Texas Department of Transportation

Corridor Planning Guidebook

Transportation Planning and Programming Division | Freight, International Trade & Connectivity Section
Corridor Planning Branch

March 2025

Table of Contents

1 Introduction

Statewide Corridor Planning Program

The Texas Department of Transportation (TxDOT) Transportation Planning and Programming (TPP) Division's Corridor Planning Branch (CPB) is responsible for developing the state's comprehensive and multimodal corridor planning program.

CPB performs high-level statewide analysis of corridors using a performance-based data-driven planning approach that evaluates and prioritizes current and future multimodal transportation needs. Needs are evaluated for various transportation modes including passenger vehicles, commercial vehicles, transit, bike, pedestrian, railroad, aviation, and maritime.

Corridor evaluations are conducted through feasibility studies, route studies, and corridor studies. These studies focus on a mix of transportation needs as they relate to the complex economic, demographic, and social characteristics of communities within the corridor. Preliminary environmental reviews and design efforts may also be conducted as part of these studies.

Performance-based planning, according to the Federal Highway Administration (FHWA), applies performance management principles to transportation system policy and investment decisions, providing a link between management and long-range decisions about policies and investments that an agency makes in its transportation system.

For TxDOT's Statewide Corridor Planning Program, this means applying sound, quantifiable measures that help inform the identification and evaluation of potential multimodal transportation investments along with qualitative analysis and professional judgment.

How it All Fits Together

The Statewide Corridor Planning Program supports TxDOT's effort to provide safe, reliable, efficient travel to and from urban and rural areas, industrial areas, agricultural production areas, oil and gas production areas, lumber production areas, maritime ports, airports, and border ports of entry. TPP fulfills the duty of evaluating corridors from a multimodal and geographical point of view to ensure a holistic approach to the health and safety of its network.

TxDOT's Corridor Planning Program links the Statewide Long-Range Transportation Plan (SLRTP) and the Unified Transportation Program (UTP) by evaluating the movement of both people and goods along Texas' corridors and identifying needed improvements. **Figure 1-1** shows the relationship between the SLRTP, the UTP, corridor studies, and the modal plans that feed into these programs.

Figure 1-1 Multimodal Transportation Planning at TxDOT

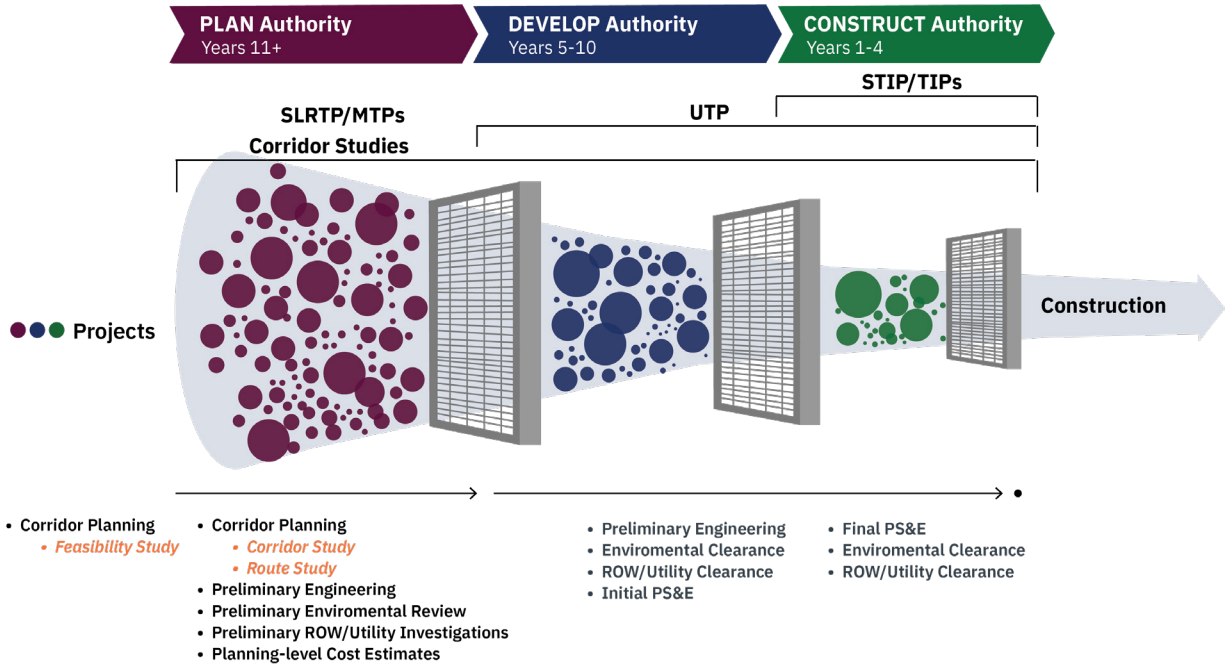
*To be developed or in development

TxDOT's Project Development Process and Levels of Funding Authority

Transportation projects are identified years in advance of their actual funding and construction through long-range planning studies (corridor studies, route studies, and feasibility studies). Project needs identified through these studies are evaluated on their ability to meet the goals and objectives of the SLRTP and may proceed through TxDOT's project development phases: programming, preliminary engineering, final design, letting, and construction. The Project Development Process Manual (PDP Manual) provides additional information on these phases and related activities.

As shown in **Figure 1-2**, project development activities may be funded through TxDOT's three major stages of project authorization: PLAN Authority, DEVELOP Authority, and CONSTRUCT Authority. PLAN Authority corresponds to project development outside the 10-year UTP and supports TxDOT's long-range transportation planning efforts such as corridor and route studies. Feasibility studies, can be programmed within the 10-year UTP with the estimated let date as the anticipated year the study will be completed. TPP's role is to review the feasibility study's scope for statewide consistency, and TPP's Corridor Planning consultant contracts may be used for these three types of planning studies as needed.

Figure 1-2 TxDOT's Project Development and Levels of Funding Authority



Note: Long-term = Statewide Long-Range Transportation Plan (SLRTP) and Metropolitan Transportation Plans (MTP), Mid-term = Unified Transportation Program (UTP), Short-term = Statewide Transportation Improvement Program (STIP) and Transportation Improvement Program (TIP)
A Feasibility Study is a planning study to determine the viability of proposed improvements through evaluating possible alternatives and their potential economic, social, and environmental impacts. Feasibility studies do not require any of the three levels of funding authority.

Purpose of the Guidebook

Developed by CPB, in collaboration with TxDOT's Districts and modal Divisions, the Corridor Planning Guidebook (Guidebook) is intended to clearly describe TxDOT's approach to conducting feasibility studies, route studies, and corridor studies. The Guidebook outlines TxDOT's requirements and expectations while presenting comprehensive and flexible guidelines for conducting corridor planning studies. These guidelines allow Divisions, Districts, and other involved parties to integrate the activities identified in this Guidebook based on the corridor's size and the District's planning capacity, as well as local and regional resources and partners available for each effort.

Comprising five chapters and two appendices, this Guidebook provides a comprehensive overview of what feasibility studies, route studies, and corridor studies ought to include, consider, and accomplish to provide proper guidance for future project development efforts. These chapters and appendices include:

- Introduction
- Stakeholder Engagement and Public Involvement
- Existing and Future Conditions Assessment
- Corridor Analysis Tools
- Study Recommendations and Implementation Plan
- Appendix A. Visual Communication
- Appendix B. Project Evaluation Metrics

Who is the Guidebook for?

The Guidebook is intended to be a resource in the development, production, and implementation of statewide corridor planning studies. This document and its supporting materials are also meant to be an informational resource to understand and encourage stakeholder participation during the corridor planning process.

Corridor Planning Scope and Content

There is no one-size-fits-all approach for corridor planning studies because there are several factors to consider including the study purpose and desired outcome. The following section provides a general overview of the three types of planning studies: corridor studies, route studies and feasibility studies.

Corridor Study

A corridor study **provides a plan for the future** by examining existing and future conditions:

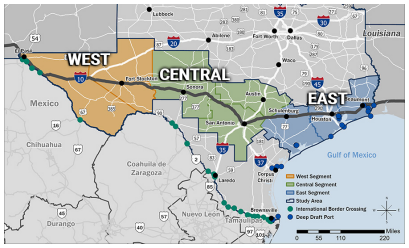
- Multimodal solutions are developed based on identified needs and the shared vision of stakeholders and communities along the corridor.
- The geographical scope of a corridor study can vary widely in length and is evaluated either from a statewide perspective (TPP) or regional perspective (District).
- The environmental impact of current and future needs are considered in the development of proposed improvements.

Corridor studies enable stakeholders to provide input on multimodal needs and prioritize improvements.

The final deliverable is an **implementation plan** with a timeline for which proposed improvements may advance to the next stage of development (short-, mid- and long-term).

Example studies shown below.

I-20 Texas Corridor Study



I-10 Texas Corridor Study

Route Study

A route study **identifies a preferred route location** based on a detailed analysis of alternatives, which may include new roadway alignments:

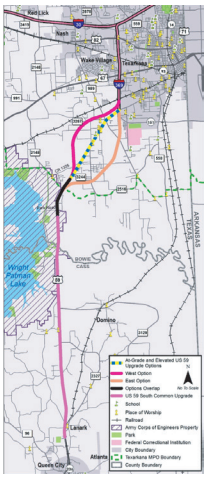
- The detailed analysis considers roadway design requirements, traffic, environmental features, safety, and land use impacts of a specific route location (water resources, natural resources, historical landmarks, parks, schools, first responder facilities, future land uses).
- Limited efforts that support the preparation of environmental review documents in accordance with National Environmental Policy Act (NEPA) may be performed in a route study.

Route studies involve the greatest level of local community-driven effort and are most focused on stakeholder and public engagement activities.

The final deliverable is a **preferred route location** that moves to the next stage of project development.

Example studies shown below.

US 77 Odem Area Planning Study (Corpus Christi District)



US 59 Texarkana to Queen City Route Study (Atlanta District)

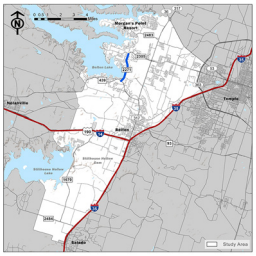
Feasibility Study

A feasibility study is a high-level planning effort conducted **when a solution is unknown:**

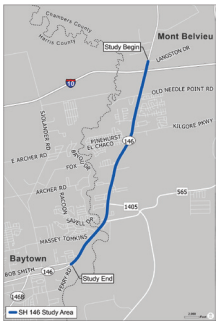
- It examines the viability of multiple proposed improvements by evaluating possible alternatives, and their potential economic, social, and environmental impacts.
- Multiple corridors may be evaluated during a feasibility study and stakeholder engagement may be limited.
- A high level screening is conducted to identify environmental "fatal flaws" that could pose challenges to future development (e.g. archaeological sites).

The final deliverable is a **feasibility study report**. The report provides recommendations on alternative alignments, preliminary design concepts, general right-of-way requirements, traffic analysis, environmental "fatal flaws", and planning level cost estimates.

Example studies shown below.



FM 2271 Extension Regional Feasibility Study (Waco District)



SH 146 Feasibility Study (Beaumont District)

Corridor Study

A corridor study can vary in length and is evaluated either from a regional or statewide perspective. A corridor study is a concept-level planning effort that establishes a shared vision by allowing stakeholders and communities to set goals and objectives. A corridor study identifies deficiencies, needs, and improvements, and develops solutions to address those needs. Corridor studies are usually initiated and led by CPB through collaboration with one or more Districts. In addition, TPP's Corridor Planning Tools (CPT) are also used to identify corridors needing further study.[1]

A corridor study often includes:

- Maps and graphics that show the study area limits, environmental features and conceptual plans.
- Meetings with stakeholders, the public and other groups/individuals.
- Technical memoranda related to:
  - Traffic analysis methodology, existing and future traffic conditions, crash analysis (crash rate, concentrated areas).
  - Engineering considerations, including design criteria, typical section(s), route option evaluation, preliminary cost estimates (construction, ROW acquisition, utility relocations and adjustments).
  - Other subject matter, as warranted.
- Corridor study report which includes:
  - Background information such as previous studies conducted along the corridor.
  - Purpose and need of the study.
  - Inventory of existing transportation infrastructure and conditions (traffic operations, safety and geometry).
  - Correspondence/resolutions from coordination with public agencies (cities, counties, metropolitan and rural planning organizations).
  - Environmental features and land use (water resources, natural resources, historical landmarks, parks, schools, first responder facilities, future land uses).
  - Description, development and evaluation of alternatives.
  - Implementation plan of prioritized projects.
  - Other findings and recommendations, as warranted.

[1] Additional information on these tools can be found in Chapter 4 – Corridor Analysis Tools.

Route Study

A route study may follow a feasibility study and identify build option(s) for further detailed schematic design and/or environmental impact analysis. A route study differs from a feasibility study in that it focuses on one of the alternatives selected during a feasibility study and provides a more detailed analysis of roadway design, traffic conditions, and environmental features. Route options may include construction of roadways on new alignments or providing improvements along existing facilities to increase capacity, enhance mobility, and improve safety.

A route study often includes:

- Meetings with stakeholders, the public and other groups/individuals.
- Findings from a feasibility study previously performed on the route.
- Maps and graphics that show study area limits, environmental features, and route options and other relevant information.
- Technical memoranda related to:
  - Traffic analysis methodology, existing and future traffic conditions, crash analysis (crash rate, concentrated areas)
  - Engineering considerations, including design criteria, typical section(s), route option evaluation and preliminary cost estimates (construction, ROW acquisition, utility relocations and adjustments)
  - Other subject matter as warranted
- Route study report which includes:
  - Purpose and need of the study
  - Correspondence/resolutions from coordination with public agencies (cities, counties, metropolitan and rural planning organizations)
  - Summary of stakeholder engagement and public outreach
  - Inventory of existing transportation infrastructure and conditions (traffic operations, safety and geometry)
  - Environmental features and land use (water resources, natural resources, historical landmarks, parks, schools, first responder facilities, future land uses)
  - Summary of traffic and safety analyses
  - Route options and evaluation process/results

Findings based on the overall process, which could include recommending a route option(s) or course of action.

Feasibility Study

A feasibility study is conducted to determine the viability of proposed improvements through evaluating possible alternatives and their potential economic, social, financial, legal, and environmental impacts. A feasibility study helps determine whether a project can move into more in-depth phases, and includes preliminary design concepts, environmental analysis, general right-of-way (ROW) mapping, and public involvement. A feasibility study may include studying multiple corridors or routes within a study area. A feasibility study may be done at the District's discretion or initiated by the TPP Division and does not require any of the three levels of funding authority. Feasibility studies can be programmed within the 10-year Unified Transportation Program (UTP) with the estimated let date as the anticipated year the study will be completed.

A feasibility study often includes:

- Potential design concepts and alternative alignments for a corridor
  - General ROW footprint of alternative alignments
- High-level safety analysis and traffic analysis
  - Recommendations for improving safety and mobility
- High-level construction costs
- Environmental "fatal flaws"
- Feasibility study report which includes:
  - Purpose and need
  - Graphics and maps of alternative alignments
  - Summary of stakeholder engagement and public outreach
  - Summary of traffic and safety analysis

Mission, Goals, and Objectives of a Corridor Planning Study

Developing the mission, goals, and objectives is a critical piece of any corridor planning study. Together, these elements establish a framework and serve as the study's guideposts, ensuring the study's activities and outcomes support its mission and goals.

Before a mission statement, goals, or objectives can be developed, a clearly defined purpose statement should be created. The purpose statement is typically developed by TxDOT staff, in coordination with the public, based on existing conditions, needs, challenges, and local insight regarding a corridor. It defines why the study is needed by explaining what it will do and/or is expected to achieve.

Purpose Statement

A purpose statement should be clear and concise, laying the foundation for TxDOT staff to work with the public and stakeholder groups to develop the study's mission statement, goals, and objectives.

Examples

Feasibility Study

"To enhance safety and mobility for drivers, accommodate population and employment growth, support economic development, and facilitate freight movement."

Route Study

"To develop a corridor that will meet future transportation needs and facilitate the safe movement of goods and people."

Corridor Study

"To identify multimodal needs and prioritize improvements that facilitate the movement of people and goods along the corridor."

When developing the purpose statement, consider including background information on the study area or other relevant projects/studies that could provide key context that further describes and justifies why the study is needed. Consider also including a study area overview map or any other useful visuals in this section when describing the study purpose.

Mission Statement

The mission statement describes the vision for a study or project. It is often first developed by TxDOT staff and then presented to stakeholder groups early in the planning effort. TxDOT staff should incorporate feedback from stakeholders and ensure that the mission statement reflects the community's desires, including their vision of how the corridor may serve them, how it will support local and national interests, and how that vision can be achieved.

Examples

"I-10 is an ever-improving lifeline corridor for Texas. It provides safe, reliable, multimodal transportation from the state line to the state line. I-10 is accessible and well-maintained, connecting communities and supporting the national and state economies by efficiently moving people and goods within rural and urban areas and throughout the state and beyond."
Source: I-10 Texas Corridor Implementation Plan

"Deliver a short-, mid-, and long-range multimodal program of improvements to facilitate economic development and provide a safe, reliable, resilient, and efficient movement of people and goods connecting I-20 with Texas and beyond."
Source: I-20 Texas Corridor Study

Corridor Planning Program Goals

TxDOT's Corridor Planning Program supports the SLRTP by identifying improvements for the movement of both people and goods along Texas' corridors. As such, all Corridor Planning Program studies should reflect the goal areas of the SLRTP. Corridor planning goals should be concise, clearly stated, and attainable. Typically, the goals are drafted by the study team and presented to applicable TxDOT stakeholders for feedback. Upon receiving feedback from key stakeholders, the goals are refined, presented to the public, and finalized.

There are generally six common areas that Corridor Planning Program goals address to align with TxDOT's key documents – the SLRTP and the Strategic Plan. For example, the strategic goals developed through the Connecting Texas 2050 SLRTP address the areas of safety, preservation, mobility, connectivity, economic vitality, and stewardship as shown in **Figure 1-3**.

Figure 1-3 Corridor Planning Program Goal Areas

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

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

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

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

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

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

Study Objectives

Study goals need to be further defined by objectives, and there are typically several objectives tied to each goal. The objectives serve as a high-level list of action items that need to be addressed by the study. For example, a corridor planning study may seek to improve safety and operations for all users. In this case, the objectives in **Table 1-1** could be considered:

Table 1-1 Example Goal and Objectives

Goal	Objectives
Improve Safety and Operations for All Users	Identify concentrations of traffic fatalities and injury-causing crashes.
	Identify structurally deficient facilities.
	Increase pedestrian and bicycle safety in locations where the corridor meets other on-system facilities.

Key Considerations

In addition to the study's goals and objectives, it is important to consider the context and need of each corridor or segment of the corridor. Depending on the type of corridor being studied and the identified need, the following is a non-comprehensive list of key consideration topics and examples for each that a study could account for:

- **Safety –** Crash totals and trends, fatalities, types of crashes, and contributing factors.
- **Operations –** Traffic Management strategies and equipment as well as Intelligent Traffic Systems deployment.
- **Connectivity –** Continuity of frontage roads, access points, and statewide networks.
- **Asset preservation –** Pavement, bridge, and roadway element preservation and maintenance.
- **Reliability –** Consistency and predictability in travel times for passenger and freight vehicles.
- **Multimodal mobility –** Bicycle, pedestrian, and transit connectivity issues.
- **Intermodal –** Freight solutions, truck parking.
- **Emerging technologies –** Autonomous/automated, connected, and electric vehicle support infrastructure; smart parking application and Internet of Things (IoT).
- **Resiliency –** Alternative routing, vulnerable infrastructure, and mitigation strategies.

Next Steps

Having a definitive framework for the study that clearly outlines the study's mission, goals, and objectives sets the stage for meaningful and measurable outcomes. This step of the corridor planning process involves stakeholder input and relies on existing TxDOT strategic goals. Chapter 2 includes discussion of the stakeholder and public engagement process.

2 Stakeholder Engagement and Public Involvement

Public involvement is an integral part of TxDOT's planning efforts. The scope and nature of public involvement depends on the planning study type and complexity. TPP's Public Involvement Section serves as a resource for public involvement efforts and can provide support as needed. This chapter summarizes strategies for developing the stakeholder engagement and public involvement process.

Figure 2-1 presents the International Association for Public Involvement Professionals (IAP2)'s Spectrum of Public Participation. It was designed to assist in identifying and selecting the level of participation that defines the public's role in any public participation process. The public generally falls closer to the "inform and/or consult" end of the spectrum because they are individuals that are interested or may be indirectly impacted by a study. A stakeholder is often engaged at the "involve and/or collaborate" side of the spectrum because they may be directly impacted, have a vested interest in the study, or are influential in the planning process/are decision makers.

Figure 2-1 Spectrum of Public Participation

Inform	Consult	Involve	Collaborate	Empower
To provide the public with balanced and objective information to assist them in understanding the problem, alternatives, opportunities, and/or solutions.	To obtain public feedback on analyses, alternatives, and/or decisions.	To work directly with the public throughout the process to ensure that public concerns and aspirations are consistently understood and considered.	To partner with the public in each aspect of the decision, including the development of alternatives and the identification of the preferred solution.	To place final decision making in the hands of the public.

Public — *Stakeholder*

Source: Adapted from IAP2 2018

Public Involvement Resources

One of the first public involvement deliverables is developing a Public Involvement Plan (PIP). A PIP is a living document that should be updated and revised as the planning process continues. The following links provide a wide range of resources that together provide guidance on TxDOT's standard public involvement procedures.

- TxDOT's Strategic Public Engagement Guidance (SPEG) - supports project teams across the state in engaging all members of the public and should be the go-to resource for public involvement. The guidance contains a checklist for planning effective public involvement, resources for conducting community research and forging partnerships with local stakeholders and advocates, guides for identifying and overcoming the most common barriers to public participation, and more.
- Chapter 4, "Public Involvement," of TxDOT's Transportation Planning and Programming Manual links to the TxDOT TPP Manual's chapter on the Public Involvement Section, which develops PIPs. Chapter 4 describes the PIP process and the various steps to take when developing a PIP.
- In addition to the two resources listed above, TxDOT's Environmental Affairs Division developed a Public Involvement handbook that provides guidance and procedures for meeting public involvement requirements for studies, either state or federal, undergoing the environmental analysis study development process. Though this resource was developed by the Environmental Affairs Division, public involvement procedures and ideas are translatable.

Components of a Public Involvement Plan

- **Study Description/Background:** Include a clear statement of the goal of the study, which may be drawn from the scope of work and other factors, such as study background or history, including any past public involvement efforts, study location map, issue identification, and issue prioritization.
- **Current Issues to Address:** Define and understand the issues and problems the proposed study is designed to address.
- **List of Stakeholders:** Identify a list of preliminary stakeholders based on initial contacts with the community. Make deliberate attempts to identify underserved populations. Ask known stakeholders who will be impacted and who else should be involved. Note that stakeholders will be added to this list as the study progresses.
- **Tactics, Tools, Roles, Responsibilities:** List the techniques and outcomes that can take the public involvement efforts a step above just checking the box. Establish specific tactics and tools for outreach and public involvement and assign roles and responsibilities. Establish the specifics for information and notification methods, including the format (flyers or newsletters), the vehicle (social media, study webpage), and the methods for outreach (changeable message signs, postcards, etc.). Establish the primary and secondary entity responsible for these tasks.
- **Timeline:** Develop a timeline for public involvement – from the development of a PIP through the development of a meeting summary for the final public meeting or hearing. Timelines also include responsibilities and estimated deadlines.
- **Evaluation:** Measure the effectiveness of the public involvement effort and how it met the plan's objectives.
- **Close the Loop with the Public:** Let the public know how their feedback impacted the study. Closing the engagement loop builds trust and credibility with the public.
- **Notes:** Include a media request protocol and approval process for communications products.

Tip: U.S. Census Bureau (U.S. Census) data should be evaluated as the PIP is developed and analyzed further such as AcGIS. The tool used should match the level of analysis needed.

Stakeholder Engagement

The purpose of stakeholder engagement is to better understand the communities' needs, priorities, and challenges associated with the corridor. Stakeholder engagement will vary by corridor and study area, thus it should be designed to match the study purpose, decision-making process, political landscape, and study planning phase.

The study team might first start with a stakeholder identification exercise to identify stakeholders. As part of the Effective Public Involvement (EPI) 200 training, TxDOT has developed several worksheets designed to identify stakeholders, including the Strategic Framework for Identifying Stakeholders worksheet and the Identifying Pivotal Stakeholders worksheet. Contact a Public Involvement (PI) Planner to request these worksheets.

Other methods can also be used to identify stakeholders, such as identifying individuals or organizations based on their level of power versus interest in a study.

Tip: Involve other TxDOT Divisions early in the stakeholder engagement process. Divisions like Maritime, Public Transportation, and others are often deeply involved in various elements of a corridor, so it is critical to engage these adjacent divisions early and often.

Steps for Stakeholder Analysis:

1. Identify a list of preliminary stakeholders based on an understanding of the community and who will be impacted.
2. Examine U.S. Census data to learn about the different demographics of people living in the community.
3. Ask known stakeholders who will be impacted and who else should be involved.
4. Make efforts to identify underserved populations, including low-income and minority populations.
5. Who else should be engaged?

Corridor Guidance and Stakeholder Groups

Most corridor studies use stakeholder groups to review data, identify needs, and review and recommend improvements or preferred alternatives.

Table 2-1 Types of Stakeholder Groups

Group Type	Description	Example
Texas Transportation Commission (TTC)	The TTC includes five commissioners appointed by the governor with the advice and consent of the state legislature to review and approve plans and studies for TxDOT.	The TTC generally will receive briefings on corridor plans. Other commissions have been established for high-profile studies and projects, including the Commission for High-Speed Rail in the Dallas/Fort Worth Region.
Advisory Committee	Outlined in the Texas Transportation Code with specific rules on membership and terms. Appointed by TTC.	TxDOT Advisory Committees include, but are not limited to, the following: • Aviation • Border Trade • Pedestrian and Bicycle • Freight • Port Authority • Public Transportation • Urban Air Mobility
Divisions and Districts	Divisions are involved in the goal and vision setting of the corridor planning program from a Statewide perspective and Districts are involved in the final implementation of a study recommendation.	Districts within the study area and modal Divisions such as Aviation, Bridge, Maritime, PTN, Rail, and TPP
Steering Committee	Steering committee members represent regions in a study area or along a corridor and are invited to participate based on their knowledge of the corridor and state. The steering committee is tasked with reviewing planning data, assessing needs, discussing scenario planning assumptions, and evaluating recommendations. Steering committees can include county judges, mayors, city council members, and executive directors of MPOs and councils of government. In addition, membership can include representatives from relevant special interest and private sector groups.	I-20 Corridor Study Steering Committee
Working Group	Working groups utilize local expertise and knowledge of a corridor to review study-specific information, assist in concept development, and make recommendations at a local level, which support the steering committees to make more informed decisions at a corridor level.	I-20 Corridor Study Working Groups (West, Central, East)
Task Force	A subset of individuals from the larger stakeholder group dedicated to work on a specific task or problem. Some task forces spring up organically while others may be required by law.	• The Texas Technology Task Force was mandated by Texas Legislature in 2013. • The Connected and Automated Vehicle Task Force was set up in 2019, with support from the governor.

Key Considerations for Stakeholder Groups

Once the types of stakeholder groups have been determined, consider how, when, and where they will meet:

- Who will determine the membership/participation?
- Who approves membership?
- Who invites the members to join?
- Who manages the stakeholder database and responds to inquiries?
- Can members send an alternate to meetings as a representative? Can alternates make decisions on the member's behalf?
- Who will lead the meetings? The chairperson? TxDOT leadership? A consultant? Other political or organizational leads (such as the Metropolitan Planning Organization [MPO] chair)?
- Is there an approval process? Will another entity (such as the TTC, MPO, District Engineer [DE]) recommend or decide who the leader will be? What happens if the leader is unable to attend a meeting?
- Can the public attend?
- What role will other Divisions and Districts have in stakeholder meetings?
- Will staff be invited?
- Will staff be briefed before or after a meeting?
- What coordination with other TxDOT stakeholder groups (such as advisory committees, the commission, or others) is needed?
- Who is responsible for creating the agenda, reserving meeting space, facilitation, or summary documentation?
- How will decisions be made? (e.g., consensus-driven)

Out-of-state Stakeholder Outreach

Many roadway corridors extend well beyond Texas and will require stakeholder coordination with out-of-state agencies and organizations. This might include the following:

- US international trade partners
- State transportation departments
- Other state FHWA Division offices
- Metropolitan Planning Organizations
- County and municipal governments
- Tribal entities
- Neighborhood associations, homeowner associations, business organizations, chambers of commerce
- Other impacted groups or users (such as bicyclists, trucking, or tourism)

From a stakeholder and public involvement perspective, the planning team will need to coordinate meeting requirements for meeting notice and stakeholder group formation, along with overall study planning coordination. This might include holding stakeholder or public meetings or hearings in multiple jurisdictions.

Binational Considerations

For cross-border studies, in addition to Texas' stakeholders, such as municipalities and business groups (i.e., chambers of commerce), it is encouraged to engage representatives from the Mexican cities and states that are impacted by the study and are located along the U.S. border. U.S. Customs and Border Patrol should also be considered during binational stakeholder outreach.

The Binational Working Group for TxDOT's I-10 Corridor Study provided input on border-specific issues impacting the corridor, such as international trade and development trends, border crossing traffic and signage, key connections, and system-wide operations at the ports of entry.

Other Tools

Technique	Description	Notes
Focus Group	A message-testing forum with the target audience, which can also be used to obtain input on planning decisions in a small group format.	Use a facilitator experienced in this technique.
Workshop	An informal public meeting that may include presentations and exhibits but ends with interactive working groups.	Know how input will be used before the workshop. Conduct training in advance with small group facilitators.
Interview	One-on-one meetings with stakeholders to gain information for developing or refining ideas.	Where feasible, interviews should be conducted in person or via video conferencing.
Survey	Targeted outreach to stakeholders using paper, telephone, or web-based surveys.	Surveys should be interactive and short, and questions should be thoughtful and not leading.

Source: Adapted from IAP2 2018

See TxDOT's Strategic Public Engagement Guidance ***Chapter 4*** for additional tools and techniques for stakeholder engagement.

Public Involvement

How and when the public is involved will vary based on the study. The following recommendations will need to be adjusted depending on the study.

Identifying the Public

The first step is to identify the public or populations impacted by the study. The Strategic Public Engagement Guidance (SPEG) directs TxDOT staff and consultants to techniques and tools to ensure robust, strategic, and intentional public engagement with all interested stakeholders.

Who is the Public?

Texas is a large state, and studies may affect many different communities. Studies may also have different effects on different people at different points in the process. To identify who the target audience is, ask the following:

- ☑ Who will be affected?
- ☑ Who benefits?
- ☑ Who will be negatively impacted?
- ☑ Who represents the traveling public?
- ☑ Do they live or work near the study area?
- ☑ Are there affected property owners?
- ☑ Who will be impacted by a change in service?
- ☑ Besides the general public, who else needs to be part of the conversation?
- ☑ Should other state agencies, local governments, or private entities such as developers be involved?
- ☑ Are there disadvantaged populations?

It is likely a study will affect a range of stakeholders. Thinking about who they are and how they can best be reached before designing a PI process will help ensure the study's success.

Source: TxDOT Public Involvement Guidebook

Other Sources of Data

- **Doing your Community Research:** Chapter 3 of TxDOT's SPEG describes how to research the impacted community for public engagement. One of the first places to start is to utilize Census datasets necessary to complete a Community Impacts Assessment for TxDOT. This includes data on language, education level, income, and more. The U.S. Census Bureau conducts the American Community Survey every year. For ease of access, pre-built Data Profiles at the county, census tract, and zip code levels are made available at https://www.census.gov/acs/www/data/data-tables-and-tools/data-profiles/ for analysis.
- **Property Owner Information (e.g., Appraisal Districts):** Used for mailing lists and assessing adjacent property use/size/ownership/value. It is important to note that this would not include address information for properties that are rented. Use Every Door Direct Mailings (EDDM) to reach residents of a large apartment complex or tenants of commercial areas.
- **Homeowner Associations and Neighborhood Groups:** These groups may have email or social media groups or maintain a database of residents. Some county or municipal geographic information system (GIS) departments maintain ArcGIS data showing the geographic boundaries of these groups and have contact information.
- **Data Axle or Other Business Databases:** This information can be purchased, and in some cases, TxDOT may have acquired the information and made it available. Generally, the information is reported in a table with a latitude/longitude point for the business location. There may be information about the industry type (North American Industry Classification System [NAICS]) and the number of employers. However, some of this information can be inaccurate if reported by a company with many offices or sites.
- **Web-based Search:** Reviewing web-based maps (e.g., Google Maps) can provide additional information about large businesses, apartment or condo complexes, churches, or other entities along a corridor. In some cases, these entities may not own property or their owner contact info from parcel data is not local.
- **Site Visits:** Drive the corridor to evaluate what businesses, industries, community organizations, and residential areas are adjacent to the corridor and assess activity.
- **Business Group Data:** Check business associations, chambers of commerce, economic development corporations, or Business Improvement Districts.
- **Big Data:** Big Data sources (for example, Street Light, INRIX, Replica) can help the study

team understand the traveling public and assess demographic, socioeconomic, and travel preference data. It is important to understand how this data is aggregated because it is often tied to U.S. Census data/geographies.

- **Stakeholders:** Once stakeholders are identified, ask them what data sources should be consulted and who else should be included.
- **Advocacy Groups:** These groups are often organized around specific issues or represent specific geographical areas. They are usually engaged and interested in all phases of a study and must be considered and included in the study.

Information Sharing Tools

Sharing information is important to building trust and maintaining transparency in the planning process. How and when information will be shared will vary based on the study and planned public involvement activities. The purpose, goals, and objectives of this will be outlined in the PIP. Tools are constantly evolving, and the study team should consider this and the audience before information is shared. Below are various tools to consider during all phases of a study.

TxDOT Project Webpage

Project webpages can be created on the TxDOT.gov website. A PI Section Planner can assist with getting a project webpage set up.

Steps for creating TxDOT.gov project webpage include:

1. Draft the webpage content based on current templates or previous webpage examples.
2. Send to the TxDOT Project Manager (PM) and PI Planner for review and revisions.
3. Send the final content to the TxDOT PM and PI Planner. Allow 1 week for the materials and webpage to be finalized.
4. The TxDOT PM will review the draft project webpage and revise or approve for publishing.

If the study warrants enough content to host multiple pages of information, the TxDOT Web Team will work with the TxDOT PM to build out a layered project webpage that exists within TxDOT.gov.

GovDelivery

TxDOT uses GovDelivery to send mass emails. This system is similar to Constant Contact or Mail Chimp, but TxDOT maintains the license and information. To set up a GovDelivery subscription for a study, work with a TxDOT PI Planner to request a topic to be set up for the Study. This account can then be linked to the project webpage. Subscribers can share emails or unsubscribe based on their interest in the study.

TxDOT has templates for emails; however, they can be adapted, and there is some flexibility. The study team should draft the email and provide all email addresses to the PI Planner, who will load this information into GovDelivery and prepare the draft preview of the email.

Communication Plan

A communication plan is a great tool to align the purpose and messaging, assign responsibilities, and create a timeline for a specific public engagement activity or event. Creating a communication plan helps get all study partners on the same page and disseminate content (such as press releases, social media, or emails) in a strategic manner.

Engagement Software Features:

- Interactive maps
- Interactive surveys
- Customized feedback tools (idea walls, surveys, forums, chats, budget tools, and more)
- TxDOT project webpage
- Compatible with Google Translate

Engagement Software

Engagement software can be used to share information and obtain feedback. TxDOT has licenses with Social Pinpoint and MetroQuest (as of January 2024), which can be used to share information and obtain feedback from the public.

The timeline and steps for creating a site using engagement software vary, but planning should begin at least 6 weeks before the site needs to go live.

To help determine which engagement software is most appropriate, TxDOT has developed several guides and tools which can be provided by the PI Section.

Social Media

Social media can be a useful tool for public outreach for TxDOT's statewide corridor planning studies. Social media posts on TxDOT accounts and the accounts of study and community partners can both raise awareness and direct people to the project webpage. Paid ads on social media platforms can target specific communities along a corridor at various stages of a study.

Media Releases

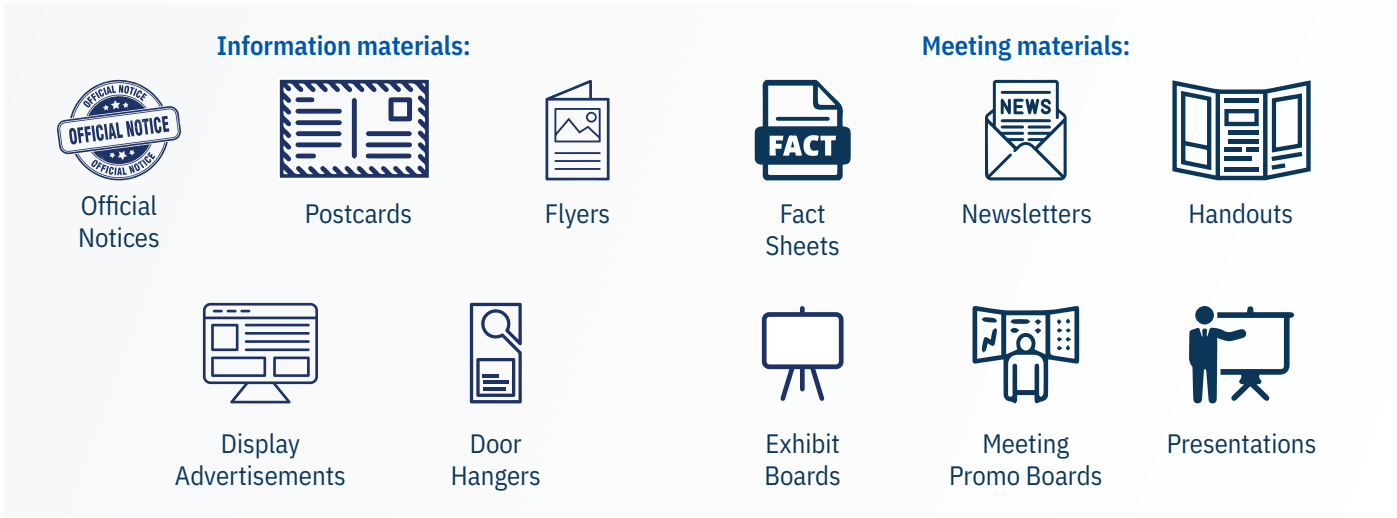
Media releases are often used in corridor studies to announce engagement opportunities such as a public survey or an open house. A general media release can be created and distributed to the District Public Information Officers (PIOs) to customize for their media contacts. Media releases should include a timeline for distribution.

Mailing Lists

Mailing lists should be continuously maintained and in a format that is easily used to create a mailing, such as Excel. A mailing list can include physical mailing addresses and email addresses. This contact information can be used to provide information on a study or notice of an upcoming engagement opportunity. Mailings, such as postcards, may be useful for smaller segments of a corridor, but mass mailings for an entire corridor would likely not be realistic due to potential logistical and budgetary constraints.

Materials

TxDOT maintains templates for a number of outreach materials, including those providing notice of a public involvement activity. Check with the PI Specialist for the representative District(s) for the latest versions of these templates. They include items such as:



3 Existing and Future Conditions Assessment

The existing and future conditions assessment provides an overview of the current and future state of a route or a corridor. This assessment includes socioeconomic and land use characteristics, network connectivity, physical roadway characteristics, environmental considerations, multimodal transportation, and traffic and safety analysis. This assessment also informs the discovery of trends, the forecasting of future conditions, and the identification of needs and issues along a corridor.

Socioeconomic and Land Use Characteristics

Socioeconomic analysis provides context to the study area by describing population size, employment, age, sex, commuting characteristics, households, income, means of transportation, and historical trends. Other relevant insights from socioeconomic analysis include land use characteristics, travel patterns, and industrial trends.

Land Use Assessment

Land use characteristics provide context for existing and potential future needs, design considerations, and the significance of the corridor based on the uses it serves.

Land use assessment efforts include:

Geographic context of the study limits: Geographical and organizational boundaries such as urban/rural, counties, TxDOT Districts, cities, or MPOs are important to developing an understanding of the study area. Other potential boundaries to consider include tribal designated lands, metropolitan statistical areas/micropolitan statistical areas, congressional districts, state legislative districts, and school district boundaries.

- **Land cover:** Land cover types such as developed, undeveloped, cultivated/farmlands, and water resource areas provides an understanding of the patterns of land usage in the study area.
- **Existing and future land use:** When available, existing and future land uses in residential, agricultural, recreation, transportation, commercial areas, and known future development sites are useful to forecast trip generation patterns, freight, and other large infrastructure needs. Local governments and their partners typically maintain this type of land use data.

Examples of data sources used for land use assessments include:

- **Geological regions and land cover:** The U.S. Geological Survey (USGS) National Land Cover Database provides land cover data for the entire country.
- **Existing and future land use:** Review local jurisdiction internet sites, including city and county webpages, for the most updated versions of local planning documents. The Association of Texas MPOs keeps a catalog of planning documents for each MPO in the state.

Demographic Assessment

A demographic assessment accounts for the characteristics and needs of residents, growth patterns, and social considerations that impact transportation infrastructure priorities. Demographic assessments ensure that transportation networks meet the needs of communities now and in the future. Understanding socioeconomic context helps guide decision-making and resource allocation of transportation investments.

Demographic assessment efforts include:

- **Population totals and distribution:** Current totals, historical trends, and growth forecasts can reveal trends in evolving mobility demands that transportation improvements will need to accommodate.
- **Population characteristics:** Details on employment, age distribution, income levels, disability status, vehicle ownership, migration flows, housing variables by geographic distribution, minority populations, and low-income populations should be included. Supplemental data such as migration flows, Limited English Proficiency (LEP), and internet access, among others, may also be considered.

Tip: The use of a variety of demographic metrics, along with strategic analysis and clear visual communication, is necessary for conducting demographic assessment. Spatial analysis, for example, provides the best approach to illustrating the demographic characteristics of groups along a corridor. Heatmaps can showcase high- and low-density concentrations and growth pressure points to illuminate community growth patterns.

Examples of data sources used for demographic assessments include:

- **Population:** U.S. Census Bureau population and socioeconomic data provides historical counts and yearly estimates to include in the analysis.
- **Population trends and forecast:** The Texas Demographic Center produces Texas-specific population forecasts and trends at the statewide and county level.

Economic Assessment

Corridor planning aligns transportation networks with the underlying economic conditions of the study area. Studying the distribution and growth of economic activity along a study corridor helps identify opportunities for economic development through transportation infrastructure investments.

Economic assessment efforts include:

- **Employment trends:** Labor force, unemployment rates, and industry-level employment densities.
- **Industry and commerce profiles:** Identification of high-growth zones, business parks, industrial areas, major employers, gross domestic product (GDP), hiring trends, commodity flows, and supply chain trends for local industries.
- **Labor market characteristics:** Average commute times, access to transit facilities, inflow/outflow, and work destination analysis.

Examples of data sources used for economic assessments include:

- **Labor and employment:** The Bureau of Labor Statistics from the U.S. Department of Labor and the Texas Labor Market Information web portal from the Texas Workforce Commission provide access to forecasts, historical data, and preliminary insights at regional levels.
- **Market trends:** The Bureau of Economic Analysis from the U.S Department of Commerce provides data on the GDP at a county level and the North American Industry Classification System (NAICS) from the U.S. Census Bureau provides statistical data related to the U.S. business economy.
- **County inflow/outflow and work destination analysis:** The county inflow/outflow analysis can be conducted using the Longitudinal Employer-Household Dynamics (LEHD) Program. The LEHD Origin-Destination Employment Statistics (LODES) data series is one of the datasets produced by the U.S. Census Bureau for studying a local economy. The LODES data, which is accessible primarily via the OnTheMap application, helps users understand, analyze, and visualize where populations in a given area work and live.

Network Connectivity

Network connectivity analysis examines how a study area links to other critical statewide infrastructure, such as interstates, U.S. highways, state highways, and other alternative or major nearby routes. This analysis provides critical information regarding travel behavior and patterns to, from, and within a study area or along a corridor. A corridor's connectivity can be analyzed by verifying how much it overlaps with certain roadway networks, such as the following:

- National Highway System
- Texas Trunk Highway System
- Future Interstates Network
- Strategic Highway Network and Military Installations of Strategic Importance
- Texas' Connectivity Corridors
- National Highway Freight Network
- Corridors of Statewide Significance (featured in the Statewide Long-Range Transportation Plan – Connecting Texas 2050)
- National Multimodal Freight Network (this network is in development through USDOT's Office of Multimodal Freight Infrastructure and Policy)

When studying a corridor's connectivity, it is also worth analyzing distances to locations, such as border crossings, seaports, and airports. Understanding whether the corridor provides connectivity to such notable infrastructure will help form a more complete picture of the corridor's role in the greater context of the state.

Examples of data sources used for network connectivity analysis include:

- Texas Roadway Inventory
- Statewide Planning Map
- TxDOT's Open Data Portal

Physical Roadway Characteristics

Physical roadway characteristics considered in this analysis often include corridor geometries, ramps, pavement, and bridges. Understanding the different data types, data sources, and how data are analyzed to evaluate roadway characteristics is critical in developing initial corridor roadway evaluations. **Table 3-1** provides a list of commonly studied roadway characteristics for each element of a corridor plan.

Table 3-1 Commonly Studied Roadway Characteristics

Roadway Elements	Characteristics of Interest
Corridor cross-section and associated roadway geometries	• Number of lanes, lane width, median type, clearance, and shoulders • Vertical and horizontal alignments • Speed, passing regulations, and sight distances
Ramp geometries	• Length of acceleration and deceleration lanes for on- and off-ramps • Steep grades for trucks ascending or descending
Pavement condition	• Pavement condition rating • Material type
Bridge condition	• Bridge condition rating • Vertical clearance (over roadways and waterways)

Examples of data sources used in evaluating physical roadway characteristics include:

- **TxDOT's Open Data Portal:** This portal is a platform for downloading statewide GIS datasets. Most of the roadway characteristics commonly used in corridor planning are collected frequently by TxDOT shared on the Open Data Portal and published as the Roadway Inventory and Bridge Inventory.
- **City and/or county-level GIS databases:** Some cities and counties, such as the City of Austin, have developed and maintained a large roadway database.
- **Satellite imagery:** The Texas Imagery Service provides satellite imagery that can be used as a complementing source for verifying lane width or speed limit information on roadway segments to avoid errors commonly found in systemic datasets.
- **Site visits:** Driving along the existing highway corridor and adjacent public roads in the study area and documenting observations can provide context and the ability to identify land uses and environmental features that are not easily identified through desktop-based services.
- **Literature review:** Data from a literature review, such as past studies, as-built plans, and land use plans from TxDOT and other entities, could be used where applicable.

Tips:

- **Data availability:** Long corridors experience segmented roadway improvements regularly; however, online databases could take months or years to update. This leads to dated information on online databases. Conducting research on ongoing roadway improvement projects and maintaining coordination with the associated local agencies, such as TxDOT Districts, is important to identify gaps and limitations in online databases.
- **Data collection process and lead time:** Some databases require a specific license to access or have long lead times, especially if the data collection process involves manual steps. Holidays and busy seasons could also add additional wait time to the overall procedure. These issues should be anticipated and incorporated into the schedule.

Corridor Cross-section and Associated Roadways

Corridor cross-sections are useful for understanding the corridor context, size, and capacity of roadways. Cross-section information is also used in estimating improvement costs. Information such as segment length, number of lanes, presence of sidewalks, and ROW widths should also be considered during the analysis.

Corridor length and capacity are reported as centerline miles, lane miles, and number of lanes. Rural and urban segments are reported separately due to differences in characteristics and performance measure thresholds. Depending on the length of the corridor and the study purpose, segments could be further classified into appropriate functional classes.

Photographs and observations from field visits can help to highlight special features or potential constraints of specific segments.

Centerline miles and share of frontage road coverage can be calculated using TxDOT Roadway Inventory Data, which has information regarding the right frontage road, left frontage road, and gaps along on-system roadway segments. Gaps in a corridor's associated roadways could be the result of physical constraints, such as interchanges, railroad crossings, and water bodies.

Similar to reporting mainlane statistics, the existing condition of associated roadways could be visualized via summary charts, maps, or field visit photographs.

Ramp Geometry Analysis

Ramp geometry analysis determines if the existing corridor on- and off-ramps meet current roadway design standards. Ramp features to be considered in this analysis include acceleration length, deceleration length, auxiliary lanes, and, where applicable, posted speed limits and ramp spacing, which is the longitudinal distance between successive ramps.

Pavement

Typically, pavement conditions are assessed by measuring physical conditions (such as roughness, rutting, faulting, and cracking) and then using those measurements to calculate four metrics (condition score, distress score, International Roughness Index (IRI) score, and ride score). Once scoring is completed for all sections of the roadway, the scores for each of the four metrics are assigned a letter-grade classification based on a five-point scale (F = Very Poor, D = Poor, C = Fair, B = Good, and A = Very Good). Finally, the overall pavement condition on a corridor can be evaluated by calculating what percentage of the corridor falls into each one of the five letter grades for all four metrics.

TxDOT maintains pavement condition data under its Pavement Management Information System (PMIS), which is provided for consultants on a per-request basis to use in corridor studies. The PMIS is typically provided to consultants in tabular form (.CSV format) and requires an extra step of linear referencing-based geoprocessing with the TxDOT Roadway Inventory to be mapped.

Bridges

An analysis of bridges along corridors is essential in addressing safety concerns and identifying bridges susceptible to frequent weather damage, natural disasters, and overall roadway network resiliency. Descriptive statistics, such as the number of bridges as well as their specific locations and distribution, provide important planning and operational context.

Bridges within Texas are classified as on- and off-system bridges depending on whether the bridge is on the TxDOT-designated state highway system and administered by TxDOT. Off-system bridges are typically under the direct jurisdiction of a local government (county, city, other political subdivision, or a special authority responsible for the operation of the bridge). Data related to on- and off-system bridges and their condition can be found on the TxDOT Bridge Inspection Database on TxDOT's Open Data Portal.

- **Conditional ratings** are provided by TxDOT and updated every 2 years. This rating considers factors such as bridge condition ratings and appraisal ratings and classifies bridge elements into Good (G), Fair (F), and Poor (P). Bridge condition is based on FHWA's National Bridge Inventory condition ratings scale, which designates a bridge and its four elements (the deck, the superstructure, the substructure, and the culvert) based on a scale of Good (rating of 7 or above), Fair (rating of 5 or 6), and Poor (rating of 4 or below). Bridges in poor condition often belong to one of two categories – Structurally Deficient (SD) or Functionally Obsolete (FO) – and require immediate attention.

Tip: To prioritize needs, a bridge condition score could be used for bridge improvements, replacements, or new construction. Good-Fair-Poor bridge condition measures are encouraged in the prioritization process and targets emphasize bridges with condition scores of 4 or less.

- **SD-rated bridges** are bridges that have deteriorations, cracks, or other flaws that reduce their load-carrying capacity and may cause weight restrictions on the bridge. Most SD bridges can continue to serve traffic safely if they are properly inspected and maintained. To be classified as SD, the bridge must have a rating of 4 or less for the deck or superstructure, superstructure or substructure, or substructure, or a rating of 2 or less for structural evaluation or waterway adequacy.
- **FO-rated bridges** are bridges that do not meet current design lane widths, shoulder widths, or vertical clearances adequate to serve traffic demand, or the bridge may not be able to handle occasional roadway flooding. While it is not unsafe for all vehicles, its older design features cannot adequately accommodate current traffic volumes or vehicle sizes and weights. To be classified as FO, the bridge must have a rating of 3 or less for the deck geometry, under clearances, or approach roadway alignment, or must have a rating of 3 or less for structural evaluation or waterway adequacy.
- **Vertical clearance** is a safety concern, especially for roadways with high commercial vehicle traffic. Insufficient vertical clearance can cause trucks to either hit the bridge or detour to another route. The alternate route may be a local roadway not designed to handle the loads or the intensity of truck traffic, resulting in disruptions to the local network and increased wear-and-tear to these roadways. The “clearance below” bridges over waterways should also be considered as bridges with insufficient distance from the surface of the water to the highest point on a vessel, which can limit maritime traffic and suppress economic opportunities.

Environmental Characteristics

For corridor plans, a high-level review of environmental features and characteristics using desktop literature resources (shown in **Table 3-2**) is conducted to identify existing conditions and environmental features that may need additional analysis or research. This review informs the feasibility of potential corridor improvements or routes considering environmental constraints, as well as possible avoidance and minimization of impacts to parks, historic sites, cemeteries, hazardous materials sites, etc. A more detailed environmental review and analysis is conducted in a project's schematic and environmental phase.

Table 3-2 Environmental Features to Consider in Corridor Planning

Category	Regulatory Triggers	Data Sources
Public parks, recreational facilities, wildlife refuges, and management areas	• Section 4(f) of the U.S. Department of Transportation Act • Section 6(f) of the Land and Water Conservation Fund (LWCF) Act	• National Park Service – National Park System • National Park Service – National Wildlife Refuge System • U.S. Forest Service – National Grasslands • Texas Parks and Wildlife Department • The LWCF Coalition • Cities/Counties
Federal lands	• Indian Reservations	• U.S. Department of Interior, Bureau of Indian Affairs
Federal lands	• Military Installations	• U.S. Department of Transportation/Bureau of Transportation Statistics – National Transportation Atlas Database
Hazardous materials (landfills, superfund sites, oil & gas pipelines, and wells)	• Resource Conservation and Recovery Act • Comprehensive Environmental Response, Compensation, and Liability Act	• Texas Commission on Environmental Quality geospatial data • Environmental Protection Agency geospatial data • Texas Railroad Commission – Texas Natural Resources Information System
Cultural resources (archeological sites and historic sites)	• Section 4(f) of the U.S. Department of Transportation Act • Section 106 of the National Historic Preservation Act • Health and Safety Code • Antiquities Code of Texas	• Texas Historical Commission – Historic Sites Atlas • Certified Local Governments • TxDOT – Historic Resources Aggregator • Potential Archeological Liability Maps (PALMs)

Protected habitat	• Endangered Species Act • Coastal Barrier Resources Act (CBRA)	• U.S. Fish and Wildlife Service and National Marine Fisheries Service – Critical Habitat Units • U.S. Fish and Wildlife Service – Karst Zones (Austin and San Antonio areas) • U.S. Fish and Wildlife Service – John H. Chafee Coastal Barrier Resources System (Jefferson, Chambers, Galveston, Brazoria, Matagorda, Calhoun, Aransas, Nueces, Kleberg, Kenedy, Willacy, and Cameron counties)
Water features (streams, wells, wetlands, aquifers, coastal resources)	• Section 404 of the Clean Water Act • Section 408 of the Clean Water Act • Edwards Aquifer Rules • Trinity River Corridor Development Regulatory Zone • CBRA	• U.S. Army Corps of Engineers – Section 408 Program • Texas Water Development Board • U.S. Fish and Wildlife Service – National Wetland Inventory • Texas Commission on Environmental Quality geospatial data • National Hydrography Dataset – U.S. Geological Survey via Texas Natural Resources Information System • North Central Texas Council of Governments • U.S. Fish and Wildlife Service – John H. Chafee Coastal Barrier Resources System (Jefferson, Chambers, Galveston, Brazoria, Matagorda, Calhoun, Aransas, Nueces, Kleberg, Kenedy, Willacy, and Cameron counties)

Multimodal Transportation Analysis

A multimodal transportation analysis involves a comprehensive review of the modes of transport serving a study area and the level of integration of these modes in moving people and goods. The analysis is conducted through a review of existing and future programs, data collection, and an inventory of existing multimodal infrastructure.

A comprehensive program review ensures coordination with relevant studies, plans, programs, and processes, both internal and external to TxDOT. This review identifies relationships between the various transport modes and their networks, needs, and investments, as well as how they may impact the study corridor.

The review provides a general context of transportation planning activities within the study area and, at a minimum, covers the following modes of transport:

Active transportation modes

Transit

Aviation

Maritime ports

Freight

Border ports of entries

Active Transportation Modes

Active transportation encompasses a variety of specific modes of travel, including pedestrians (such as walking or using wheelchairs and other assistive mobility devices), bicycles, and micromobility (such as e-scooters, bike-share, skateboards).

Tip: These modes interact with each other and may foster symbiotic relationships. For example, people frequently complete the first and last segments of a transit trip by walking, using assistive mobility devices, and/or biking to and from a transit stop – these are commonly known as "first/last mile" solutions.

Tip: While conducting the review, look for any ongoing or upcoming active transportation projects or activities, as well as common active transportation planning goals, that might impact or align with the corridor's study area. In addition, look for active transportation stakeholder groups mentioned in these plans/documents that could serve as stakeholders for a study. This will help ensure coordination and cohesion between various planning processes and prevent potential contradictions.

Table 3-3 provides a checklist of suggested internal and external active-transportation-related documents, data sources, and programs to include in the review phase of a corridor planning study.

Table 3-3 Suggested Documents and Programs for Review (Active Transportation)

Document/Program Name	Purpose	Year
Statewide Active Transportation Plan	This plan establishes a unified vision for the identification and implementation of strategic active transportation priorities and policies across Texas through 2050.	In progress
Texas Bicycle Tourism Trails (BTT) Study	This study identified BTT routes in and around a study corridor. TxDOT requirements state that any new on-system roadway or rehabilitation of any existing on-system roadway that is part of the BTT example network must include the installation of dedicated bicycle facilities.	2018
Pedestrian Safety Action Plan	This plan identified locations of pedestrian safety concerns relevant to the corridor planning study area.	2023
District Bicycle Plans	These plans aim to create an understanding of the bicycle high injury network and identify locations for proposed improvements. A District Bicycle Plan is planned for each TxDOT district with initial pilots in the Bryan, Pharr, Laredo, and San Antonio Districts.	In progress
Texas Roadway Design Manual	This manual provides updated information on design practices and standards related to highway design.	2022
TxDOT's Project Tracker	The tracker can be used to review the existing project pipeline along and adjacent to the study corridor to determine nearby UTP investments, which may include bicycle and pedestrian improvements.	Ongoing
Statewide Transportation Improvement Program	The STIP can be used to identify ongoing and planned corridor investments.	Recurring/ Ongoing
Active Transportation Plan Inventory	The inventory is an online tool that identifies previous active transportation-related planning efforts for the study area.	Ongoing
Local Active Transportation Plans/ Chapters	These plans/chapters can be used to reveal community preference for and locations of active transportation infrastructure.	Recurring/ Ongoing

Note: Additional information on the list of plans/programs can be found on txdot.gov or by contacting the Planning and Program Development section within the Public Transportation Division.

Examples of data sources used in evaluating active transportation infrastructure include:

- **Pedestrian infrastructure:** The TxDOT Comprehensive Accessibility Program web application – part of the TxDOT Accessibility Management Enterprise System – is a useful tool for understanding the existing conditions of the on-system network as well as planned projects and rehabilitations for pedestrian facilities across Texas. This inventory includes pedestrian and bicycle infrastructure elements within the roadway ROW, like sidewalk segments, curb ramps, bus pads, pedestrian islands, signals, sidewalk obstructions, and driveways, and tracks the progress made toward implementing TxDOT's ADA Transition Plan. The inventory is updated over time as new facilities are added and existing facilities are rehabilitated. TxDOT's Design Division is also in the process of making pedestrian infrastructure geodata available to the public.
- **Bicycle infrastructure:** TxDOT maintains the On-System Bikeways geospatial bicycle infrastructure inventory, which is updated as new facilities are built.
- **Micromobility infrastructure:** Micromobility infrastructure may include charging stations, shared mobility on-street lanes, and zones within urbanized areas where micromobility usage and/or parking may be prohibited or metered. Charging facility location data, for example, is available through third-party vendors.
- **Pedestrian and bicycle counts:** TxDOT has partnered with the Texas A&M Transportation Institute (TTI) to establish the Texas Bicycle and Pedestrian Count Program (BP|CX). TTI has aggregated active transportation demand data generated from permanent and short-term count stations installed by TxDOT as well as local and regional partners.
- **Third-party big data vendors:** These vendors provide products that claim to indicate pedestrian and/or bicycle demand. Whereas the Texas BP|CX counts only indicate pedestrian and bicycle modal volumes at a precise location and only while a counter is in the field, big data vendors can provide indices and estimates of pedestrian and bicycle demand for a much wider geographic and temporal expanse. Ongoing research continues to analyze how closely third-party big data vendor indices and estimates align with observed demand.

Transit

Transit services available within Texas include a combination of bus (local urban service, rural service, and private long-distance service) and passenger rail (public commuter rail, light rail, and long-distance private service). Many of the transit services are provided by municipalities and other governmental agencies, but non-profit organizations and private companies also provide some transit services. **Table 3-4** provides a checklist of transit-related documents and programs to include in the document review phase of a corridor study.

Table 3-4 Documents and Programs for Review (Transit)

Document/ Program Name	Purpose	Year
Statewide Multimodal Transit Plan	This plan will provide multimodal solutions and statewide strategies for improved mobility and connectivity, with a planning horizon of 2050. The plan will pinpoint needs and opportunities for public transportation improvements and provide a framework for prioritizing future investments. The plan aims to identify needs and gaps within the state's existing transit system and account for anticipated demographic changes, and technological developments.	In progress
Statewide Transportation Improvement Program	The STIP can be used to review the state's 4-year capital improvement program, particularly the rural transportation improvement programs, revealing study corridor investments in the pipeline.	Recurring/ Ongoing
Local Transit Transportation Plans	Local transit development plans, service plans, or comprehensive/master plans reveal community preference for and locations of transit infrastructure.	Recurring/ Ongoing

Note: Additional information on the list of plans/programs can be found on txdot.gov or by contacting the Public Transportation Division.

Examples of data sources used in evaluating transit infrastructure include:

- **Texas Transit Performance Dashboard:** The Texas Transit Performance Dashboard provides information about state-funded public transportation services in Texas' urban and rural transit districts. In addition to the dashboard, TxDOT maintains the Texas transit agencies webpage that provides resources to identify the various transit authorities and transit districts throughout the state. The dashboard does not include any non-state-funded services run by transit authorities, such as Houston Metropolitan Transit Authority of Harris County (METRO), Dallas Area Rapid Transit (DART), and similar. Once the relevant providers of public transit in the study area (including transit districts and transit authorities) have been identified, TxDOT should collaborate with each provider to obtain geospatial data, including transit routes, stops, and service areas, where possible.
- **General Transit Feed Specification (GTFS):** The GTFS enables public transit agencies to publish their transit data in a format that can be consumed by a wide variety of software applications. GTFS data are available through a transit agency's website or third-party data vendors. Other transit providers, such as Amtrak passenger rail, as well as Greyhound, Megabus, and other private bus services, make information about their routes and stops available online.
- **National Transit Database:** Maintained by the Federal Transit Administration (FTA), the National Transit Database provides monthly ridership data and financial, operating, and asset conditions of transit systems in the U.S.
- **Transit demand analysis:** Coordination with local transit providers provides additional information on high-demand routes and stops. In addition, TxDOT's accounts with big data providers can provide indices and estimates of transit demand. Estimating transit demand for specific locations can be indirectly conducted using certain measures as indicators for higher demand. Specifically, the U.S. Census collects household and individual data attributes that may indicate demand for transit. These include zero-car households, household poverty rates, median income, and households with limited english proficiency (LEP).

Aviation

Texas has one of the largest airport systems in the U.S., with six airports making the list of the "top 50 cargo airports in the United States in 2022" (by total landed weight).[1] Identifying aviation assets along a corridor is the first step in determining how and to what degree aviation might impact a study area. Information relevant to corridor planning includes the volume of freight or passengers moved, origin/destination (O/D) travel patterns, and infrastructure needs described in airport master plans. A conditions assessment of existing inventory will include:

- Identification of airports along a corridor or within the study area, including their names and classifications (such as commercial, general aviation, heliports, and similar)
- Fleet size and type of each airport (small, medium, large) based on factors like runway length and passenger capacity
- Information on airport ownership and management
- Details about auxiliary airport facilities, including terminal buildings, hangars, fueling stations, control towers, and maintenance facilities, as needed

Table 3-5 identifies an aviation-related document to review during a corridor planning study. In addition, consider technology updates (e.g., air traffic control modernization, sustainable aviation fuel, and the NextGen Air Transportation System) and airport capital improvement projects (e.g., the Terminal D expansion of Dallas Fort Worth International Airport [DFW] and the Cargo Development East at Austin-Bergstrom International Airport [AUS]).

Table 3-5 Documents and Programs for Review (Aviation)

Document/ Program Name	Purpose	Year
Texas Airport System Plan	The Texas Airport System Plan (TASP) identifies airports and heliports in the state that perform an essential role in the economic and social development of Texas. From approximately, 1,600 public and private landing sites, 292 airports and two heliports meet the requirements of the TASP.	2010

Note: Additional information on the list of plans/programs can be found on txdot.gov or by contacting the Aviation Division.

Examples of data sources used in evaluating existing aviation infrastructure include:

- **General airport information:** TxDOT maintains an online directory of airports and heliports and an interactive directory web map version. The website and directory map provide facility and service summaries of all airports and heliports in Texas.
- **Freight Analysis Framework (FAF):** FHWA's FAF can be used to calculate statistics for the airborne freight in the study area. This information should include volumes of cargo originating from and arriving in the study area.
- **Other data sources:** Other sources that can provide useful aviation data include the BTS's TranStats portal and T-100 Segment data, the Federal Aviation Administration's (FAA's) Passenger Boarding (Enplanement) and All-Cargo Data and Air Traffic Activity System, and other reports published by individual airport authorities, like the traffic statistics reported by DFW and airport activity reports posted by AUS.

Border Ports of Entries

Texas is bordered by Mexico and New Mexico in the west, Oklahoma in the north, and Louisiana and Arkansas in the east. The Texas-Mexico border is North America's busiest trade gateway connected by a binational multimodal transportation infrastructure critical to the movement of goods and people. Based on proximity, some corridor planning studies may have direct connections to the Texas-Mexico border crossings. Special consideration should be given to such studies concerning the following:

- Network connectivity and links to international trade routes
- Current and forecasted cross-border trade impacts
- Binational and interstate stakeholder groups
- Major international freight generators and destinations
- First-and-last-mile connections
- Population and employment centers
- Tourism and other recreational travel impacts

Table 3-6 provides a checklist of border-ports-of-entry-related documents and programs to include in the review phase of a corridor planning study.

Table 3-6 Documents and Programs for Review (Border Ports of Entry)

Document/ Program Name	Purpose	Year
Texas-Mexico Border Transportation Master Plan	The Texas-Mexico Border Transportation Master Plan is a comprehensive, multimodal, Texas-Mexico long-range plan. It identifies current and future transportation needs, challenges, and opportunities for moving people and goods across the Texas-Mexico border.	Ongoing
Border Trade Advisory Committee (BTAC)	BTAC recommendations are included in border reports that are presented to the presiding officers of the Texas House of Representatives and Texas Senate.	Ongoing
TxDOT International Trade and Border Planning	Documents and reports published by the International Trade and Border Planning Branch of TPP provide additional information on relevant planning processes.	Ongoing
MTPs and Regional Freight, Pedestrian, Transit, and Active Transportation Plans	MTPs and other regional plans provide detailed context on needs and planned improvements to address those needs.	Varies

Note: Additional information on the list of plans/programs can be found on txdot.gov or by contacting TPP's International Trade and Border Branch.

Examples of data sources used in evaluating border trade and infrastructure include:

- **Border crossing/entry data:** Published by the U.S. Customs and Border Protection and the respective bridge operators, border crossing/entry data includes disaggregated monthly data by privately owned vehicles, trucks, buses, rail, and pedestrians.
- **Geographic data:** Geographic representation of key intermodal facilities, including pipeline terminals, airports, public transit stations, intercity bus terminals, and rail yards, is published through the National Transportation Atlas Database and MPO or city websites.
- **Mexico-related data:** The National Institute of Statistics, Geography, and Informatics provides Mexico-related data regarding demographics, economy demographics (education, employment, population), economy and productive sectors (trade, manufacturing, GDP, transport), geography, and environment (maps, environment).
- **Transborder Freight Data:** Published by BTS, Transborder Freight Data provides insights on North American freight movement by mode of transportation, commodity type, and geographic detail for U.S. exports and imports with Canada and Mexico.
- **Big Data:** Providers include StreetLight, TomTom, and Geotab, with coverage in Mexico and the U.S.

Maritime Ports

The maritime ports within Texas constitute vital nodes in the state's transportation network, serving as gateways for international trade and key contributors to the Texas economy. These ports, strategically positioned along the Gulf of America, facilitate the import and export of a variety of goods, supporting industries ranging from manufacturing to agriculture. Depending on the geographical expanse, it may be important to briefly reiterate the purpose and scope of the corridor plan and what it means in the context of the maritime ports in the study area. A systems analysis can be done to highlight how these maritime ports operate collectively within the corridor and how they can impact regional and state-level trade.

Ports are classified based on the volume of cargo handled, the major commodities imported and exported, and whether they are deep draft or shallow draft ports. This classification lays the groundwork for a nuanced understanding of each port's unique contributions and challenges relative to the study.

Considerations when evaluating maritime ports for corridor planning study areas include:

- Identification of all maritime ports, their significance, and their connection to various shipping channels and waterways, like the Gulf Intracoastal Waterway.
- Physical infrastructure, such as terminal facilities, berths, and container-handling facilities, that represent critical components that dictate a port's capacity and operational capabilities.
- Identification of warehouses and storage facilities, bulk cargo handling facilities, and energy terminals to assess efficiency and resilience of the maritime assets.

Table 3-7 provides a checklist of documents and programs related to Maritime Ports to include in the review phase of a corridor planning study.

Table 3-7 Documents and Programs for Review (Maritime Ports)

Document/ Program Name	Purpose	Year
2024-2025 Texas Port Mission Plan	This plan outlines the activity, investment, and economic impact of Texas' ports across three categories: waterways, port facilities, and inland connections.	2024
Texas Freight Mobility Plan 2050	This plan documents the importance of freight movement in Texas, discusses key factors impacting demand, and identifies challenges, investment strategies, policies, and data needed to enhance freight safety and mobility to improve the state's economic competitiveness.	2023
2022 Texas Port Profiles	These profiles provide a detailed snapshot of Texas' ports, covering facilities at each port, tonnage, capital projects, and ship channel information. In 2024, the Texas Port Profiles will be incorporated into the Texas Port Mission Plan.	2022
Gulf Intracoastal Waterway Legislative Report	This document is currently under development and expected in Fall 2024.	2024

Note: Additional information on the list of plans/programs can be found on txdot.gov or by contacting the Maritime Division.

Examples of data sources used when evaluating maritime infrastructure include:

- **Waterborne cargo volumes:** This information would include the volume of cargo originating in and destined for the study area. The U.S. Army Corps of Engineers' Waterborne Commerce Statistics Center is responsible for capturing information on vessels, tonnage, commodity, origin, and destination from vessel operating companies. The FAF also has forecasts for the horizon year of 2050 that can be used to understand predicted trends of cargo movement. For individual port statistics, data from the relevant port authorities can be used for the analysis of cargo volumes, shipping routes, and terminal capacities. Please coordinate with TxDOT's Maritime Division.
- **Other data sources:** Some other sources that can provide useful maritime data include the Maritime Administration, PIERS, Transearch, and the U.S. Census' USA Trade Online database.

Freight Transportation

As a key economic hub, Texas relies heavily on an efficient and reliable freight transportation system to support its wide variety of industries. The state's strategic location and vast network of highways play a pivotal role in facilitating the movement of goods within and beyond its borders. Understanding the current state of freight infrastructural elements is crucial to identifying areas where improvements are needed to handle freight traffic while contributing significantly to the efficiency, safety, and overall performance of freight movements along the corridor.

An existing conditions assessment of freight movements along a corridor should consider the following:

- **Infrastructure deficiencies:** Deficiencies include existing road infrastructure condition, roadway capacity, pavement condition, bridge vertical clearance, areas of persistent congestion, and aging infrastructure.
- **Safety concerns:** Areas with a high frequency of crashes, especially those involving freight vehicles, create safety concerns for the movement of goods.
- **Supply chain and commodity flow patterns:** This includes commodity types, volumes, and value of goods being moved by truck or freight rail in the study area.
- **Access and connectivity to critical freight infrastructure:** Evaluating freight facilities like truck parking, truck terminals, warehouses, and rail-to-truck yards provides an understanding of the degree of accessibility/connectivity freight vehicles have to critical infrastructure.
- **Intelligent Transportation Systems (ITS):** ITS includes infrastructure elements such as traffic management systems, dynamic messaging boards, and electronic tolling system elements, which can be assessed to determine their effectiveness for freight movement.

Table 3-8 provides a checklist of documents and programs related to Freight Transportation to include in the review phase of a corridor planning study.

Table 3-8 Documents and Programs for Review (Freight Transportation)

Document/ Program Name	Purpose	Year
Texas Delivers 2050 - Freight Mobility Plan	This plan documents the importance of freight movement in Texas, discusses key factors impacting demand, and identifies challenges, investment strategies, policies, and data needed to enhance freight safety and mobility to improve the state's economic competitiveness.	2023
Freight Network Technology and Operations Plan	This plan outlines technology-based strategies to help improve freight transportation safety and mobility in Texas.	2020
2024-2025 Texas Port Mission Plan	This plan outlines the activity, investment, and economic impact of Texas' ports across three categories: waterways, port facilities, and inland connections.	2024
Statewide Freight and Supply Chain Resiliency Plan	This future TxDOT plan identified within the 2050 Freight Mobility Plan will assess Freight Resiliency to anticipate human-driven and extreme weather events. Resiliency will be determined for the six key industry supply chains identified in Texas Delivers 2050.	Future
Regional Freight Plans	These plans are developed to identify opportunities and strategies to address regional freight mobility challenges. Some of these plans are available on the TxDOT Freight Planning webpage and from the respective MPOs.	Varies

Additional information on traffic and safety analysis of freight movement is provided in the Traffic and Safety Analysis section on the next page.

Traffic and Safety Analysis

Identifying traffic and safety needs is a critical component of all planning studies. Existing traffic conditions analysis examines performance measures related to travel time, delay, level of service, speeds, volume-to-capacity ratio, and vehicle miles traveled (VMT). These measures of effectiveness may vary depending on the study limits, scope, data availability, and analysis tools selected for the study.

Traffic safety analyses examine safety concerns and issues concerning roadway geometry, poor pavement conditions, pavement marking visibility, insufficient traffic control, and driver behavior, all of which result in unsafe travel conditions. Safety analyses are informed by crash frequency, crash type, and contributing factors at historical crash locations.

Data, Methods, and Tools

TxDOT's Traffic and Safety Analysis Procedures Manual provides detailed guidance on conducting traffic and safety analysis for corridor studies. **Table 3-9** provides a summary of traffic and safety performance measures, data sources, and tools to be considered for most corridor studies. Refer to the manual for additional information on analyzing these performance measures.

Table 3-9 Traffic and Safety Analysis Performance Measures for Corridor Studies

Category	Performance Measures	Data Sources	Tools [2]
Mobility	• Level of service and delay • Travel time • Free flow speed vs. peak period speed • Travel time reliability • Volume-to-capacity ratio • Vehicle miles of travel	• INRIX/StreetLight/Replica/ NPMRDS/Geotab/ American Transportation Research Institute (ATRI) data • TTI Top 100 Most Congested Roadways statewide dataset • Aerial imagery from the Texas Imagery Service • Texas Roadway Inventory	• Statewide and MPO travel demand model outputs • Deterministic analysis • Capacity Analysis for Planning of Junctions • Highway Capacity Manual (HCM) analysis
Freight traffic	• Vehicle classification and percentage • Truck flows into and out of areas • Commodity tonnage and value movement	• Commodity Flow Survey • Vehicle Inventory and Use Survey • Transearch (available through TPP data request)	• FAF • Sketch level or macroscopic analysis • Statewide and MPO Travel demand model outputs
Pedestrians and bicyclists	• Number of marked crossings within a corridor • Width of bike lanes or sidewalks • Length of crosswalks • Crosswalk lighting	• Big Data sources such as Strava, Streetlight, and Replica • Field visit • Aerial imagery	• HCM analysis • Pedestrian and bicycle facility inventory • Texas BP|CX • Texas Comprehensive Accessibility Program
Transit	• Person throughput versus vehicular throughput • Number and spacing of transit stops on corridor • Service frequency • Ridership • On-time service (reliability)	• Transit agency • Aerial imagery	• Microsimulation • Travel demand modeling
Safety	• Number of fatal or severe injury crashes compared to a similar facility type • Crash rates for different modes of travel • Number of pedestrian and bicycle-related collisions • Number of similar types of crashes	• Crash Records Information System (CRIS) • Aerial imagery from the Texas Imagery Service • As-builts	• GIS software • Highway Safety Manual spreadsheets • Interactive Highway Safety Design Model • Enhanced Interchange Safety Analysis Tool
Access management	• Driveway spacing • Number of median openings • Conflicting driveways on a two-way left turn lane	• As-builts, CAD drawings, and survey files • Aerial imagery from the Texas Imagery Service	• Microsimulation • HCM analysis

Note: Adapted from Table 7-1: Corridor Planning Performance Measures from the Traffic and Safety Analysis Procedures Manual.

[2] For additional information on the tools described in this table, see the Traffic and Safety Analysis Procedures Manual.

Key Considerations

Key considerations when performing traffic and safety analysis for corridor studies include:

- Ensure that the **defined study limits** for the analysis are appropriate and based on the issues the study is trying to address.
- **Consider the impact of larger areas** on a corridor or route to provide additional context concerning traffic patterns, population characteristics, land use, freight movement, industries served, environmental features, employment, and other economic indicators.
- **Consider the impact of roadway infrastructure such as intersections**, interchanges, ramp spacing, weaving lengths, ramp lengths, frontage routes, and parallel routes on a corridor or route when conducting traffic and safety analyses.
- When using historical traffic and safety data, **check for outliers and the impact of major events**, such as economic downturns, hurricane evacuations, new industrial development, and roadway construction closures.
- **Conduct site visits** to identify additional insights not captured through published databases. Site visits also confirm existing traffic operation and safety conditions as well as issues not obvious through desktop-based analysis.
- **Adequately document** assumptions and data sources used, including reasonableness checks and resulting decisions.
- **Verify analysis results with local stakeholders** to ensure the validity of assumptions, accuracy of results, and relevance of recommendations in addressing needs. For example:
- **A high involvement of commercial trucks in crashes** may necessitate targeted safety measures, including infrastructure design improvements to accommodate larger vehicles, specialized driver training, and stricter enforcement of regulations.
- **A higher proportion of intersection-related crashes** may indicate a need for targeted safety measures at intersections, such as improved signage, traffic signal optimization, or geometric modifications.
- Understanding the **“manner of collision”** (e.g., rear-end, side swipe) provides insights into the specific scenarios leading to crashes.
- **Higher crash rates during low-light conditions** highlight the importance of nighttime safety measures. Improved street lighting, reflective signage, and visibility enhancements may be implemented to address this issue.

- **Analyze crashes based on weather conditions** to identify areas where inclement weather plays a significant role, thus requiring advanced safety warning systems and driver education.
- **Understand crash severity trends** to prioritize interventions for improvement.
- **Analyze contributing factors** to crashes, such as distracted driving, speeding, or impaired driving, to help identify the root causes of crashes. Implementing educational campaigns or enforcement strategies can address these factors and improve road safety.
- Consider the **impact of planned projects** in addressing traffic and safety needs identified during the analyses to ensure needs are not already being addressed.

Reporting of Analysis Results

The following are some examples of how traffic and safety analyses may be reported:

1. Identification of crash hotspots: Overlaying roadway geometry with crash points helps to identify crash hot spots that can be used to create heat maps in GIS for better interpretation. This information can help visualize crash density; however, crash rate analysis and other more detailed crash analyses are required to assess crashes along the study corridor.

2. Crash frequency and characteristics: Historical crash data can be used in visualizing trends and characteristics of crashes.

3. Trip O/D analysis: Travel demand and traffic patterns are typically characterized using O/D data. This type of data is derived from travel demand models or Big Data sources from vendors such as INRIX, StreetLight, Replica, and Geotab, as well as data from ATRI.

Next Steps

This chapter provided an overview of conducting an existing conditions analysis concerning socioeconomic and land use characteristics, network connectivity, physical roadway characteristics, environmental and cultural considerations, multimodal transportation, and traffic and safety analysis. The next step is forecasting future conditions and identifying potential improvements to address needs.


EXIT 386
281
Stephenville
Mineral Wells
20 WEST
Abilene
El Paso
EXIT
386
EXIT
30
TRUCKLOAD • LTL • HEAVY HAUL/SPECIALIZED • EXPEDITED • INTER

4 Corridor Analysis Tools

This chapter provides an overview of data-driven corridor analysis tools to assist with needs identification and prioritization of improvements. In addition, as corridor needs are identified, conceptual project ideas are developed and analyzed to quantify their potential impacts to affected communities, and the movement of goods and people.

GIS and Mapping Tools

One of the foundations of a successful corridor and route study is the effective use of GIS data and software applications. GIS is used in the following:

1. Conducting geospatial analysis
2. Visualizing multiple sources of data
3. Identifying needs
4. Communicating analysis results to stakeholders and the public

TxDOT Open Data Portal: This web-based portal publishes multiple transportation-related datasets which can be used to learn more about a study area or corridor. The data can also be used to produce customizable maps and graphics to convey relevant information to stakeholders and the public. Datasets published on the portal include TxDOT's roadway inventory, mile markers, the most congested roadway segments, geographical boundaries, bridges, border crossings, etc. Some of the information on this portal can also be found on other TxDOT online data sources, such as the TxDOT Statewide Planning Map and TxDOT Project Tracker.

Source: Traffic and Safety Analysis Procedures Manual

Additional GIS-based datasets are available through requests to TxDOT Divisions (e.g., bridge strike and pavement data from the Maintenance and Pavement Divisions, respectively), federal data sources (e.g., FHWA, U.S. Census Bureau, Bureau of Economic Analysis), and private data vendors.

Corridor Planning Tools

TxDOT TPP has developed the Corridor Planning Tools to support performance-based planning for corridors. The Corridor Planning Tools (CPT) are intended to help identify the greatest needs on Texas transportation corridors, as well as collaborate with districts. The CPT provide a data-driven, performance-based approach on selecting and evaluating corridors; consistency in identifying the greatest statewide needs for better investment decisions; and enhance planning and programming by facilitating decisions earlier in the process before going into the annual cycle of the Unified Transportation Program (UTP). The Corridor Planning Tools help districts better define regional needs and conceptual improvements outside the UTP; improve scoping for future corridor studies; customize performance measures that reflect district priorities; leverage existing TxDOT datasets for decision-making; support Metropolitan Planning Organization (MPO) call for projects; and coordinate with local transportation partners to help refine results and identify overlooked needs.

Corridor Assessment

Corridor Assessment allows users to assess corridors that are generally 100 miles in length based on overall corridor performance. Corridor Assessment supplements the long-term planning phase, so it is used for evaluations outside of the UTP. Corridor Assessment uses 23 performance metrics to identify statewide corridors of greatest need.

Segment Evaluation

Segment Evaluation allows users to evaluate corridor segments that are 10 miles long to identify specific segment needs. Segment Evaluation informs development of projects moving into the UTP, the Develop Authority phase, to perform schematic and environmental study. Segment Evaluation uses 25 performance metrics to conduct a detailed segment analysis of these corridors.

Travel Demand Modeling

Travel demand model (TDM) outputs are used to provide insight into travel patterns, assist with forecasting future traffic growth, and identify areas for traffic improvements based on changes in land use, population, employment, and other demographic factors. TxDOT's Statewide Analysis Model (SAM) is used in conjunction with MPO models to provide a larger context of travel demand along a corridor due to the impacts of major highway networks, including connections to border ports of entry, maritime ports, airports, and critical freight corridors. TDMs also incorporate planned and approved future projects and can be used for testing build and no-build scenarios. For additional information and guidance on using SAM and MPO TDMs for planning studies, refer to Chapters 3 and 4 of the Traffic and Safety Analysis Procedures Manual.

Economic Analysis

An economic analysis for corridor planning typically includes two separate components: an Economic Impact Analysis and a Benefits-Cost Analysis (BCA). Generally, an Economic Impact Analysis is used when the focus is on the economic impact of a project identified through the corridor planning process, while a BCA is used when the focus is on the overall benefits and costs of a project, including non-economic factors such as safety, emissions, and quality of life.

A BCA evaluates impacts in present value, while an Economic Impact Analysis portrays expected changes in the economy. In general, a BCA compares the net present value of benefits and costs or the macro-level benefits from capacity improvement projects and their associated impact. Economic Impact Analyses show the impacts of improvement projects on regional economic growth over time.

Several regional economic analysis models (including data) are available for use in economic analysis. These include Regional Economic Models Inc. (REMI), Regional Industrial Multiplier System II (RIMS II), IMpact analysis for PLANning (IMPLAN), and Transportation Economic Development Impact System (TREDIS). There are pros and cons to using each of these models, which are not covered in this guidebook. For a more detailed description of each model and their capabilities, refer to the following:

- Analyzing the economic impact of transportation projects using RIMS II, IMPLAN and REMI by Tim Lynch (2000)
- Tools for Transportation and Economic Development: TranSight and TREDIS
- IMPLAN, RIMS II, and REMI Economic Impact Models by AKRF, Inc.

Economic Impact Analysis

An Economic Impact Analysis focuses on estimating the expected changes and impacts on the economy of a designated region (e.g., county, metro area, or state) as a result of proposed improvements and recommendations from a corridor, feasibility, or route study. For transportation projects, this can be useful for identifying the short- and long-term impacts of projects on jobs, income, and tax revenues in the study area. The short-term effects are typically in generating jobs and income by construction activities, while the long-term effects typically come in the form of cumulative economic growth occurring after completion of the project due to changes in business productivity and competitiveness enabled by the transportation improvements.

Tip: Generally, an Economic Impact Analysis is most applicable for proposed projects that have a construction cost of $10 million or more and have significant long-term positive impacts on commuter and/or freight flows (e.g., affecting 2,500 persons or vehicles per day). An Economic Impact Analysis can be carried out for smaller projects, but the resulting job impacts may be small (Weisbrod 2014).

Economic Impact Analyses for corridor studies typically involve an economic opportunity assessment that includes:

- **Capital expenditures (CapEx):** The CapEx profile is based on short-, medium-, and long-term investments in projects proposed to be implemented. CapEx includes construction costs, ROW acquisition, utility relocations, and other roadway construction related costs and contingencies. Proposed projects may include increasing roadway capacity, improving interchanges, converting frontage roads from two-way to one-way, filling frontage road gaps, adding new ramps, resolving ramp lengths, replacing bridges, increasing bridge vertical clearance and other safety related improvements.
- **Labor income:** Labor income includes employee wages (including benefits) and income to the business owners as a result of investments in the proposed projects.
- **Value added:** Value added is the difference between an industry or establishment's total output and the cost of intermediate inputs. It consists of employee compensation, taxes on production and imports (minus subsidies), and gross operating surplus (such as profit). Changes in gross regional product are considered value-added changes from the CapEx.
- **Job creation:** Job creation is the result of direct, indirect, and induced impacts by activities, such as construction and spending by households associated with direct jobs.
- **Quality of jobs:** Quality of jobs can be measured by estimated future job growth and wage levels.

Benefit-Cost Analysis

A BCA compares total project costs and benefits by evaluating the stream of costs and net benefits that had occurred to users and the rest of society (non-users) at different time points over the life cycle of a project. All benefits and costs are monetized and then discounted to present value to allow for a comparison of the time value of money. Because benefits are presented relative to cost, project scale does not affect the results.

This analysis is particularly valuable for transportation infrastructure projects because the costs are incurred up front while the benefits may not occur until well after the project is completed. A BCA measures the "efficiency" of an investment (in terms of its relative payback), which can then be compared amongst potential projects – this process prioritizes the projects with the greatest overall payback while screening out the projects where the costs exceed the eventual benefits.

A typical BCA is a two-step process – step one estimates the direct project impacts, while step two applies valuation factors to calculate the direct user and non-user impacts. In the first step, impacts are allocated by type and trip purpose and are then extended (based on VMT and vehicle/trip types) to estimate further non-user implications, such as emissions and health effects. In the second step, direct user and non-user impacts generated in the first step are multiplied by applicable per-unit valuation factors. These factors can be derived from either observed market prices or inferred shadow prices (willingness to pay for improved conditions), and the source of data can be either revealed or stated in a preferences survey.

Despite its benefits, a BCA also has limitations; it measures overall efficiency by rolling up all costs and all benefits regardless of who pays and who benefits. Thus, a BCA cannot consider the fair distribution of impacts of impacts across different groups of people or geographic areas. Because a BCA uses a discounted net present value concept, it is also not the right tool to evaluate financial feasibility in terms of cash flow over time and is not set up to evaluate progress toward achievement of long-range policy goals for future economic development or environmental improvement. In addition, it is widely recognized that BCAs may be defined for a specific viewpoint, but do not have an explicitly stated spatial boundary for benefit measurement, particularly for transportation analysis.


5
5STARS LOGISTICS INC
5SLI1
VANGUARD

5 Study Recommendations and Implementation Plan

A corridor planning study's recommendations and implementation plan should tie into the mission, goals, and objectives for the corridor while addressing the challenges identified along the project. The study's recommendations should also connect to the strategies laid out in the SLRTP and support its long-range goals. To obtain buy-in for the process, a coordinated planning effort with decision-makers and consensus from the public, business entities, and key stakeholders is needed.

Study recommendations generally fall into three major categories: policies, programs, and improvements, as shown in **Figure 5-1**.

Figure 5-1 Study Recommendations

Policy and Program Recommendations

Policies and programs provide the foundation for stakeholders to prioritize ongoing needs, assist in future decision-making, and successfully achieve a study's mission, goals, and objectives. Corridor-level policies establish guidelines and limits for TxDOT Districts and regional planning agencies regarding investment priorities along the corridor. Policies and programs are most useful when aligned with existing national, statewide, regional, or corridor goals and programs.

In general, corridor-level policies and programs should address the following topic areas derived from the TxDOT Strategic Goals and various action plans:

- **Safety:** This includes policies and programs that address roadway design issues, driver behavior (distracted driving, driving under the influence, seat belt usage), and conflicts with active transportation users like pedestrians and cyclists. Safety policies and programs should also incorporate the use of data and technology to improve crash prevention and raise public and operational system awareness. Examples of policies and programs can be derived from the Texas Highway Safety Plan, the TxDOT Mission Zero Initiative, the Texas Truck Parking Study, the TxDOT Work Zones Program, and other national safety programs.
- **Multimodal Access and Connectivity:** This includes policies and programs that address improving accessibility options to multimodal trip generators and attractors, such as transit stations and freight facilities, and harmonizing coordination efforts among public and private stakeholders serving the first and last mile to and from these facilities. Multimodal access and connectivity policies and programs should also address the need for system continuity, stakeholder engagement, illegal ramp usage, animal crossings, frontage road continuity, roadway design constraints, and rural connectivity.
- **Multimodal Transportation Adoption:** This includes policies and programs that address providing safe and reliable connections for transit, pedestrians, and cyclists moving between and within cities along the corridor. Considerations for this policy topic include sufficient mobility options, increased geographic coverage, geographically geographically balanced distribution of resources, service predictability, service affordability, and the role of emerging and innovative technologies in promoting multimodal adoption.

- **Forecasted Growth:** This includes policies and programs that address the potential impacts of forecasted traffic caused by the growth of existing or new businesses, population centers, and industries moving freight along the corridor. Policies and programs may be derived from transportation demand management strategies, use of intelligent transportation systems, and finding opportunities for managed lanes in urban areas.
- **Emerging Technologies and Data:** This includes policies and programs that address intelligent connected infrastructure and electric vehicle charging. Examples include encouraging the development of an integrated multimodal data sharing program or reviewing the corridor's connected and autonomous/automated vehicle readiness program.
- **Project Delivery:** This includes policies and programs that address project prioritization, tracking of project development to communicate progress with stakeholders, and identification of alternative funding sources. Policies and programs may be derived from the Statewide Transportation Improvement Program and goals established in federal infrastructure funding programs such as the Infrastructure Investment and Jobs Act (IIJA).
- **Performance Monitoring:** This includes policies and programs that promote the collection and use of data to monitor the condition and operating characteristics of the corridor. Examples include implementing an asset management and tracking program, monitoring oversize vehicle movements, or coordinating data sharing efforts among Districts.
- **Truck Parking and Rest Areas:** This includes policies and programs that promote the provision of physical and technological infrastructure which support the safety of truck drivers along a corridor. Policies and programs can build on national, statewide, and regional truck parking initiatives, such as TxDOT's Truck Parking Study.
- **Environmental Stewardship:** This includes policies and programs that address the impacts of extreme weather and natural disasters on mobility and the impacts of mobility on local air pollution, flooding, stormwater runoff, and wildlife habitat loss.
- **System Resiliency:** This includes policies and programs that address potential damage from climate-related hazards, such as hurricanes, flooding, wildfires, winter storms, tornadoes, and sandstorms. These policies and programs identify strategies to minimize the effects of these natural disasters on corridor traffic flows.

Proposed Improvements and Implementation

Developing recommendations and projects that result from corridor studies involves a number of steps. These include identifying needs, categorizing improvements, project evaluation through technical analysis, and project prioritization through stakeholder involvement.

Needs Identification

Corridor needs are first identified as part of outreach efforts to TxDOT Districts, working groups, Steering Committee members, and any other stakeholders as identified in Chapter 2. Needs identified through technical analysis of existing conditions and site visits (Chapter 3) are considered in the identification of proposed improvements to the corridor.

Project Categorization

Once projects are identified, they can be categorized based on the type of improvement as shown in **Figure 5-2**.

Figure 5-2 Project Categorization

Added Capacity

Projects involving the construction of additional mainlanes in both directions.

Interchanges

Projects involving the redesign of interchanges to improve operations.

Freight, Rest Areas, & Truck Parking

Projects involving the movement of freight and the design and construction of rest areas or truck parking facilities along the corridor.

Frontage Roads

Projects involving frontage road improvements, such as construction of frontage road sections to connect existing gaps and conversion to one-way frontage roads.

Bridges

Projects involving bridge rehabilitation, replacement, and reconstruction to meet minimum vertical clearance.

Multimodal Access

Projects aimed at improving bicycle and pedestrian access to intra-city transit facilities. These include route connectivity improvements such as sidewalks, bikeways, bicycle storage facility plans, and pedestrian-friendly routes (including lighting, landscaping, signals, crosswalks, underpasses, overpasses, and shoulder widths).

Ramps

Projects involving ramp improvements, such as ramp realignments or reconstructions and review of distances between ramps to determine whether weaving distance is adequate.

Safety

Projects involving localized improvements to address safety concerns. These can be spot safety improvements or larger improvements.

Wildlife Crossings

Projects aimed at protecting the natural environment and movement of wildlife along corridors. These include fences, underpasses, overpasses, culverts, and others.

Project Evaluation and Scoring

Proposed improvements may be evaluated with different metrics. For example, for consistency with the UTP, the following criteria groups are suggested as evaluation metrics:

- Safety
- Asset Preservation
- Congestion and Mobility
- Multimodal Connectivity
- Economic Competitiveness

The description of these metrics, potential data sources, and suggested weights used for evaluation can be found in Appendix B.

Project Evaluation Scoring Methodology

1. For each criteria group, assign a weight. The sum of total weight for all criteria groups should be 100%.

2. Metric weights can be equally or non-equally distributed amongst the different criteria groups. When utilizing a non-equal distribution of weights, justification/explanation should be provided in case there are questions about or disagreements with this approach.

3. Raw numeric values for each metric are then converted to a 0-to-100 scale to provide consistency and standardization in scoring.

4. The 0-to-100 criteria scores are then grouped and weighted as described in the earlier steps.

Preliminary Construction Cost Estimates

Preliminary cost estimates are calculated based on conceptual typical sections, pavement design, TxDOT average unit bid prices, and project costs. For projects that address low bridge vertical clearances, including standalone bridge projects and added capacity projects, cost ranges may be provided. The lower estimate includes the cost to raise the existing bridge to the current 18-foot-6-inch standard, while the higher estimate includes the cost to "flip the stack;" that is, to reconfigure the interchange with the main highway going over the cross street to eliminate conflicts. The projects' scores combined with their cost estimates are then presented to stakeholders during the project prioritization exercise detailed blow.

Project Improvement Prioritization

The proposed improvement prioritization exercise is best held as an in-person meeting because currently, there is not a web-based tool adequate to conduct this exercise. For the prioritization exercise, working group members are split into sub-groups to make it easier for stakeholders to provide input. Proposed improvements are presented to meeting attendees in an interactive map format. Working group members are given the opportunity to review proposed improvements and participate in the prioritization activity.

Based on their knowledge of the area and taking into account factors such as safety, ongoing projects, operational enhancements, and economic development activities, working group members categorize proposed improvements as short, mid, and long term.

Opportunities to group smaller proposed improvements are also considered. If there are differing results from the small group activities, these differences are discussed in the full group session to gain consensus on prioritization of all improvements. When consensus building is a challenge, attendees can vote to determine the appropriate prioritization of proposed improvements.

Once proposed improvement prioritization is completed at the working group level, results are shared with Steering Committee members for feedback. Steering Committee members may decide on how to proceed with issues such as the following:

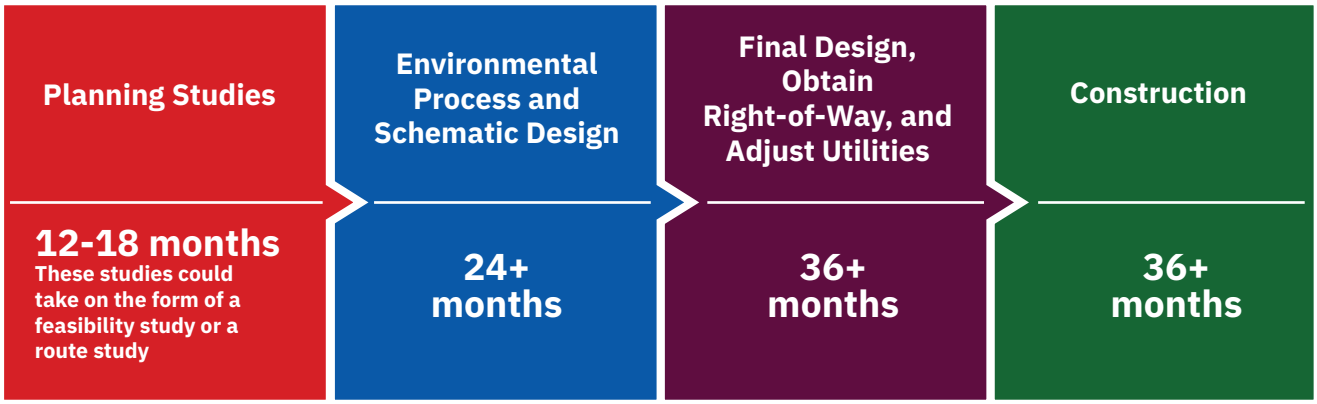
- Proposed improvements with expansive scopes that were classified as "short term"
- Proposed improvements that were deemed high need but were classified as "long term"
- Proposed improvements that had low implementation costs that were classified as "long term"

Typical Project Development Process

After the Steering Committee's review, the list of proposed improvements is sent to District Engineers for final review and incorporation into the TxDOT project development process.

Depending on the proposed improvements, additional planning studies may be conducted, giving the public more opportunity to provide input on a proposed improvement. As shown in **Figure 5-3**, other steps that must be completed before construction can begin, include environmental clearance, utility adjustments, and right-of-way acquisition.

Figure 5-3 Typical Project Development Process



- Advancements from step to step is contingent upon the outcome of the previous step and the availability of funding.
- Dependent on the scope, the study recommendations could be broken into several projects that extend over a longer period of time

Tracking Progress on the Implementation Plan

The corridor study Implementation Plan is a non-fiscally constrained long-range plan used to advance multimodal corridor development to prepare the state system for the future. The Implementation Plan provides a comprehensive, unified corridor-wide strategy for TxDOT and serves as a planning tool to guide decision-makers, particularly TxDOT Districts, on how we strategically plan, design, fund, and construct the series of improvements needed over time.

Broken down by individual districts, the Implementation Plan prioritizes improvements into near-term (0-4 years), mid-term (5-10 years), and long-term (10+ years) timeframes. The construction of proposed improvements identified in the corridor study Implementation Plan is expected to be completed incrementally through a series of local-level projects as funding becomes available.

Recommended improvements documented in the implementation plan may be adjusted over time based on TxDOT District priorities, funding availability and other considerations. Associated estimated costs for proposed improvements in the implementation plan include planning level estimates that use study year dollars. Therefore, cost estimates will need to be escalated at a reasonable inflation rate as projects are programmed in the future. Individual Districts should meet internally periodically and coordinate with each other, as well as the MPOs and RPOs to discuss updates to their respective portion of the corridor study Implementation Plan and collaborate with other stakeholders as appropriate.

To track corridor development progress for an individual corridor across the state, TxDOT created a dynamic way to report and communicate more readily in a clear, concise, and easy to understand manner to decision makers, elected officials, and the general public. The Corridor Planning Implementation Dashboard (CP-ID) automates the reporting process by integrating data from various key systems such as TxDOTConnect and other TxDOT databases that contain historical project development and funding information.

The CP-ID is designed to enhance transparency and collaboration among stakeholders by making essential project-level data readily and easily accessible. It supports real-time monitoring through scheduled data refreshes, which provide the latest information for decision-making. Additionally, the CP-ID enables data-driven insights, helping to identify trends and areas for improvement in corridor implementation strategies. The primary users of this tool are the TxDOT TPP staff and TxDOT Districts, while stakeholders include planning partners, divisions, project delivery teams, and data owners involved in the corridor study implementation process.

Project Funding Opportunities

The availability of funding plays a crucial role in implementing improvements identified through the planning studies. TxDOT can leverage federal, state, and other resources to fund improvements that align with its priorities and address the unique needs of the state's transportation system. TxDOT's transportation programs such as the UTP and STIP (see **Figure 5-4**) are integrated and linked to support the state's transportation goals and performance targets at the project level. Additional information on the UTP and STIP can be found in their respective program manuals.

Figure 5-4 Project Funding Opportunities

Statewide Long-Range Transportation Plan (SLRTP)

Planning Horizon: A minimum of 24 yearsUpdated: Every four years

Purpose: Establish the vision, goals and performance objectives for the state's transportation system, identify funding needs and set long-term strategies.

Unified Transportation Program (UTP)

Planning Horizon: 10 years

Updated: Annually*

Purpose: Guides the development of specific transportation projects and programming linked to the goals, performance measures and targets of the long-range plans.

Metropolitan Transportation Plans (MTP)

Planning Horizon: A minimum of 20 years

Updated: Every four or five years

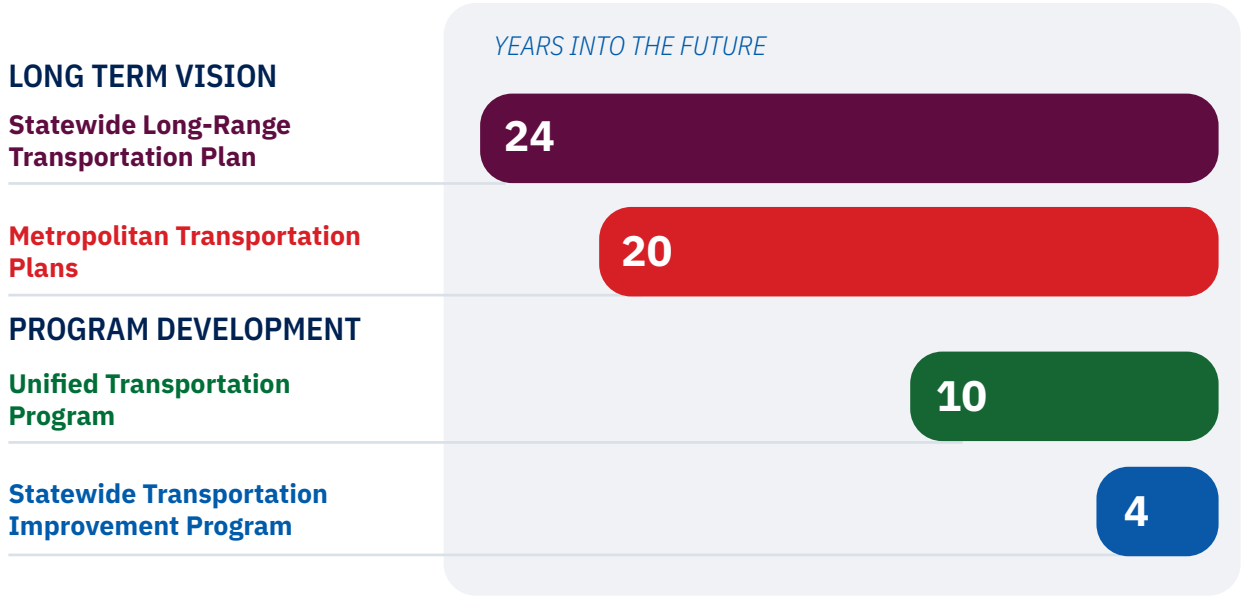
Purpose: Each MPO in Texas prepares an MTP for its respective region, which establishes the long-term transportation policy agenda for metropolitan areas.

Statewide Transportation Improvement Program (STIP)

Planning Horizon: 4 years

Updated: Every two years (as well as quarterly revisions)

Purpose: Provide a listing of transportation projects in the final stages of development. Once a project is approved in an approved STIP, TxDOT's two-year letting schedule authorizes and administers its construction.




16 FT 10 IN
Jeep

Appendix A: Visual Communication

Visual communication for corridor studies involves displaying information and ideas using color, symbols, graphics, maps, and more. Key considerations for visual communication tools and elements are presented in the following sections.

Accessibility

Accessibility is foundational to all visual communication TxDOT uses. Poor design and exhibition of informational materials can cause difficulties for people with visual or hearing impairments. Accessibility of these materials becomes increasingly important in public-facing documents and during public engagement efforts. In Chapter 2 of its Strategic Public Engagement Guidance document, TxDOT identified several techniques to minimize barriers in engagement and visual communication materials. Techniques include contrast, color, captions, and formatting. In addition, TxDOT maintains a SharePoint site devoted to creating accessible digital materials.

The following are common examples of barriers in visual communication:

- Materials such as presentations, brochures, and posters designed with hard-to-read fonts, low-contrast colors, and crowded layouts, making them difficult to view for those with visual impairments
- Online content incompatible with screen readers and other aids and poorly adapted into offline formats

The following are additional links to help ensure TxDOT's visual communication materials are accessible:

- TxDOT's Brand Guidelines
- Guides on creating accessible materials of all kinds
- Test adequate contrast between pairs of colors

Color

Colors should be used with intention and purpose – elements with block colors or a higher contrast compared with the rest of the page will have increased prominence in the visual hierarchy. Because the content that stands out will likely be perceived as more important, it is important to be intentional with which content is given prominence.

Too many colors can create clutter and confusion and compromise accessibility. Consider color accessibility for all users, including those with color vision deficiencies. The TxDOT Brand Guidelines embody the agency's mission, vision, and values. Consistent use of TxDOT brand colors strengthens awareness about the scope of TxDOT's work and its positive impact.

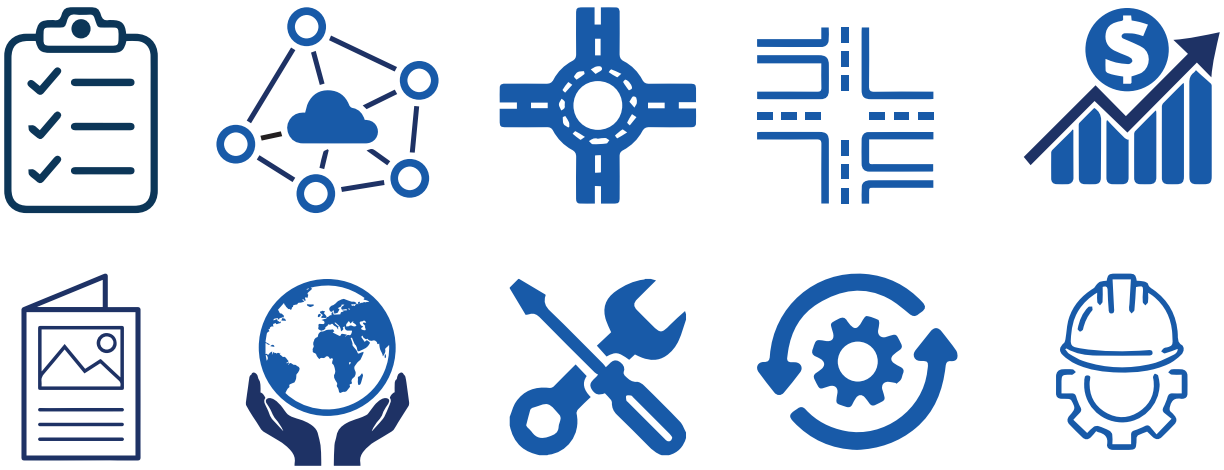
Icons and Symbols

Icons and symbols must be simple and versatile and should be designed in the context of other elements that may appear alongside them to be distinguishable yet complimentary in style and messaging.

Labels should accompany icons whenever the icon may be unfamiliar to audiences. Labels should not be more than 30 characters or one-to-three words because the icon is the key visual element.

Icons and symbols should comply with all relevant licensing and use regulations.

- Consider how the icon would look on different mediums (e.g., phone, desktop, or print).
- Consider how the icon would look on both dark and light backgrounds (different icons might be needed).



Charts and Tables

Charts

Charts are useful in representing data for comparisons, trends, distributions, proportions, and percentages. Some basic considerations when using charts include the following:

- Choose a bar or column chart first. Pie or circle charts can be used, but their slices can be difficult to compare and are often dependent on many colors.
- Consider the level of detail required by the audience. For example, are data labels necessary? If so, how much can the numbers be rounded without altering the meaning?

Tables

Tables are useful for displaying large amounts of data in a compact form, comparing data and categories, or displaying exact and defined figures. Some basic considerations when using tables include the following:

- If data is very complex, a table may become too detailed, making it difficult to read and understand. Lengthy tables that require time and attention can create accessibility issues.
- Tables sometimes require the reader to be familiar with the topic or dataset before reading the table. Using a chart or graphic may be clearer and simpler for all readers.

Graphics

Effective graphics communicate information in a more engaging and accessible way, making a document more interesting and more readable.

Tip: While graphics are often encouraged, pure text may be preferable in some situations. When precise and complex meanings are important, graphics might misconstrue or inadequately communicate a message. The clarity of a message should not be sacrificed in favor of visual appeal.

The following are a variety of elements to consider when choosing to incorporate graphics into your project:

- **Purpose and message:** Clearly define the purpose of the graphic and the message being conveyed.
- **Target audience:** Identify the target audience and consider their preferences, interests, and demographics. Tailor the graphic to resonate with the specific audience being reached.
- **Simplicity:** Keep the design simple and focused. Avoid clutter and unnecessary details that may distract from the main message. A clean design is often more effective.
- **Consistency:** Ensure the graphic aligns with the TxDOT brand and project identity, using consistent colors, fonts, and visual elements.
- **Accessibility:** Ensure the graphics are accessible to a varied audience, including those with disabilities. Use alternative text for images and consider color contrast for readability.
- **Imagery:** Use high-quality and relevant images or illustrations that support your message. Ensure visuals are clear and enhance rather than detract from the message and the overall design.

Photography

Using photographs is a powerful way to illustrate real-world scenarios and enhance the overall visual appeal of a document. Considerations when incorporating photography into a corridor planning study are as follows:

- Ensure each photograph directly supports the content of the document, especially the body of text to which it corresponds.
- In a document, provide captions for all images except cover photos.
- Maintain consistency in color tones and lighting, when possible.
- Attempt to include photographs from locations relevant to the study.

TxDOT maintains a Public Image Gallery and has a team of professional photographers. If a specific photograph or type of photograph is needed, work with TxDOT's Creative Services group to identify potential photographs from the TxDOT Public Image Gallery. Images are subject to copyright and intellectual property laws, so it is crucial to verify that no copyrighted photographs are being used and any photographs under a Creative Commons license are cited properly according to the individual license.

Mapping

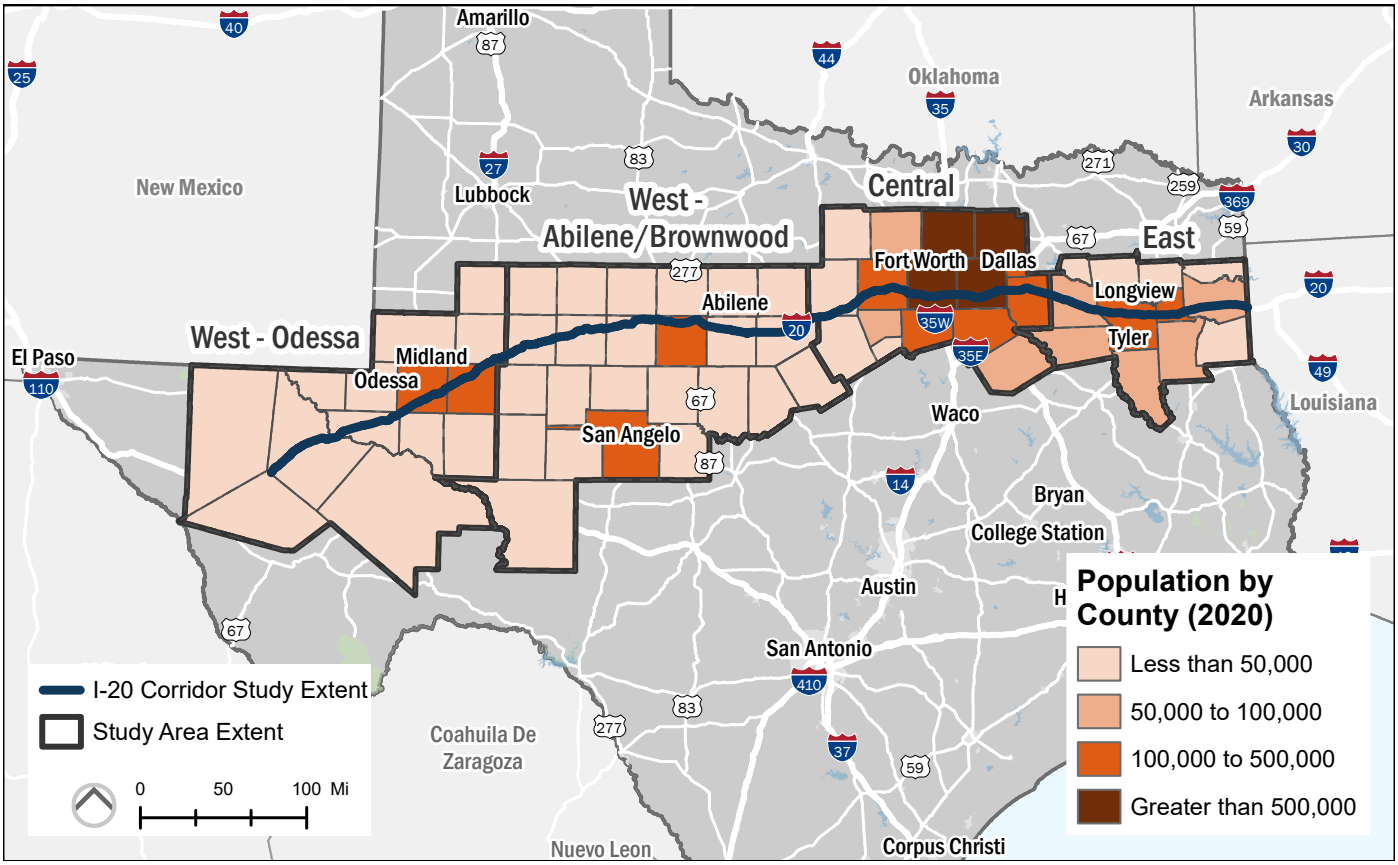
Mapping surmises big datasets and displays them in a more accessible way where users can detect spatial relationships, identify regional patterns, and notice any anomalies that may not be apparent in non-spatial data. Mapping also provides geographic context – for example, how a project or corridor planning study area connects to the surrounding local and state networks.

Maps, particularly online maps, are an important part of the public involvement process because they inform the public and decision-makers regarding proposed projects and future planning efforts.

In general, maps provide a variety of ways to display data, so it is important to choose an appropriate map type that effectively communicates the information. Examples of common maps and their map elements include the following:

- For a study basemap, include geometry for the state of Texas and the surrounding states and country of Mexico (if applicable), as well as U.S. interstates, highways and Mexican highways (if applicable).
  - » Study area polygons and their respective labels are usually included in maps and counties within the study area can be displayed depending on the purpose of the map. Additionally, community-related assets or institutions (such as schools, parks, or natural areas), residential areas, and commercial districts are sometimes included.
- For crash hotspots, consider a heat map or a kernel density map, which identify clusters of crashes on a map.
- For demographic data, consider a basic choropleth map that displays Census data using color gradients across counties or Census tracts.

Working with both TxDOT data professionals and consultant project staff to identify the type of map, scale, and level of detail will be a key consideration early in study development. Refer to TxDOT's Open Data Portal for exploring and downloading GIS datasets.



Project Webpage

Project webpages provide the latest information and engagement opportunities for stakeholders. It is essential that the project webpage is compatible with multiple screen sizes (including smartphones), is Section 508 compliant, and contains the most relevant project information while avoiding clutter and unnecessary text or features.

Project webpages are set up with assistance through the TxDOT Public Involvement and Creative Services teams to ensure compliance. For corridor studies, the most relevant information for a project webpage includes the following:

4. **Study overview:** This includes a description of the corridor planning study's mission, goals, and purpose, including project extents, maps, and key considerations of the study.

5. **Stakeholder and public engagement summary:** This includes a general description of the makeup of the stakeholders and their roles and responsibilities during the study (District, Division representatives, the Steering Committee, Working Groups, Industry Stakeholders, and the public).

6. **Study approach and timeline:** This includes a schedule of planned activities and level of involvement of the various stakeholders.

7. **Links to stakeholder outreach efforts (e.g., online surveys):** These links allow project webpage visitors to participate in the engagement process.

8. **Downloadable content:** This is a list of documents developed during the study that can be downloaded and printed by stakeholders. These include, but are not limited to:

    a. Study fact sheets

    b. Maps

    c. Stakeholder meeting summaries

    d. Final reports

9. **Contact information of the TxDOT PM:** This allows project webpage visitors to reach out to the study team with questions, comments, and concerns.

Other Materials

Presentations and factsheets are also often used in communicating messages and information to the public during a corridor planning study. Consider these and other materials based on study needs, goals, and activities.

Presentations

Developing presentations for outreach and engagement efforts is a common activity during corridor planning. Presentations often utilize PowerPoint – consider the following if using PowerPoint:

- Use the TxDOT-approved or project-specific PowerPoint template. These will include the proper font style and colors schemes.
- Ensure images, graphics, and maps are high resolution and clear to read and understand. A blurry graphic or illegible map does not provide useful information.
- Indicating the purpose of the study and its goals is important to fostering study understanding, so be sure to mention these early in the presentation.
- Think about the flow of the meeting and how the presentation supports the meeting purpose.
- Ensure the PowerPoint is clear and concise. Avoid overloading slides with text and opt for interesting images or graphics to help tell the story or explain a message.

Fact Sheets

Fact sheets are typically concise, one- or two-page documents that summarize a study and provide updates. Their purpose is to provide a quick reference, highlighting key facts and issues pertaining to a study. Fact sheet components include the following:

- Study overview
- Study details
- Study status
- Study area map
- Eye-catching photos, renderings, or infographics

Appendix B: Project Evaluation Metrics

Table Appendix B-1 Project Evaluation Metrics
AADT = annual average daily traffic
CRIS = Crash Records Information System
VMT = Vehicle Miles Traveled
ROW = right of way
TTI = Texas A&M Transportation Institute

Group	Weight	Metric	Source
Safety	28%	Overall Crash Rate	CRIS Crash Database (last 5 years) and TxDOT Roadway Inventory
		Fatal & Incapacitating Crash Rate	CRIS Crash Database (last 5 years) and TxDOT Roadway Inventory
Asset Preservation	22%	Pavement Condition Rating	TxDOT Pavement Database and PMIS
Congestion and Mobility	22%	Annual Delay per Mile (person-hours)	TTI Top 100 Congested Routes
		Annual Truck Delay per Mile (person-hours)	TTI Top 100 Congested Routes
		Volume to Capacity Ratio (present)	Texas Roadway Inventory
		Volume to Capacity Ratio (future)	Texas Roadway Inventory
Multimodal Connectivity	17%	National Highway System - Number of crossings	TxDOT Roadway Inventory
		Texas Trunk System - Number of crossings	TxDOT Roadway Inventory
		Energy Sector Corridor - Length	TxDOT Roadway Inventory
		Energy Sector Corridor - % of project	TxDOT Roadway Inventory
		Energy Sector Corridor - Number of crossings	TxDOT Roadway Inventory
		Hurricane Evacuation Route - Length	TxDOT Roadway Inventory
		Hurricane Evacuation Route - % of project	TxDOT Roadway Inventory
		Hurricane Evacuation Route - Number of crossings	TxDOT Roadway Inventory
		TxDOT Freight Network - Number of crossings	TxDOT Roadway Inventory
		Future Interstate Connectivity - Number of crossings	TxDOT Roadway Inventory

Group	Weight	Metric	Source
Economic Competitiveness	11%	Population Density	Texas Demographic Center - Population Estimated by County
		Employment Density	Bureau of Labor Statistics - Quarterly Census of Employment and Wages
		Daily Truck Volumes - Truck % of AADT	TxDOT Roadway Inventory
		Daily Truck Volumes - Truck AADT	TxDOT Roadway Inventory
		Commodity Flow - Freight tonnage	Transearch and TxDOT Roadway Inventory
Transportation Access Considerations	-%	Population Under Poverty Line	Census Income Data Tables
		Households with Limited English Proficiency	Census Block Groups
		Rural Connectivity	Census Block Groups
Public Health	-%	Alcohol-Impaired Fatalities - Fatal crashes that involve a driver who is impaired by alcohol	CRIS Crash Database (last 5 years) and TxDOT Roadway Inventory
		Housing and Transportation Affordability - % income the average household spends on housing and transportation combined along the corridor	U.S. Department of Housing and Urban Development Location Affordability Index
		VMT Per Capita - Calculated as the total annual miles of vehicle travel divided by population density	TxDOT Roadway Inventory and Texas Demographic Center Population
Environmental Impacts	-%	Floodplain Within ROW (acres)	Federal Emergency Management Agency Flood Maps

Acronyms

ADA	Americans with Disabilities Act
ATRI	American Transportation Research Institute
AUS	Austin-Bergstrom International Airport
BCA	Benefit-Cost Analysis
BIL	Bipartisan Infrastructure Law
BP|CX	Bike-Ped Count Exchange
BTAC	Border Trade Advisory Committee
BTS	Bureau of Transportation Statistics
BTT	Bicycle Tourism Trails
CapEx	Capital Expenditures
CBRA	Coastal Barrier Resources Act
CPB	Corridor Planning Branch
CPT	Corridor Planning Tool
CRIS	Crash Records Information System
DART	Dallas Area Rapid Transit
DE	District Engineer
DFW	Dallas Fort Worth International Airport
EDDM	Every Door Direct Mailings
EPI	Effective Public Involvement
FAA	Federal Aviation Administration
FAF	Freight Analysis Framework
FHWA	Federal Highway Administration
FO	Functionally Obsolete
FTA	Federal Transit Administration
GDP	Gross Domestic Product
GIS	Geographic Information System
GTFS	General Transit Feed Specifications
Guidebook	Corridor Planning Guidebook
HCM	Highway Capacity Manual
I-10	Interstate 10
I-20	Interstate 20
IAP2	International Association of Public Involvement Professionals
IIJA	Infrastructure Investment and Jobs Act
IMPLAN	IMpact analysis for PLANning
IoT	Internet of Things
IRI	International Roughness Index

ITS	Intelligent Transportation Systems
LEHD	Longitudinal Employer-Household Dynamics
LEP	Limited English Proficiency
LODES	LEHD Origin-Destination Employment Statistics
LWCF	Land and Water Conservation Fund
METRO	Houston Metropolitan Transit Authority of Harris County
MPO	Metropolitan Planning Organization
MTP	Metropolitan Transportation Plan
NAICS	North American Industry Classification System
NEPA	National Environmental Policy Act
NHFN	National Highway Freight Network
NHS	National Highway System
O/D	Origin/Destination
PALM	Potential Archeological Liability Map
PHB	Pedestrian Hybrid Beacon
PI	Public Involvement
PIO	Public Information Officer
PIP	Public Involvement Plan
PM	Project Manager
PMIS	Pavement Management Information System
PPP	Public-Private Partnership
REMI	Regional Economic Models Inc.
RIMS II	Regional Industrial Multiplier System II
ROW	Right-of-Way
RPO	Rural Planning Organization
RRFB	Rectangular Rapid Flashing Beacon
RTIP	Rural Transportation Improvement Program
SAM	Statewide Analysis Model
SD	Structurally Deficient
SH	State Highway
SLRTP	Statewide Long-Range Transportation Plan
SPEG	Strategic Public Engagement Guidance
STIP	Statewide Transportation Improvement Program
TASP	Texas Airport System Plan
TDM	Travel Demand Model
TIP	Transportation Improvement Program

TPP	Transportation Planning and Programming
TREDIS	Transportation Economic Development Impact System
TTC	Texas Transportation Commission
TTI	Texas A&M Transportation Institute
TxDOT	Texas Department of Transportation
U.S. Census	U.S. Census Bureau
USDOT	U.S. Department of Transportation
UTP	Unified Transportation Program
VMT	Vehicle Miles Traveled

Version Control Document

Version Control

Version	Author	Date	Changes
0.1	Transportation Planning and Programming Division	May 31, 2024	First version
0.2	Transportation Planning and Programming Division	August 30, 2024 October 11, 2024	Updates to address feedback from TPP Leadership.
0.3	Transportation Planning and Programming Division	January 13, 2025	Updates to include Tracking Progress on the Implementation Plan section.
0.4	Transportation Planning and Programming Division	March 19, 2025	Updates to include summary table of planning study types and changes to reflect new TxDOT communication guidance

Corridor Planning Guidebook

For more information:

Texas Department of Transportation
Transportation Planning & Programming Division
Freight Trade & Connectivity Section
Corridor Planning Branch
6230 E. Stassney Ln.
Austin, Texas 78744
ww..txdot.gov

Texas Department of Transportation