize efficiency through technology and innovation, and eliminate gaps in transportation system.
- Address the unique needs of both urban and rural areas.
- Enhance connectivity to avoid congestion, including first-mile/last-mile segments, and improve connectivity for rural areas to ensure access to jobs, healthcare, services, and recreational activities. Freight generators need to be connected to different modes of transportation and barriers to crossings need to be mitigated.
- Stewardship in transportation involves strategically leveraging funds, maintaining infrastructure, utilizing data-driven decision-making, and focusing on performance measures to achieve success and demonstrate value.

External partner agencies and TxDOT districts and divisions offered feedback and guidance through virtual and in-person meetings during the spring and fall outreach. They provided localized expertise and input on various transportation-related topics, helped identify needs, and shaped strategies based on their specific areas of focus.

What We Heard from the External Partner Agencies, TxDOT Districts, and Divisions:

- Integrate transportation planning with economic development and land use planning.
- Provide safe and reliable public transit options and last-mile connectivity.
- Address freight congestion, safety, and the shortage of truck parking.
- Reduce uncertainty about EVs, develop designated EV corridors, and prepare for EV trucks.
- Advance density-oriented approaches for urban areas.
- Leverage emerging technology and infrastructure for multimodal transportation and safety.
- Improve resiliency to address flooding, extreme weather, and sea level rise.
- Develop district-level plans, particularly in rural areas outside of Metropolitan Planning Organization boundaries.
- Incorporate scenario planning into the transportation planning process, especially in urban areas.
- Identify additional funding opportunities.
- Acquire right-of-way and obtain environmental clearance early.
- Continue to facilitate the growth of broadband capacity.



2

Connecting Texas 2050 | Statewide Long-Range Transportation Plan

Purpose, Goals, and Objectives

This chapter defines the long-range transportation vision, goals, and objectives that set the direction for the state's multimodal transportation system over the next 25 years.

2 Purpose, Goals, and Objectives

Connecting Texas 2050 Vision

Create an innovative multimodal transportation system that safely and efficiently moves people and freight and supports future growth.

Purpose of the Plan

Connecting Texas 2050 is TxDOT's latest update to the SLRTP and serves as the highest-level strategic policy plan for transportation in Texas. It includes strategic recommendations to address safety, preservation, mobility, reliability, and resilience of the state's transportation system and provides guidance for investments to meet current and future needs for the movement of people and goods across the state.

Connecting Texas 2050:

- Considers current and future transportation choices for the movement of people and goods.
- Evaluates integration of all modes to serve Texans and our economy.
- Includes input from data analysis, public and stakeholder input, and other planning efforts.

Performance-Based Planning

TxDOT's performance-based planning and programming process begins with the SLRTP. To ensure that *Connecting Texas 2050*'s vision is achieved, TxDOT revisited the core elements that underpin the agency's mission and vision, which include goals and objectives. Through consideration of federal and state planning requirements, a review of multimodal transportation plans, and extensive and inclusive stakeholder engagement, TxDOT identified six long-range goals to reflect priorities and address needs across the state between now and 2050. Each goal includes objectives to establish specific strategies that TxDOT can lead or support to achieve that goal.

The goals and objectives established in the SLRTP drive project prioritization and investment decisions in TxDOT's UTP, which guides the programming and development of transportation projects across the state over a 10-year timeframe. Performance measures help to track progress towards meeting the plan's goals and objectives, ensuring that TxDOT is on track to achieve its vision for the Texas transportation system by 2050. TxDOT is committed to ongoing performance reporting with established performance measures, and it will continue to assess and refine performance measures and targets through implementation activities.

Goals and Objectives

Connecting Texas 2050 identifies six goals that set the foundation for meeting, supporting, and delivering on TxDOT's mission and vision for transportation across the state. The goals identified for *Connecting Texas 2050* are either performance or strategic goals. Performance goals identify specific tasks to ensure a safe, efficient, and resilient transportation system. Strategic goals guide organizational decision-making and provide overall direction to develop a well-connected and future-focused transportation system.

Performance

Safety
Plan, build, and maintain a safe and secure transportation system for all users.

Preservation
Maintain and preserve transportation infrastructure and resources to achieve a state of good repair and mitigate asset deterioration.

Mobility
Address congestion by improving efficiency, resilience, and reliability.

Strategic

Connectivity
Improve multimodal and intermodal connectivity at the local, regional, statewide, national, and international level.

Economic Vitality
Develop transportation systems that support the movement of people and goods to enhance quality of life and promote personal and statewide economic growth.

Stewardship
Continue the responsible and efficient use of federal, state, and local fiscal and natural resources.

Safety

Plan, build, and maintain a safe and secure transportation system for all users.



In 2023, an average of 11 people died daily and nearly 42 people per day were suspected to have sustained serious injuries in crashes on Texas roads, making improved safety across the state critically important. Safely moving people and goods is the top priority for TxDOT, which aims to reduce roadway hazards and resulting impacts, including crashes, serious injuries, and fatalities. The safety focus extends to railway, aviation, public transportation, active transportation, and maritime as well. TxDOT safety campaigns, such as the #EndTheStreakTX, target bicycle safety, pedestrian safety, work zone safety, drunk driving, and other focus areas.

Addressing unique safety concerns and hazards for all transportation modes consists of applying a multi-faceted, innovative, technology-enabled inclusive approach to planning, design, construction, maintenance, oversight, management, and operation of the transportation system, as well as coordination with emergency response agencies to improve post-crash care. Prioritizing safety, including understanding the safety implications of emerging technologies, will improve quality of life for all Texans and support TxDOT in reducing fatal and severe injury crashes on Texas roadways.

Improving security is an important element to ensure the safe and reliable management and operation of Texas' transportation system. Security encompasses a variety of facets across the transportation system, including physical security, cybersecurity, and securing access for emergency services to reach the areas where they are needed. This includes protection against and mitigating the risk from natural disruptions (such as extreme weather) and humanmade disruptions (such as border shutdowns) that can interrupt the management, operation, and safe use of the transportation system, as well as emergency evacuation and recovery.

Objectives

- Reduce the frequency of crashes and associated impacts for all modes.
- Eliminate fatalities and reduce serious injuries on the roadway system.
- Improve safety for all users of the transportation system, including VRUs.
- Strengthen the security of physical and digital transportation assets.
- Improve incident identification and response.



Preservation

Maintain and preserve transportation infrastructure and resources to achieve a state of good repair and mitigate asset deterioration.



The state's transportation system, which includes roads, bridges, sidewalks, transit fleet and facilities, rail, airports, ports and navigable waterways, pipelines, and other assets, plays an important role in moving people and goods statewide, nationally, and internationally. The preservation of infrastructure, including physical assets and the key functions of corridors, is crucial to maintaining a sustainable and functional transportation system.

As of 2022, less than 5% of TxDOT-owned pavements and about 1% of TxDOT-owned bridges are in poor condition.[9] By adequately investing in preservation and improving asset management, maintenance, and rehabilitation techniques, pavements and bridges will remain in good condition while reducing long-term maintenance costs.

Preservation also requires optimizing transportation management and operations. This includes improving traffic signals, intelligent transportation systems (ITS), and other technologies to enhance efficiency and safety. Maintaining a state of good repair and improving performance are also critical to preservation. Additionally, modernizing freight infrastructure such as rail, airports, seaports, and pipelines is essential to supporting the seamless movement of goods and promoting economic growth.

Well-maintained infrastructure improves reliability, reduces social, economic, and environmental impacts, and fosters a sustainable transportation system. TxDOT will take a central role in preserving TxDOT-owned assets, while also assisting with maintaining transportation infrastructure owned and operated by partner agencies.

Objectives

- Preserve the integrity and longevity of pavement and bridges to maintain a state of good repair.
- Invest in multimodal assets preservation, maintenance, and replacement.
- Optimize transportation system management and operations (TSMO).
- Maintain transportation assets in the most cost-effective manner.
- Enhance resiliency to natural and humanmade risks, both physical and digital.



Mobility

Address congestion by improving efficiency, resilience, and reliability.



The population of Texas is expected to grow by 39% by 2050, expanding by over 11 million people.[10] Ensuring mobility through 2050 is critical to providing an efficient, resilient, and reliable transportation system.

Increasing the efficiency of the transportation system using technology-driven and innovative strategies will allow businesses to operate more effectively, resulting in transportation cost savings. Ensuring a resilient transportation system will support the movement of both people and goods by mitigating physical and cyber risks, ultimately reducing travel delays and hazards on the road.

A reliable transportation system is critical for mobility across Texas as it improves the overall experience for users and fosters economic development for businesses. The Texas Delivers 2050: Texas Freight Mobility Plan identifies travel time reliability, including border crossings, as a challenge. Improving travel time reliability includes leveraging ITS and other technologies, such as truck parking availability systems, rail crossing traffic management systems, and smart freight connectors.

This goal will strategically address congestion in all areas — urban, rural, border regions, and emerging megaregions. Improving mobility requires a multimodal approach that serves the needs of all Texans and includes investments in infrastructure, technology, and alternative transportation options. By prioritizing mobility, the Texas transportation system will meet the needs of the state's growing population and economy now and into the future.

Objectives

- Mitigate congestion and enable reliable travel times.
- Ensure the efficient movement of goods and support a resilient supply chain.
- Increase system redundancy.
- Improve cross-border travel time reliability.



Connectivity

Improve multimodal and intermodal connectivity at the local, regional, statewide, national, and international level.



Improved connectivity will enhance safety and increase accessibility to essential services, such as jobs, schools, and healthcare. This is particularly important for rural regions that have limited access to alternative transportation options such as public transportation or airports. Well-connected sidewalks, bike lanes, and trails will encourage the use of active transportation options, resulting in reduced traffic congestion and improved sustainability.

The mobility and reliability of freight movements depend on first-mile/last-mile connections, which refer to the need to efficiently move freight between mainline transportation corridors and local origins or destinations, including manufacturing plants, warehouse/distribution centers, and other freight generators. Connectivity to key intermodal transfer points is critical for every supply chain.

Enhancing connectivity to and from border crossings and border regions is also crucial to facilitate the international movement of people and goods. The Texas-Mexico Border Transportation Master Plan states that the demand on the Texas-Mexico transportation network has outpaced capacity, indicating a need for improved connectivity to roadways and other modes.

Overall, enhanced connectivity will boost economic growth, improve quality of life, promote sustainability, and create new opportunities for Texans and businesses. The use of technology and innovative strategies will be encouraged to support these efforts.

Objectives

- Increase statewide, regional, and local connections that are inclusive and accessible to all, including urban, rural, and border connections.
- Increase modal options to enhance alternative transportation.
- Improve freight network connectivity, including intermodal connections; connectivity between urban and rural areas, and global markets; and access to freight facilities and markets.
- Modernize infrastructure to support the implementation of emerging transportation technologies.



Economic Vitality

Develop transportation systems that support the movement of people and goods to enhance quality of life and promote personal and statewide economic growth.



Texas has one of the largest populations and robust economies in the United States. Texas had the fastest Gross State Product (GSP) growth in the nation for the fourth quarter of 2022 with a 7% annual growth rate.[11] It is essential to continue to invest in a multimodal transportation system to remain competitive through 2050.

Strengthening economic competitiveness relies on ensuring that the multimodal freight network is connected and efficient. This requires investing in the modernization of aging transportation infrastructure, supporting resilient supply chains, leveraging technology-oriented solutions, expanding system capacity to accommodate growing freight demand, and connecting Texas to the global trade market.

Public transit and active transportation have been shown to deliver economic benefits to society as well as to individuals. The Texas Bicycle Tourism Trails (BTT) Study emphasizes that constructing bike tourism trails will boost economic development by supporting transit-oriented development, tourism-related spending, and bicycle retail and manufacturing. Reliable transit and a robust bicycle network provide an alternative mode to connect Texans to businesses and regional attractions, and to connect all communities across the state.

A safe, connected, and efficient transportation system is critical for Texas to remain economically competitive and to better serve the needs of all Texans and businesses. This goal will improve quality of life for residents and visitors while fostering economic development, both personal and statewide.

Objectives

- Expand and modernize transportation assets to spur economic growth.
- Increase access to and support opportunities for jobs, services, and activity centers.
- Promote workforce training to support a growing economy and emerging industries.
- Ensure the state's multimodal transportation system is supportive of all users, including tourism and leisure travel.
- Align with key economic initiatives of the state of Texas.



Stewardship

Continue the responsible and efficient use of federal, state, and local fiscal and natural resources.



Maintaining transportation infrastructure and building for future needs requires significant resources, including funding for construction, maintenance, repairs, and services. The 2024 UTP explains that some revenue streams are steady while other sources are more susceptible to fluctuations in the economy or state budget. Identifying and maintaining sustainable funding sources will support the delivery of more transportation across Texas through 2050 and beyond.

Good stewardship will also minimize the environmental impact of the Texas transportation system. By using resources responsibly and leveraging technology and innovation, TxDOT can reduce waste and conserve natural resources. Encouraging the use of public and active transportation options and promoting alternative fuel vehicles will further reduce transportation-related emissions. Prioritizing environmental stewardship will reduce greenhouse gas emissions and air pollution, resulting in better public health.

Being a good steward starts with TxDOT understanding the unique needs of stakeholders across Texas and delivering the right programs and projects at the right time. Effective project delivery consists of transparent and consistent communication and leveraging data and technology to guide decision-making. This will ensure that TxDOT uses all resources more responsibly and efficiently. By implementing good stewardship practices, TxDOT can maintain its transportation infrastructure and meet the needs of the public and stakeholders, all while strategically allocating transportation benefits across diverse geographies and social demographics.

Objectives

- Identify and maintain sustainable funding.
- Avoid, minimize, and/or mitigate adverse and/or disproportional impacts to cultural, natural, and historic resources.
- Protect vulnerable populations from adverse health risks resulting from air pollution from transportation systems.
- Strategically allocate transportation spending across diverse modes, geographies, and social demographics.
- Deliver programs and projects efficiently and responsively.



Compliance with Federal Requirements

Table 1 shows how the long-range goals integrate federal planning factors required by Title 23 of the Code of Federal Regulations (CFR) §450.206 as part of the scope of the statewide and nonmetropolitan transportation planning process.[1,2]

Table 1: Alignment of *Connecting Texas 2050* Goals and Federal Planning Factors

Federal planning factors required by 23 CFR §450.206	Safety	Preservation	Mobility	Connectivity	Economic Vitality	Stewardship
Support the economic vitality of the United States, the states, nonmetropolitan areas, and metropolitan areas, especially by enabling global competitiveness, productivity, and efficiency	✓	✓	✓	✓	✓	✓
Increase the safety of the transportation system for motorized and nonmotorized users	✓	✓	✓	✓	✓	✓
Increase the security of the transportation system for motorized and nonmotorized users	✓	✓	✓	✓	✓	✓
Increase the accessibility and mobility of people and freight			✓	✓		✓
Protect and enhance the environment, promote energy conservation, improve the quality of life, and promote consistency between transportation improvements and state and local planned growth and economic development patterns	✓	✓	✓	✓	✓	✓
Enhance the integration and connectivity of the transportation system, across and between modes throughout the state for people and freight			✓	✓	✓	
Promote efficient system management and operation		✓	✓	✓		✓
Emphasize the preservation of the existing transportation system	✓	✓			✓	✓
Improve the resiliency and reliability of the transportation systems and reduce or mitigate stormwater impacts of surface transportation	✓	✓	✓	✓	✓	✓
Enhance travel and tourism			✓	✓	✓	



3

Connecting Texas 2050 | Statewide Long-Range Transportation Plan

Texas Transportation System

This chapter provides an overview of the Texas transportation system and identifies Corridors of Statewide Significance that will play a key role in developing an integrated multimodal transportation system.

3 Texas Transportation System

Texas Transportation System

Texas transportation system comprises multiple modes that provide for the safe and efficient movement of people and freight into, out of, and within Texas. The system is made up of roadways, bridges, railroads, public transit systems, sidewalks and bikeways, airports, seaports and waterways, and border crossings (**Figure 2**). The transportation system is owned and operated by a combination of public- and private-sector agencies that include TxDOT, local governments, transit agencies, tollway authorities, and private companies. TxDOT oversees planning and programming decisions for the development, management, and operation of the statewide transportation system that serves all Texans, businesses, and visitors.

Figure 2: Texas' Multimodal Transportation System



*** MTA count of eight includes the Denton County Transportation Authority.**

TxDOT Roles and Responsibilities

TxDOT's roles and responsibilities within the Texas transportation system vary by mode. Overall, TxDOT either assumes a leadership role, overseeing the development, operations, and maintenance of infrastructure or assets, or a supportive role, aiding external partners such as local and regional agencies. TxDOT's general roles and responsibilities by transportation mode include:

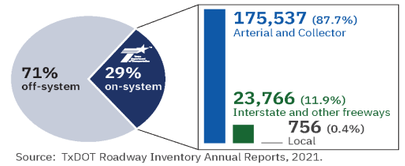
- **Roadways:** Oversees planning, development, and management of on-system pavement, bridges, and ITS devices, also offering support for off-system infrastructure.
- **Active Transportation:** Supports the improvement of the Texas bicycle and pedestrian network, allocates funds, provides design guidance, and promotes safety while integrating these needs into its planning processes.
- **Public Transit:** Provides transit planning support, funding, and grant administration to external partners and local transit agencies.
- **Rail:** Provides support for planning, monitoring service quality, and expanding services, administers rail grants, and manages the South Orient Railroad.
- **Seaports and Waterways:** Promotes intermodal connectivity by supporting external partners and port owners, and operates two ferries.
- **Aviation:** Oversees statewide aviation network planning, funding, execution, and improvements, manages airport funding programs for non-commercial airports, supports external partners and commercial airports to secure state and federal funds, and manages airport funding programs.
- **Pipelines:** Coordinates with the Texas Railroad Commission on permitting.



Roadways

Texas has the most extensive roadway system in the United States, with nearly 700,000 lane miles throughout the state. The roadway system is made up of interstate highways (IHs), U.S. highways, state highways, arterials, collector roads, and local roads that support regional and local travel needs. The on-system roadways, owned and maintained by TxDOT, account for approximately one-third of all Texas roads by lane miles. Arterial and collector roads make up a majority of the on-system roadways, as shown in **Figure 3**.[13]

Figure 3: Texas Roadways Overview



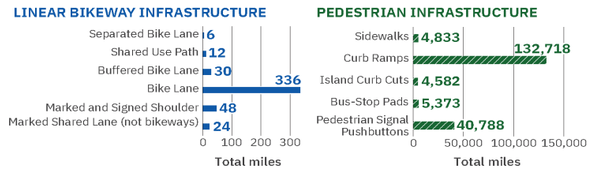
Source: TxDOT Roadway Inventory Annual Reports, 2021.

Active Transportation

Active transportation networks include facilities that enable safe and efficient walking and bicycling, and use of other human-powered, non-motorized transportation devices (e.g., skateboards, wheelchairs), as well as micromobility technologies (e.g., electric scooters, electric bicycles).

Texas' active transportation network comprises a mix of infrastructure types, such as shared-use trails and paths, sidewalks, sufficiently wide roadway shoulders, and designated bicycle lanes that are accommodated on state right-of-way and on local facilities. TxDOT documented on-system existing bicycle and pedestrian infrastructure in the Texas Comprehensive Accessibility Project (TCAP) completed in 2020 (**Figure 4**).[14]

Figure 4: Statewide On-System Bikeway and Pedestrian Inventory



Source: TxDOT Bike and Pedestrian Strategic Direction Report, 2022.

Source: TCAP, 2021.

Public Transportation

Public transportation, including bus and intercity bus (ICB), and intercity passenger rail, provides residents of all ages, abilities, income levels, and racial and ethnic backgrounds with access to work, school, shopping, and services, especially for those who are unable to or choose not to drive. Texas public transit services are provided primarily by Metropolitan Transit Authorities (MTAs), Urban Transit Districts (UTDs), and Rural Transit Districts (RTDs).

Fast Facts

175	million passenger trips
7,428	vehicles
226	million vehicle revenue miles
$2.6	billion operating expenses

Source: Texas Transit Statistics, 2022

ICB services are provided by more than a dozen carriers in Texas, including both the unsubsidized operations that provide a major part of the service network and the TxDOT-funded Section 5311(f) services.

Amtrak operates all intercity passenger rail services in Texas, connecting rural and urban areas and facilitating interstate travel. Operating on 1,500 miles of track with three routes and 19 stations, Amtrak offers cross-country services such as the Sunset Limited and Texas Eagle, along with regional options such as the Heartland Flyer, which serves North Texas and Oklahoma.[15]

Passenger Air Travel

Texas' strategic location, booming economy, and strong transportation infrastructure have made it a main hub for air passenger service across the country. As of 2022, there were 26 commercial service airports in Texas, six of which were in the top 50 airports nationally ranked by passenger enplanements.[16] These airports collectively contribute significantly to the state's economy, supporting nearly 800,000 jobs and generating $94 billion in economic output, according to the 2018 Texas Aviation Economic Impact Study.[17]

Fast Facts

In Texas, there are:

26	primary airports (commercial service)
274	general aviation airports
24	reliever airports
23	military airfields
56	public use heliports

Source: FAA, Texas Airports Council, TxDOT, 2023

Freight Rail

Texas' rail network plays a pivotal role in connecting with other transportation modes and facilitating access to trade gateways. Dominated by Class I railroads, which constitute the majority, and supplemented by short line railroads, which provide critical first-mile/last-mile connections for shippers, the freight rail network is deemed a cost-effective choice for goods transportation amid rising demand and increased costs. Three Class I railroads and 55 Class III or short line railroads operate on the TMFN.[18] An overview of the TMFN is provided on the next page (**Figure 5**).

Air Cargo

Air cargo's role in freight transportation and economic development is critical and unique. The TMFN includes 10 cargo airports, six of which are also part of the National Multimodal Freight Network. Major cargo airports in Texas are generally located within or near major metropolitan areas, providing the most efficient market access. Air cargo is essential for carrying lightweight, time-sensitive, and high-value items, with small, packaged freight shipments being the top commodity tonnage fueled by e-commerce. The top commodity by value is electrical equipment. Nearly 1.8 million tons of air cargo valued at nearly $258 billion moved into Texas in 2019. Air cargo volumes are projected to grow by about 250% by 2050 to over 4.6 million tons.[19]

Seaports and Waterways

Texas handled more waterborne tonnage than any other state in the country—more than 629 million tons of foreign and domestic cargo—in 2020. By 2050 waterborne cargo is expected to grow over 80%. Waterways are also part of the TMFN and are critical for providing maritime access to Texas ports and port ship channels off the Gulf of Mexico. The primary shallow draft waterway in Texas is the Gulf Intracoastal Waterway (GIWW) which runs the length of the Gulf of Mexico from Texas to Florida and handles both domestic and foreign trade. Ten ports, including 9 deep water ports and 1 shallow draft port, and 379 miles of the GIWW system are on the TMFN.[20]

Pipelines

Texas is the leading domestic producer of oil and natural gas. The petroleum industry in the state relies on pipelines as the primary mode for transporting natural gas, crude oil, and a variety of liquefied products. Texas has the most extensive pipeline network of any state with nearly 500,000 miles of pipelines, representing 1/6th of the total pipeline mileage in the country.[21]

Border

Texas-Mexico border crossings are important gateways for trade, facilitating the movement of goods and commodities vital to Texas businesses and industries. The 18 border crossing locations on the TMFN provide important connectivity for the daily flow of imports and exports. In 2019, movements of people and goods through the Texas-Mexico border generated over 7 million jobs and more than $350 billion gross domestic product (GDP) in both countries. By 2050, the economic impact of cross-border trade will increase to over 20 million jobs and nearly $1.2 trillion in GDP.[22]

Over 23,000 centerline miles of TxDOT on-system roadways designated as Texas Highway Freight Network (THFN)

3 Class I railroads and 55 Class III or short line railroads operated on the TMFN

10 ports, including 9 deep water ports and 1 shallow draft port, and 379 miles of the GIWW system on the TMFN

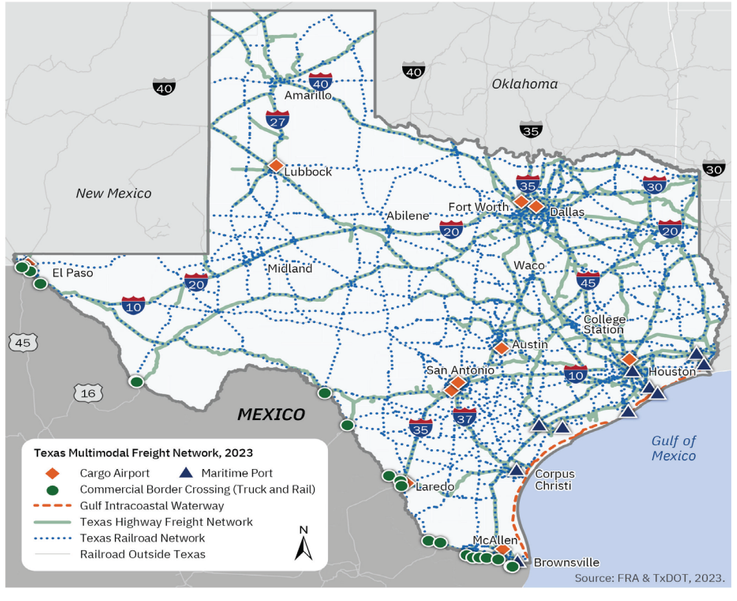
10 cargo airports on TMFN

Nearly 500,000 total miles of pipelines

20 commercial international border crossings, including 15 commercial vehicle crossings and 5 rail crossings, all on the TMFN

Source: Texas Delivers 2050: Texas Freight Mobility Plan, 2023.

Figure 5: Texas Multimodal Freight Network



Source: FRA & TxDOT, 2023.



Corridors of Statewide Significance

The Corridors of Statewide Significance play a crucial role in connecting different regions and facilitating the movement of people and goods across Texas. Some of these corridors have been studied, and others will require future studies to identify issues and needs. Rural corridors identified as Corridors of Statewide Significance will be eligible for funding. As projects along the Corridors of Statewide Significance advance to implementation (construct/expand/improve), they will increasingly contribute to achieving *Connecting Texas 2050*'s vision and goals, enhancing efficiency, promoting economic development, and improving the overall quality of life for all Texas residents.

Benefits of Corridors of Statewide Significance

- Improve safety
- Support key economic sectors
- Support freight movement
- Support population growth
- Provide alternative routes and congestion relief
- Facilitate border and maritime trade

Identification of the Corridors of Statewide Significance

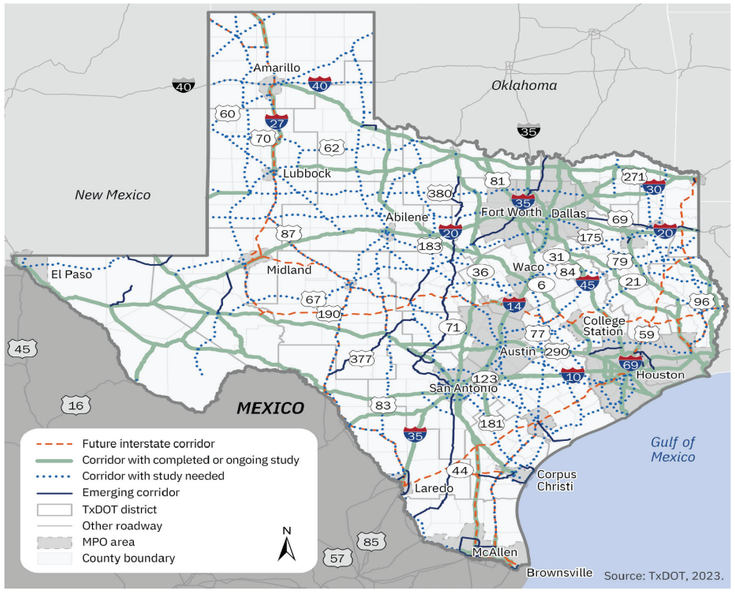
1. The approach utilized existing networks and systems that are considered important for the safe and efficient movement of people and goods in Texas. TxDOT District staff reviewed the initial list of corridors for concurrence or modification. The initial list of corridors included all current and future Interstate, U.S., and State Highways.
2. The planning team conducted an overlay analysis based on the following 10 systems and networks to determine the overlap with each corridor.
   - National Highway System (NHS)
   - National Highway Freight Network (NHFN)
   - Strategic Highway Network (STRAHNET)
   - TxDOT Statewide Connectivity Corridors
   - The Texas Highway Trunk System
   - Existing and Future Interstates
   - Intercity Passenger Bus Network
   - Multimodal Transportation Corridors
   - Energy Sector Corridors
   - Evacuation Routes
3. The planning team used the results to identify corridors that comprise four or more networks. These corridors became the preliminary corridors. The planning team used the Corridor Prioritization Tool (CPT) to analyze each preliminary corridor's performance and identify the Corridors of Statewide Significance.
4. Corridors with completed or ongoing study are ones with a comprehensive statewide study with an implementation strategy completed or expected to have one soon. The others were categorized as corridors with study needed when there was no comprehensive statewide corridor study. The planning team updated the Corridors of Statewide Significance based on TxDOT District staff review and recommendations.

- ***Future interstate corridors*** – refers to corridors such as I-69, I-14, and I-27 that have been advanced through federal or state initiatives and play a larger economic role for the state.
- ***Corridors with completed or ongoing study*** – these are corridors that have a study completed or ongoing that would advance towards implementation based on study recommendations.
- ***Corridors with study needed*** – these corridors have been identified through stakeholder and public input where there is not a current study. These should be considered for a comprehensive study to identify needs and develop an implementation strategy.
- ***Emerging Corridors*** – these corridors have not been studied. However, these are corridors of interest that may rise to Corridors of Statewide Significance as development advances.

For corridors that span the state, TxDOT will likely lead implementation in coordination with Metropolitan Planning Organizations (MPOs), Regional Planning Organizations (RPOs), and other agencies. MPOs, in coordination with TxDOT and other agencies, will likely lead implementation for corridors that are mostly within MPO limits.

A map of existing and future Corridors of Statewide Significance is shown in **Figure 6**.

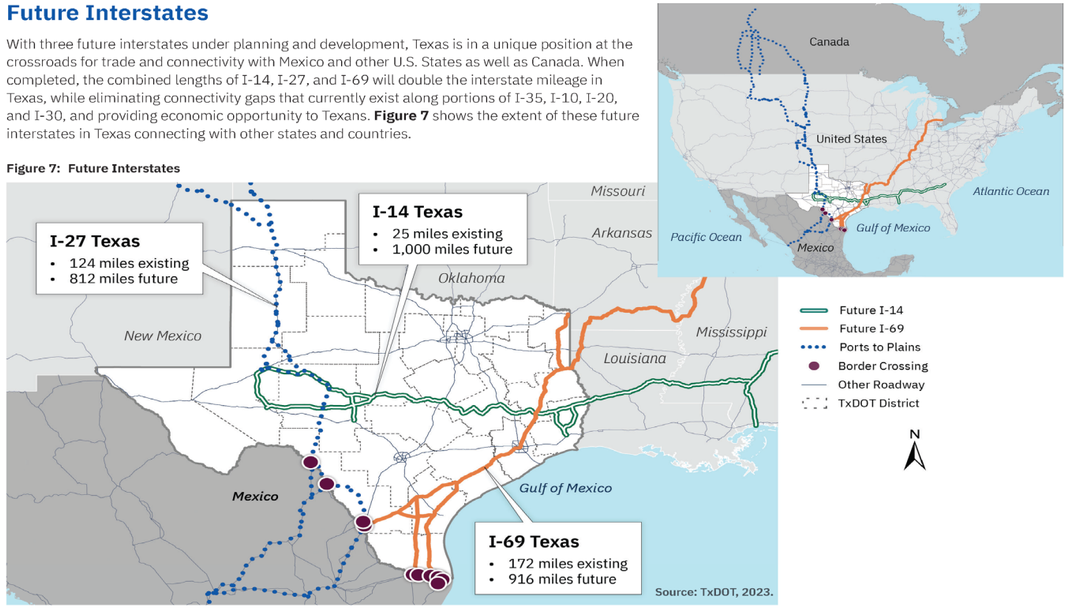
Figure 6: Corridors of Statewide Significance



Future Interstates

With three future interstates under planning and development, Texas is in a unique position at the crossroads for trade and connectivity with Mexico and other U.S. States as well as Canada. When completed, the combined lengths of I-14, I-27, and I-69 will double the interstate mileage in Texas, while eliminating connectivity gaps that currently exist along portions of I-35, I-10, I-20, and I-30, and providing economic opportunity to Texans. **Figure 7** shows the extent of these future interstates in Texas connecting with other states and countries.

Figure 7: Future Interstates

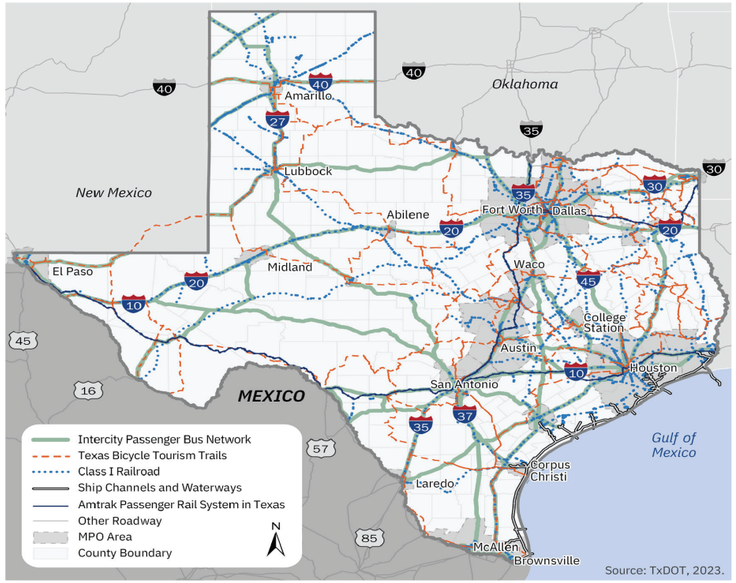


Modal Corridors

To ensure intermodal connectivity, additional modes, including intercity bus, active transportation, and water routes, are incorporated based on recommendations from modal plans. Modal corridor recommendations are shown in **Figure 8**.

- **Texas Bicycle Tourism Trails Network** is an example network of 11 BTTs, totaling over 8,300 miles.[23]
- **Marine Highway 69** is a designated marine highway along the GIWW from Brownsville to Port Arthur. M-69 is a key part of the U.S. Marine Highway System.
- **Intercity Passenger Bus Network** is operated by a variety of private and public entities, including Greyhound, Megabus, and Vonlane with regularly scheduled bus service that serves passengers traveling long distances.
- **Amtrak Passenger Rail System** in Texas has almost 20 Amtrak stations and three Amtrak routes: Heartland Flyer, Sunset Limited, and Texas Eagle. It provides service regionally between Oklahoma City and Fort Worth, and other major cities in Texas and beyond.
- **Class 1 Railroads** in Texas make up one of the largest rail networks and have an operating revenue of $490 million or more, which is adjusted for inflation each year.[24]

Figure 8: Statewide Multimodal Corridors



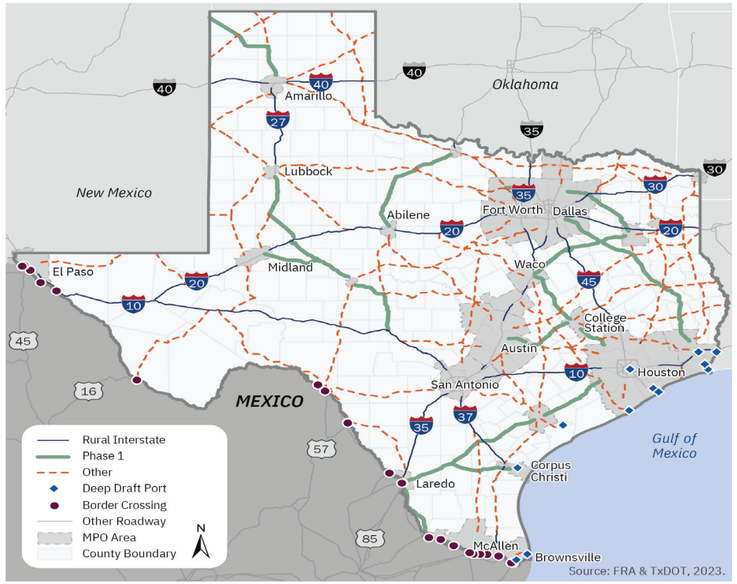
Texas Trunk System

The Texas Trunk System (**Figure 9**) is a rural network of highways expected to be four-lane divided or better. The Texas Trunk System was adopted by the Texas Transportation Commission in 1990 to improve rural mobility, connect major activity centers, and provide access to ports of entry into Texas. The Texas Transportation Commission identified Phase 1 Corridors to prioritize expansion of two-lane highways to a more desirable four-lane divided facility. However, due to limited funding in subsequent years, not all segments of Phase 1 Corridors have been expanded to four-lane divided and there remain some gaps. Addressing these gaps will significantly enhance mobility in these rural areas of Texas. The Texas Transportation Commission has identified some such priority corridors with gaps in four-lane divided facility. These include:

- US 87 & US 83
- US 69 & US 175
- US 59
- US 281
- US 277 & US 83

Expansion of an existing two-lane or four-lane undivided facility to a four-lane divided facility provides significant safety benefits. There is a 60% reduction in fatality rates from a two-lane to four-lane divided roadway, and a 41% decrease in fatality rates from a four-lane undivided to a four-lane divided roadway.

Figure 9: Texas Trunk System





4

Connecting Texas 2050 | Statewide Long-Range Transportation Plan

Trends and Scenarios

Texas' multimodal transportation system faces a number of challenges and opportunities. This chapter describes key trends and potential future implications associated with long-range transportation planning through 2050.

Texas Department of Transportation

4

Trends and Scenarios

Trends Overview

Considered one of the nation's largest and most diverse, Texas' multimodal transportation system faces a number of challenges and opportunities. Some are inherent to the network itself, such as continuing to ensure the safe and efficient movement of people and goods, while others are related to factors with more uncertain elements, such as demographic shifts, technology advances, policy and funding changes, and land use development. While no one knows exactly what the future will bring, identifying and exploring the trends and associated implications can help TxDOT and its partner agencies to better understand potential future transportation challenges. For more information on Safety, Asset Condition, and Mobility, see **Chapter 5 - Measures and System Performance**.

Trends related to the existing and future transportation system in *Connecting Texas 2050* include:

- Population and Demographics
- Employment and Industry
- Movement of People (driving, active transportation, public transportation, passenger rail, and air travel)
- Movement of Goods (trucking, freight rail, seaports and waterways, air cargo, and pipelines)
- Land Use and Development
- Resilience and Sustainability
- Technology and Innovation
- Policy, Geopolitics, and Funding (explored in Scenario Planning)

Trends and implications are identified and explored through:

- Projections and forecasts, leveraging data and planning tools
- Plan review, including over 60 modal and performance-based plans
- Exploratory scenario planning, an engaging process involving extensive stakeholder and public involvement

Population Growth

As the second largest state in the country by both land area and population, Texas faces unique transportation challenges. As the population continues to grow and people's characteristics and preferences change, so does overall transportation demand and the way people use transportation.

Between 2000 and 2022, the state population increased by 43%, with continued growth anticipated through 2050. In 2022, Texas reached a population milestone by passing the 30 million threshold, only the second state to do so.[25] This rapid growth in population is largely attributable to the growth of several metropolitan areas in the Texas Triangle portion of the state, which includes Houston, Dallas-Fort Worth, Austin, and San Antonio.

By 2050, the Texas Demographic Center (TDC) projects a 40% increase in Texas' population, from 29 million (in 2020) to over 40.6 million (**Figure 10**).[26] The growing population will increase travel demand, requiring additional capacity, more travel choices, more frequent maintenance, and efficient use of existing infrastructure.

Most of the population growth between now and 2050 will occur in the Texas Triangle area and other urban areas (**Figure 11**).[27] Without providing more choices, this growing travel need will likely put more pressure on congested urban highways, resulting in more severe traffic congestion and longer delays.

Micro areas are continuing to experience moderate population growth, which will likely increase travel demand across all modes of transportation.

Many rural areas are experiencing population loss or slower population growth, which reduces overall transportation demand, but connections to services, jobs, and industries remain critical.

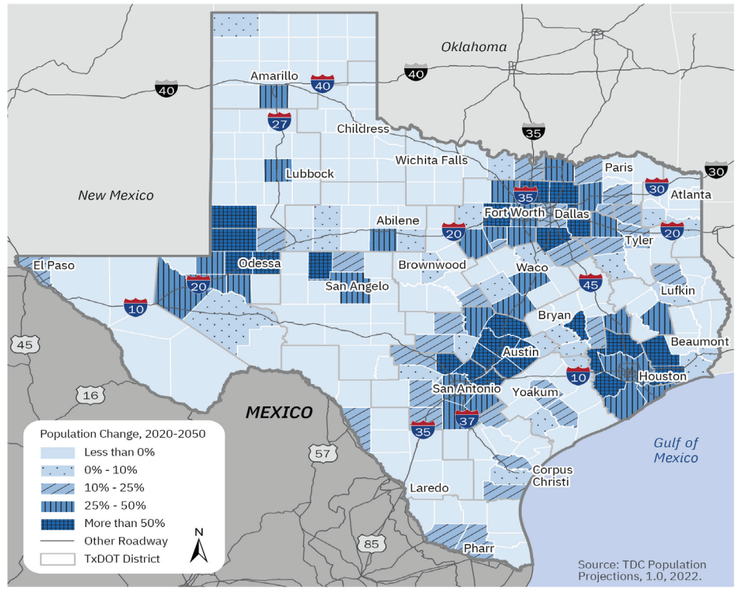
Figure 10: Texas Population Change (2020–2050)



Source: Texas Demographic Center, Population Projections, 1.0 Migration Scenario, U.S. Office of Management and Budget (OMB), 2022

Note: Percentages have been rounded off to whole numbers.

Figure 11: Texas Population Change, (2020-2050)



Source: TDC Population Projections, 1.0, 2022.

Demographics

Individuals with different age, racial, ethnic, and disability characteristics have different transportation needs, and considering those needs helps to identify successful transportation solutions. Key demographic trends in Texas include the following:

Aging Population: Adults with an age of 65 or older will increase from 3.8 million in 2021 to over 7.3 million in 2050 (**Figure 12**).[28] Many seniors experience reduced mobility as they age. Effective transportation is essential for this age group, allowing them to age in place, meaning they can choose to remain in their homes.

Generational Shifts: Millennials (age group 25–44) have now become Texas' largest demographic group. The share of this age group will remain stable over the next 30 years. Millennials (born 1981–1996) and Generation Z (born 1997–2012) have a greater desire to use alternative modes of transportation and mobility as a service to access workplaces, shopping, and restaurants.

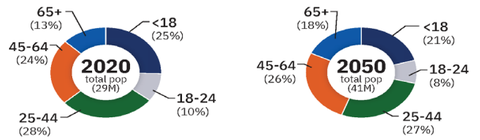
People with Disabilities: Over 3.5 million Texans (or 12% of total state population) have at least one disability.[29] Reliable and safe transportation connects them to appointments, community events, social services, friends, and families. When designing and building our transportation system, consideration needs to be given to people with mobility challenges and their ability to access jobs, education, and services.

Minority Groups: Texas' minority population is forecasted to increase from 59% in 2020 to 71% in 2050 (**Figure 13**).[30] Based on Federal Highway Administration (FHWA) studies, minority cohorts tend to drive less and produce more transit trips than non-Hispanic whites in Texas and are less likely to own homes, especially in the state's largest metro areas.

Transportation Affordability: In Texas, some neighborhoods in suburban counties within the Texas Triangle are significantly cost-burdened households as they are paying over 50% of their total income for housing and transportation.[31] Making sure that residents have access to affordable transportation will improve quality of life and increase access to opportunity for those who are struggling financially.

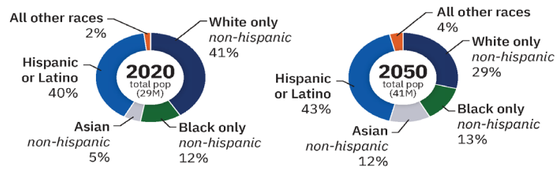
Zero-Vehicle Households: Although most Texans utilize cars for commuting or other trips, approximately 5% of total households in Texas did not have access to a personal vehicle in 2021.[32] For those who do not have access to a personal vehicle, other transportation modes such as public transit, bicycling, and walking, may be the viable travel options.

Figure 12: Current and Projected Age Distribution in Texas



Source: TDC Population Projections, 2022.

Figure 13: Current and Projected Race/Ethnicity in Texas



Source: TDC Population Projections, 2018.



Economy

Texas has the second-largest economy in the United States, contributing 9% to the nation's economic value in 2022. With a GSP of around $2.1 trillion and an annual growth rate of 7%,[33] the fastest among all states, Texas anticipates a substantial GSP increase to $6.8 trillion by 2047.[34]

Employment

Employment Growth: The projected population growth in Texas is matched by a rapidly growing economy. The state's employment is projected to grow by 50% to nearly 20 million jobs by 2050.[35] Employment growth corresponds with areas where population growth is expected.

Mature Workers: Although mature workers (age 55 and older) make up a smaller number of workers overall, this age group of the labor force is projected to grow faster than any other age group, fueled by the aging baby boomer generation.

Key Industries: The continued economic shift toward high-skilled jobs will increase the demand for professional services, and the rapid population growth will require more jobs in education and health care.[36] Along with transportation, trade, and utilities, these core sectors account for over 56% of the jobs in Texas and are projected to continue to grow in the next 10 years.

Workforce Shift: While the transportation industry is facing a labor shortage, especially qualified and certified commercial vehicle operators, new technologies such as automated vehicles (AVs) and connected vehicles (CVs) will bring opportunities to the industry. These advancements will not replace workers but will change what they do and require new skills.

Industry

Texas' economy comprises various industries, from advanced manufacturing, aerospace, aviation, information technology, and biotechnology, to energy, agriculture, and more, with distinct transportation needs (**Figure 14**). Today, energy-related industries are Texas' most prominent industries. Other industries, such as advanced manufacturing and biotechnology, also significantly contribute to the state's economy. Some industrial highlights include:[37]

Energy: Texas provides one-fourth of U.S. domestic produced energy.

Manufacturing: Contributes $241 billion (13%) of the state's GDP.

International Trade: Produces $740 billion of total economic output.[38]

Biotechnology: Texas is home to seven of the nation's top 125 medical schools which generate $6.6 billion in annual research and development expenditures.

Information Technology: Texas is ranked among the top two states for the number of technology-related patent assignees.

Aerospace & Aviation: Texas is home to the headquarters of two international airlines, two of the world's busiest airports, 15 active military bases, and National Aeronautics and Space Administration's world-famous Johnson Space Center.

By 2050, Texans can expect a thriving industrial landscape supported by the projected population growth. *Connecting Texas 2050* considers long-term growth and plays a crucial role in supporting Texas' industries by ensuring the safe and efficient movement of goods and people across the state.

Agricultural Production
$32.2 billion a year in sales statewide (2023)[39]

Energy Production
$751 billion of total private-sector Texas GSP in 2022[40]

Timber and Lumber Production
$41.6 billion in total industry output[41]

US/Mexico International Border Trade
37% of US/Mexico trade ($285 billion of $780 billion) in 2022[42]

International Maritime Trade
20% of U.S. Maritime trade in 2023
$260 billion in exports and $148 billion in imports[43]

National Defense and Security
Texas military bases added $67 billion to the state's GDP, and generated over 600,000 direct and indirect jobs[44]

Figure 14: Texas Key Economic Sectors



Source: Texas Industry Concentrations, Office of the Texas Governor, 2023

Movement of People



Driving

Between 2000 and 2022, statewide VMT has been increasing steadily. The growth in travel demand has remained well above the growth in roadway capacity, leading to increasing congestion and longer travel time. The growing population and economic activity are predicted to result in total VMT in Texas increasing 42% by 2050 (**Figure 15**).[45] The Texas Triangle area and major interstate highways will experience over 85% of VMT growth. Those areas are already the most populous regions in Texas and will continue to experience significant growth in population and travel demand through 2050.

Most trips in Texas use a personal vehicle compared to other means of transportation. By 2050, without a more integrated system, driving will remain the dominant mode of travel in Texas with even worse roadway congestion and traffic delays. The vast size of Texas means that many rural communities are significant distances from major urbanized areas. The travel distances for some rural residents to reach services, such as health care and education, are much longer than for urban residents. These disparities may be especially challenging for those with limited access to personal vehicles and those who rely on a single road to connect with the transportation system.

Figure 15: VMT and Person Delay Change

Daily Vehicle Miles Traveled
+42%
2020: 673 million miles
2050: 957 million miles

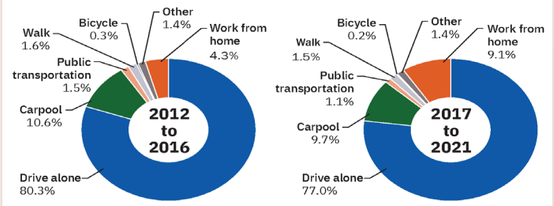
Daily Delay Per Person
+211%
2020: 12 minutes
2050: 36 minutes

Source: Statewide Analysis Model, (2020 & 2050).

How Texans commute?

Most residents in Texas who work outside the home commute to work by driving. However, telework has drastically impacted the commuting patterns in Texas. Based on American Community Survey (ACS) 5-year estimates, the proportion of people working from home increased from 4.3% to 9.1% in recent years; the number and proportion who commute by driving alone or carpooling has declined (**Figure 16**).[46]

Figure 16: Means of Transportation to Work

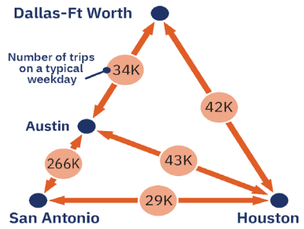


Source: ACS 5-year estimates, 2012-2016 and 2017-2021.

Long-Distance Travel

TxDOT helps facilitate millions of long-distance trips annually, with inter-district travel being a significant part of this network. Understanding the inter-district travel patterns on the network is key to identifying and prioritizing future roadway investments where they are needed most. Replica' data shows that in 2022, Texas had approximately 5 million inter-district trips, accounting for 5% of all trips on average weekdays.[47] Most inter-district trips occur between neighboring districts, such as Dallas and Fort Worth, Houston and Beaumont, and San Antonio and Austin (**Figure 17** and **Figure 18**).

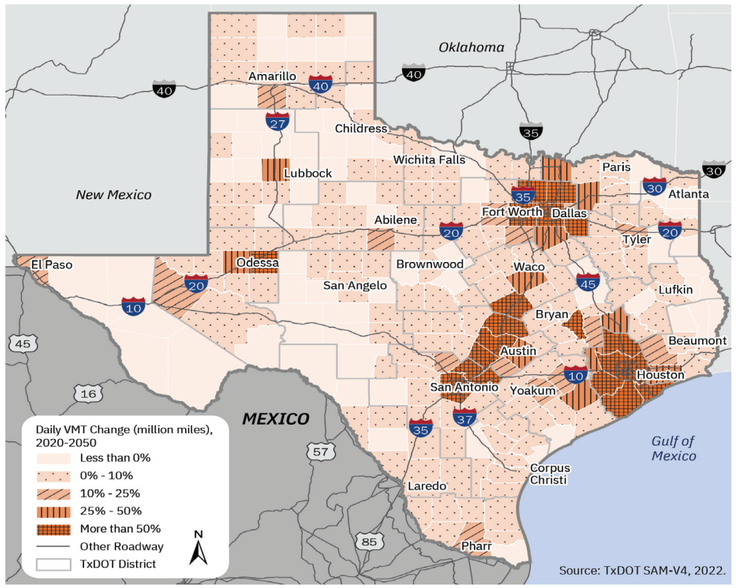
Figure 17: Inter-district Trips within Texas Triangle



Source: Replica Fall 2022 Thursday Data, 2023 (Average weekday in Fall 2022).

* Replica (www.replicahq.com), a data platform TxDOT subscribes to, provides modeled trips data at the link level that are calibrated to ground-truth data for a given region.

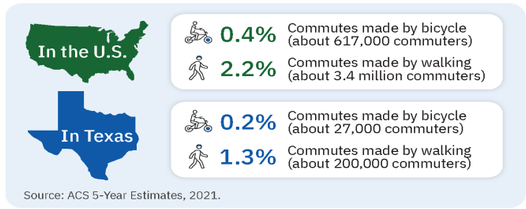
Figure 18: Daily VMT Change (2020-2050)



Active Transportation

Based on ACS 5-year estimates, bicycling and walking declined as travel modes for commuting to work during the 2017–2021 period compared to the 2012–2016 estimates. In 2021, around 0.2% of workers in Texas commuted by bicycle and 1.2% commuted by walking, both lower than the national average (**Figure 19**).[48] Bicycling and walking activity is generally underestimated because many trips are made for reasons other than commuting to work. The number of people who would start using active transportation facilities or use them more frequently would likely increase if the conditions were safe and comfortable.

Figure 19: Percentage of Commuters Bicycling and Walking



Source: ACS 5-Year Estimates, 2021.



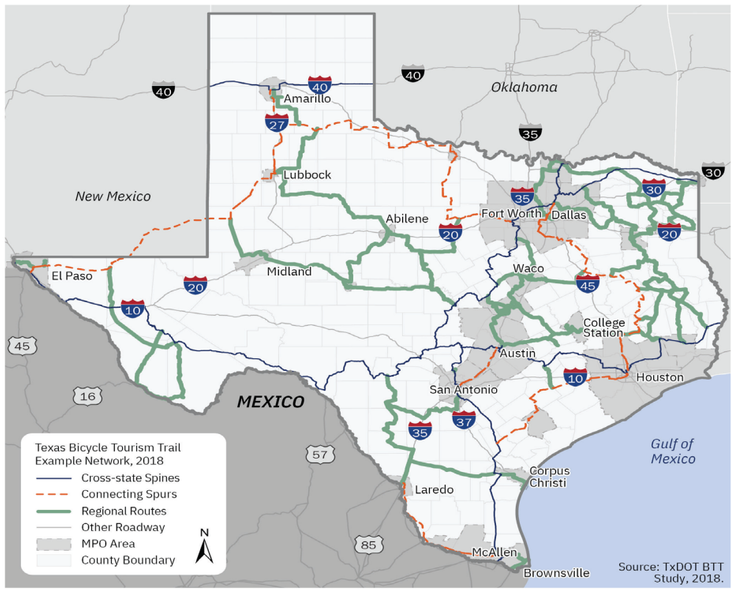
Safety remains a significant concern for active transportation. Additionally, the surge in micromobility adds additional safety challenges, emphasizing the need for robust safety planning and effective countermeasures. The expansion of the active transportation network will enhance connectivity within the system including first-mile/last-mile connections, improve safety and accessibility for vulnerable road users, and promote the use of active transportation across the state. TxDOT will need to coordinate with local and regional partner agencies to maintain all-ages-and-abilities networks as well as to fill bicycle- and pedestrian-network gaps. Recognizing data limitations and developing statewide management systems for bicycle and pedestrian information, which may include data on safety, usage, and infrastructure, will be instrumental in helping agencies to identify issues, prioritize projects, and ultimately make informed investments.

TxDOT plays a multifaceted role in improving the Texas active transportation network. These responsibilities include supporting local projects and programs through the allocation of state and federal funding, as well as requiring TxDOT design engineers to consider bicycle and pedestrian accommodations on all construction and reconstruction projects on the state roadway system. Since 2018, TxDOT has invested federal funding for BTT improvements. In May 2022, TxDOT's Roadway Design Manual was updated to ensure that on-system roadways align with BTT network segments and provide appropriate bicycle infrastructure.[49] Today, TxDOT is developing the Statewide Active Transportation Plan, set to evaluate statewide demand, pinpoint network gaps, and offer strategic recommendations for active transportation priorities and policies through 2050.

> Texans identified addressing the lack of safe, connected, and sufficient active transportation infrastructure as a key priority.
>
> *~ 2023 Transportation Visioning Survey*

The BTT Study established the BTT Example Network (**Figure 20**),[50] which is envisioned to be developed incrementally over time through federal, state, and local partnerships. The example network is subject to local refinement and has become a priority for TxDOT to implement as part of existing and future TxDOT projects. As District Bicycle Plans are developed, the BTT Example Network will be evaluated, and potentially modified, to promote routes that avoid significant barriers, provide more comfortable riding conditions, or enhance connections to community destinations. Proposed BTT refinements will be reviewed in conjunction with TxDOT district staff and the public to best align to local priorities and projects.

Figure 20: Texas BTT Example Network

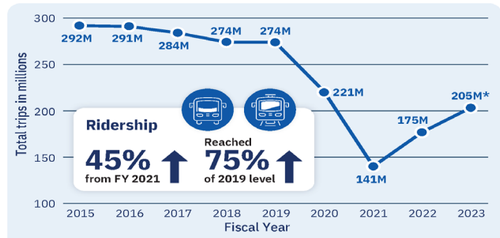


Public Transit



Public transit ridership in Texas was already experiencing a gradual decline before the COVID-19 pandemic, with a 6% drop between 2015 and 2019, mirroring a national trend (**Figure 21**).[51] The pandemic exacerbated this decline, causing a substantial drop in ridership of nearly 36% in fiscal year (FY) 2021 compared to FY 2020 and almost 49% compared to FY 2019. In FY 2023, Texas' public transit ridership increased 45% from FY 2021 and has reached 75% of 2019 level, on par with national trends.

Figure 21: Public Transit Ridership



* 2023 Texas Transit Statistics is currently under draft review.
Source: Texas Transit Statistics, 2018, 2021, and 2022.

Texas faces a range of complex needs and challenges in its public transit sector, with a primary focus on enhancing intermodal connectivity. By improving first-mile/last-mile connections, integrating walking and bicycling infrastructure into transit planning, and filling transit agency service gaps, public transit will become a more attractive and effective option. Recognizing the intrinsic connection between asset condition and safety, maintaining a well-managed fleet, equipment, and facilities is imperative for improving system safety, reliability, and performance, particularly for rural transit agencies. With the population in many rural counties projected to decline by 2050, RTDs are facing more challenges in maintaining service frequency and obtaining funding, which requires coordination with ICB and nearby urban systems, to enhance the connectivity between rural and urban areas.

Microtransit is one of many trends emerging from the COVID-19 pandemic. Public transportation providers had to make changes to their service, such as frequency of trips and transit routes, due to changing ridership demand and health and safety requirements. These changes immediately impacted those who had no other reliable means of transportation to go to work or access healthcare and other services. Microtransit has been a vital option to fill the transit gap and reduce the cost of poorly performing fixed transit routes. It can provide transportation to those who have been historically underserved by traditional transit, and it improves accessibility for the elderly and those with mobility challenges and unique transportation needs. However, microtransit has limitations and challenges, such as lack of efficiency and relatively higher operational cost, compared to fixed routes.





Intercity Bus

ICB services in Texas, provided by over a dozen carriers, experienced significant disruption during the COVID-19 pandemic, with ridership plummeting to approximately 20% of pre-pandemic levels. Traditional carriers reduced frequencies and suspended certain routes while endeavoring to maintain essential travel services. Express carriers faced more substantial challenges, suspending many services entirely. The 2021 Texas ICB Study noted a gradual return in ridership, but uncertainties persist regarding reaching 2019 levels and the consequential impact on service availability and funding requirements for specific routes.[52]

The 2021 Texas ICB study identifies 29 urban areas with the highest transit needs that are more than 25 miles away from an ICB stop. It is important for rural operators, including RTDs and ICB providers, to coordinate with each other as well as nearby urban systems to provide mobility services to residents across jurisdictional lines and address unmet transit needs.

What do we mean by "ICB"?

- Long-distance bus services
- Often part of the national ICB network of connected services:
  - Shared stations
  - Coordinated schedules
  - Interline ticketing if appropriate
- Fixed-route, fixed-schedule (except feeder services)
- Has space for baggage (Think overnight trips)





Intercity Passenger Rail

Using freight railroad lines, Amtrak focuses on longer-distance journeys, supporting economic development, tourism, and accessibility to cities, historical sites, parks, and employment centers across the state (**Figure 202**). Amtrak passenger rail service ridership declined 22% from FY 2017 to FY 2022.[53] Although ridership is gradually recovering from the COVID-19 pandemic, it still has not rebounded to the pre-pandemic level.

The projected surge in travel demand by 2050 in the Texas Triangle and along the Gulf Coast highlights the urgent need for expanded transportation options. Major metropolitan growth calls for increased rail capacity, as the current infrastructure faces strain and potential gridlock. Driven by growing freight volumes, existing rail-line constraints require the construction of additional capacity and upgrades to rail crossings for both reliability and safety. In addition to improvements in the current intercity passenger rail system, Texas Central Partners and Amtrak are also exploring the possibility of developing high-speed rail between Dallas and Houston.[54] This service is estimated to serve nearly 6 million annual passengers by 2029 and more than 13 million annual passengers by 2050.

Amtrak has noted that it is facing a notable reliability challenge because of its reliance on other railroads.[55] Hence, enhancing on-time performance has emerged as one of Amtrak's primary development focus areas. Additionally, passenger rail service also needs to prioritize intermodal connectivity. This strategic approach aims to simplify trips for passengers, particularly for those who require transfers and depend on an integrated network and local public transportation. Effectively addressing these factors is necessary to meet the evolving travel needs of Texas residents but also to ensure the overall efficacy of passenger rail services.

TxDOT has a limited ability to impact passenger rail service levels, train frequencies, or train schedules. The Texas Rail Plan highlights the most critical improvements for passenger rail, including rail station improvements, privately funded ventures to increase intercity passenger rail service, continued coordination with neighboring states for state-supported intercity passenger service, and commuter and regional passenger rail extension and improvement projects funded by local and regional public agencies.

TxDOT has been involved in the Federal Railroad Administration's (FRA's) Corridor Identification and Development Program, which is a nationwide program that aims to plan and develop intercity passenger rail projects throughout the United States.[56] TxDOT submitted applications to the program to advance passenger rail in Texas starting with corridors connecting the Texas Triangle. TxDOT will continue to work with external partners to facilitate intercity passenger rail planning in Texas to further connect the state.

Figure 22: Amtrak Routes and Stations in Texas

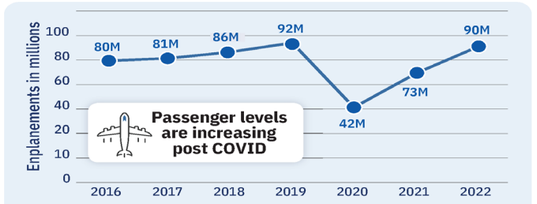




Air Passenger Travel

Despite a sharp decline in enplanements during the pandemic, air travel demand has been steadily rebounding since 2020 and is poised to surpass pre-pandemic levels (**Figure 23**).[57]

Figure 23: Commercial Airport Enplanements in Texas



Source: Federal Aviation Administration Passenger Boarding (Enplanement) Data for U.S. Airports, 2023.

TxDOT identifies necessary improvements in collaboration with airport sponsors and community leaders through the Texas Airport System Plan (TASP) and supports Texas cities and counties in obtaining and disbursing federal and state funds for general aviation and reliever airports identified in the TASP. The multifaceted challenge of meeting Texas' aviation needs requires maintaining and expanding commercial service facilities to accommodate future growth, enhance safety measures, and improve connectivity with other transportation modes. Additionally, addressing underserved areas and promoting safety remain priorities, with a focus on technology, airspace management, and community integration. Regional airports will play a vital role in connecting smaller communities, reducing road congestion, and bolstering economic mobility. The aviation industry is also exploring Urban Air Mobility (UAM) or Advanced Air Mobility (AAM) as a solution to congestion and mobility challenges, with a keen focus on technology, safety, and community integration in preparation for adoption in Texas.

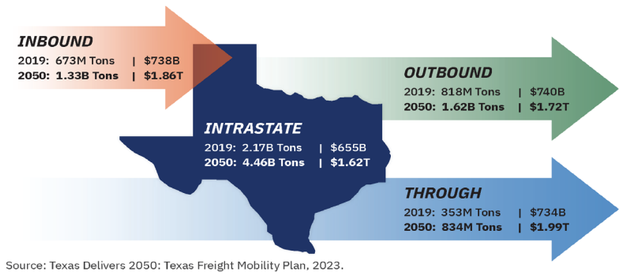


Movement of Goods

Integral to the state's robust economy is the transport and distribution of freight. In 2019, the freight transportation sector in Texas supported nearly 2.2 million full-time jobs, or 1 in 8 jobs in Texas. These jobs added close to $161 billion in labor income and led to $239 billion in economic activity, including GSP and tax revenues.[58]

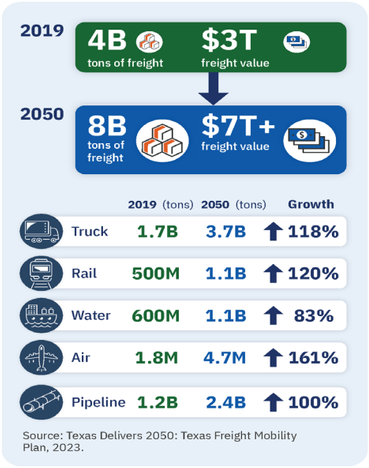
Fueled by expanding industries such as agriculture, manufacturing, and oil and gas, the state has witnessed a notable upswing in freight volume, value, and job opportunities during the past 10 years. With ongoing growth in these sectors, coupled with rising demand in e-commerce and nearshoring, Texas anticipates a surge in truck and rail traffic within the state and across the Texas-Mexico border, an expanded warehousing footprint, and the establishment of new distribution facilities near major metropolitan areas. The Texas Delivers 2050: Texas Freight Mobility Plan forecasts a doubling of freight volumes and a 151% increase in freight value by 2050 (**Figure 24**).[59]

Figure 24: Texas Freight Volume and Value Projection



Source: Texas Delivers 2050: Texas Freight Mobility Plan, 2023.

Figure 25: Texas Freight Growth Overview



Source: Texas Delivers 2050: Texas Freight Mobility Plan, 2023.



Freight Highway Network

Highways play a critical role in linking all modes on the freight network by providing first-mile/last-mile connections to and from intermodal terminals, warehouses, and customers. Urbanized areas, where most truck delays occur today, will likely experience more frequent and longer delays with bottlenecks becoming more impactful. With the projected freight growth (**Figure 25**),[60] Texas will continue to face truck parking shortages in certain areas. Addressing truck parking demand is critical to the functioning of the freight system and requires both public and private investments and technology. Modernizing and maintaining the THFN to address challenges related to intermodal connectivity, freight bottlenecks, and truck parking shortage is imperative to ensuring the safety, reliability, and efficiency of freight transportation in the state.



Freight Rail

While most Class I railroads are generally in good condition, strategic investments to achieve a state-of-good repair for short lines are imperative, particularly for first-mile/last-mile transportation in for shippers and manufacturers. Short line operations are important to rural areas as those short-haul routes support economic activity and quality of life in many of the smaller communities in Texas. Additionally, Texas railroads face challenges at six international border crossings between Texas and Mexico due to different certifying requirements. These challenges decrease efficiency, limit community mobility, and introduce safety concerns, potentially necessitating enhanced cross-border coordination.





Ports and Waterways

Ports experienced growth due to supply chain shifts stemming from diversification of businesses and increased demand for goods, which highlighted the limited options to quickly expand capacity and the impacts of a labor shortage on operations. The trend toward nearshoring may also have long-term impacts to the Texas ports. Prioritizing investments in the GIWW and coastal resilience, as well as continued federal and state collaboration, is important for maintaining a safe, navigable waterway system and preserving economic competitiveness.



Border Crossings

In 2019, 49.3 million tons of freight worth $249.2 billion flowed into Texas from Mexico, while 64.9 million tons worth $167.8 billion entered Mexico from Texas.[61] With Mexico as the state's top trading partner and commercial vehicle and rail crossings facilitating the movement of goods and commodities, the TMFN is a vital hub for international trade.





Air Cargo

Airports handling large air cargo volumes depend on the travel time efficiency and reliability of the highway infrastructure that connects to them. The ability to transfer cargo to trucks and rail is also critical for the efficient movement of air cargo to and from the airport. Increased air cargo volumes combined with staffing shortages are creating congestion at many cargo airports. There is a significant need for new cargo facilities that can handle larger aircraft and specialized cargo requirements.



Pipeline

Texas has the most extensive pipeline network of any state, comprising primarily natural gas and petroleum liquid pipelines. Texas also has the most oil refineries and natural gas processing plants in the United States, many of which are concentrated in large complexes along the Gulf Coast and connected by pipeline. Nearly 40% of Texas' pipeline is over 50 years old; continuous maintenance and rehabilitation is critical. Extreme winter weather events could also cause disruptions to pipelines. Pipelines in the Permian Basin froze during winter storm Uri in 2021, resulting in ruptures and frozen valves.[62] The effects of the winter storm pointed to the urgency to increase the resilience of the pipeline network.



Snapshot of Key Findings

The Texas Delivers 2050: Texas Freight Mobility Plan highlights the following trends and challenges related to freight.

E-Commerce: E-commerce has transformed the way many Texans shop for retail goods. The e-commerce trend is expected to lead to an increase in the statewide warehousing footprint and new distribution facilities. It will also have implications for how freight moves with many e-commerce fulfillment centers located in and near large metropolitan areas, and for critical last-mile logistics.

Nearshoring: Nearshoring refers to when manufacturers shift supply chain and production closer to end users. The trend of nearshoring, particularly in the North American market, will have significant implications for the volume of trucks and rail cars crossing the Texas-Mexico border and freight movement in Texas.

Supply Chain Disruptions: Understanding the range of disruptions and their impacts is essential to ensuring the TMFN can support goods movement and resilient supply chains. The surge in consumer demand and labor shortage are probably the most notable contributors to supply chain disruptions in recent years, but given their connections to global markets, Texas supply chains can also be impacted by geopolitical conflicts.

Energy: As one of the emerging energy trends in Texas, the growth in renewable energy may change the demand for non-renewable energy sources (e.g., coal). In addition, the increased demand for liquefied natural gas has transportation implications that include increased vessel calls to Gulf Coast ports. Also, the construction of wind farms across the state requires unique freight capacities for shipping large items.

Land Use and Development

Land use is closely related to transportation planning, as the location of jobs, housing, and other land use types affect how far, how frequently, and which modes people use to travel. Land use and development trends bring both challenges and opportunities for establishing an efficient and comprehensive transportation system.

Urbanization: By 2020, 90% of Texas' population lived in metropolitan areas, and that number will continue to grow to around 92% by 2050.[63] This trend in Texas has driven economic growth, fostered diverse communities, and promoted productivity. However, it also has worsened problems such as traffic congestion, inadequate infrastructure and affordable housing, and environmental issues.

Fast Growing Suburban Communities: The rapid development of suburban communities raises concerns about the capacity of their transportation infrastructure, such as narrow farm-to-market roads and discontinuous frontage roads. As cities in Texas continue to grow and develop, adopting a strategic approach for integrating transportation and land use in a way that enhances the quality of life for all residents will be crucial.





Freight: In addition to passenger travel, growing freight demand and emerging supply chain management approaches such as freight villages, freight hubs, and inland ports will greatly influence land use. As communities in Texas adopt various land use practices, those land use changes will also have impact on the movement of freight.

Working Lands: Aside from the economic benefits working lands provide from general agricultural production such as crops, livestock, and timber, open spaces are essential to sustaining wildlife and our ecosystem, cleaning water and air, and safeguarding a healthy environment. As Texas continues to grow in population and economically, the demand for rural land, especially in areas surrounding major urban centers and transportation corridors, will require informed conservation and transportation planning efforts that should include owners of working lands and explore methods to incentivize the continued stewardship of such lands in Texas.

Resilience and Sustainability

Resilience is the ability to withstand, respond to, and recover rapidly from disruptions. Improving resilience across the network can help TxDOT and its partner agencies better adapt to disruptions to transportation infrastructure and services from natural and humanmade hazards.

Every year, the state's transportation system is vulnerable to extreme weather events such as riverine and coastal flooding, intense heat and cold, security threats to ITS, and other humanmade hazards such as bridge strikes and hazardous material spills. Over the past few years, Texas experienced Category 4 Hurricane Harvey, three lower category hurricanes, three tropical storms, Winter Storms Mara, Elliott, and Uri, and numerous localized droughts, tornadoes, wildfires, and flood events. Extreme events have become more frequent and intense and are changing how transportation systems need to be planned, designed, and maintained. These hazards can harm transportation infrastructure and disrupt operations, leading to far-reaching effects on public safety and health, freight and supply chains, and the state's economy.

TxDOT is creating the Statewide Resiliency Plan to analyze the trends and prepare for building resilience into the state's transportation system, including:

- Integrate resilience into the overall transportation planning process
- Improve the resilience of the transportation system through various strategies and tools
- Enhance the protection of the state's transportation assets

TxDOT is also developing the Statewide Freight Resilience Plan to provide a comprehensive framework for identifying key freight infrastructure and strategies to ensure a resilient freight transportation network in Texas.

The state's transportation system is also vulnerable to cyber and electronic disruptions. This is particularly true of the aviation system, which depends on electronic and digital navigation aids, communication systems, command and control technologies, and public information systems. As advanced technologies are deployed, all the surface transportation modes may be similarly vulnerable. Cybersecurity will be a critical component of future transportation safety and security standards, especially because transportation systems, devices, components, and communications must be protected from malicious attacks, unauthorized access, damage, or anything else that might interfere with safety functions.

As the transportation system, a critical component of our state's economy, is energy-intensive and contributes to approximately one-third of total greenhouse gas emissions in Texas, promoting sustainable development for the system is important. On the freight side, sustainable operation trends include the use of smaller vans in place of larger trucks. This trend is also seen in e-commerce because these vans are more efficient on shorter routes than longer ones, making them well-suited for urban environment and on-demand service.



Recognizing the need to mitigate environmental impacts, TxDOT aims to create a sustainable transportation system, aligning with the requirements set forth by the Infrastructure Investment and Jobs Act (IIJA).[64] As part of the state's effort to curb vehicle emissions, TxDOT developed the Texas Carbon Reduction Strategy in 2023. The plan was approved by FHWA in early 2024. With $641 million expected from the Carbon Reduction program of IIJA, TxDOT will collaborate with MPOs to develop carbon-reduction strategies and integrate these sustainable practices into the long-range transportation plan to help reduce emissions, alleviate congestion, and enhance the overall quality of life for residents while protecting the state's natural environment.

Technology and Innovation

> Vehicle technologies and innovative transportation services significantly facilitated advancements in the transportation system over the past decades. Shared mobility, EVs, and CAVs are the major technologies and innovations that are going to shape the future transportation system.

Shared Mobility such as car sharing, bike sharing, ridesharing, and microtransit enable users to gain short-term access to transportation modes on an as-needed basis without requiring ownership. It is having a transformative impact on many cities, especially in high-density urban areas, by providing new ways to access goods and services. Key trends impacting shared mobility and its mainstreaming include:

- More variable commuting patterns due to increasing telecommuting, part-time workers, and advances in communication technology, such as video conferencing.
- Increased adoption of online services such as medical appointments that reduce the need for some trips and alter non-work travels.
- Rapidly growing e-commerce that allows more purchases to be made online and products to be delivered directly to homes and businesses.
- Growing use of widely accepted intelligent technologies, including smartphone transportation apps and real-time information, which enable greater adoption of shared and on-demand services.

The benefits of more shared mobility usage are:





EVs are zero-emission vehicles powered by electricity. Although EVs constitute under 1% of all registered vehicles in Texas, the total number of EVs in the state has nearly tripled since 2020, as more people adopt the technology. As of September 2023, 222,150 EVs are registered in the state of Texas with 73.8% battery electric vehicles (BEVs) and 26.2% plug-in hybrid electric vehicles (PHEVs). Among the 254 counties in Texas, EVs are registered in 233 counties.[65] Using current growth trends for EVs, the Texas Department of Motor Vehicles estimates Texas will reach 1 million EVs by 2031.

According to the Texas Broadband Plan, **broadband** refers to "high-speed access to the internet and also bandwidth — the amount of data that can be sent through a connection that provides access to the internet." Like other states, communication infrastructure is primarily provided by the private sector in Texas. As of 2022, 2.8 million Texas households did not have access to high-speed broadband.[68] Some of the challenges identified in the Texas Broadband Plan include insufficient funding to support full coverage, uncertainty of CVs and infrastructure, and the length of roadways that makes extending broadband infrastructure more challenging. The passage of the American Rescue Plan Act of 2021 and IIJA provides Texas with significant funding to support broadband efforts. Actions to maximize available funds, provide for accountability and transparency, and create partnerships to develop creative solutions to overcome barriers are critical for broadband improvements across the state.

TxDOT Broadband Program, launched in 2023 and jointly sponsored by the Right of Way and Information Technology Divisions, is responsible for administering the agency's broadband program. The program will provide access to right-of-way via utility permit, develop a formal "dig once" policy, assist statewide broadband initiatives, and facilitate the growth of TxDOT broadband infrastructure to promote agency initiatives for workforce connectivity and ITS.

- Broadband enables remote access to medical services for patients and provides improved, cost-effective access to healthcare.
- Broadband provides local communities, regions, and nations with the opportunity to develop and expand businesses.
- Broadband allows teleworkers to live and work in locations of their own choice.





UAM, also referred to as AAM, is an innovative solution in the aviation industry to relieve congestion and improve mobility.

UAM/AAM seeks to transport people and goods through the air using technologies such as drones, helicopters, and electric vertical take-off and landing (eVTOL) aircraft. In 2021, the Texas Legislature passed Senate Bill 763 establishing the Urban Air Mobility Advisory Committee to support the development of AAM operations and infrastructure in Texas. In 2022, the committee fulfilled its role and in 2023 Senate Bill 2144 established the Advanced Air Mobility Advisory Committee. This committee will have a similar responsibility and duration. The Committee identified four key areas to prepare for AAM in Texas: Technology, Airspace and Infrastructure, Safety and Security, and Commerce and Community Integration.[69] Each key area has unique needs and opportunities to prepare for the emergence of AAM and to support a transformative, safe, and efficient transportation ecosystem.



The increasing use of EVs will require expanded EV infrastructure, particularly charging stations and ports. The FHWA initiated the National Electric Vehicle Infrastructure (NEVI) Formula Program to establish a national network of EV charging stations. Following the guidance from FHWA, TxDOT developed the Texas Electric Vehicle Infrastructure Plan in 2022, which sets a vision and high-level goals for establishing the statewide EV network in Texas. The addition of infrastructure under the NEVI program will enhance the travel experience and provide options for future growth and development in Texas.

> As of September 2023, there are 3,293 EV charging stations in Texas.[66]

As specified in the EV Infrastructure Plan, TxDOT will continue to monitor the adoption rate of EVs in Texas and adjust the network going forward. In addition, TxDOT recognizes that working with vendors and planning partners is critical to address known risks and challenges such as ongoing equipment, labor, precious metals, and microchip shortages, risks posed to charging infrastructure from natural and humanmade disasters, and cybersecurity or personal privacy risks.

Automated Vehicles (AVs) are vehicles controlled by varying levels of automated driving systems, from level 1 (driver assistance) to level 5 (full automation), also known as self-driving or driverless vehicles. **Connected Vehicles (CVs)** are vehicles that work cooperatively with other vehicles, mobile devices, and roadway infrastructure. When paired with connected infrastructure, CVs have a demonstrated potential to improve both road user safety and system efficiency.



In 2021, the Texas Legislature passed Senate Bill 1308 requiring a study to explore the potential benefits and impacts of automated driving system (ADS) and connected driving system (CDS) technologies. The study suggested that ADS and CDS could reduce congestion and crashes while creating new opportunities for the Texas workforce. Texas is a proven leader in the development of ADS/CDS technology with a successful record in technology deployments and the ability to attract private industry. Multiple vehicle technology companies are actively testing AVs and CVs in Texas, primarily in major cities and interstate highway corridors ranging from few-day AV shuttle demonstrations to multi-million dollar statewide deployments of vehicle-to-everything (V2X) technology.

The study included a set of considerations that could help Texas stay well-positioned to generate the benefits of these technologies. Many of these considerations complement or expand upon established programs and initiatives already in place and include:[67]

- Develop a coordinated technology program
- Monitor and engage with private industry
- Incorporate technology into the state's safety program
- Promote workforce training and development
- Advance system integration and shared data
- Support education and promotion of new technologies
- Retain legislative authority
- Keep supporting testing and deployment of new vehicle technologies

Several technology initiatives and programs are underway, including the CAT program, Texas Connected Freight Corridors program, CAV Task Force, Texas Technology Task Force, and the Innovative Transportation in Texas program, to identify, evaluate, and develop innovative solutions to meet the growing transportation needs and promote and coordinate transportation technologies across the state.

Scenario Planning

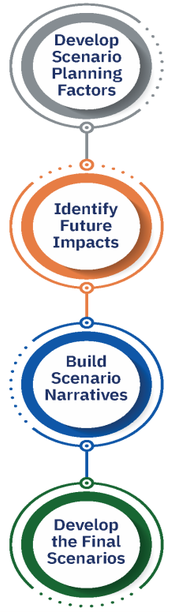
> *Connecting Texas 2050* uses scenario planning to help prepare for an uncertain future. Understanding existing and evolving trends will help TxDOT create a plan that is more adaptive to a range of changing needs and develop strategies that are resilient to future challenges.
>
> While there are many ways to explore change, TxDOT utilized an Exploratory Scenario Planning (XSP) process. The XSP process allowed for an in-depth exploration of what forces may contribute to change in the future, how likely these changes are to occur, and what these changes may look like.

Engagement was crucial to completing several steps of the XSP process. By involving stakeholders and the public in the scenario development process, *Connecting Texas 2050* ensured that the resulting scenarios were not just the product of limited perspectives but rather a comprehensive synthesis of diverse viewpoints. Engagement provided an opportunity to identify pressing issues and challenges that the state's transportation system faces, such as congestion, aging infrastructure, environmental impacts, accessibility, and technological advancements. Each step of engagement played a pivotal role in transforming high-level themes, planning factors, and multilevel impacts into four final scenarios and ultimately a set of outcomes that informed *Connecting Texas 2050* (**Figure 26**).

The outcomes of *Connecting Texas 2050* scenario planning are used to:

- Understand various futures for Texas' transportation system
- Inform the Needs and Funding Assessments
- Develop strategies and solutions for uncertain futures shaped by emerging trends, including population growth, automation technology development, and more frequent extreme weather events

Figure 26: Scenario Planning Engagement Key Milestones



Used stakeholder feedback to identify the eight planning factors most likely to have significant impacts on the movement of people and goods across Texas by 2050.

Worked with stakeholders to consider the eight planning factors and how they could develop if existing conditions persist, in the face of environmental and economic changes, and in light of technological shifts.

Based on stakeholder feedback, the planning team developed 32 scenarios (four narratives for each of the eight planning factors) using the impacts identified for each planning factor.

Based on their votes for the scenarios most likely to occur or impact the movement of people and goods in 2050, stakeholders selected the final four scenarios for discussion during the final Scenario Planning Workshop.

The final Scenario Workshop focused on the top four future scenarios that stakeholders identified in the pre-workshop survey. Of the initial 32, the top four received the most votes when combining votes for the categories most likely to occur and most impactful to movement in Texas by 2050. Future statewide planning efforts could consider exploring the remaining 28 scenario narratives in more detail.

The four scenarios that stakeholders identified for the final workshop were:

- **Texas Leads as E-Commerce Supplier:** E-commerce growth leads to more freight trips and road wear, while warehouses are pushing affordable housing away from essential services.
- **Increased Funding but More Competition:** With increased IIJA funding, large municipalities are able to submit more applications, but small municipalities struggle to attract staff and projects.
- **Bottlenecks at the Border:** Slow freight movement crossing the border leads to freight corridor developments close to the border with advanced technologies to speed up delivery.
- **Telework Life Balance:** Communication technology investment enables telecommuting and rural living, and reduces congestion, with service workers as primary commuters.

During the Scenario Workshop, participants were assigned to one of the four scenarios to explore the following three questions:

» What are the threats and opportunities to a player like us (TxDOT) in this scenario?
» What functional capabilities would a successful organization (TxDOT) need in this scenario?
» What specific actions should we prepare for the scenario?

Although the exercise was about exploring future scenarios, the questions allowed participants to think critically about what could be done to better handle potential impacts. The results of this exercise identified possible actions that can be taken today to mitigate, manage, and prepare for the challenges presented in each scenario. More details on the potential impacts discussed can be found in the following section.

The activity helped to identify five cross-cutting actions to help TxDOT prepare for and manage potential impacts related to the scenarios in the future. These actions include:

Internal and External Coordination: Stakeholder coordination must continue to effectively understand needs and priorities. Improving engagement efforts helps create a better understanding between all groups, and helps to develop strategies that gather resources from a variety of stakeholders.

Workforce Readiness: Planning for the organization of the future will require new training policies and creating new workforce pipeline programs between TxDOT and the range of educational systems (high school, trade school, community colleges, universities, etc).

Plan Ahead: Investigating where growth is likely to be located (housing, employment, and freight) will help identify opportunities to acquire necessary right-of-way for critical infrastructure to support the movement of people and goods (freight and technology corridors).

Raise Awareness: Educating the public on future implications of new transportation technologies and freight growth will help the public understand safety concerns and be prepared for the future (AVs, growth of freight distribution infrastructure).

Embrace Technology: Technology can be used to implement effective long-term transportation strategies. Utilize technology to get real-time data to monitor system performance. Private industry will likely lead technology development so it is important to continually engage the business community.

Workshop discussions on potential impacts were conducted for each of the four scenarios. The discussed impacts were aligned with the goals to understand the implications of the impacts for the plan. The following section presents the title and narratives for each scenario as they were used at the final Scenario Workshop along with the discussed potential impacts by goal areas.

Texas Leads as E-Commerce Supplier

By 2050, e-commerce continues to show significant growth due to Texas leading the nation's e-commerce and warehouse jobs. The impact of the extra goods has resulted in more freight trucks and trains and introduced capacity constraints at seaports and the border. Additionally, new warehouses are being constructed on large pieces of land in cities, which pushes residents further from critical city services.

Safety — Increased demand for freight may result in more trucks and trains, which may ultimately contribute to more crashes.

Preservation — An increased use of heavier freight vehicles may cause more excessive wear and tear on roadways, resulting in a greater need to preserve road infrastructure to desirable conditions.

Mobility — More freight movement on roadways may lead to more congestion, increasing the demand for more efficient mobility management.

Connectivity — More freight trains may cause more delays at at-grade crossings. This may lead to longer commute times and reduce system-wide connectivity.

Economic Vitality — Growth in e-commerce may result in Texas leading the nation in e-commerce and warehouse jobs, which may strengthen economic vitality.

Stewardship — New warehouses may push residents farther away from the city center where critical services are concentrated. This may prompt the need to build additional lanes and/or dedicated freight routes that may also require consuming land resource.

Increased Funding but More Competition

By 2050, the federal government has increased IIJA spending by 50%. Larger municipalities can submit more funding applications and manage more projects due to the ability to recruit and pay experienced staff. Meanwhile, smaller municipalities struggle to attract and retain staff to manage funding applications and projects.

Safety — Large municipalities could afford to hire more workers to improve safety. Small municipalities could lose workforce to larger municipalities, resulting in decreased staffing for safety.

Preservation — Municipalities with improved access to federal funding may achieve an efficient allocation of resources for keeping transportation infrastructure in desirable conditions.

Mobility — More funding allows transit agencies to adopt state-of-the-art technologies to improve mobility.

Connectivity — Rural areas may fall behind in adopting emerging technologies to enhance connectivity due to staffing and resource shortages.

Economic Vitality — Increased funding may lead to more opportunities for municipalities to prioritize alternative transportation projects, which could also have economic benefits.

Stewardship — Collaborating with local schools, colleges, and universities will aid in upskilling the transportation industry workforce with technology skills that may help smaller municipalities with limited resources to maximize the efficient allocation of available resources.

Bottlenecks at the Border

By 2050, geopolitical affairs and policies have slowed freight movement crossing the border resulting in major delays and increased shipping costs. Because of the delays, more logistics systems and dedicated freight corridors are developing closer to the border and using advanced transportation technologies to speed up delivery time to mitigate delays.

Safety — Increased traffic at the border may result in difficulty with traffic management, which may increase the risk of traffic incidents or security violations.

Preservation — Difficulty in coordination on infrastructure management between federal and state agencies may lead to delays for infrastructure maintenance and repairs.

Mobility — More stringent border security screening may interrupt people and goods movement. Investments into cutting-edge security scanning technology may improve wait times at security checkpoints.

Connectivity — Coordination for transnational multimodal connections, facilitating stakeholder input along borders, or between border security and local, state, and federal agencies may enhance connectivity.

Economic Vitality — The development of a border transportation plan has created opportunities for cooperation between Texas and Mexico to identify shared transportation and economic goals. Shared goals focus on improving access, and connectivity, which boost tourism, visitor spending, and trade along border communities.

Stewardship — Coordination between Texas, the U.S. federal government, and Mexico has resulted in an updated border resilience plan that outlines environmental and climate goals and objectives, prioritization of efficient and sustainable infrastructure projects, and creation of emissions reduction policies.

Telework Life Balance

By 2050, significant investment in communications technology has occurred and reliable, high-speed internet is now readily available statewide. Congestion will be reduced by telework. Due to the reduction in the digital divide, more people are choosing to live outside of city centers. Primary commuters are now workers who live further away from city centers due to costs of living.

Safety — Reduced traffic on the road may decrease the chance of minor traffic accidents but may also increase the potential for more severe accidents as drivers may travel faster with less congestion.

Preservation — Fewer commuters on the road may result in less wear and tear, leading to a reduction in maintenance needs.

Mobility — Less commuting may lead to less congestion on the road during peak periods, as traffic may spread out across the day.

Connectivity — Urban teleworkers may rely more heavily on public transit, which becomes a key determinant of population density. Rural areas without transit infrastructure experience population loss while service workers living outside areas served by public transit face longer commuting times.

Economic Vitality — Fewer commuters into Central Business Districts (CBDs) may result in decreases in public transportation ridership and revenues coming from business districts. Less revenues may ultimately lead to less investment in the CBDs, potentially lowering economic vitality.

Stewardship — More telework may lead to people relocating to rural areas accelerating urban sprawl.



5

Connecting Texas 2050 | Statewide Long-Range Transportation Plan

Measures and System Performance

This chapter summarizes the Texas Transportation System's long-range transportation measures and performance trends. Identifying long-range transportation measures and measuring system performance helps track progress towards achieving Connecting Texas 2050 goals and guide future investments and project prioritization.

5 Measures and System Performance

Performance Measures

Monitoring and reporting an agency's progress towards meeting the statewide transportation planning goals and statewide transportation system targets are the key steps in TxDOT's performance-based planning process. TxDOT performance tracking is conducted on two levels: one set of metrics that addresses state performance measures related to the strategic goals and one set that addresses the federal measures established in 23 CFR 450.

TxDOT Agency Performance Measures

TxDOT currently uses a variety of performance measures to track and improve its operations. These measures are focused on TxDOT's seven strategic goals and are reported through TxDOT's publicly available performance dashboard. These measures, including both system and organizational measures, align with *Connecting Texas 2050* measures that focus primarily on Texas transportation system performance.

National Performance Measures

Federal agencies, such as the FHWA and the Federal Transit Administration (FTA), developed performance measures to enhance the performance management process. Federal performance measures advance state transportation performance management and provide a means for agencies to track and report on their contributions to achieving the national planning goals established by Congress.

FHWA Highways Performance Measures[70]

- Number of fatalities and fatalities rate
- Number of serious injuries and serious injury rate
- Number of non-motorized fatalities and non-motorized serious injuries
- % of pavements on the NHS in good or poor condition
- % of bridges on the NHS in good or poor condition
- Truck travel time reliability index
- Annual hours of peak hour excessive delay per capita
- % of non-single occupancy vehicle travel
- Total emissions reduction

FTA Transit Performance Measures[71]

- % of revenue vehicles exceeding the Useful Life Benchmark (ULB)
- % of non-revenue service vehicles exceeding ULB
- % of facilities rated under 3.0 on the Transit Economic Requirements Model (TERM) Scale
- % of track segments under performance restriction

Connecting Texas 2050 Performance Measures

Connecting Texas 2050 builds on existing federal and TxDOT performance measures by identifying transportation measures that can help TxDOT track progress towards meeting long-range goals and objectives. The following pages highlight the three *Connecting Texas 2050* performance goals and the established measures associated with the three goal areas: Safety, Preservation, and Mobility.

Performance Goal – Safety

Table 2 shows the existing safety performance measures, targets, and trends. The performance trends indicate increasing fatalities and serious injuries, making it crucial to enhance safety on the Texas transportation system for all users and modes.

Table 2: TxDOT Safety Performance Trends and Targets

Performance Measure	Current Value[1]	Target Value[2]	Trend[3]	2050 Target
Fatality Rate (Fatalities per 100 million vehicle miles traveled [VMT])	1.51	1.25	↘	0
# of Fatalities	4,406	3,272	→	0
# of Serious Injuries	18,881	17,539	↘	0
Serious Injury Rate (serious injuries per 100 million VMT)	6.49	6.70	↘	0
Fatalities Involving Run off the Road	1,428	N/A	↘	0
Fatalities Involving Driving Under the Influence (DUI)	1,628	N/A	↗	0
Fatalities Involving Intersections	1,019	N/A	↘	0
Fatalities Involving Distracted Driving	488	414	↗	0
Fatalities Involving Pedestrians	816	666	→	0
Fatalities Involving Pedalcyclists	91	52	↗	0

1: 2022 Current Values were retrieved from the TxDOT Performance Dashboard (Accessed on February 19, 2024).
2: 2022 Target values were retrieved from the TxDOT Performance Dashboard (Accessed on February 19, 2024).
3: Trends indicate improving, declining, or stable performance from previous year.

Legend

↘ Value Decreasing; Performance Improving
→ <0.5% Change; Performance Stable
↗ Value Increasing; Performance Declining

Performance Goal – Preservation

Table 3 shows the existing asset condition performance measures, targets, and trends. The trends indicate that pavement and bridge conditions are meeting targets and performance is improving. TxDOT must continue to invest in preservation to maintain and improve multimodal asset conditions.

Table 3: TxDOT Asset Condition Performance Trends and Targets

Performance Measure	Current Value[1]	Target Value[2]	Trend[3]	2050 Target
Bridge Condition Score - Statewide	89.0	90.0	→	90
Bridge Condition Score - NHS, IH	87.8	N/A	→	N/A
Bridge Condition Score - NHS, Non-IH	89.3	N/A	→	N/A
Bridge Condition Score - Non-NHS	89.2	N/A	→	N/A
Percentage of Lane Miles in Good or Better Condition - Statewide	89.7%	90%	→	90%
Percentage of Lane Miles in Good or Better Condition - NHS, IH	91.6%	N/A	→	N/A
Percentage of Lane Miles in Good or Better Condition - NHS, Non-IH	88.8%	N/A	↗	N/A
Percentage of Lane Miles in Good or Better Condition - Non-NHS	89.8%	N/A	→	N/A
Percentage of Lane Miles in Good or Better Condition – Energy Sector	90.1%	N/A	↗	N/A

1: 2022 Current Values were retrieved from the TxDOT Performance Dashboard (Accessed on February 19, 2024).
2: 2022 Target values were retrieved from the TxDOT Performance Dashboard (Accessed on February 19, 2024).
3: Trends indicate improving or stable performance from previous year.

Legend

↗ Value Increasing; Performance Improving
→ <0.5% Change; Performance Stable

Performance Goal – Mobility

Table 4 shows the existing mobility performance measures, targets, and trends. The trends indicate the system is meeting mobility targets and performance is improving, except for rural areas, which are seeing an increase in congestion and travel time. It is vital to address the needs of all geographic regions to ensure an efficient and reliable transportation system.

Table 4: TxDOT Mobility Performance Trends and Targets

Performance Measure	Current Value[1]	Target Value[2]	Trend[3]	2050 Target
Urban Congestion Index	1.16	1.20	↗	1.15
Urban Reliability Index	1.49	N/A	↗	N/A
Rural Reliability Index	1.15	1.12	↗	1.12
Truck Reliability Index	1.37	N/A	↗	N/A
VMT - All Vehicles Statewide (Billion VMT)	276.9	N/A	↗	N/A
Annual Delay per Person (Hours) - All Vehicles Statewide	27.8	N/A	↗	N/A

1: 2022 Current Values were retrieved from the TxDOT Performance Dashboard (Accessed on February 19, 2024).
2: 2022 Target values were retrieved from the TxDOT Performance Dashboard (Accessed on February 19, 2024).
3: Trends indicate improving or declining performance from previous year.

Legend

↘ Value Decreasing; Performance Improving
↗ Value Increasing; Performance Declining

How Can TxDOT Advance Performance-Based Planning and Programming?

TxDOT will continue to track and report performance through regular performance management processes, including the TxDOT annual Statewide Transportation Report, federally required performance reporting, and implementation of the *Connecting Texas 2050* plan. As new data becomes available and measures and targets are revised, TxDOT will continue to update measures and track progress through performance dashboards and transparent public reports. To start this process, **Table 5** lists potential measures that can help track progress towards meeting the long-range goals. These potential measures integrate key themes and considerations to capture a more comprehensive and multimodal view of TxDOT's performance and progress and foster a culture of continuous improvement and innovation. These measures, subject to refinement, are drawn from best practices, peer states, and division input. Establishing additional long-range measures and setting targets will enhance project decisions and future investment outcomes, ultimately helping TxDOT deliver the right projects.

Table 5: Potential Types of Long-Range Measures

Safety	Preservation	Mobility	Connectivity	Economic Vitality	Stewardship
» National Public Transportation Safety Plan performance measures » Work zone crashes » Railroad crashes » IT security events » Incident response and/or detection time » Transit safety incident rate	» Transit asset condition (FTA established performance measures) » Transit service levels » General aviation airport runway pavement condition » Operational fleet equipment condition/ downtime » Lane-miles resurfaced » Pavement lifecycle efficiency metric	» Travel times by mode » Average vehicle occupancy » Redundancy score (on-system) » Border crossing times	» Access to alternative modes (transit, bike/ pedestrian, intercity rail, etc.) » Access to key destinations » Change in transit ridership » Change in active transportation facility lane-miles » Progress on EV charging infrastructure » Freight intermodal connectivity	» Freight network economic importance » Aviation economic importance » Maritime industry economic importance » Access to jobs » Progress on employee training and education programs » Progress on constructing bicycle tourism trails	» Trend of revenue projections » Progress on public involvement » Progress on avoiding and mitigating transportation-related impacts on natural and cultural environment » Modal investment profile (linking performance with investment decision-making across different assets)

Safety

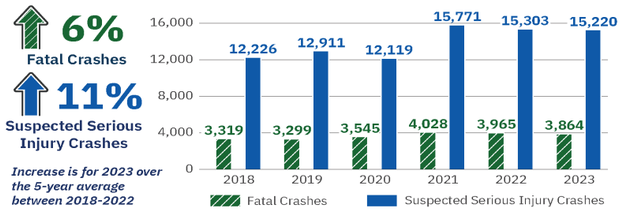
Roadway Safety

Texas has not seen a day without a death on its roadways since November 7, 2000, and since then, over 75,000 people have lost their lives in crashes on Texas roads. Comparing 2023 to the previous 5-year (2018-2022) average crash statistics, Texas has experienced an increase in the total number of fatal and suspected serious injury crashes (**Figure 27**).[72] In 2023, an average of 11 people died daily, and 42 people per day were suspected to have sustained serious injuries in vehicle crashes on Texas roadways. TxDOT's on-system roadways account for approximately one-third of Texas roadway lane miles. Between 2017 and 2021, 64% of fatal and suspected severe injury crashes in the state occurred on on-system roadways (**Figure 28**).[73]



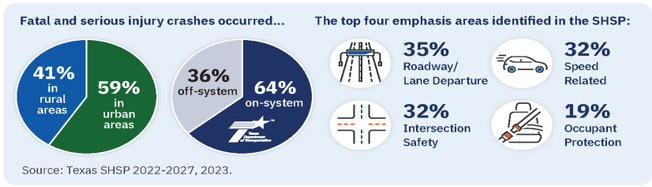
The Texas SHSP is the department's key safety document that integrates all of the strategies and countermeasures to address TxDOT's mission of promoting safety. The 2022–2027 SHSP has set up 11 emphasis areas in support of its vision to reduce specific types of crashes. The identification of emphasis areas is data-driven based on a 5-year cycle of crash data, VMT, and demographics. These areas are designed to reduce specific types of crashes, with TxDOT focusing on engineering, education, and supporting enforcement efforts to ensure the safety of all road users.

Figure 27: Fatal & Serious Injury Crash Trend (2018-2023)



Source: TxDOT Traffic Safety Division, 2024.

Figure 28: Fatal & Serious Injury Crash Findings



Source: Texas SHSP 2022-2027, 2023.



Safety Performance Trend Snapshot

Safety is TxDOT's top priortity. To track progress towards the statewide transportation goals, TxDOT has established performance measures and targets related to promoting safety, including annual fatalities and fatality rate (**Figure 29**), suspected serious injuries, and suspected serious injury rate (**Figure 30**).[74]

Figure 29: Annual Fatalities and Fatality Rate (2014-2023)



Figure 30: Annual Suspected Serious Injuries and Suspected Serious Injury Rate (2014-2023)



Source: TxDOT Performance Dashboard, 2024.

TxDOT's Key Investments in Safety Initiatives Over the Past 5 Years:

» TxDOT started various statewide initiatives to raise public awareness about safety and initiated programs to direct the agency to work toward zero deaths and serious injuries on Texas roadways. This was an important step in TxDOT's safety culture as an organization. In addition to UTP Category 8 funds, the Texas Transportation Commission made an additional investment in safety, $600 million in projects specifically focused to reduce fatalities and serious injuries on Texas roads.[75]

» In 2021, the Commission established a new funding program dedicated to safety in UTP Category 11. Specifically, this category of funds helps districts implement their local safety plans. In 2023, the Commission increased funding from $500 million to $1.2 billion, marking a significant commitment to safety and helping the districts to address larger safety needs within their plans.[76]

» The 2024 UTP authorized approximately $350 million annually for the Highway Safety Improvement Program to fund safety projects on and off the state highway system, with the purpose of achieving significant reductions in traffic fatalities and serious injuries on all public roads.[77]

» TxDOT has several additional safety initiatives currently underway, including establishing the Safety Task Force and the Roundabout and Alternative Intersection Design Task Force, expanding incident management programs and safety analysis tools, and implementing variable speed limits.

Public Transportation Safety

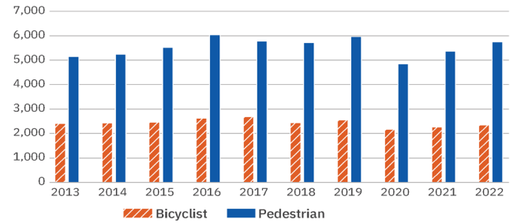
From 2017 to 2021, the number of safety incidents and vehicle failures reported in the Texas Transit Statistics report decreased overall across all three types of transit agencies, MTAs, UTDs, and RTDs, except that MTAs experienced an increase of 40% in vehicle failure over the 5-year period.[78] Maintaining a safe fleet and facilities by ensuring vehicles are in a good state of repair will lead to increased system safety and reliability and enhance overall transit system performance. FTA's National Public Transportation Safety Plan calls for a more proactive risk management approach to proactively identify and analyze safety hazards and risks. Investing in transit safety, such as technology solutions, will also help increase passenger's sense of safety and security about public transit and potentially lead to increased ridership.



Vulnerable Road Users

The safety needs associated with transportation extend beyond motor vehicles and include other modes such as walking, bicycling, micromobility, and public transportation. These modes have unique safety concerns, such as conflicts between pedestrians/bicyclists and motor vehicles, safety hazards at bus stops and passenger rail stations, and the need to reduce the number and severity of crashes involving vulnerable road users. Crashes involving bicyclists and pedestrians have been gradually increasing since 2011, except for a decline in 2020, likely due to travel behavior changes influenced by the COVID-19 pandemic (**Figure 31**).[79]

Figure 31: Crashes Involving Bicyclists or Pedestrians (2013-2022)



Source: Texas Motor Vehicle Crash Statistics, 2011 - 2022.

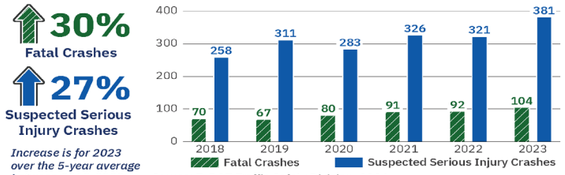
Accessing safe and convenient bicycle and pedestrian facilities can be a challenge for all residents, but particularly for those in rural communities in Texas. In areas without designated bike and pedestrian facilities or areas with incomplete and poorly maintained facilities, individuals are compelled to walk or bike along roads with high traffic speeds and volumes, which can be hazardous. This may increase their exposure to traffic and the risk of collisions with motorized vehicles. For people with disabilities, the hazards are even more acute, and in some cases, their mobility may prohibit access entirely. Continued investment in safe infrastructure designed to accommodate multiple modes helps decrease motor vehicle-related bicycle and pedestrian injuries and fatalities and delivers safer roadways for all users.

In recent years, Texas has seen a considerable rise in the number of fatal and serious injury crashes related to VRUs (**Figure 32** and **Figure 33**).[80] In 2022, the fatal and suspected serious injury crashes involving bicyclists and pedestrians represented 3% and 11%, respectively, of all fatal and suspected serious injury crashes. Given that many crashes and injuries are not reported if they occurred at non-roadway locations, or if no motor vehicle was involved, the number likely underestimates the total fatalities and serious injuries related to VRUs in Texas.



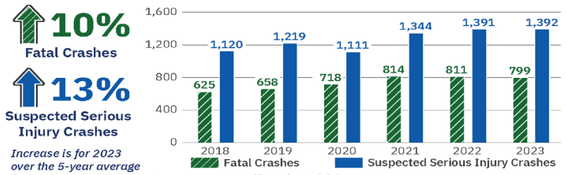
People who use active transportation, including bicyclists and pedestrians, are referred to as VRUs due to the unique safety challenges and higher risk of sustaining fatal or severe injuries in collisions with motor vehicles. TxDOT's Vulnerable Road User Safety Assessment reinforces the need for a collaborative and holistic approach to address crash trends and lower them over time.

Figure 32: Bicyclist Fatal & Serious Injury Crashes (2018-2023)



Source: TxDOT Traffic Safety Division, 2024.

Figure 33: Pedestrian Fatal & Serious Injury Crashes (2018-2023)



Source: TxDOT Traffic Safety Division, 2024.

Data and System Security

The security of Texas' transportation system, including roads, rail corridors, airports, seaports, border crossings, and digital infrastructure, is crucial for the nation's security. It is essential for moving supplies, manufacturing, and construction materials, ensuring reliable connections to strategic trade gateways, and providing food and energy security. Disruptions to the transportation system can result in significant impacts for supply chains. Cybersecurity and physical security are vital for critical transportation infrastructure nodes, including ports, airports, Traffic Management Centers (TMCs), rail yards, and ports of entry along the Texas-Mexico border. All stakeholders must collaborate to ensure the transportation system remains secure and reliable.





Freight Safety

Freight safety is a top priority for all transportation agencies, railroads, ports, and airports. Overall crash reduction is critical to safety throughout the state. Under this overarching goal, reducing the number of truck-involved crashes is critically important for the safe movement of freight and goods. Despite a 20% reduction in traffic during the pandemic, crashes decreased by only 12% between 2019 and 2020, and fatal truck-involved crashes decreased by only 5%.[81] In addition to saving lives, increasing highway freight safety reduces disruptions to the efficient flow of goods and people across Texas' transportation system.

According to the Texas Delivers 2050 Plan, over 25,000 truck-involved crashes occurred per year between 2015 and 2020 in Texas. **These crashes include over 400 fatal truck-involved crashes per year.** Overall, urbanized areas have the highest rate of truck-involved crashes per 100 million VMT (greater than 540); however, approximately half of truck-involved fatalities occur in rural areas.



Improving safety in Texas requires addressing safety hazards at highway-rail at-grade crossings, including pedestrian and bicycle crossings, and upgrading freight rail tracks. Over the past decade, there has been a general downward trend in rail-related incidents, injuries, and deaths despite the substantial growth in population, registered vehicles, miles traveled, and rail traffic. The safety of the public can be affected by train accidents and incidents due to derailments, especially if hazardous materials are involved, at highway at-grade rail crossings, and injuries that may occur while traveling by rail or on railroad property. The goal of Texas' rail safety programs is to address these issues through continued coordination with the state's rail operators, safety-related infrastructure improvements, and monitoring of the rail network through safety inspections to identify existing and potential problems.

TxDOT recently completed its Highway-Rail Grade Crossing State Action Plan, which identifies specific solutions for improving safety at highway-rail grade crossings. The State Action Plan includes a full analysis of highway-rail grade crossing collisions. Between 2016 and 2020, there were 1154 collisions. **Of these collisions, 92 were fatal.** Nearly 82% of collisions occurred at public highway-rail grade crossings.[82]

To maintain a safe and navigable waterway system, the Texas Port Mission Plan and Texas Delivers 2050 Plan both identify channel widening and deepening as critical needs. Deeper channels mean fewer vessels risk running aground. Wider channels mean vessels can pass more easily, allowing more ships and barges through and making it safer for seafarers to navigate the channel. This is especially important in Texas, as many of the vessels traveling to and from the ports are tankers carrying hazardous materials or cargo ships carrying high-value cargo or consumer goods. Both plans also underscore the importance of coastal resilience investments in coordination with the federal government to prepare ports and waterway facilities for future extreme weather events and mitigate the effects on freight movement.

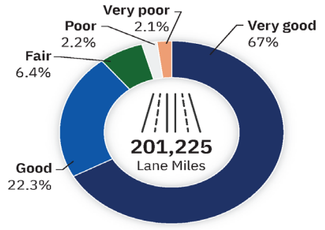
Asset Condition

Pavement

Pavement condition has a significant impact on the safe and efficient movement of people and goods on the Texas transportation system. TxDOT owns, maintains, and operates approximately 201,225 lane miles of roads (on-system roads) with nearly 186 billion VMT annually. The overall pavement condition of the on-system road network has steadily increased since FY 2001 when the Texas Transportation Commission established the statewide pavement condition goal of 90% of lane miles in "Good" or better condition. In 2021, more than 89% of on-system pavements have an overall condition of Good or Very Good, which is the highest percentage in the last 25 years (**Figure 34**).[83] Less than 5% have an overall condition of Poor or Very Poor.

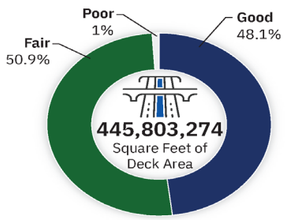
On-system pavement condition is forecasted to remain steady over the 10-year period of the TAMP, given the current annual funding level for pavement. However, using the current funding scenario but implementing a "worst first" management approach yields a noticeable decline in predicted performance for on-system pavement conditions. Maintaining roadways in good condition generally is less expensive than repairing and fixing deteriorating roadways. It is important for TxDOT to continue to keep the pavement network in overall good condition and reduce the long-term cost of maintaining pavements.

Figure 34: On-System Pavement Condition



Source: TAMP, 2022.

Figure 35: On-System Bridge Condition



Source: TAMP, 2022.

Texans supported continued investment in maintaining and preserving the conditions of roads and highlighted the importance of keeping the pavement in overall good condition.

~ 2023 Transportation Visioning Survey

Bridges

Texas has the largest statewide bridge inventory in the United States. Despite the large bridge inventory, the percentage of bridges in poor condition remains among the lowest in the country and well below the national average. As of 2022, over 55,000 bridges in Texas are listed on the National Bridge Inventory, of which over 60% are owned and maintained by TxDOT (on-system). In 2021, more than 48% of on-system bridges were in good condition and only 1% of on-system bridges were in poor condition (**Figure 35**).[84] While the percent of bridges in poor condition has been reduced over the past 20 years, the increasing percent of bridges in fair condition requires a growing level of attention and funding.

On-system bridge condition is forecasted to slightly decline over the next 10-year period, given the current annual funding level for bridges. The expected decline in condition reflects an expanding bridge inventory and a significant portion of bridges approaching the end of their service life. As TxDOT's bridges age, maintaining older bridges in good condition with current funding levels will become increasingly difficult. Looking toward the future, resources should be focused on keeping Good bridges in good condition, rehabilitating Fair bridges when it is economical to do so, and repairing or replacing Poor bridges. Maintaining bridges in a state of good repair is important to support a safe and resilient transportation system.

TxDOT has made strong progress in extending the life of critical assets, including implementing its new bridge management system, moving from a worst-first approach to a preservation focus, developing 4-year pavement and bridge plans, and completing several resilience efforts. The 4-year pavement and bridge plans are project-specific and financially constrained plans that map out the asset needs for districts and predict conditions based on a specific funding level.

Asset Condition Performance Trend Snapshot

Preserving such an extensive network of assets is one of TxDOT's strategic goals and highest priorities. To track progress towards the statewide transportation goals, TxDOT has established performance measures and targets related to preserving assets, including pavement (**Figure 36**) and bridges (**Figure 37**).[85]

Figure 36: Statewide Pavement Condition (2013-2022)

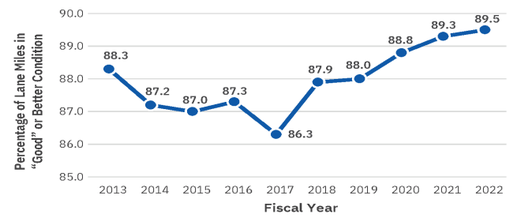
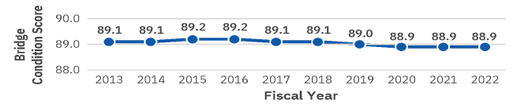


Figure 37: Statewide Bridge Condition (2013-2022)



Source: TxDOT Performance Dashboard, 2023.



Public Transportation and Active Transportation

A continued commitment to accessibility and Americans with Disabilities Act (ADA) improvements is crucial to ensure the existing transportation system continues to meet the needs of all users and population demographics. Rural transit agencies face challenges, such as substandard facilities, lack of safety amenities and lack of intermodal intercity terminals. Improving passenger rail infrastructure, such as platforms, lighting, and bike-ped access, and expanding airport capacity are imperative for future passenger growth.

Aviation

The challenge of unprecedented growth in future enplanements highlights the importance for the aviation industry partners to maintain current levels of service and expand the capacity of the main commercial service facilities to accommodate more aircraft or higher activity levels. Some of these improvements may include new or extended runways, expanded aircraft parking aprons, new or expanded terminal buildings, additional aircraft hangars, and increased capacity for the roadway and multimodal connections to the surrounding community. Adding new facilities and capacity to reliever and general aviation airports may help relieve congestion at other area airports. The TxDOT Aviation Division assists cities and counties in securing and distributing federal and state funds for reliever and general aviation airports included in the TASP, which comprises 300 airports.[86]

Freight Highway

Pavement issues on the freight highway corridors are most concentrated in urban areas, but rural corridors carrying much of Texas' agricultural and energy products also exhibit asset needs related to pavement deterioration. Bridge conditions and load restrictions affect the overall efficiency of freight operations and have the potential to disrupt freight movement significantly, especially where long detours are required for those transporting oversized and overweight loads. While bridge condition is important to monitor and improve, the majority of TxDOT bridges are in good or satisfactory condition, and load restrictions on the state freight network are relatively low.

Rail

Most of the Class I railroads in Texas are generally in good condition. However, short lines have inherited track that experienced years of deferred maintenance. Investing in a state of good repair for this infrastructure is critical for first-mile/last-mile transportation for shippers and manufacturers. Short line operations are important to rural areas as those short-haul routes support economic activity and quality of life in many of the smaller communities in Texas.

Ports and Waterways

Waterways have an important role to play in alleviating some of the demand and congestion on the state's major freight corridors. The GIWW is authorized for a 12-foot draft;[87] however, insufficient federal funds for maintenance have led to many sections of the waterway having as low as a 9-foot draft.[88] This requires barge operators to light load, decreasing efficiencies and economic impact, while increasing congestion and pollution. The Texas section of the GIWW connects all Texas ports to each other and to a robust network of Gulf Coast and inland waterways. The investments that maintain and upgrade the GIWW will be more important in the future to reliably support Texas freight movement and provide alternatives to highway transportation. Federal and state funding to maintain authorized ship channel depths and implement congressionally authorized ship channel improvement projects is critical. Continued federal and state coordination is needed to ensure that Texas ports and waterways remain safe to navigate and can compete with the ports on the East Coast, West Coast, and Gulf of Mexico.

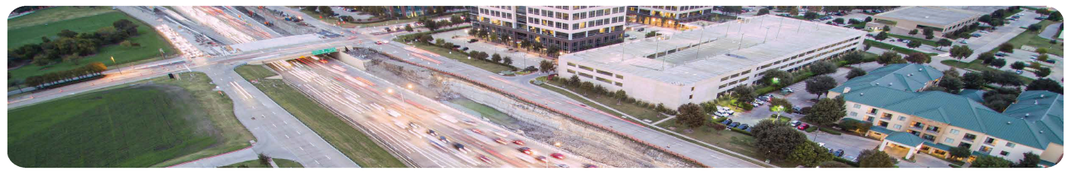
Traffic Operational and Intelligent Transportation System Assets

TxDOT's existing ITS technology and programs play an important role in the safe and reliable operation of the transportation system. TxDOT owns and maintains thousands of ITS devices, including 5,000 traffic signals, 980 dynamic message signs, 2,700 closed-circuit television (CCTV) cameras, and seven TMCs.[89] These ITS assets are concentrated primarily within urban areas and along high-volume corridors. ITS coverage gaps exist especially in rural areas. TxDOT has developed systems and applications to monitor devices and improve device uptime. As of 2020, approximately 65% of all traffic devices statewide are under monitoring and over 90% of these devices have uptime availability.[90]

As part of the TSMO strategies, TxDOT has utilized technology solutions such as Traffic Incident Management (TIM), data analytics, and intelligent work zones to improve traffic operations and safety. TIM has reduced annual delays by 129.5 million hours and secondary crashes by 69%.[91] Improving the operational efficiency of roadways will require continued preservation of devices, implementing and enhancing the traffic management system (TMS), upgrading devices to improve mobility and safety, and implementing operational management strategies that make the best use of advanced technologies.

Improving the conditions and efficiencies in one mode will contribute to the efficiency of goods movement and the overall transportation system. Timely and effective asset management practices help ensure that transportation infrastructure continues to operate at a high level and can accommodate growing transportation demands.





Mobility and Reliability

Highway Mobility

Highway mobility is measured by the ability of the roadway system to accommodate the safe, efficient, and reliable movement of people and goods. When travel demand increases more than roadway capacity, travelers will experience more congestion and travel delays. Over the past few decades, Texas experienced a steady increase in highway congestion in all geographies of the state. On average, each Texan spent a total of 23.5 hours sitting in traffic in 2021.[92] Trends in the last few months of 2022 suggest a return to pre-pandemic congestion levels in various areas of Texas. Without a more integrated system, congestion and traffic delays will continue to worsen, causing the cost of transportation to increase as people spend more money on fuel and lose valuable time that could be spent with family and friends, recreating, or at work.

TxDOT's 2022 Most Congested Roadways report shows that traffic delays on Texas' 100 most congested road sections amounted to **382 million** hours, costing the state's economy more than **$9 billion** in 2022.[93]

Congestion primarily affects metropolitan areas since nearly 13% of VMT on urban roadways experienced congestion conditions whereas less than 2% of VMT on rural roadways were associated with congestion. For 2050, nearly 30% of total VMT in the metro areas is estimated to be congested (**Figure 38**).[94] As travel demand reaches and exceeds pre-COVID levels, along with population growth and urbanization trends within the Texas triangle, urban roadways will continue to experience more congestion. This highlights the need for TxDOT to explore innovative solutions in urban areas given the high costs associated with limited right-of-way and the technical challenges of adding capacity in confined urban areas.

Figure 38: Percentage of Congested VMT (2020 and 2050)

	Metro	Micro	Rural
2020	12.8%	1.6%	0.3%
2050	29.9%	5.4%	2.5%

Note: For metro, "congested" is defined as volume-to-capacity ratio (v/c)>0.9; for micro and rural, "congested" is defined as v/c>0.8.

Texans considered congestion relief as one of their highest priorities, especially in the metropolitan areas.

~ 2023 Transportation Visioning Survey

Travel Reliability

Travel reliability is an important factor in determining transportation system efficiency. For highways, it is measured in terms of the additional time that drivers and transit passengers need to allocate to compensate for unexpected delays. Increased congestion delays, operational inefficiencies, closed lanes due to crashes or work zones, or spikes in traffic demand all contribute to decreased travel time reliability. The persistent growth of travel demand has significantly outpaced the growth in roadway capacity, leading to increasing congestion and longer travel times.

TxDOT's investments significantly contributed to travel reliability leading up to 2019 , surpassing 2013 levels. However, urban travel reliability worsened in 2021, though it remained below pre-COVID levels. Meanwhile, rural travel reliability was worse than it has been since 2013. Without improvements, Texas travel times are expected to become increasingly unreliable by 2050, with VMT increases in both urban and rural areas. The expansion of Texas' transportation system to meet the growing demand will necessitate continuous improvements, including monitoring mobility patterns and system performance and providing context-sensitive mobility solutions and strategies.

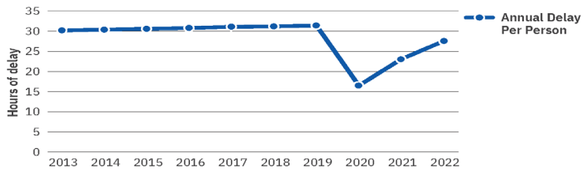
Multimodal Freight Mobility and Reliability

A reliable multimodal network is critical for efficient freight movement and connectivity to major freight corridors. While highways play a central role, truck congestion and delays can cause significant issues, particularly in the last-mile connections to intermodal facilities. The COVID-19 pandemic increased congestion and caused longer delays at Texas ports, affecting truck trips and air cargo. The delays extended beyond the gate, causing problems with truck trips. Efficient access to airports handling large volumes of air cargo depends on connections to highways and interstates. However, issues with travel time efficiency and reliability on infrastructure accessing airports can be severe, affecting the overall efficiency of freight movement in the state.

System Performance Trend Snapshot

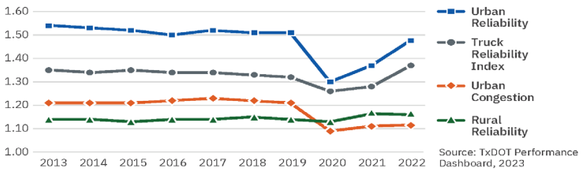
TxDOT strives to optimize system performance by working to relieve congestion and improve highway mobility. To track progress towards the statewide transportation goals, TxDOT has established performance measures and targets related to optimizing system performance, including annual delay per person (**Figure 39**) and reliability indices (**Figure 40**).[95]

Figure 39: Annual Delay Per Person (2013-2022)



Source: TxDOT Performance Dashboard, 2023

Figure 40: Travel Reliability Indices (2013-2022)



Source: TxDOT Performance Dashboard, 2023



6 Multimodal Transportation Needs

This chapter summarizes multimodal needs across Texas' transportation system. Needs are aligned with Connecting Texas 2050 goals. Understanding statewide multimodal transportation needs is the first step toward ensuring a safe, efficient, sustainable, and integrated transportation system.

Aligning Multimodal Needs with Goals

To help TxDOT and its partner agencies understand the most urgent needs and challenges in the state across all modes and regions, *Connecting Texas 2050* identifies multimodal transportation needs that must be considered to ensure a safe, efficient, and sustainable multimodal transportation system.

Categorizing multimodal needs by goal area is essential to identifying strategies that can be implemented to reach those goals and fulfill user needs.

Multimodal needs in *Connecting Texas 2050* reflect:

- Strategic issues and concerns informed by the public and partner agencies and validated by TxDOT.
- A synthesis of interrelated needs with multimodal implications to avoid duplication and build synergy.
- A focus on needs that highlight cross-cutting multimodal trends and issues in the transportation system across all regions.

Safety
- Reduce frequency of motor vehicle crashes and associated impacts, especially fatal and severe injury crashes
- Improve safety for all users
- Enhance security of systems

Preservation
- Maintain and preserve state highway system
- Improve multimodal transportation assets
- Improve TMFN infrastructure

Mobility
- Relieve highway congestion
- Improve freight mobility and reliability
- Enhance network resilience

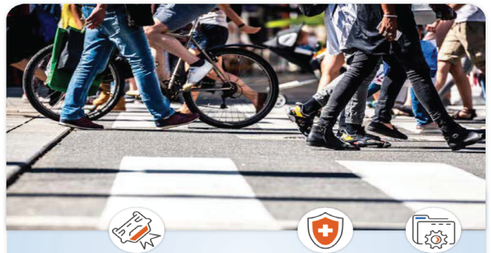
Connectivity
- Improve modal options and connectivity for the movement of people
- Integrate multimodal connectivity into freight network
- Enhance connectivity to the border crossings and border regions

Economic Vitality
- Strengthen economic competitiveness
- Invest in workforce development
- Support tourism and leisure travel

Stewardship
- Optimize available funding and leverage alternative funding sources
- Minimize impacts to natural and cultural environment and promote public health
- Improve planning, programming, and project delivery

Ensuring a Safe and Secure Multimodal Transportation System

Motor vehicle crashes are a common occurrence on Texas roads, with fatalities and serious injuries being a major concern. Ensuring a safe transportation system will reduce hazards and resulting impacts, especially fatalities and serious injuries. Additional safety concerns are focused on users of other transportation modes (including walking, bicycling, and public transportation), highway workers, and first responders. The need for security measures in transportation planning is critical to ensure the safety and integrity of infrastructure and the safe and efficient movement of people and goods.



Reduce frequency of motor vehicle crashes and associated impacts, especially fatal and severe injury crashes

Improve safety for all users

Enhance security of systems

Snapshot of Key Findings

System Performance and Safety Trends
- In 2023, Texas experienced a 6% increase in the total annual number of fatal crashes compared to the 5-year average between 2018 and 2022.[96]
- In 2023, an average of 11 people died daily and nearly 42 people per day were suspected to have sustained serious injuries in crashes on Texas roads.[97]

Coordination with Other Plans
- The SHSP states that most crashes are related to roadway and lane departures, speed, and/or intersections. The SHSP also highlights the importance of addressing emergency response time and placing an overall emphasis on post-crash care.
- The VRU report delves deeply into the safety concerns of VRUs, including pedestrians and pedalcyclists, and plays an essential role in advancing the broader mission of the SHSP — to create safer roadways for all and reduce the occurrence of accidents, injuries, and fatalities.

Collaboration with External Partner Agencies and the Public
- Texans considered safety as the most critical issue and showed strong support for safe transportation facilities for travelers using all modes.
- External partner agencies, particularly from rural communities, are concerned about large trucks making diversions on local roads to bypass heavy traffic on highways, making travel on local roads unsafe for residents.
- It is important to engage stakeholders, such as law enforcement, to address enforcement needs.

Collaboration with TxDOT Divisions and Districts
- Safety-related risks associated with aging infrastructure are a common concern, including for maritime, aviation, and rail infrastructure.
- Almost all districts have raised safety-related concerns, largely due to increased traffic congestion and truck parking shortages.

Preserving Our Multimodal Assets and the Vital Functions of Corridors

As the backbone of Texas' multimodal transportation system, roadway infrastructure affects where people live, how they travel, and the transportation options they require to meet evolving needs and preferences. Given this diversity of travel needs, a complex and interconnected transportation network of roads, bridges, traffic operational systems, and other elements must be maintained and preserved to ensure safe and efficient mobility for people and goods. This priority applies across all modes of transportation: as population expands across the state, it will be imperative to preserve the condition and functionality of multimodal corridors so that a well-connected transportation network can continue to support a high quality of life and economic vitality across the state.



Maintain and preserve the state roadway system

Improve multimodal transportation assets (e.g., active transportation, public transit, passenger rail, aviation)

Improve TMFN infrastructure

Snapshot of Key Findings

System Performance and Asset Condition Trends

- As of 2022, more than 89% of on-system pavements have an overall condition of Good or Very Good; more than 48% of on-system bridges are in Good condition.[98]
- The TAMP predicts that with the current funding level, pavements and bridges will remain in relatively good condition with a minor performance gap, which can be addressed through additional investment in pavement management.

Coordination with Other Plans

- TxDOT's modal plans identify the need for continued maintenance and preservation efforts across all modes of transportation, including roadway, active transportation, transit, rail, aviation, ports, and waterways.

Collaboration with External Partner Agencies and the Public

- Having roads and bridges in good condition is one of the public's top priorities. Residents in rural/border areas indicated a desire to see increased funding for highway improvements.
- External partners raised concerns with aging infrastructure and the need for wider bridges and greater vertical clearances to accommodate oversized freight.

Collaboration with TxDOT Divisions and Districts

- Increasingly, several TxDOT divisions are focusing on addressing flooding issues and the impact of inflation on material and labor costs for preventative maintenance projects.
- Districts are concerned about maintenance funding gaps and are interested in exploring context-sensitive design and asset management to account for unique transportation system needs specific to their parts of Texas.

Expanding Mode Choice and Intermodal Connectivity

Improving connectivity at various levels is fundamental to improving access to services and destinations and unlocking opportunities for economic growth. Addressing the broad range of issues related to highway corridors, including infrastructure and digital connections, is essential for linking rural areas to urban commerce and population centers where much of Texas freight is consumed or forwarded, driving economic growth. Providing enhanced and expanded public transportation services will improve access to jobs, medical facilities, and essential services. Closing gaps in the existing active transportation network and increasing user comfort will encourage the use of active transportation modes.



Improve modal options and connectivity for the movement of people

Integrate multimodal connectivity into the freight network

Enhance connectivity to the border crossings and border regions

Snapshot of Key Findings

Strategic Importance and Connectivity Trends

- Approximately 5 million inter-district trips (accounting for 5% of all trips) occur every day, with the majority occurring between neighboring districts.[100]
- In FY 2022, Texas' public transit ridership increased 24% from the previous year.
- From 2020 to 2022, total passenger enplanements increased from 42 million to 90 million, marking an increase of more than 100%.[101]
- Growth in freight transportation is expected to continue, with freight volumes expected to double by 2050.[102]

Coordination with Other Plans

- Several statewide modal studies call for improved ICB and rail services, long-distance bicycle trails, and connected infrastructure and communications (e.g., broadband,EV charging).
- The Texas-Mexico Border Transportation Master Plan states that improving the capacity and operations of existing Texas-Mexico border crossings and multimodal transportation infrastructure is critical for the border region.

Collaboration with External Partner Agencies and the Public

- Texans strongly supported increasing investment in public transportation and intercity passenger rail service.
- Similarly, most external partner agencies expressed a desire to expand the network for bicyclists and pedestrians and improve last-mile connectivity in both urban and rural areas.

Collaboration with TxDOT Divisions and Districts

- Most divisions underscored the importance of improving connectivity to, from, and between intermodal facilities such as airports, ports, and rail.
- Rural areas need improved connections to urban centers to support commerce and access to medical care across the state.

Improving Multimodal Mobility and Reliability

By 2050, without more choices, congestion and traffic delays will continue to worsen, causing increased transportation costs and major disruptions to supply chains. Travelers will spend more money on fuel and lose valuable time that could be spent with family and friends, recreating, or working. With the projected robust growth in population and e-commerce, strategic investments that leverage technology and innovation to increase network capacity, reduce bottlenecks along major trade corridors, and provide alternative travel options will be important for keeping Texas' multimodal transportation system reliably and efficiently serving Texas residents and businesses.



Relieve highway congestion

Improve freight mobility and reliability

Enhance network resilience

Snapshot of Key Findings

System Performance and Mobility Trends

- Growth in population and economic activity are predicted to result in a 42% increase in total VMT by 2050. Over 85% of the VMT growth (from 673 million miles in 2020 to 957 million miles in 2050) is expected to occur in the Texas triangle area and along major interstate highways. For 2050, nearly 30% of total VMT is estimated to be congested.[99]

Coordination with Other Plans

- The Texas Delivers 2050: Texas Freight Mobility Plan identifies the top freight mobility needs as reducing congestion and delay, improving travel time reliability, and improving cross-border travel time reliability.

Collaboration with External Partner Agencies and the Public

- Texans who live in metro/urban areas, and along the U.S.-Mexico border, indicated the need to reduce congestion and delays.
- External partners raised concerns over extreme weather events such as wildfires, flooding, and hurricanes. Improving the resilience of infrastructure will result in improved system efficiency and reliability.

Collaboration with TxDOT Divisions and Districts

- The Public Transportation and Rail Divisions identified the need to expand service and coverage across the state and rural transportation challenges.
- Almost all districts identified concerns related to population and freight growth, including traffic congestion, delays at the ports and borders, and the demand for more regional airports.

Promoting Economic Opportunities and Accommodating Growth

Texas remains one of the strongest and most diverse economies in the nation and across the globe. Its multimodal freight network plays a vital role in supporting the state's supply chains, with key industries relying on its safe and reliable transportation services to keep business operations running smoothly. A well-connected transportation system can contribute to economic vitality by providing businesses with an efficient way to transport their goods throughout the state, creating job opportunities. With a large and growing population, the multimodal transportation system helps people commute to work and connect to essential services and opportunities.



Strengthen economic competitiveness

Invest in workforce development

Support tourism and leisure travel

Snapshot of Key Findings

Strategic Importance and Economic Trends[103]

- In 2019, the freight transportation sector in Texas supported nearly 2.2 million full-time jobs.
- The trend in freight tonnage growth is projected to continue, with freight volumes projected to double and freight value to increase by 151% by 2050.
- The state's employment is projected to grow by 50% to nearly 20 million jobs by 2050, with the Texas Triangle being the largest growth area.

Coordination with Other Plans

- The state's rapid population growth and aging baby-boomer population increases demand for service sector jobs, primarily in Education and Health Services. These two industries, in addition to Trade, Transportation, and Utilities, are projected to continue to grow over the next 10 years, according to the Texas Workforce Report.

Collaboration with External Partner Agencies and the Public

- The public strongly supported improving access to jobs and healthcare.
- External partner agencies emphasized the need to provide a balanced investment in different modes, and better integrate transportation planning with economic development and land use. Preparing for emerging technology and infrastructure to promote economic competitiveness and multimodal transportation is a high priority for several regions.

Collaboration with TxDOT Divisions and Districts

- Several districts highlighted that expanding and modernizing the multimodal freight networks is vital to accommodate future growth.
- TxDOT divisions underscored the importance of workforce readiness and planning.
- The Rail Division identified a need for industry to invest in short line rail improvements to stay ahead of future rail traffic growth.

Managing Financial Resources and Reducing Environmental Impacts

Securing sustainable long-term transportation funding is crucial for TxDOT and its planning partners to address statewide and regional needs and set the agency on the path to achieve its goals and objectives. Addressing diverse transportation needs across the state requires efficient and effective project delivery. This may include timely completion of critical infrastructure projects, operations, and maintenance services, making data-driven decisions, and reducing the risk of delays that can result in increased costs and decreased public trust. TxDOT's stewardship needs also include delivering the right projects while minimizing adverse impacts to the natural and cultural environment.



Optimize available funding and leverage alternative funding sources

Minimize impacts to the natural and cultural environments

Improve planning, programming and project delivery

Snapshot of Key Findings

Strategic Importance and Funding Trends

- Since the IIJA passed, Texas has made significant transportation investments in roads and bridges, public transit, EV charging, airports, and seaports and waterways.[104]
- The 2024 UTP includes a record $100 billion for more than 9,000 construction and major maintenance projects and an additional $34 billion to develop future projects, and an additional $7.5 billion in routine maintenance contracts.[105]
- Transportation needs often outweigh funding, emphasizing the importance of strategic planning. For more information on funding and investment forecasts, see **Chapter 8 - Transportation Investment Overview**.

Coordination with Other Plans

- Several statewide efforts are underway to strengthen stewardship and foster sustainability at TxDOT, including the Texas Carbon Reduction Strategy, Statewide Resiliency Plan, Statewide Active Transportation Plan, and Statewide Multimodal Transit Plan.

Collaboration with External Partner Agencies and the Public

- The public expressed an interest in transportation agencies considering public health in their decision-making and raised concerns regarding the environment, such as air quality, animal crossings, traffic noise, and extreme weather events.

Collaboration with TxDOT Divisions and Districts

- Key takeaways include the expectation for increasing transportation funding challenges and the need for leveraging technology, innovation, and partnerships.
- Districts indicated that effective communication and coordination will help not only with project delivery but also to support statewide long-range planning.



7

Connecting Texas 2050 | Statewide Long-Range Transportation Plan

Recommended Strategies

This chapter presents the strategy recommendations developed to put Texas on the path to achieving the Connecting Texas 2050 goals and objectives. These strategies are intended to be broad and applicable to the statewide system and its users.

7

Recommended Strategies

Strategy Development

Developing statewide strategies that align with the goals and address the transportation system's needs over the next 25 years is essential to achieving the *Connecting Texas 2050* vision. Strategy recommendations include policies, programs, and actions, which together represent the pathway for achieving the goals and objectives. These strategies encompass all modes of transportation and are intended to be broad and applicable to the statewide system and its users.

The *Connecting Texas 2050* Strategy Development process includes:

- A comprehensive consideration of strategies; strategies come from various modal plans and programs, stakeholder input, and best practices.
- The collaborative participation of external partner agencies and the public; stakeholder input helped to ensure recommendations reflect the vision and priorities across all regions.
- TxDOT divisions and districts review and refinement; districts and divisions vetted the recommendations to ensure that all recommendations are supportive of statewide policies and planning efforts.

The recommended strategies are grouped into eight themes that reflect federal planning requirements such as safety and preservation, state planning priorities such as technology and economic vitality (e.g., freight, border, job access), and cross-cutting areas such as resilience, planning, and collaboration. Whether a strategy supports one or multiple *Connecting Texas 2050* goals is also noted. Under each theme, the strategies are separated into **continued and/or expanded efforts**, which are ongoing or build upon existing activities that remain essential to addressing the goals and needs, and **additional opportunities** that could be considered in the future by TxDOT and its partner agencies.

Although TxDOT led the strategy development, many of the recommendations require collaboration and partnerships. Given *Connecting Texas 2050*'s comprehensive, statewide focus, many entities will need to participate in its implementation, including TxDOT, other state agencies, federal partners, MPOs, transit authorities, regional mobility authorities, localities, and the private sector.

1 Strengthen the safety and resilience of the state's transportation system

TxDOT is working alongside stakeholders and road users toward a future with zero traffic fatalities and serious injuries. Safety-focused strategies encompass actions that strengthen the safety of the state's transportation infrastructure and promote safe behaviors. *Connecting Texas 2050* identifies safety for all users as a system need. Thus, addressing safety for VRUs and first responders is an integral strategy. In addition, two other overarching themes directly related to safety are security and resilience. Those recommendations aim to prepare the transportation system to withstand the impacts of unforeseen events (e.g., extreme weather, terrorism, natural disaster) and enable quick recovery from disruptions.

Table 6: Continued and/or Expanded Efforts

Strategies	Safety	Preservation	Mobility	Connectivity	Economic Vitality	Stewardship
Enhance and expand public awareness campaigns, outreach, education, and training on safe use and operation of the Texas transportation system for all users, transit operators, construction workers, and first responders.	✓		✓			
Implement proven safety countermeasures and mitigation strategies identified in the Texas Strategic Highway Safety Plan, to achieve zero roadway fatalities.	✓					
Identify priority locations for critical infrastructure redesign and implementation of innovative designs.	✓	✓	✓			
Build safer accommodations for all users, to include VRUs, and remove barriers for non-motorized travel.	✓		✓	✓	✓	
Leverage partnerships between state, county, and local agencies to ensure safety is considered in project implementation.	✓					✓
Advance engineering solutions where possible to improve response time and safety for first responders.	✓		✓			
Enhance security monitoring and protection of critical digital assets through best practices and innovative technologies.	✓	✓				✓
Implement and monitor resilience and risk mitigation strategies identified in TxDOT's Transportation Asset Management Plan and the Statewide Resiliency Plan.	✓	✓	✓	✓		✓

Table 7: Additional Opportunities

Strategies	Safety	Preservation	Mobility	Connectivity	Economic Vitality	Stewardship
Incorporate resilient design considerations in TxDOT's Roadway Design Manual and Bridge Design Manual and advocate to incorporate in guidelines governing other modes.	✓	✓				✓
Evaluate approaches to adjust speed limits, depending on road characteristics, and consider variable speed limits based on operational and environmental conditions.	✓		✓			
Invest in and collaborate on shoreline protection projects.	✓	✓				✓

2 Expand the use of transportation technology and innovation to enhance system performance

TxDOT is focusing on leveraging technology and innovation to enhance safety and other performance goals. These recommendations in this theme emphasize actions that advance the integration of transportation technologies into the transportation system and leverage technologies and data to make more informed decisions. In addition, these strategies encourage the expansion of electric and low-emission vehicle infrastructure and broadband access. Through incentives and partnerships, these technology-focused strategies aim to enhance system performance by improving safety, enhancing system reliability, and increasing multimodal connectivity statewide.

Table 8: Continued and/or Expanded Efforts

Strategies	Safety	Preservation	Mobility	Connectivity	Economic Vitality	Stewardship
Leverage technology data and innovative tools to manage transportation assets effectively and efficiently.	✓	✓	✓	✓	✓	✓
Assess and support the integration of technology-based safety measures.	✓					
Leverage TSMO strategies and support districts to develop context-sensitive plans.	✓		✓			
Advance the deployment of emerging technologies and innovations through partnerships with public agencies and the private sector while leveraging existing infrastructure.	✓	✓	✓	✓	✓	✓
Support the adoption of alternative fuel vehicles and the strategic expansion of electric and low-emission vehicle infrastructure.					✓	✓
Identify opportunities to improve digital infrastructure and access to broadband through coordination and partnerships with the public sector and private entities.			✓	✓	✓	

Table 9: Additional Opportunities

Strategies	Safety	Preservation	Mobility	Connectivity	Economic Vitality	Stewardship
Incorporate emerging technology best practices into the Roadway Design Manual and other guidebooks.	✓	✓	✓	✓		✓
Develop statewide data-collection and management systems for bicycle and pedestrian information, including safety usage and infrastructure data to help identify network gaps and targeted improvements.	✓		✓	✓	✓	✓
Identify opportunities to advance mobility technologies through partnerships that enhance multimodal connectivity, system reliability, and supply chain efficiencies.			✓	✓	✓	

3 Promote freight infrastructure and intermodal connectivity for a prosperous future

The importance of expanded freight infrastructure is underscored in its role of supporting statewide economic growth and facilitating consistent and reliable freight transportation travel times. Consistent with the Texas Delivers 2050: Texas Freight Mobility Plan, these freight-focused strategies aim to strengthen the freight infrastructure network, ensuring intermodal facilities are prepared to handle increased throughput and intermodal transfer, and support expanded freight facilities while minimizing impacts to the communities. In addition, the recommendations support the establishment of a statewide Supply Chain Council consisting of industry representatives to advise various state agencies on a variety of supply chain challenges and opportunities.

Table 10: Continued and/or Expanded Efforts

Strategies	Safety	Preservation	Mobility	Connectivity	Economic Vitality	Stewardship
Identify new or expanded intermodal freight facilities to enhance multimodal connections between railroads, seaports, airports, and highways.	✓		✓	✓	✓	
Implement and monitor policy initiatives to address urban freight congestion and bottlenecks.	✓		✓		✓	✓
Implement and monitor policy initiatives to address freight transportation issues that are critical to rural areas and support rural economic development opportunities.		✓		✓	✓	✓
Improve statewide truck parking capacity and efficiency through partnerships, technology, and programmatic solutions.	✓	✓	✓		✓	✓
Evaluate policy initiatives and strategies to address freight movement safety on the Texas Multimodal Freight Network, including locations with high truck-related crashes, at-grade highway/rail crossings, damaged infrastructure, hazardous cargo, or VRUs.	✓			✓	✓	
Modernize freight infrastructure to accommodate unique localized needs on key supply chain corridors.	✓			✓	✓	
Strengthen internal and external outreach efforts with an emphasis on intermodal connections including expanded partnership with the freight industry and businesses to enhance the safest and optimal modal investments and operational decisions.	✓		✓	✓	✓	
Identify and document modal investment needs and funding sources for all freight transportation modes.						✓

Table 11: Additional Opportunities

Strategies	Safety	Preservation	Mobility	Connectivity	Economic Vitality	Stewardship
Proactively integrate freight considerations into the planning and implementation of future interstate routes, including I-14, I-27, and I-69.			✓	✓	✓	✓
Encourage a robust community impact assessment and outreach program related to freight movement and coordinate with environmental and safety programs and land use to enhance the incorporation of community considerations in all stages of freight planning and project development.	✓	✓		✓	✓	✓

4 Optimize investment in the multimodal transportation system to accommodate future growth

TxDOT recognizes the importance of optimizing investments to enhance the state's multimodal system. These recommendations include actions to work with other modal operators to coordinate plans and align funding options, maximize the use of competitive grants, and explore innovative financing mechanisms for transportation improvements. Improving transportation system connectivity by integrating active transportation into other transportation investments, developing corridor studies, and supporting the expansion of intercity transportation options is encouraged. Finally, these recommendations consider unique community needs and priorities, such as low-income and limited-mobility populations, and how they can be integrated into the transportation planning process.

Table 12: Continued and/or Expanded Efforts

Strategies	Safety	Preservation	Mobility	Connectivity	Economic Vitality	Stewardship
Explore opportunities to increase the flexibility of state funding for multimodal, people and freight transportation systems and services to deliver the right projects.			✓	✓	✓	✓
Explore new and innovative financing mechanisms to fund the expansion, maintenance, and improvements of multimodal and digital infrastructure.		✓	✓	✓		✓
Collaborate with partner agencies to maximize the use of discretionary grant opportunities for high-priority multimodal projects.				✓		✓
Support multimodal investments that align with community needs and priorities.	✓			✓	✓	✓
Expand bicycle and pedestrian networks with both roadway and standalone investments.	✓			✓	✓	
Develop and implement corridor studies along the multimodal Corridors of Statewide Significance, including, but not limited to, identifying critical infrastructure investment and ensuring environmental stewardship.	✓	✓	✓	✓	✓	✓

Table 13: Additional Opportunities

Strategies	Safety	Preservation	Mobility	Connectivity	Economic Vitality	Stewardship
Facilitate the interoperability of transit services across jurisdictional boundaries and service models.				✓	✓	
Explore and identify funding options to support the expansion of intercity passenger rail and bus operations through partnerships.			✓	✓	✓	✓
Develop strategic initiatives targeted at low-income and limited-mobility populations.			✓	✓	✓	✓

5 Enhance cross-border connectivity and operations

Advancing border connectivity and operations while preserving transportation assets is key to sustaining the movement of people and goods and the continued economic prosperity of the Texas-Mexico border region, as well as the United States and Mexico. The border strategies primarily build upon the policy and program recommendations outlined in the Texas-Mexico Border Transportation Master Plan. These border-specific strategies seek to improve coordination and collaboration with border partners to enhance mobility, reliability, operational performance, and security of the border region. These strategies include expanding the number of border crossings, reducing crossing wait times, promoting consistent operational procedures at each crossing location, and leveraging technology and innovation.

Table 14: Continued and/or Expanded Efforts

Strategies	Safety	Preservation	Mobility	Connectivity	Economic Vitality	Stewardship
Implement, reevaluate, and update policy recommendations outlined in the Texas-Mexico Border Transportation Master Plan.	✓	✓	✓	✓	✓	✓
Improve Texas-Mexico coordination, collaboration, and cooperation to improve mobility, reliability, operations, and security of the border region transportation system.	✓	✓	✓	✓	✓	✓

Table 15: Additional Opportunities

Strategies	Safety	Preservation	Mobility	Connectivity	Economic Vitality	Stewardship
Develop a comprehensive Texas-Mexico mechanism for enhancing the system capacity of existing border crossings and assessing the feasibility of new border crossings.	✓		✓	✓	✓	
Develop a comprehensive strategy to improve safety and enhance operational efficiency along designated Texas-Mexico multimodal transportation corridors.	✓		✓	✓		
Identify and implement strategies to enhance multimodal connectivity for first-mile/last-mile connections from border crossings to designated corridors and border communities and between border crossings for efficient border region trips.				✓	✓	
Develop Texas-Mexico asset management frameworks to preserve assets on the border transportation system.		✓				✓

6 Support workforce connections to jobs and develop and retain a skilled transportation workforce to meet future needs

The statewide needs assessment identified ensuring access to jobs and prioritizing transportation investment as important needs to support local economic vitality and the workforce. These recommendations emphasize improving workforce connections to jobs as part of the strategies that support plan's the Economic Vitality goal. One of the strategies recommends exploring ways to partner with the business community to integrate transportation services that meet workforce needs. In addition, these strategies promote workforce development that aligns with the future needs of the state, including expanding transportation apprenticeship programs, providing regular trainings for all employees and contractors, and continued professional development for experienced staff.

Table 16: Continued and/or Expanded Efforts

Strategies	Safety	Preservation	Mobility	Connectivity	Economic Vitality	Stewardship
Identify opportunities for TxDOT to support the expansion of statewide transportation apprenticeship programs between universities, colleges, and trade schools to meet the demands of the transportation industry.					✓	✓
Identify on-the-job training opportunities in various areas of the transportation industry and enhance rotation programs to broaden the understanding of various aspects of project planning, development, and implementation.					✓	✓
Prioritize investments that improve access to jobs throughout the state, including, but not limited to, critical connections to job centers and mobility hubs.					✓	✓
Explore opportunities to invest in locations for transportation infrastructure that will attract future businesses and jobs and support economic competitiveness.			✓	✓	✓	✓

Table 17: Additional Opportunities

Strategies	Safety	Preservation	Mobility	Connectivity	Economic Vitality	Stewardship
Support partnerships with the business community to provide transit services that meet workforce needs.	✓		✓	✓	✓	✓

7 Adapt the long-term planning process to better address evolving transportation challenges and leverage opportunities

These strategies focus on how the statewide long-range planning process can be adapted to meet the future needs of the state. Enhancing the performance-based planning process and strengthening district-level planning and collaboration are foundational to plan implementation. In addition, these strategies aspire to develop actions that address evolving transportation, public health, and environmental challenges in Texas. They also aim to ensure collaboration with a range of planning partners to maximize the integration of transportation and land use with strategies that are tailored to specific community needs and priorities.

Table 18: Continued and/or Expanded Efforts

Strategies	Safety	Preservation	Mobility	Connectivity	Economic Vitality	Stewardship
Enhance the performance-based planning process to deliver the right projects at the right time.	✓	✓	✓	✓	✓	✓
Implement all statewide transportation plans and programs in collaboration with district-level planning efforts and partners.						✓
Work closely with planning partners to advance the integration of multimodal transportation and corridor preservation with land use and future growth.		✓		✓	✓	✓
Advance the integration of transportation with public health and environmental stewardship through close coordination with local, regional, state, and federal agencies.	✓			✓		✓
Assess and mitigate environmental impacts on all TxDOT projects.		✓				✓

Table 19: Additional Opportunities

Strategies	Safety	Preservation	Mobility	Connectivity	Economic Vitality	Stewardship
Develop district-level, long-range transportation plans that consider unique needs, priorities, and characteristics.	✓	✓	✓	✓	✓	✓
Expand the use of scenario planning and statistically valid statewide and district surveys in the long-range planning process.	✓	✓	✓	✓	✓	✓

8 Enhance public and stakeholder collaboration and engagement to achieve the state's transportation vision and goals

These strategies focus on how Texas' transportation partners can work together within the statewide long-range planning process. They include creating modernized public and stakeholder engagement processes with the goal of increasing participation and ensuring that a range of safe and accessible in-person outreach strategies are available. Reinforcing the commitment to increased transparency between all stakeholders and strengthening collaboration with other agencies is important to achieving the visions and goals of the SLRTP. Finally, the recommendations include initiating an advisory group to guide the plan implementation and enhancing coordination with TxDOT Advisory Committees.

Table 20: Continued and/or Expanded Efforts

Strategies	Safety	Preservation	Mobility	Connectivity	Economic Vitality	Stewardship
Reinforce the commitment to increase transparency and communication between all transportation partners, stakeholders, and the public.						✓
Enhance customer engagement through a public-facing information sharing system to gain real-time understanding of Texans' needs, views, and priorities for their transportation system.	✓		✓	✓		✓
Expand the use of innovative public engagement techniques to reach diverse demographics and hard-to-reach population groups in the community to inform all planning and project efforts.						✓
Strengthen collaboration with other local, regional, and state agencies, peer states, federal transportation partners, and regulatory agencies.						✓

Table 21: Additional Opportunities

Strategies	Safety	Preservation	Mobility	Connectivity	Economic Vitality	Stewardship
Collaborate with TxDOT divisions and districts to initiate an advisory group to guide the implementation of *Connecting Texas 2050*.	✓	✓	✓	✓	✓	✓
Enhance coordination with TxDOT advisory committees to identify opportunities for collaboration and assist with overall implementation activities.	✓	✓	✓	✓	✓	✓

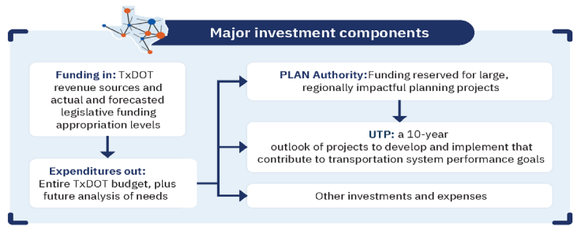


8 Transportation Investment Overview

Major multimodal transportation investments are needed to address transportation opportunities and challenges across the state through 2050. These investments will be crucial to achieving the *Connecting Texas 2050* goals and performance targets. While recent investments have reached historic levels, the continued pace of population and economic growth in Texas necessitates an ever-increasing amount of transportation facilities that will need to be funded, constructed, and maintained.

How TxDOT invests its resources today and how it leverages various funding sources will impact the transportation system of tomorrow. Anticipating the system's future needs puts a focus on the long-term resources that will be required, and it helps ensure that today's resources are effectively deployed. Planning for future resources includes considering uncertainties about the system's long-range needs and how needs may vary over time and across the regions of Texas.

The analysis in this plan takes a high-level approach to broadly estimate forecasted revenues and investments, and the impact that investments may have. The estimations are intended to guide strategic investment discussions and are not focused on short-term, project specific, investments.



The Need for Funding Analysis

***Connecting Texas 2050* includes:**

- A summary of high-level funding and investment forecasts.
- Broad levels of investment that will likely be needed to achieve the goals and performance measures established in the plan.
- An overview of potential long-range shortfalls and the continued need to ensure sufficient funding for transportation.

Why conduct this analysis:

- Anticipating the system's future needs puts a focus on the long-term resources that will be required, and it helps ensure that today's resources are effectively deployed. Planning for future resources includes considering uncertainties about the system's long-range needs, and how needs may vary over time and across regions of the Texas. High-level estimates are intended to guide strategic investment discussions and are not focused on short-term, project-specific, investments.

Figure 41: Planning and Programming Process (adapted from Table 1 of the FY23-26 Statewide Transportation Improvement Program)[106]

High-level Strategies

TxDOT Strategic Plan
Developed by: TxDOT
Approved by: Texas Transportation Commission
Planning horizon: 5 years
Update cycle: Every 2 years
Contains TxDOT's operational goals and strategies for achieving state goals and objectives.
Investment recommendations included: None.

Statewide Long-Range Transportation Plan
Developed by: TxDOT
Approved by: Texas Transportation Commission
Planning horizon: 24+ years
Update cycle: Every 4 years
Contains goals, objectives, performance measures, performance targets, and strategies to guide long-term multimodal transportation investments; incorporates elements from other plans listed.
Investment recommendations included: High-level unconstrained investment needs and a constrained investment component.

Metropolitan Transportation Plans (MTPs)/ Regional Transportation Plans (RTPs)
Developed by: MPO/RPO
Approved by: MPO/RPO Policy Board
Planning horizon: 20+ years
Update cycle: Every 4 years
Contains policies, program, and projects for development that respond to adopted goals and expenditures for state and federal funds over the next 20+ years.
Investment recommendations included: Unconstrained and constrained priority projects list.

Specific Investments and Project Development

Various Modal Plans and Corridor Studies
Developed by: TxDOT
Approved by: Varies
Planning horizon: Varies
Update cycle: Varies
Specific to a mode or corridor, contains goals, objectives, performance measures, and performance targets, and includes investment strategies and projects.
Investment recommendations included: May contain high-level unconstrained and constrained investment needs, and project-specific unconstrained and constrained investment needs.

Unified Transportation Program (UTP)
Developed by: TxDOT
Approved by: Texas Transportation Commission
Planning horizon: 10 years
Update cycle: Annual
Contains multimodal projects to be funded/implemented in a 10-year period in support of SLRTP strategies and performance targets.
Investment recommendations included: Based on forecast revenue projections, identifies projects that might receive funding and authorizes project development activities to prepare projects for future implementation.

Transportation Improvement Programs (TIPs)
Developed by: MPOs
Approved by: Governor (delegated to TxDOT)
Planning horizon: 4 years
Update cycle: Every 2 years
Contains multimodal transportation projects/ investments in support of performance targets.
Investment recommendations included: MPO's constrained program of projects that it expects to be funded and ready for construction in the next 4 years.

Rural TIPs – TxDOT
Developed by: TxDOT Districts
Approved by: Governor (delegated to TxDOT)
Planning horizon: 4 years
Update cycle: Every 2 years
Contains multimodal transportation projects/ investments in support of performance targets.
Investment recommendations included: RPO's constrained program of projects that it expects to be funded and ready for construction in the next 4 years.

Statewide Transportation Improvement Program (STIP)
Developed by: TxDOT
Approved by: FHWA/FTA
Planning horizon: 4 years
Update cycle: Every 2 years
Contains multimodal transportation projects/investments in support of performance targets.
Investment recommendations included: TxDOT's constrained program of projects that it expects to be funded and ready for construction in the next 4 years.

Project Delivery

Letting Schedule
Developed by: TxDOT
Approved by: Texas Transportation Commission
Planning horizon: 2 years
Update cycle: Annual
Contains projects from the STIP scheduled for letting based on funding decisions.
Investment recommendations included: TxDOT's 2-year letting schedule authorizes and administers project construction.

Transportation Funding Sources

TxDOT has a number of funding sources, each with different constitutional and statutory requirements. The table below provides descriptions, benefits of these sources, and challenges to consider in making sure transportation needs are adequately funded for the next few decades.

Table 22: Summary of Funding Programs at the State level

Funding Program	Primary Revenue	Additional Revenue	Uses	Modes	Challenges
State Highway Fund (SHF) (Dedicated) is TxDOT's primary funding source, established by Texas Constitution	Portion of State Motor Fuels Tax, lubricant sales tax, permit fees for special vehicles, motor vehicle registration fees, federal reimbursements, and local project participation funds	Propositions 1 and 7, State Infrastructure Bank (SIB) and regional subaccounts with toll and concession revenue	State right-of-way acquisition, planning, engineering, highway construction, and maintenance of public roadways other than toll roads (per Texas Constitution Section 7-a)	Constitutionally dedicated to public roadways, Section 7-a does not allow funds to be spent on other modes of transportation	State gas tax rate has been unchanged since 1991, has not kept up with inflation; not flexible, can't support other modes and alternative fuels Prop 1: Volatile tax revenues; fund transfers set to expire after FY 2043 Prop 7: Primary revenue component set to expire in FY 2042, additional revenue component expires in FY 2039
Federal Funds	Federal gasoline and diesel tax; supplemented with federal general revenue placed in Highway Trust Fund	IIJA provides targeted transportation funding for 5 years from FY 2022 through FY 2026	Reimbursements to TxDOT for payments on projects that meet certain federal requirements	All	Federal motor fuels tax rate unchanged since 1993, has not kept up with inflation
Texas Mobility Fund (TMF) established by Texas Constitution	Bonds, taxes, and fees		More flexible than other revenue sources, but not as flexible as non-dedicated SHF; includes miscellaneous public transportation expenditures as statutorily required; cannot be used for toll roads	All	Statutory requirements have reduced flexibility and diminished capacity of funds to issue bonds
SHF (Non-Dedicated) designated by statute, not the Texas Constitution	Special vehicle permit fees, sale of magazine publications, motor vehicle certificates, land sales, legal judgments and settlement, certain reimbursements, and other fees		TxDOT's most flexible source of funding; traditionally used to secure matching funds for federal dollars, which allow local governments (mostly rural) to obtain federal funding for multi-modal services	All	Limited revenue further constrained by statutorily annual transfer of $150 million out; many multimodal services have received the same level of funding for decades because of limited availability of non-constitutionally dedicated funds
General Revenue designated by statute in biennium appropriation bills	The state's General Revenue		To pay for exceptional items or legislative directives where other revenues are unavailable due to restrictions or if they have already been fully obligated	All	Competing with other state priorities for limited revenue allocations determined by the legislature.

Funding Levels

The Texas transportation system faces challenges like never before. Factors like inflation, a growing population, an aging infrastructure, and more fuel-efficient vehicles are stretching current funding sources.

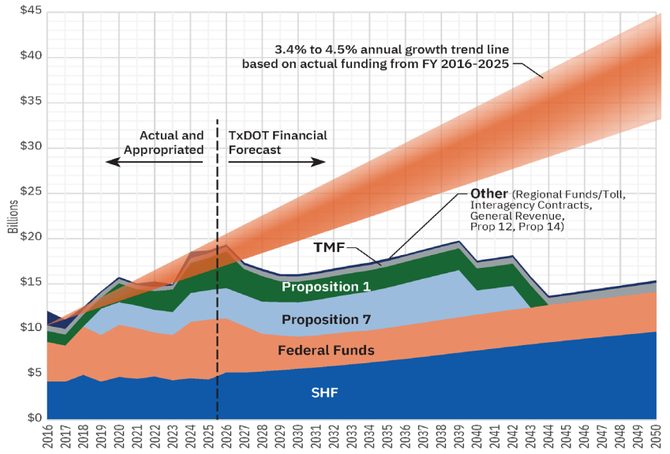
A healthy and reliable transportation system is critical for Texas, now and in the future. However, solving funding challenges will require a multi-level approach, with all Texans involved in the planning process.

The 88th Texas Legislature (Regular Session, 2023), with its record-high level of funding for general-purpose spending in the 2024-25 biennium, supported TxDOT's mission and reaffirmed its commitment to state transportation infrastructure by investing $32.7 billion in funding for the development, delivery, and maintenance of state transportation projects.[107]

Actual and appropriated funding levels through FY 2025 and conservative forecasts for years beyond 2025, developed by TxDOT Financial Management Division, are shown in **Figure 42**.[108] A more optimistic outlook would be a continued growth in funding levels, as seen in recent years, which would equate to nearly twice the funding by 2047.

Figure 42: TxDOT Funding Forecast

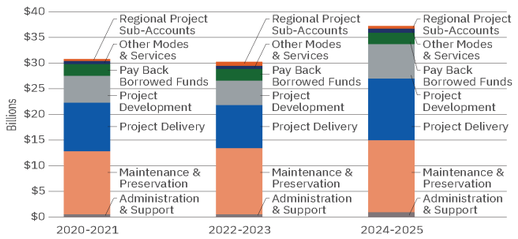
Entire TxDOT funding is a combination of the funding sources summarized on the previous page and depicted in the chart below.



Funding Uses

The funding described in the previous section is allocated to various programs in the biennial budget appropriations. The uses are consolidated into the general funding use categories shown in **Figure 43**.[109] All of these categories have seen funding increases in the recent biennial budgets with the exception of pay back of borrowed funds and regional project sub-accounts.

Figure 43: TxDOT Funding Uses



Record amount of multimodal Funding in the 2024-2025 Biennial Budget, a significant portion from General Revenue funding source[110]

- $287 million for aviation services
- $272 million for public transportation
- $642 million for maritime
  - $400 million for Ship Channel Improvement Revolving Loan Program
  - $200 million for Maritime Infrastructure Program
  - $2 million for GIWW
  - $40 million for Seaport Connectivity Program
- $21 million to enhance rail transportation

Many of the funding and grant programs that contribute to the total TxDOT budget have specific eligibility requirements. Some of these funding and grant programs are listed below.

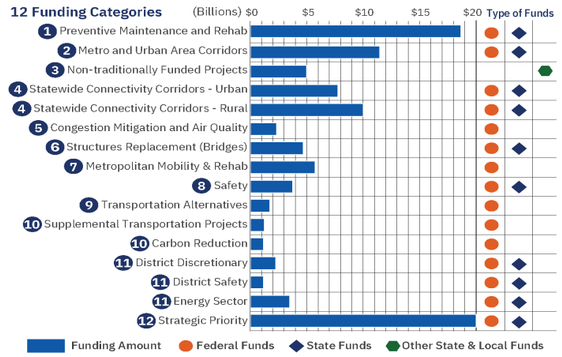
Funding and Grant Programs[111]

- 2020 County Transportation Infrastructure Fund Grant Program
- Transportation Alternatives Set-Aside Program
- Traffic Safety Electronic Grants Management System
- Aviation Grants
- Routine Airport Maintenance Program
- Public Transportation Grant Programs
- Rural Public Transportation
- Intercity Bus
- Enhanced Mobility of Seniors and Individuals with Disabilities
- Planning and Research
- Small Urban Public Transportation
- Bridge Formula Program
- SIB Transportation Loan Program
- Emergency Relief Programs
- Seaport Connectivity Program
- Rebuilding American Infrastructure with Sustainability and Equity
- Bridge Investment Program
- Strengthening Mobility and Revolutionizing Transportation
- Multimodal Project Discretionary Grant
- Intercity Passenger Rail Corridor Identification and Development Program
- Rail Crossing Elimination Grant Program
- Low and No Emission and Grants for Buses and Bus Facilities Programs
- Consolidated Rail Infrastructure & Safety Improvements
- Promoting Resilient Operations for Transformative Efficient, and Cost-saving Transportation Program
- Wildlife Crossings Program

Unified Transportation Program

A significant portion of TxDOT's overall biennial budget is allocated to construction and major maintenance projects. To help in selecting the right projects and proactively positioning these projects for timely execution once funded, TxDOT prepares a 10-year program of selected projects to advance through project development and on to the letting schedule. This program is referred to as the UTP, is updated annually, and approved by the Texas Transportation Commission. As of December 2023, TxDOT has over $38 billion in active construction contracts for roads and bridges identified through previous UTP updates. In the latest 2024 UTP update, the Texas Transportation Commission authorized TxDOT to program a $15.5 billion increase in funding over the 2023 UTP for a record total of $100.6 billion towards construction and major maintenance projects, $34.2 billion for developing future projects, and $7.5 billion for routine maintenance contracts over the next 10 years, FY 2024-2033.[112]

Figure 44: 2024 UTP Allocations



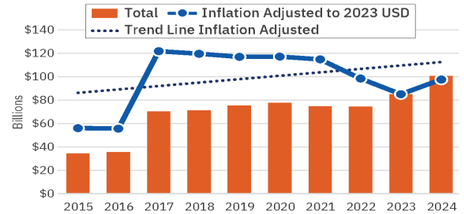
Trends in Recent UTP Totals

Over the past several years, investments have grown significantly for certain categories to better address goals and performance targets.

- Cat 1 – Preventive Maintenance and Rehab has increased over $4.8 billion (35%) since 2017.
- Cat 4 – Statewide Connectivity Corridors has increased over $6.1 billion (53%) since 2017.
- Cat 9 – Transportation Alternatives has increased over $1.2 billion (247%) since 2017.
- Cat 10 – Supplemental Transportation Projects has increased over $1.8 billion (337%) since 2017.
- Cat 11 – District Discretionary has increased over $2.9 billion (74%) since 2017.

The last 2 years have seen historic levels of UTP investment. The 2024 UTP is 43% higher than in 2017. However, recent high construction cost inflation, as documented in TxDOT's annual Highway Cost Index Report, has negatively impacted the purchasing power of these historic investment levels, as shown in **Figure 45**.[113]

Figure 45: UTP Investments (10-year Program Totals)



Note: Inflation based on TxDOT Highway Cost Index Report, January 2024.

UTP Analysis – Minimum Investment Level for 2050 Targets

To understand how much UTP funding may be needed to achieve the desired transportation system of the future, *Connecting Texas 2050* developed an investment analysis. The analysis was based on the estimated relationship between investment amounts and transportation system performance. With predetermined performance targets, the corresponding investment amounts were calculated. This analysis is useful for considering high-level funding estimates to help achieve desired long-term outcomes in support of *Connecting Texas 2050* goals.

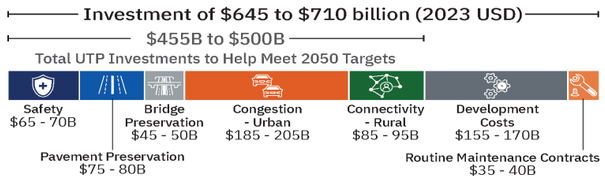
Table 23 lists the 2033 and 2050 targets for key performance measures related to safety, preservation, and mobility goals.

Table 23: TxDOT Performance Targets

Performance Measure	UTP 2033 Target	SLRTP 2050 Target	Performance Area
Fatality Count	2,031	0	Safety
Fatality Rate	0.90	0	Safety
% Good or Better Pavement	90.0%	90.0%	Preservation: Pavement
Statewide Bridge Condition Score	90.0	90.0	Preservation: Bridge
Urban Congestion Index	1.20	1.15	Mobility: Urban
Rural Reliability Index	1.12	1.12	Mobility: Rural

Investment analytics were based on the 2024 UTP Investment Level Analysis to Achieve Preliminary Targets (2020 Model) tool. This tool utilizes widely used asset management tools, historic performance and investment data, and general assumptions regarding the impact investments can have on the performance of the transportation system. The tool helped calculate the high-level estimates of minimum total investments required to help achieve the 2050 performance targets. Given the gap in time from when a project is funded to when construction is complete and contributes to improved performance, the total investments are assumed over a 22-year period from 2025 through 2046. Individual 10-year UTP totals will be an increment of this total amount. **Figure 46** illustrates the minimum total investments for each performance area (in 2023 U.S. dollars). Urban mobility has the highest value between $185 to $205 billion. Rural mobility, safety, and pavement preservation require similar levels of investments in the range of $65 to $95 billion. Bridge preservation accounts for the least amount of investment between $45 to $50 billion. The investments add up to around $455 to $500 billion, which averages to $215 billion per 10-year UTP. Funding is also needed to prepare UTP projects for construction, referred to as development cost. Routine maintenance contracts are funded by an additional category of funds that help to preserve the performance of previous investments. Development costs and routine maintenance contracts are estimated as a percentage of total capital investments and projected to need $155 to $170 billion and $35 to $40 billion, respectively.

Figure 46: Minimum Investment Level (2023 USD) Needed Through 2046 to Help Meet 2050 Targets



UTP Investment Scenarios

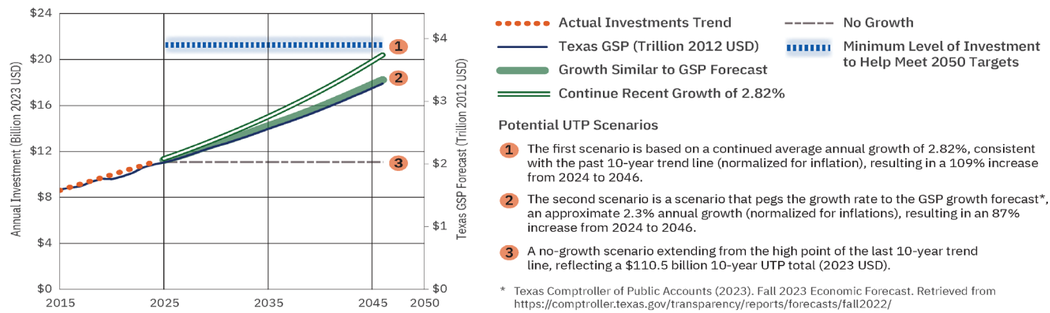
Considering recent trends, three investment growth scenarios were evaluated in relation to the minimum level of UTP investments that may be needed to help achieve 2050 performance targets, as shown in **Figure 47**. To simplify the analysis of trends and scenarios, the 10-year UTP investment values have been annualized over 10 years to show individual fiscal year investments. Values are shown in 2023 U.S. dollars and actual historical values have been adjusted for highway construction cost inflation. Development costs and routine maintenance contract costs are in addition to the UTP investment described in these scenarios.

UTP investments, normalized for inflation, from 2015 to 2023 have grown with an average trend line of 2.82% annual increase. Using this trend line as an approximation for recent investments, **Figure 47** depicts three future scenarios out to 2046. The end year of 2046 is used because projects funded after 2047 likely will not be completed and contributing to system performance by 2050.

The first scenario, continuing the recent UTP growth trend, comes closest to meeting system performance goals but still falls short of the estimated minimum level of investment to meet 2050 targets. This scenario has a total investment shortfall over the 22-year period of $140 billion (2023 U.S. dollars). In any scenario, the level of investments for each of the 12 UTP categories over that time will need to vary from year to year depending on observed performance trends to ensure investment growth is most effectively used toward achieving the performance targets.

Figure 47: Potential UTP Scenarios (2023 USD)

These scenarios illustrate annual UTP funding levels and not the entire 10-year UTP value. To meet the minimum level of investment shown below, an average of approximately $21.5 billion (2023 USD) annually would need to be invested over the next 22 years.



Potential UTP Scenarios

1. The first scenario is based on a continued average annual growth of 2.82%, consistent with the past 10-year trend line (normalized for inflation), resulting in a 109% increase from 2024 to 2046.
2. The second scenario is a scenario that pegs the growth rate to the GSP growth forecast*, an approximate 2.3% annual growth (normalized for inflations), resulting in an 87% increase from 2024 to 2046.
3. A no-growth scenario extending from the high point of the last 10-year trend line, reflecting a $110.5 billion 10-year UTP total (2023 USD).

* Texas Comptroller of Public Accounts (2023). Fall 2023 Economic Forecast. Retrieved from https://comptroller.texas.gov/transparency/reports/forecasts/fall2022/

Recommendations and Strategies

The recent increases in TxDOT's budget are crucial toward meeting future challenges in maintaining and expanding the Texas transportation system. In addition to the budget increases, the Texas Legislature has also expanded TxDOT's budget flexibility, which will help increase efficiencies in delivering the right projects and more easily support new federal programs and initiatives.

Other recent benefits from the budget include increasing the number of employees, bolstering cybersecurity, increasing fleet funding, supporting building construction and rehabilitation, technological upgrades, and $1.2 billion in general revenue for aviation, public transportation, rail, and maritime activities.

In addition to these recent initiatives to bolster funding, some strategies for securing additional funding and ensuring the efficient use of funds are listed below:

- Identify innovative and reliable revenue sources to achieve the ambitious funding levels needed to meet TxDOT's goals.
- Closely monitor performance based on levels of investment to improve insights on how to most effectively allocate funding across the many programs and deliver the right projects to meet the desired performance.
- Consider sustainable alternative funding sources that are readily feasible to integrate today, such as funding programs covering alternative fuels and road use charging.
- Fully leverage federal funding sources and advocate for new federal funding programs and policies that fit the diverse multimodal needs across Texas.
- Use the recent funding growth trends to project reasonable levels of funding that can justify associated PLAN Authority.

PLAN Authority

Prior to projects reaching the UTP, where funding is authorized for developing and constructing projects, a planning step sets the stage for more evaluation of significant corridors to prioritize investments and planning projects that will further TxDOT goals as outlined in this plan.

- PLAN Authority is reserved for large, regionally impactful planning projects requiring long lead times for development and major funding commitments. It is prioritized for IH, US, and SH corridors.

Standard PLAN Authority Activities

- Corridor studies
- Route studies
- Preliminary engineering for schematics
- Preliminary environmental review
- Preliminary utility investigations and coordination
- Preliminary right-of-way scoping
- Planning-level cost estimates

These activities help to identify and make projects ready for the UTP
Does not authorize right-of-way acquisition nor final design

- *Connecting Texas 2050* has identified Corridors of Statewide Significance. This identification supports prioritizing limited PLAN Authority funding for studies along these corridors that will directly contribute to identifying and preparing for projects that will support *Connecting Texas 2050* goals.
- Incorporate the designation of and unique needs of the Corridors of Statewide Significance into PLAN Authority investment strategies.

High-level Corridors of Statewide Significance Investment Outlook

Corridors of Statewide Significance play a crucial role in connecting different regions and facilitating the movement of people and goods across Texas. **Chapter 3** identified the Corridors of Statewide Significance, which are those corridors that provide a greater contribution to multimodal connectivity in Texas. Designating them as Corridors of Statewide Significance helps elevate them in terms of priority for future study and the implementation of improvement projects.

PLAN Authority provides a means for funding studies and preparing projects. PLAN Authority funds are crucial for rural areas outside of MPO area boundaries because these rural areas do not have the same resources for long-term planning activities to prepare a project for consideration in the UTP.

Given the forecasted growth of Texas population and economy, as well as the demands in preserving these corridors' function, there are significant long-term needs that need to be considered. *Connecting Texas 2050* includes a high-level analysis of potential investment scenarios to assess funding gaps and evaluate potential PLAN Authority funding needs.

This high-level investment analysis is simplified for the purpose of this plan by evaluating a rough order of magnitude, per-mile cost of upgrading various corridor types, see **Table 24**. The corridor types are based on various highway classifications. Cost estimates are in 2023 U.S. dollars.

The total investments shown in the table are for overall corridor upgrades and are not directly correlated to the minimum level of investments needed to obtain the statewide performance targets shown in **Figure 46**.

In addition to these upgrades, some corridors may include a new relief route. Due to the large variation in cost for these "greenfield" locations, they are not included in this analysis.

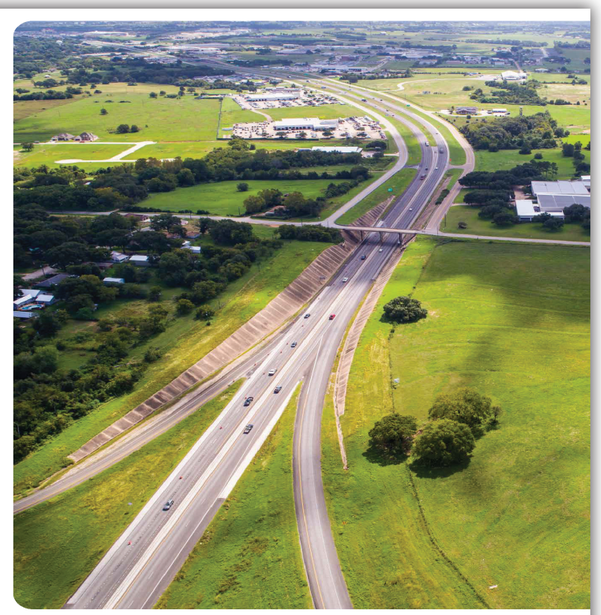
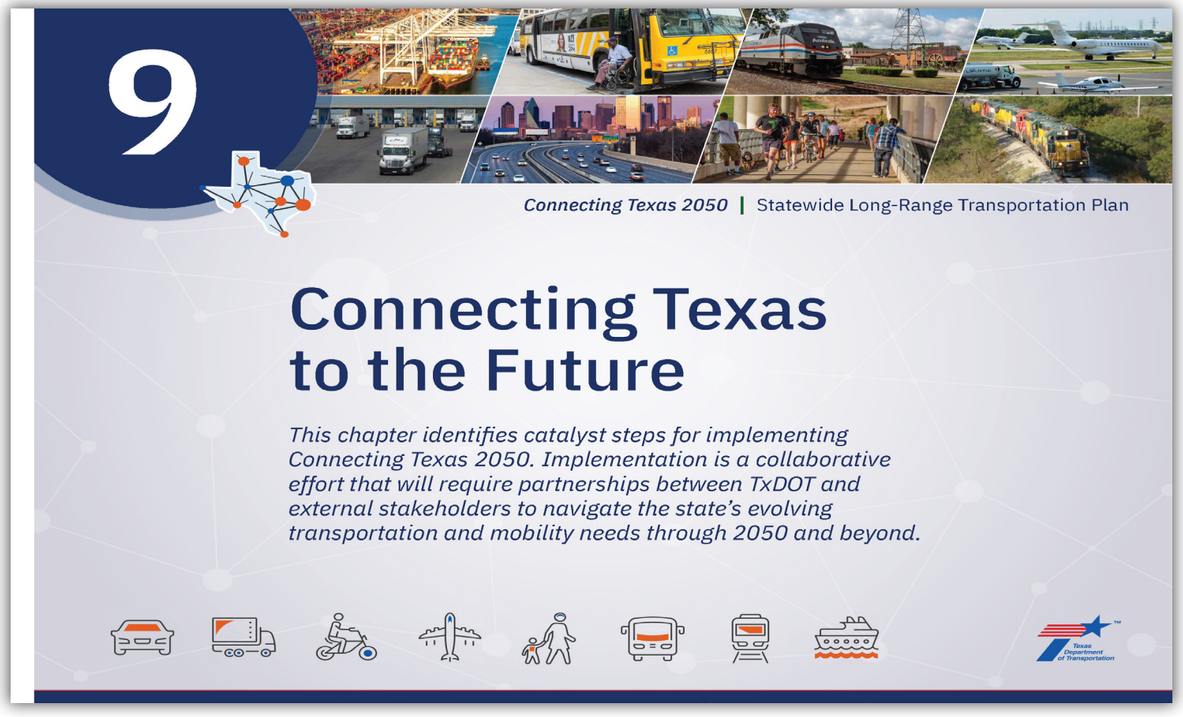


Table 24: High-level Estimates for Corridors of Statewide Significance

Type of Improvement	Number of Miles on Corridors of Statewide Significance	Per-mile Rough Order Project Cost Estimate, $M - Low	Per-mile Rough Order Project Cost Estimate, $M - High	Planning Level Construction Cost Estimate, $M - Low	Planning Level Construction Cost Estimate, $M - High	PLAN Authority Need, $M (30% of construction cost) - Low	PLAN Authority Need, $M (30% of construction cost) - High	Total Cost Estimate, $M (Construction + Planning & Design) - Low	Total Cost Estimate, $M (Construction + Planning & Design) - High
Upgrade existing two-lane to four-lane divided	5,883	$17	$21	$100,011	$123,543	$30,003	$37,063	$130,014	$160,606
Upgrade existing four-lane undivided to four-lane divided highway	1,072	$24	$29	$25,728	$31,088	$7,718	$9,326	$33,446	$40,414
Existing two-lane or "super two" to four-lane freeway (interstate standards)	1,011	$51	$61	$51,561	$61,671	$15,468	$18,501	$67,029	$80,172
Existing four-lane undivided to four-lane freeway (interstate standards)	326	$58	$70	$18,908	$22,820	$5,672	$6,846	$24,580	$29,666
Existing four-lane divided to four-lane freeway (interstate standards)	2,532	$67	$81	$169,644	$205,092	$50,893	$61,528	$220,537	$266,620
Add two additional lanes to a four-lane freeway	1,782	$9	$10	$16,038	$17,820	$4,811	$5,346	$20,849	$23,166
Add two additional lanes to a six-plus lane freeway	47	$10	$12	$470	$564	$141	$169	$611	$733
Totals	**12,653**	**n/a**	**n/a**	**$382,360**	**$462,598**	**$114,708**	**$138,779**	**$497,068**	**$601,377**



9 Connecting Texas to the Future

Connecting people and goods to the future, and ultimately delivering a world class transportation system, involves transitioning the *Connecting Texas 2050* vision, goals, objectives, and strategies from concept to reality. To advance the performance and strategic goals, implementation will require a collaborative approach consisting of TxDOT-led and TxDOT-supported efforts. While *Connecting Texas 2050* outlines numerous strategies to address needs over the next two and a half decades, the following steps serve as the catalyst for implementation.



Catalysts for Implementation

1. Strengthen Collaboration and Partnerships
2. Enhance Project Delivery and Accountability
3. Adapt the Planning Approach for the Future Transportation System
4. Execute!



1 Strengthen Collaboration and Partnerships

Collaboration and partnerships are crucial to implementing *Connecting Texas 2050*. This overarching concept includes international coordination, cross-agency coordination, multimodal collaboration, and TxDOT division and district-level coordination. Equally important are the contributions that advisory committees, working groups, and task forces have in shaping transportation policy. Embracing input from diverse stakeholders, agencies, organizations, and private industry encourages the exchange of information leading to more effective and efficient statewide transportation investments. The following are critical partnerships to support the continuing, comprehensive, and cooperative multimodal planning process to meet the state's growing population and economy.

- **Global coordination:** As one of strongest and most diverse economies in the nation, and the 8th largest economy in the world, fostering global and international coordination is critical to Texas' continued economic growth and success.
- **Cross-agency coordination:** On-going communication between government agencies helps ensure that statewide planning efforts are integrated and cohesive, avoiding duplication and promoting efficient use of financial and physical resources.
- **Multimodal collaboration:** The integration of all modes—including road, freight and passenger rail, biking, walking, transit, air, and water—will improve the overall safety, efficiency, accessibility, sustainability, and resiliency of the transportation system.
- **TxDOT division- and district-level coordination:** While coordination with external partners is important, it is equally important to support on-going efforts to enhance internal TxDOT communication, between divisions, as well as with all 25 districts, to help address regional and statewide challenges and strengthen the delivery of the right transportation investments and policies.
- **Advisory committees, working groups, and task forces:** Leveraging the knowledge of elected officials and industry leaders is critical to ensuring that Texas is prepared to meet transportation challenges and opportunities over the next 25 years and successfully implementing *Connecting Texas 2050*.

Catalysts for Implementation

- **Engage Advisory Committees, Working Groups, Task Forces.** To help guide *Connecting Texas 2050*, Advisory Committee chairs met regularly to coordinate across modes and shape the plan's multimodal strategies. These meetings should continue on a regular basis to further strengthen statewide multimodal planning and coordination, in addition to help ensure that the *Connecting Texas 2050* strategies advance from concept to reality.
- **Strengthen MPO and RPO partnerships across the state.** MPOs and RPOs play an integral part in the delivery of critical regional and statewide multimodal infrastructure investments. Coordination with MPOs and RPOs on their TIPs and the STIP is an important component of the statewide planning process. TxDOT is committed to enhance and streamline TIP and STIP coordination to ensure critical transportation investments are planned, designed, and constructed in a timely and efficient manner.
- **Leverage stakeholder input to identify legislative and policy priorities.** Effectively accomplishing some of the *Connecting Texas 2050* strategies, specifically accommodating future technology, mobility services, and sufficient levels of funding may require legislative and policy changes to ensure the strategies are translated into actionable initiatives. Collaboration between advisory committees and task forces is one way to inform stakeholders regarding future actions that will be needed to support the implementation of the plan.

2 Enhance Project Delivery and Accountability

Connecting Texas 2050 is the cornerstone planning document at TxDOT. The plan is focused on enhancing the movement of people and goods, and performance monitoring is a crucial aspect to delivering results that align with the plan goals and objectives.

Consistent with FHWA's Transportation Performance Management process, performance accountability helps deliver a better performing transportation system that supports connected and productive communities. The systematic tracking and evaluation of the transportation system's performance measures such as safety statistics, travel times, congestion delay, and environmental impacts, and monitoring the impact various funding levels have on performance, will inform project scoring and decision-making, help establish priorities, and identify areas or modes requiring greater focus or investment.

TxDOT is committed to enhancing project planning, design and engineering, and efficient project delivery to ensure future investments address the unique and diverse transportation needs and challenges across the state.



Catalysts for Implementation

- **Continue to optimize performance-based planning.** *Connecting Texas 2050* establishes performance and strategic goals to guide future transportation planning, decision-making, and investment. Moving forward, TxDOT will continue to evaluate and strengthen the performance-based planning process that emphasizes data-driven decision-making. This includes continuing to work with TxDOT divisions to establish performance measures and progress tracking to guide investment prioritization and resource allocation.
- **Develop district-level or regional transportation plans.** District or regional transportation plans can address each TxDOT district's unique characteristics, needs, and priorities and provide guidance for future context-sensitive transportation investments. These plans can play an integral part in informing the statewide long-range planning process, and will be especially helpful in supporting local and regional planning efforts in areas outside of MPO boundaries. The plans will be used to proactively identify where future population and employment growth is likely, and the appropriate transportation strategies to accommodate that growth.
- **Enhance SLRTP monitoring and reporting.** Accountability and transparency are important to ensuring the *Connecting Texas 2050* strategies become reality. TxDOT is committed to ongoing progress tracking using established performance measures, new measures, and enhanced project scoring to support implementation. To document progress toward achieving the plan goals, objectives, and strategies, the TPP Division will align annual reporting with *Connecting Texas 2050* and present it to TxDOT Administration, the Joint Executive Steering Committee, divisions, and districts. This will provide an opportunity to highlight successes, identify how new federal and/or state laws may impact the long-range planning process, establish transportation planning emphasis areas for the year, and identify any plan refinements.

3 Adapt the Planning Approach for the Future Transportation System

The transportation landscape has rapidly evolved over recent decades as seen in new forms of mobility, such as electric vehicles, on-demand and rideshare services, and micromobility that are now commonplace. New technology and innovation continue to push the envelope and are creating new ways to efficiently move people and goods, such as autonomous freight vehicles and drone deliveries that are already operating daily in Texas. Additionally, the COVID pandemic exposed significant weaknesses in the global supply chain, and it highlighted the critical linkage between our transportation system and the state and global economies. Extreme weather events, which have increased in frequency and intensity, highlight the need to incorporate resiliency into our system.

Much like mobility options have evolved over time, our approach to prepare the transportation system of tomorrow must also evolve. Technology and innovation must be at the forefront of planning and project delivery. One example of this commitment is the recent formation of the AAM Committee, which is tasked with assessing current state law and identifying potential changes needed to facilitate the development of UAM operations and infrastructure across Texas. Additionally, TxDOT is constantly exploring ways to enhance the planning, design, construction, and maintenance processes to efficiently deliver a resilient, reliable multimodal transportation system.

Catalysts for Implementation

- **Leverage reliable and consistent transportation data.** A successful performance-based planning process requires reliable and accurate real-time data. As such, TxDOT will enhance the coordination and consistent use of transportation data, socioeconomic projections, travel demand modeling results, and performance measures to ensure better outcomes and enhance project delivery. This will include establishing an integrated schedule for updating forecasts to inform future long-range planning efforts. These efforts will result in the use of more consistent data that will strengthen statewide planning and advance planning and programming at the district level.
- **Expand scenario planning to enhance future planning efforts.** *Connecting Texas 2050* leveraged scenario planning to help identify and address drivers of change and to prepare for an uncertain future. This process represented the early stages of TxDOT's efforts to make scenario planning a focal point of an integrated multimodal planning process. Continuing to develop and incorporate scenarios into all facets of planning will strengthen operational and investment effectiveness and system resilience.
- **Maximize public and stakeholder involvement to inform future planning and programming.** *Connecting Texas 2050* incorporated the use of a statistically valid survey that obtained over 4,500 statewide responses that reflected Texas' key demographics, helping to ensure that everyone's perspective was heard. Building on this success, statistically valid surveys may become a standard practice to analyze key trends and inform future transportation planning and policy. This update also utlized a series of traveling roadshows, where the planning team visited with community members across the state informally at events such as tradeshows, libraries, and festivals. Additionally, the plan leveraged email outreach more significantly and strategically than previous updates to generate interest and feedback. As part of the next plan update, TxDOT will explore opportunities to expand the use of these tools and other innovative concepts to maximize the return on investment of future engagement efforts.
- **Integrate modal planning and the SLRTP.** Long-range planning is a continuous and iterative process and future modal plan updates will help inform and refine future SLRTP updates. Conversely, the SLRTP will help inform future modal plan updates. For example, TxDOT is currently developing a Statewide Active Transportation Plan, Statewide Multimodal Transit Plan, and a Statewide Resiliency Plan. The detailed analysis, recommendations, and performance measures from *Connecting Texas 2050* will inform these respective plans. Once complete, these plans will be incorporated into the integrated and continuous long-range planning cycle to strengthen statewide and modal planning efforts.

4 Execute!

Achieving the vision and goals in *Connecting Texas 2050* will largely depend on how well the plan helps advance the selection and delivery of multimodal projects from concept to reality. While recent transportation investments at historic levels will help preserve critical infrastructure and enhance safety, mobility, and connectivity, there are still significant long-term needs that must be addressed to further advance the safe and efficient movement of people and goods statewide. In addition, new technologies' impacts will require sufficient funding, investment, and policies to ensure they effectively deliver on *Connecting Texas 2050* goals.

Catalysts for Implementation

- **Continue to efficiently deliver planning and programming efforts that lead to projects in the UTP.** Securing adequate funding may require a combination of public funding, grants, public private partnerships, and innovative financing mechanisms. Securing necessary funding to support all transportation modes will greatly contribute to achieving *Connecting Texas 2050* goals, leading to improved transportation infrastructure, safer facilities, more reliable travel times, a more resilient supply chain, and an overall improved quality of life for residents across the state.
- **Continue to maximize the use of transportation funds to support the long-term goals.** Working with other modal operators to align funding options will become increasingly important over the next decade as *Connecting Texas 2050* has highlighted the importance of an integrated approach to leverage all modes in meeting rapidly growing transportation demands and as new transportation technologies become more prevalent. The department's, and the overall transportation industry's ability to quickly adapt to the ever-evolving transportation landscape will be critical in measuring the plan's overall success.

Implementation Timelines

In conclusion, to effectively implement ongoing, short-, mid-, and long-term strategies within *Connecting Texas 2050*, a structured approach is essential.

- Ongoing and short-term strategies are most likely to require immediate action, focusing on quick wins that align with the broader vision of *Connecting Texas 2050*. These strategies are likely to reinforce the continuation of efforts that are already in place and may include opportunities to enhance or expand select strategies to advance the Department's vision.
- Mid-term strategies will likely necessitate a more detailed planning process, often involving stakeholder engagement, funding acquisition, and the initiation or development of larger infrastructure projects. These mid-term strategies, along with short-term strategies, may be ideal opportunities for TxDOT to advance the goals of *Connecting Texas 2050* by incorporating more detailed implementation steps in TxDOT's 5-year Strategic Plan.
- Long-term strategies are the most complex, requiring ongoing planning, evaluation, and adaptation to technological advancements and demographic shifts. They also are likely to need robust financial planning, stakeholder support, and policy/legislative support to ensure effective project delivery and programming efforts that lead to projects in the UTP.

Across all timeframes, public and stakeholder engagement, coordination with modal planning efforts, and continuous monitoring are crucial for meeting the overarching goals of *Connecting Texas 2050*. These implementation timeframes will be continuous, ensuring a cohesive and comprehensive approach to meeting or exceeding targets established in *Connecting Texas 2050*.

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