Project Development Process Manual

November 2024

Texas Department of Transportation

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Manual: *Project Development Process Manual*

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Purpose

The *Project Development Process Manual* (PDP Manual) has been significantly revised from its previous content to:

- Establish the five distinct pre-construction phases of project development:
  - Planning;
  - Programming;
  - Preliminary Engineering;
  - Final Design; and
  - Letting.
- Provide a more resource-based and reference-oriented manual structure to:
  - List the specific authority documents that govern the project development process;
  - Guide the persons involved in project development to detailed guidance and information currently available in other manuals, Standard Operating Procedures, and guidance documents;
  - Offer a list of suggested partners to coordinate with during project development;
  - List specific forms and tools (checklists, spreadsheets, databases, systems, portals, etc.) available for use; and
  - Suggest current training courses that provide further knowledge for development of projects.

Contents

- Chapter 1 General Guidance includes general guidance including introduction to TxDOT's pre-construction project development process, the role TxDOT plays in the stewardship and oversight of projects, introduction to the use of the Design Summary Report (DSR), understanding of project rigor and it's application to project development, the manual's organization, a more detailed project development process workflow diagram and other details.

- **Chapter 2 Planning** includes discussion of TxDOT's planning process including long-range planning and District, Division, and other types of high-level/program plans that are developed that ultimately lead to project identification, funding, and authorization.
- **Chapter 3 Programming** includes discussion of how a project, once identified, is initiated and scoped early in the project development process. The emphasis on project scoping leads to a higher level of confidence in project planning estimates and schedules. Chapter 3 also includes discussion of evaluation of several aspects of project-specfic planning including compliance with existing planning documents, related studies and compliance with environmental requirements. The chapter also discusses items for early identification such as major project feasibility and required railroad coordination. The chapter concludes with information how a project is funded and set up in TxDOTCONNECT.
- **Chapter 4 Preliminary Engineering** discusses the tasks associated with establishing a project's design criteria and geometric design, performing alternatives analysis, and developing a geometric schematic, if required, to achieve a level of 30% PS&E design/project development completeness as defined in the *PS&E Preparation Manual*. The requirements of performing a value engineering analysis are presented as well as the importance of establishing the right of way footprint early in project development. The chapter concludes with a discussion of identifying and preparing additional funding agreements with outside entities if applicable to the project.
- **Chapter 5 Environmental and Public Involvement** has been re-envisioned to include information from the perspective of a TxDOT designer and/or project manager and provides a general understanding of the environmental and public involvement processes and needed coordination with environmental specialists to successfully fulfill environmental requirements and obtain environmental clearance. A discussion has been provided on the different types of environmental reviews and documentation, specific technical studies that need to be performed, and the approach to TxDOT's public involvement policy. The chapter concludes with a list of potential interagency coordination and permit requirements to provide an understanding of how these needs may affect the project schedule.
- **Chapter 6 Right of Way and Utilities** has, like Chapter 5, been reorganized to provide a general overview of the right of way and utility processes, including data collection needed and agreements related for both these areas. Discussions on the overall right of way acquisition and utility accommodation processes are provided to assist in the determination of tasks that require coordination through the project development process resulting in clear right of way and utility certification. The chapter concludes

with specific percentages by which entities participate in right of way and utility costs along with an overview of which utility costs are reimbursable.

- **Chapter 7 Final Design** includes discussion on the specific details of final design that take a project from preliminary engineering (30% design/project development completeness) to 100% Final PS&E that is "ready to let".
- **Chapter 8 Letting** discusses the details of pre-letting, letting and post-letting and provides information in conjunction with the *PS&E Preparation Manual*.
- **Appendix A** is a list of authority documentation that applies to the project development process.
- **Appendix B** is a list of resources outside of the PDP Manual that can be accessed through links.
- **Appendix C** is a list of tools referenced in the PDP Manual that can be accessed through links.
- **Appendix D** is a list of all acronyms used in the PDP Manual.

Supersedes

The revised manual supersedes prior versions of the manual.

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Archives

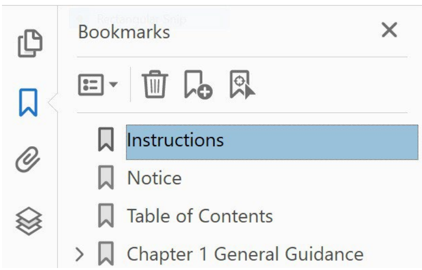
Past manual notices are available in a pdf archive.

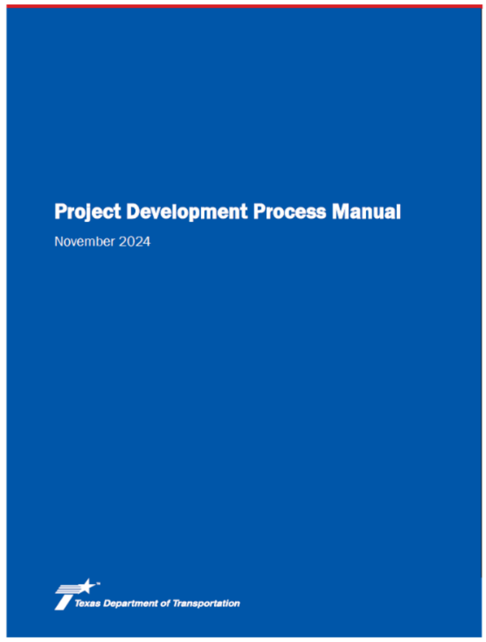
Tips for Using Your eBinder

Quick Navigation

Navigate the ebinder by clicking on the tabs to the right. Jump to each chapter and its subchapters using the Table of Contents tab.

You can also explore the ebinder by clicking on the bookmark icon on the left sidebar to navigate using bookmarks in the manual.





Appendices

Appendices A, B, and C are broken out to contain all external links for this eBinder in alphabetical order. Appendix A contains Authority Documentation Links; Appendix B contains Resource Links; and Appendix C contains Tool Links. Clicking the link in the appendix will take you to its external destination. Appendix D contains a list of acronyms used throughout the document.

Appendix A Authority Documentation

PDP Section #	Authority Document	Description
1.4	Stewardship and Oversight Agreement	S&O agreement between TxDOT and FHWA
1.4.1	43 TAC §15.52	Federal state and local participation agreements
1.4.1	Texas Local Government Code	Texas law related to Local Public Agencies (LPA)
1.7	13 TAC §6.1 et seq.	Records retention scheduling
1.7	Government Code §441.1855	Retention of contracts and related documents by state agencies
1.7	Government Code Subchapter L	Preservation and management of state records and other historical
2.2	23 CFR Part 450	Statewide and metropolitan planning and programming definitions
2.4	43 TAC §11.100 et seq.	Green Ribbon projects

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Chapter 1 General Guidance

1.1 Overview

The *Project Development Process Manual* (PDP Manual) provides information, guidance, and references for the transportation engineer to develop a transportation construction project from the planning phase to project letting through the design-bid-build process (see **Section 3.3.1.5**).

This chapter provides an overview of the project development process for transportation projects prepared by the Texas Department of Transportation (TxDOT). This chapter is not applicable to Federal Transit Administration (FTA) or Federal Railroad Administration (FRA) led projects. The project development process for Local Government (LG) projects is detailed in TxDOT's *Local Government Projects Policy Manual*. For alternative delivery projects, specifically those delivered through the design-build process (see **Section 3.3.1.5**), refer to TxDOT's *Design-Build Procurement Overview Manual*.

Resources to consult:

- ☐ Design-Build Procurement Overview Manual
- ☐ Local Government Projects Policy Manual

This chapter provides information on the following topics:

1.2 Purpose of Manual;

1.3 TxDOT's Project Development Process;

1.4 Stewardship and Oversight;

1.5 Design Summary Report;

1.6 Project Rigor;

1.7 Project File of Record; and

1.8 Manual Organization.

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1.2 Purpose of Manual

The purpose of this manual and the definitions used within are intended to describe the general project development process and associated activities, milestones and key tasks for the development of transportation construction projects at TxDOT. Not all activities will be applicable to all project types. The level of project development will depend on a project's rigor as discussed in **Section 1.6** and the project's specific needs and requirements.

It is important for the engineering practitioner to understand the full project development process, including which activities can be performed under the specific project authorization levels (i.e., **PLAN**, **Develop**, **Construct** – see **Section 2.7**). This guidance presents tools, references, training, and the needed level of coordination for the respective project activities.

This guidance is not intended as a financial or forecasting tool for programming, planning, financing, and portfolio management. Business, finance, and planning processes are distinct with unique terminology and definitions. More information is available through other Division offices (i.e., Transportation Planning and Programming Division (TPP), Financial Management Division (FIN), and Transportation Programs Division (TPD).

1.3 TxDOT's Project Development Process

TxDOT develops a Strategic Plan every four years that details the goals and action plans to guide the department in planning, developing and building the needed transportation projects to optimize the state's transportation network. With guidance from the Strategic Plan, TxDOT selects projects that meet the agency's strategic goals and are implemented through the department's project development process.

TxDOT's project development process is a comprehensive system involving the following major phases:

- Planning;
- Programming;
- Preliminary Engineering;
- Final Design;
- Letting; and
- Construction.

The project phase is defined as the project's current status within the project development process and is used to identify the necessary relevant activities, milestones, and key tasks. The overall project development process is shown in **Figure 1-1**.

A detailed illustration of each project development phase can be found on the **DES-Project Delivery Section (PDS) webpage** (TxDOT intranet only).

Communication among various Divisions, Districts, and administration involved in the project development process and transition of the project from one phase to another is critical to a project's success. Project Managers (PMs) are responsible for establishing and maintaining communication and coordination throughout the project development process. It is important to understand the sequence and interrelation between these phases to successfully deliver a project.

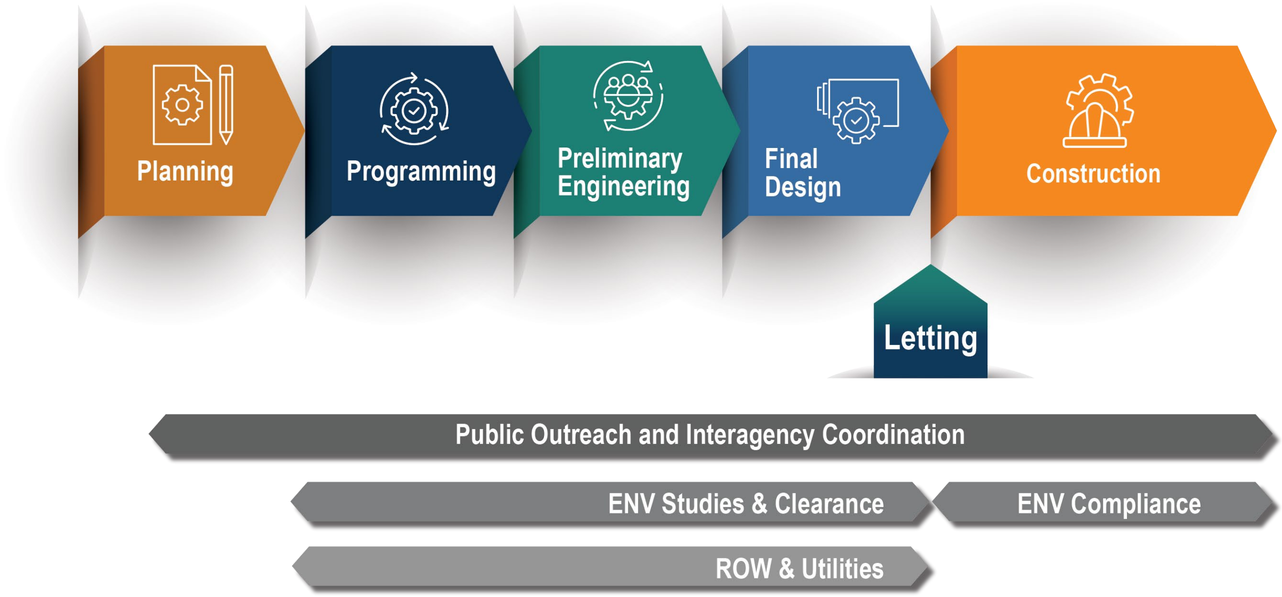

Figure 1-1: TxDOT's Project Development Process

Resources to consult:

- ☐ TxDOT's Strategic Plan
- ☐ TxDOT.gov Strategic Plans webpage

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1.4 Stewardship and Oversight

TxDOT has entered into a Stewardship & Oversight Agreement (S&O Agreement) on Project Assumption and Program Oversight with the Federal Highway Administration, Texas Division (FHWA Texas Division). This agreement sets forth the roles and responsibilities of TxDOT with respect to Title 23 of the US Code project approvals and related responsibilities for Federal-Aid Highway Program (FAHP) oversight activities. Refer to the S&O Agreement website in the references below for more information.

On an annual basis, FHWA Texas Division develops a list of TxDOT projects known as **Texas Division Involved Projects (TxDIP)** to optimize the successful delivery of TxDOT projects and to ensure compliance with federal requirements. TxDIP projects include major projects (see **Section 3.4.6**) (both design-bid-build delivery (DBB) and alternative delivery (DB) (see **Section 3.3.1.5**)), as well as other projects that FHWA Texas Division selects based on elevated program or project level risks.

The FHWA Texas Division also develops an individual TxDIP Plan for each TxDIP project to identify project risk areas, specific activities of project development/delivery that will require FHWA stewardship & oversight, and the degree of required FHWA coordination and involvement for each specified activity. The Design Division (DES), upon receipt from FHWA, coordinates the list with the respective District offices. TxDOT District and DES staff monitor projects on the TxDIP list to ensure appropriate coordination with the FHWA on any reviews or approvals identified by the TxDIP Plans. All FHWA-defined major projects are on the TxDIP list.

1.4.1 Local Public Agencies (LPAs)

Section XI, Subsection B, of the S&O Agreement also requires that TxDOT provide an annual report documenting its fulfillment of responsibilities as a pass-through entity of FHWA funds on projects performed by local public agencies (subrecipients). Federal government laws, rules and regulations refer to local government entities as local public agencies (LPAs). TxDOT refers to LPAs as local governments (LGs) since the State of Texas laws related to LG entities are codified in the Texas Local Government Code. TxDOT defines a LG project as a transportation project for which at least one phase of project development (environmental, design, right of way (ROW), utility relocation or construction) or the program is managed by a LG entity and is reimbursed with FHWA or TxDOT funds.

For this manual, the use of LGs is to be considered interchangeable with LPAs.

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Authority documents:

- ☐ 43 TAC §15.52
- ☐ Stewardship and Oversight Agreement
- ☐ Texas Local Government Code

Resources to consult:

- ☐ Individual TxDIP project plans
- ☐ Texas Local Government Code
- ☐ TxDOT.gov FHWA Stewardship & Oversight Agreement webpage

1.5 Design Summary Report

The Design Summary Report (DSR) (Form 2440) is a dynamic tool used to document the project development process for all transportation projects at TxDOT. The DSR is required for each roadway project that is programmed into TxDOTCONNECT (TxC) and serves as the main record of project development and design. TxC is the agency's custom-built system for managing the delivery of transportation programs, projects, and right of way.

The DSR remains with the Project File of Record (see **Section 1.7**) from creation to through archival as required by the record retention schedule to ensure continuity of the project during the entire project development life cycle (see **Section 1.3**).

The DSR has been developed to apply to all project types, depending on their complexity and rigor. The variations in the DSR are intended to reflect the construction type of the project as it relates to the applicable design standards selected. Refer to TxDOT's *Roadway Design Manual (RDM)* for definitions of construction type and applicable design criteria.

The DSR is an auditable record of project development, which is stored in the project File of Record.

Resources to consult:

☐ Roadway Design Manual

Tools to use:

☐ Form 2440 - DSR

Available training:

☐ DES116 – Introduction to Highway Project Development

☐ DES119 – Preliminary Design Process

* All training can be found in TxDOT's Training Catalog

1.6 Project Rigor

A project's rigor is related to the level of risk and complexity associated with the project. Identifying and evaluating the risks will support the development of the project and guide the approach to management of the project. **Table 1-1** can be used to help determine the rigor of the project.

The project rigor should be documented in the DSR and should be used to determine the level of project risk assessment. See **Section 5.4.2** for more information on types of environmental documents that apply to projects.

Table 1-1: Project Rigor[1]

Type of anticipated Environmental Document	ROW/Utility Impacts[2]		
	High potential for delay to letting[3]	**Some** potential to delay for letting	**Little to No** potential delay to letting
EIS (Environmental Impact Statement)	**HIGH** Rigor[4]	**HIGH** Rigor[4]	**HIGH** Rigor[4]
EA (Environmental Assessment)	**HIGH** Rigor[4]	**MEDIUM** Rigor	**MEDIUM** Rigor
CE (Categorical Exclusion)	**HIGH** Rigor[4]	**MEDIUM** Rigor	**LOW** Rigor

Notes:

1. Specific project details should be evaluated by Subject Matter Experts (SMEs) to determine the project's rigor.
2. ROW and Utility impacts should be determined by SMEs.
3. High potential for delay should be confirmed by appropriate staff.
4. High Rigor projects typically have high public or political interest and are generally greater than $25 million in construction cost; however, cost alone should not be the determining factor.

Table 1-2 lists typical project types and their associated rigor. This table does not cover all project types and is only intended to provide a general understanding of projects and their potential rigor.

Table 1-2: Example Project Type and Associated Rigor

Project Type	TxC Code	Typical Rigor		
		High	Medium	Low
Bridge Replacement	BR		●	●
Bridge Widening or Rehabilitation	BWR		●	●
Convert Non-Freeway to Freeway	CNF	●	●	
Intersection and Operational Improvements	IOI			●
New Location Freeway	NLF	●		
New Location Non-Freeway	NNF	●	●	
Overlay	OV			●
Rehabilitation of Existing Road	RER			●
Restoration of Pavement Structure	RES			●
Seal Coat	SC			●
Super-2 Highway	SP2			●
Widen Freeway	WF	●	●	
Widen Non-Freeway	WNF	●	●	

Tools to use:

☐ Form 2440 - DSR

Available training:

☐ PMD300 – Transportation Project Management at TxDOT

* All training can be found in TxDOT's Training Catalog

1.7 Project File of Record

For all TxDOT projects, Districts should maintain a complete and orderly project File of Record. An audit trail must be maintained in the event of a legal challenge or audits by state or federal auditors. Documents must support decision making for the plans, methods, and procedures used to meet the mission, goals, and objectives of the project.

Each District and Division is required to develop a file plan, annually certify that the file plan is current and accurate and furnish a copy of the file plan to TxDOT Records Management. Refer to TxDOT's *Records Management Manual* for more information.

The file must provide guidance to identify where electronic files are maintained. Project emails, voicemails, and desktop or portable device files must be retained according to TxDOT policy. Files must be complete, accurate, consistent, and held for the life of the project then archived for a retention period according to TxDOT's Records Retention Schedule.

All project records should be kept in ProjectWise using the recommended file directory.

Types of files that must be included in the Project of Record file in accordance with TxDOT's Record Retention Schedule include but are not limited to:

- Planning documents:
  - Corridor/route/feasibility studies; and
  - Other planning studies.
- Programming documents:
  - DSR;
  - Consultant services contract;
  - Approved Minute Orders;
  - Financial Management Information System (FMIS) project agreement/modifications; and
  - Documentation from earlier phases that supports construction cost estimates.
- Preliminary Engineering documents:
  - Invoices and billing support documents (travel, timesheets, etc.);
  - Design exceptions/waivers/variations/deviations and approvals;
  - Approved geometric schematic;
  - Public Meeting/Hearing Summary;
  - Environmental Stage Gate Checklists;
  - Interstate Access Justification Reports (IAJR) and approval;

    - Local access requests, Frontage Road Briefing Documents, and DES approval for retaining 2-way frontage roads;
    - Value Engineering (VE) Analysis and VE Report;
    - Design decision documentation;
    - Project agreements between TxDOT and local or federal agencies including funding agreements and documentation; and
    - Documentation from earlier phases that supports construction cost estimates.
- Final Design documents:
    - Environmental Stage Gate Checklists;
    - Utility agreements;
    - Preliminary/Final Plans, Specifications, and Estimate (PS&E), all design files and studies, and supporting documents; and
    - Documentation from earlier phases that supports construction cost estimates.
- Construction documents:
    - Revisions/change orders;
    - Material certifications;
    - Final inspection and acceptance report;
    - As-built certification of ADA facilities by TxDOT certified inspector (if applicable);
    - Texas Department of Licensing and Registration (TDLR) report (if applicable)
    - Audits (may occur after project close);
    - Documentation of litigation or claims;
    - Verify completion/status of environmental commitments; and
    - Warranty documentation.

Authority documents:

- ☐ 13 TAC §6.1 et seq.
- ☐ Government Code §441.1855
- ☐ Government Code Subchapter L

Resources to consult:

- ☐ Records Management Manual (TxDOT intranet only)
- ☐ Records Retention Schedule
- ☐ TxDOT Records Management webpage (TxDOT intranet only)

Coordination:

- ☐ District or Division Records Administrator

Available training:

- ☐ EL2017 – Records Retention, Open Records, and Litigation Holds
- ☐ EL2032 – Building and Using a File Plan

* All training can be found in TxDOT’s Training Catalog

1.8 Manual Organization

The PDP is formatted to present TxDOT's project development process in a logical and sequential manner. While not all transportation projects follow this exact process, most, if not all, projects in TxDOT's portfolio encompass the described tasks in the PDP. **Table 1-3** lists the chapters and chapter descriptions of the PDP.

Table 1-3: PDP Chapter Contents

Chapter	Chapter Name	Description
1	General Guidance	Describes TxDOT's project development process and the organization of the PDP Manual.
2	Planning	Discusses the tasks and activities associated with project planning up to project identification.
3	Programming	Discusses the activities needed to program a project into TxC.
4	Preliminary Engineering	Describes the tasks and activities associated with preliminary design and evaluation of alternatives up to selection of a preferred alternative and development of the design schematic or 30% PS&E.
5	Environmental and Public Involvement	Discusses tasks associated with the environmental process, including public involvement.
6	Right of Way and Utilities	Describes tasks associated with ROW and Utility (UTL) project impacts.
7	Final Design	Presents the tasks and activities associated with preparing the detailed design of the project to advance the project to letting.
8	Letting	Describes the pre-letting, letting, and post-letting processes and tasks.
Appendix A	Authority Documentation	References for authority documents (Texas Administrative Code, Code of Federal Regulation, etc.) that apply to PDP Manual information.
Appendix B	Resource Links	Links to resource documents located outside of the PDP Manual.

Appendix C	Tools Links	Links to tools referenced in the PDP Manual.
Appendix D	Acronym Glossary	List of acronyms used in the PDP Manual and their meaning.

Chapter 2 Planning

2.1 Overview

Planning is the beginning phase of project development at TxDOT. It can encompass long-range plans or short- and mid-term plans identified by Divisions, Districts, or other stakeholders such as Metropolitan Planning Organizations (MPO) (see **Section 3.4.1**) and LGs. The process includes collaboration between agencies, organizations and the public to identify state, regional and local needs.

This chapter discusses the tasks associated with the **Planning** phase of project development as shown in **Figure 2-1**.

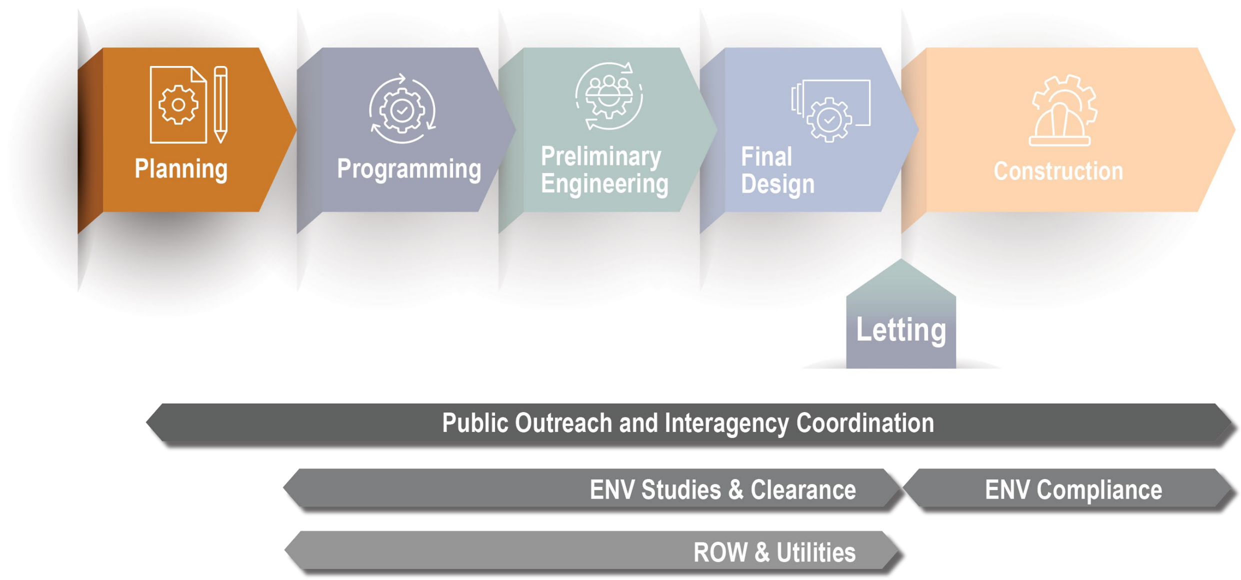

Figure 2-1: TxDOT's Project Development Process - Planning

Many factors are considered in determining the need for a project including safety-related data, pavement condition, bridge condition, Americans with Disabilities Act (ADA) accessibility related data, conformance with current geometric standards, performance metrics, security, trends, issues associated with demand for moving people and goods, and resiliency. TPP develops the Statewide Long-Range Transportation Plan (SLRTP) and projects are evaluated on the ability to meet its current goals and objectives.

The SLRTP goals and objectives are shown in **Figure 2-2**.

Figure 2-2: Statewide Long-Range Transportation Plan Goals and Objectives

Source: Connecting Texas 2050

This chapter includes discussion on the following topics that discuss the types of planning that take place to lead to project identification and project authorization.

2.2 Long Range Planning;

2.3 Division Plans/Programs;

2.4 District Plans/Programs;

2.5 Other Plans/Programs/Studies

2.6 Project Identification; and

2.7 Project Authorization.

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2.2 Long-Range Planning

Districts and Divisions use three types of long-range planning studies to identify transportation needs while determining critical elements of engineering and the economic feasibility of a proposed facility/route/corridor. Such studies establish design concepts, general ROW requirements and associated project impacts. Various elements associated with a study can include studying various alternatives, analyzing current and future traffic, analyzing potential environmental problems, development of cost estimates and determining feasibility.

The three types of studies discussed in this section include:

- Feasibility studies;
- Corridor studies; and
- Route studies.

2.2.1 Feasibility Studies

Feasibility studies use technical data to assess the practicality of proposed improvements. A feasibility study aims to provide an independent assessment that examines all aspects of a proposed project, including technical, economic, financial, legal, and environmental considerations. This information then helps decision-makers determine whether to proceed with the project.

The study may show that the project is not economically justifiable - or that it creates so many environmental impacts that it is not viable. Early determination of such a finding will avoid unnecessary expenditure of funds on preliminary engineering and related costs. **A feasibility study may include studying multiple transportation corridors or routes within a corridor.**

A feasibility study may be done at the District's discretion or initiated by TPP. A feasibility study may be warranted in the following situations:

- Project is outside an MPO planning boundary;
- Project may involve a significant fund investment;
- Solution to the project is unknown;
- The project has significant environmental concerns;
- Consensus of general public and property owners along the route has not been developed;

Feasibility study requests are submitted through TxC. TPP - Corridor Planning Branch reviews and renders a decision on the request.

- Unplanned traffic generator/development is anticipated;
- The need to prioritize project for funding;
- As directed by the Texas Transportation Commission (TTC); or
- As mandated by legislation.

Feasibility studies analyze project specific features based on a variety of factors including transportation, environmental, socioeconomic, infrastructure, government and local agency coordination, and public involvement. These studies typically include a longer-term implementation horizon and a financial decision to proceed with project development.

The usual steps of performing a feasibility study are summarized as follows:

- Examine potential environmental constraints;
- Analyze present and future traffic;
- Study alternatives;
- Prepare preliminary plan drawing;
- Develop planning level cost estimate; and
- Conduct public involvement for study, if desired.

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. **Feasibility studies are not construction projects**. TPP's role is to review the feasibility study's scope for statewide consistency. TPP Corridor Planning consultant contracts capacity may be used for feasibility studies if needed. TPP's *Corridor Planning Guidebook* provides additional information on feasibility studies.

2.2.1.1 Planning and Environment Linkage Studies

A Planning and Environment Linkage (PEL) study is a high-level, early-planning study process that represents an approach to transportation decision making that considers environmental, community and economic goals early in the planning stage and carries them through project development, design and construction. The goal of PEL studies is to gather feedback during planning to inform the environmental review process, including the National Environmental Policy Act (NEPA) (see **Section 5.2**).

Conducting a PEL study helps inform planning decisions and streamlines the project delivery process and can serve as a way for the public to discuss and prioritize transportation issues and project delivery. A PEL is most useful in the following situations:

- The project is identified as high rigor and complex (e.g., project is regionally significant, has environmental constraints, incorporates analysis of housing and community development options, is costly or controversial, or has the potential for many alternatives that could be indistinct and confusing).
- The project is not clearly defined during planning. PEL can help establish the scope of the project, purpose and need, or inform the likely level of environmental analysis that may be required.
- The environmental setting – whether there are natural features, critical habitat, built environment, disadvantaged communities, or population, employment, and land development projects – is not well known.
- Multiple alternatives need to be screened and eliminated during planning.
- Resources and regulatory agencies need to be engaged during the planning process to avoid and/or minimize environmental effects. This may include development of advance mitigation agreements or programmatic mitigation plans, creation of mitigation banks or preparation for permits or approvals.

2.2.2 Corridor Studies

The purpose of a corridor study is to assess existing and forecasted conditions along the highway corridor and develop a plan to implement various projects along the corridor, which are prioritized and phased based on need. Corridor studies are typically conducted along an elongated area that may span multiple counties, cities/towns, TxDOT Districts, and/or neighboring states (see **Figure 2-3** for an example corridor study map).

The study should include short (0-4 years), middle (5-10 years) and long term (10+ years) recommendations. From the implementation plan, the District(s) can then begin the process of planning and programming these projects into their respective project portfolios for further study and funding. However, there is no guarantee that any of the potential projects identified would be funded or implemented in the timeframes recommended in the corridor study.

Corridor planning is an early opportunity to establish a framework for integrating specific thoroughfare projects into the overall objectives for a local area and to bring public and private stakeholders together to discuss the transportation project(s). This helps to expedite the project development process by identifying and addressing key issues, opportunities, and community objectives before the design and engineering process begins.

The corridor planning process should have the following outcomes:

- Determine the relationships and needs for both mobility and land use along the corridor and in the subareas;
- Allow non-MPO communities to discuss multimodal transportation issues that may benefit their residents;
- Determine how decisions for individual thoroughfare segments affect the corridor and the transportation network as a whole;
- Establish objectives, operational concepts, context-based functions, performance measures and thresholds, land uses, access control and functional classification potential changes for an entire network or corridor, which can be applied to individual thoroughfare segments in project development;
- Allow for policy, social and public discussion of debate on issues that impact a broader area than an individual thoroughfare segment; and
- Identify additional related studies that may provide information for planning a project and assessing the relationship between a specific transportation project and neighboring community projects. Types of related studies include feasibility study, route study, toll road study, market study and value capture study. Obtaining and reviewing these studies can give a broader perspective of network and corridor needs.

Corridor studies can be initiated by Districts or TPP.

Urban and rural corridors have unique design characteristics. For planning purposes, rural corridors are outside urbanized areas and may be basic, developed, or suburban. Rural corridors may be defined by scenic purpose, connection between urban areas or by accommodating surface freight transport. Refer to the Statewide Planning Map referenced below for information on corridor context classification and functional classification.

Refer to TxDOT's *Transportation Planning and Programming Manual* for additional discussion on corridor studies.

2.2.2.1 Resiliency Planning

As a part of corridor planning and strategic projects, planning for public security must be considered. TxDOT initiated the Statewide Resiliency Plan (SRP)

The Statewide Planning Map displays data in support of planning operations at TxDOT. Base map options include TxDOT, Texas Imagery Service, TxDOT Light Gray, TxDOT Dark Gray, Esri Streets, Open Street Map. Overlay options are indicated as table of contents.

to strengthen the resilience of the State's multimodal transportation system to a range of potential hazards.

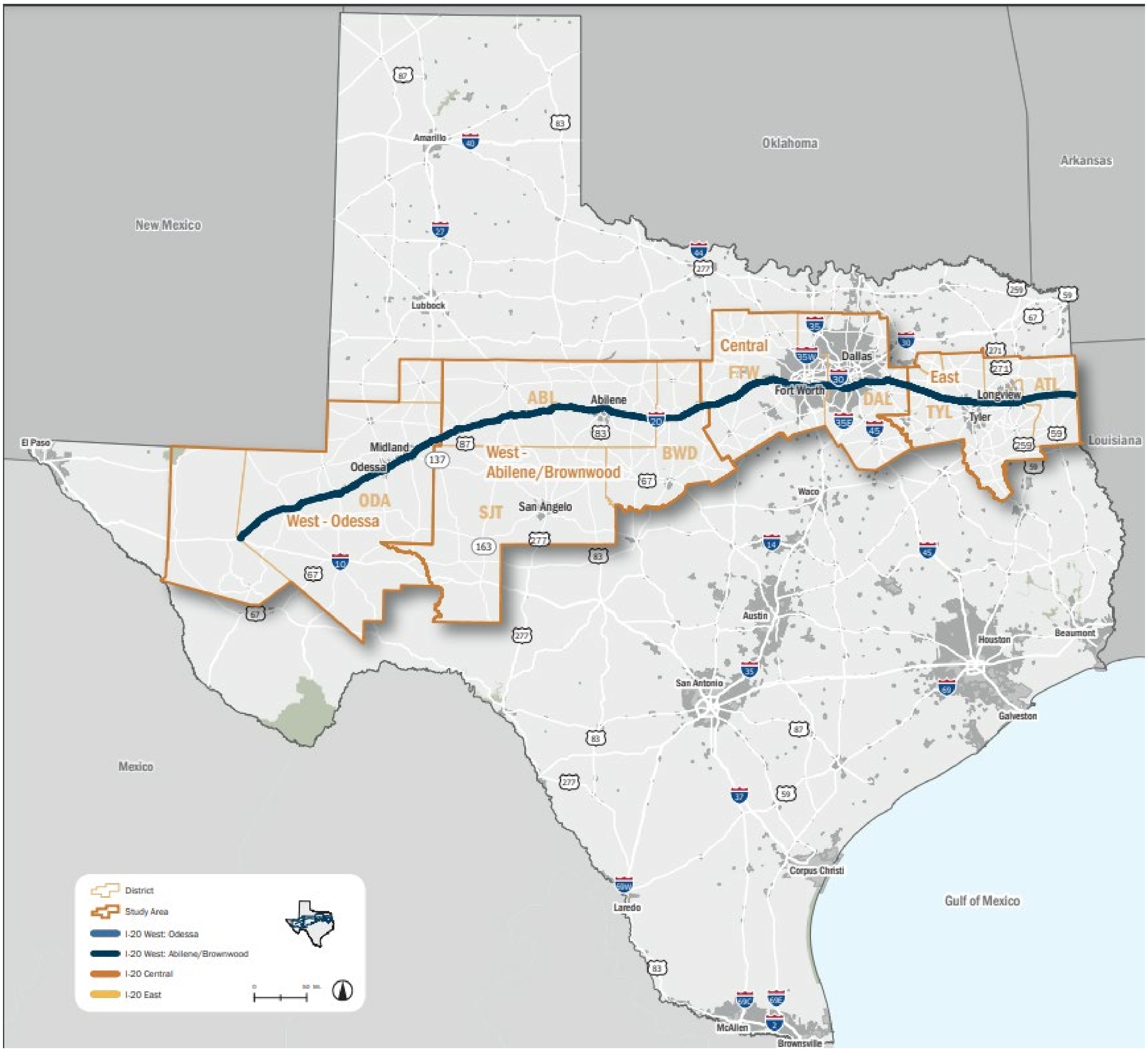

Figure 2-3: Example I-20 Corridor Planning Map

Every year, the State's transportation system is at risk to extreme weather events, such as riverine and coastal flooding, extreme heat, extreme cold, Intelligent Transportation System (ITS) security threats and other human-made hazards such as dam and levee failures. These hazards can damage transportation infrastructure and disrupt operations, with cascading impacts for public safety and health, freight and supply chains and the Texas economy.

Texas is also a significant national and international supplier of energy products with refineries and distribution infrastructure near the Texas transportation network.

Findings and recommendations of the SRP serve as a resource to TxDOT Divisions and Districts for incorporating transportation resilience into statewide, regional and local transportation planning and project development. A science-based approach, informed by stakeholder input, generates strategies and solutions that can anticipate current and future hazards for decades to come.

2.2.3 Route Studies

Route studies are typically conducted to evaluate two or more geometric alternatives associated with a specific project location. The purpose of a route study is to identify a specific build option(s) for further detailed schematic design and/or environmental impact analysis.

Many times a route study is associated with some type of "relief route" around cities/towns that is forecasted to experience adverse traffic congestion, has outdated roadway design criteria or has other circumstances where a route study is desired. **Figure 2-4** illustrates an example of a route study map.

Route options typically include the construction of roadways on new alignment or along the existing highway where substantial improvements would:

- Increase capacity, such as new main lanes and/or frontage roads;
- Enhance mobility, such as limiting access and grade separations such as overpasses and interchanges; and
- Improve safety.

Route options can include moving traffic around new developments or design elements to accommodate bicyclists, pedestrians, public transportation and railroads.

Route studies do not include high-occupancy vehicle (HOV) lanes, toll lanes, tolled facilities or managed lanes as route options.

Refer to TxDOT's *Transportation Planning and Programming Manual* for additional discussion on route studies.

TxDOT's Open Data Portal is the agency's platform for exploring and downloading GIS datasets. The portal allows users to view datasets on a map, filter data using queries, and download data in various formats.

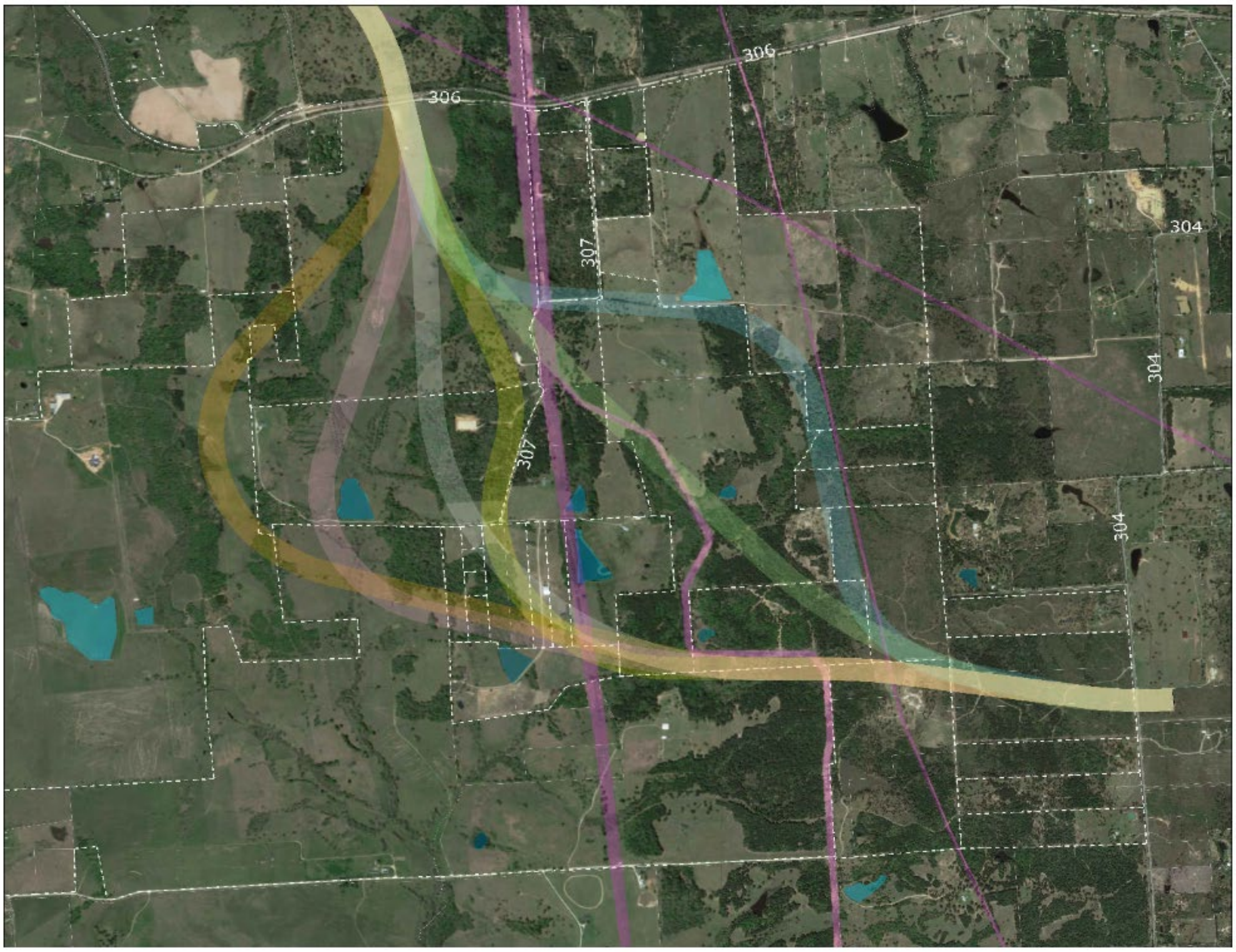

Figure 2-4: Example Route Study Map

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Authority documents:

- ☐ 23 CFR Part 450

Resources to consult:

- ☐ Corridor Planning Guidebook
- ☐ FHWA Planning & Environment Linkages Handbook
- ☐ FHWA Planning and Environment Linkages webpage
- ☐ TPP Division – Public Involvement Materials Toolkit (TxDOT intranet only)
- ☐ Transportation Planning and Programming Manual
- ☐ TxDOT Open Data Portal
- ☐ TxDOT.gov Houston Planning and Environmental Linkage (PEL) Studies webpage
- ☐ TxDOT.gov Statewide Resiliency Plan webpage
- ☐ TxDOT.gov Projects and Studies webpage
- ☐ TxDOT's Strategic Public Engagement Guidance

Coordination:

- ☐ District planning staff
- ☐ District Environmental Coordinator
- ☐ TPP staff
- ☐ MPO staff
- ☐ City and county staff and other stakeholders

Tools to use:

- ☐ Form 2440 – DSR
- ☐ Corridor Planning Tools (TxDOT intranet only)
- ☐ Statewide Planning Map

Available training:

- ☐ DES102 – Design Concepts from AASHTO
- ☐ DES108 – Urban Street Design
- ☐ DES111 – Introduction to Roadway Design
- ☐ DES119 – Preliminary Design Process
- ☐ DES813 – Addressing Climate Resilience in Highway Project Development and Preliminary Design
- ☐ DES822 – Highways in the Coastal Environment
- ☐ ENV113 - NEPA/Transportation Decision Making
- ☐ ENV123 - Roadways Interactions with Rivers and Floodplains
- ☐ ENV403 - Planning and Environment Linkages (PEL)
- ☐ EPI100 – Effective Public Involvement
- ☐ TPD342 – TxDOTCONNECT Create a Feasibility Study Project
- ☐ TPD345 – TxDOTCONNECT Feasibility Study Training

* All training can be found in TxDOT's Training Catalog

2.3 Division Plans/Programs

TxDOT Divisions oversee numerous plans and programs that yield the identification of needs and/or projects to be evaluated for construction.

Refer to the webpages listed below for a current list of Division plans and programs and their purposes. These plans should be reviewed during project planning to ensure that project goals and objectives are in alignment with other statewide priorities.

2.3.1 TxDOT's ADA Self-Evaluation and Transition Plan and Implementation Schedule

The documents provide a summary of findings of identified pedestrian facility barriers, planning-level cost estimates, and communicates TxDOT's approach to prioritization of known ADA issues. The Implementation Schedule is updated every four years, provides TxDOT projects planned to address ADA remediation, and corresponds to the Statewide Transportation Improvement Program (STIP). TxDOT projects must adequately address pedestrian access for people who have disabilities. The projects and barrier removal are communicated to FHWA in annual reporting.

2.3.1.1 TxDOT Management Enterprise System (TAMES)

This web application houses ADA violation data collected statewide between 2015 to 2022. TxDOT's Statewide Planning maps are integrated for cross referencing to the ADA data. TAMES houses ROW violation data (e.g., curb ramps, sidewalks, ped signals, bus stops) and Facilities (e.g., sites managed by Support Services Division (SSD), Maintenance Division (MNT), and the Travel Information Division (TRV)). The web application allows TxDOT to track the remediation of ADA violations through project phases (planning, design, construction, inspection). To utilize the TAMES web application, submit a ticket to request access on TxDOT's ServiceNow portal. Additional ADA barriers may exist with changing environmental conditions, or where data has not been collected.

Resources to consult:

- ☐ Bridge (BRG) Division(BRG) - Bridge Management Section webpage (TxDOT intranet only)
- ☐ Texas Carbon Reduction Strategy
- ☐ TxDOT ADA Self-Evaluation and Transition Plan
- ☐ TxDOT ADA Self-Evaluation and Transition Plan Supplement
- ☐ TxDOT.gov Bicycle and Pedestrian Local and Federal Funding Programs webpage
- ☐ TxDOT.gov Highway Safety Engineering webpage
- ☐ TxDOT.gov Projects and Studies Statewide webpage
- ☐ TxDOT.gov Statewide Long-Range Transportation Plan webpage
- ☐ TxDOT.gov Texas Freight Network Technology and Operations Plan webpage
- ☐ TxDOT.gov Transportation Planning webpage

Coordination:

- ☐ District planning staff
- ☐ TPP staff

Tools to use:

- ☐ Form 2440 – DSR
- ☐ Texas Access Management Enterprise System (TAMES)

2.4 District Plans/Programs

TxDOT Districts develop plans and programs to advance projects at their discretion, adding them to the District's portfolio of projects. Refer to the webpage listed below for a current list of District plans/programs and their purposes.

Not all Districts have the same plans and programs – metro, urban and rural Districts all have unique needs, and these plans and programs reflect those priorities. Metro, urban, and rural Districts as used in this manual are as defined by TPP:

- Metro – More than 1M
- Urban – 1M to 400k
- Rural – Less than 400k

Refer to the TPP District Classification Map below for a listing of current District designations.

These plans and programs should be reviewed during project planning to ensure that project goals and objectives are in alignment with other District activities. Examples of District plans and programs include, but are not limited to:

- District Bicycle Plans.
- District Pedestrian Plans;
- District Preventative Maintenance Program;
- District Safety Plans; and
- Green Ribbon Program.

Authority documents:

- ☐ 43 TAC §11.100 et seq.

Resources to consult:

- ☐ TxDOT.gov District Classification map
- ☐ TxDOT.gov Projects and Studies webpage
- ☐ TxDOT.gov Statewide Active Transportation Plan webpage
- ☐ TxDOT.gov Statewide Multimodal Trans Plan webpage

	Coordination: ☐ District planning staff ☐ District design, construction and maintenance staff
	Tools to use: ☐ Form 2440 - DSR

2.5 Other Plans/Programs/Studies

Other local/regional agencies and organizations produce plans, programs and studies that propose potential transportation improvements. Examples of local and regional plans include, but are not limited to:

- ADA Transition plans;
- Local advisory committee/taskforce studies;
- Local government bicycle plans;
- Master Street/Thoroughfare plans;
- MPOs Long Range Transportation Plans (Metropolitan Transportation Plan (MTP));
- Rural Planning Organizations (RPO) plans (in coordination with TxDOT);
- Safe Routes to School plans;
- Safety Action Plans;
- Stormwater Master Plans;
- Traffic Impact Assessment (TIA) study (typically completed by developers); and
- Transportation Improvement Plans (TIP) (in coordination with TxDOT).

Coordination:

- ☐ District planning staff
- ☐ CIV staff
- ☐ PTN staff
- ☐ TPP staff
- ☐ MPO staff
- ☐ Local government staff

Tools to use:

- ☐ Form 2440 – DSR

2.6 Project Identification

The plans and programs discussed in previous sections lead to a comprehensive statewide process which connects the State's transportation goals, performance measures, and targets to the transportation projects that will eventually be constructed. **Specific projects are identified through this process.**

2.6.1 TxDOT Planning Documents

Once projects are identified through the planning process, they are placed in a series of regularly updated planning documents. **Figure 2-5** illustrates the progressive levels of planning detail, from long-term vision to project letting. A brief description of each of these documents is included below.

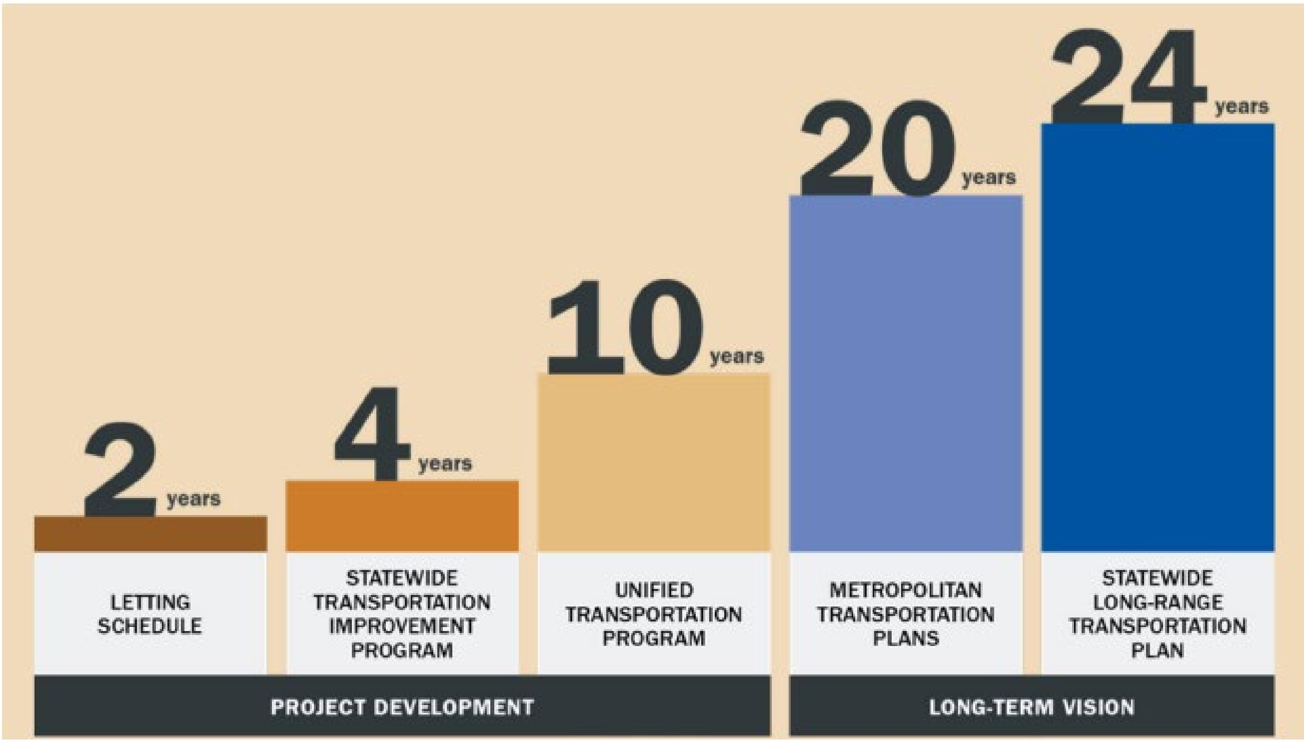

Figure 2-5: TxDOT's Family of Planning Documents

2.6.1.1 Long-Term Planning Documents

The SLRTP and MTPs identify goals, objectives, performance measures, targets and investment strategies that determine the projects and services that will be included in the statewide and local capital improvement programs to meet current and future transportation needs.

- **Statewide Long-Range Transportation Plan (SLRTP)** – a 24-year blueprint for the transportation planning process that guides the collaborative efforts between TxDOT, local and regional decision-makers and all transportation stakeholders to reach a consensus on needed transportation projects and services. The SLRTP is updated every four years and can be found on the TxDOT.gov webpage referenced below.
- **Metropolitan Transportation Plans (MTP)** – a blueprint to guide the spending of federal and state transportation plans for regional areas for the next 20 years. The MTP is developed by the local MPO and approved by the MPO Policy Board and is updated every four or five years and can be found on the individual MPO webpages.

2.6.1.2 Project Development Planning Documents

- **Unified Transportation Program (UTP)** – TxDOT's 10-year fiscally constrained plan to guide transportation development across the State, approved annually by the TTC before August 31st. It determines how many construction dollars are expected to be available over the next 10 years and how to distribute them. Projects in the UTP can be found on the TxDOT.gov webpage referenced below.
- **Transportation Improvement Program (TIP)**– as projects move closer to construction or implementation, they will advance into a TIP. A TIP is a four-year program developed by MPOs that contains a fiscally constrained list of multimodal (e.g., highway, transit, bicycle, etc.) transportation projects in a specific rural or metropolitan area that accomplishes the planning goals and objectives and achieves targeted performance identified in the SLRTP and MTPs. The TIP for rural areas is developed by TxDOT Districts in cooperation with the RPO and incorporated into the STIP. Projects in the TIP can be found on individual MPO and RPO webpages.
- **Statewide Transportation Improvement Program (STIP)** –TxDOT's four-year capital improvement program that includes the individual MPO TIPs mentioned above as well as other project identified by Districts. The STIP contains all phases of transportation projects in the final stages of development that have funds allocated to them. The STIP is updated every two years and has quarterly revisions (November, February, May and August). Projects in the STIP can be found on the TxDOT.gov webpage referenced below.

A proposed project must be listed in the STIP before any federal transportation funds (the Highway Trust Fund) can be used.

- **2-Year Letting Schedule** – Once a project is listed in an approved STIP, TxDOT's 2-year letting schedule authorizes and administers its construction. Projects in the 2-year letting schedule can be found on TxDOT.gov webpage.

All project development planning documents are required to be funded and fiscally constrained.

2.6.2 Placing Projects in the STIP/TIP

As projects move through the project development process, they are eventually placed in the STIP. This planning document has many requirements to be aware of. Specific details concerning the STIP are listed below:

- Updating a TIP must be consistent with the STIP development process;
- Modifications to a currently approved TIP can be made as defined by state law;
- The TIP is approved by the MPO and by the Governor's designee (TTC or TxDOT Executive Director). After approval, the TIP must be included without modification into the STIP except in nonattainment and maintenance areas where a conformity finding (i.e., a determination that a transportation plan, project, or improvement program will not violate air quality standards) by the FHWA and the FTA must be made before it is included in the STIP;
- All TIPs must be financially constrained and are merged into the STIP. Generally, a project's letting year is established as part of placing it in the TIP;
- Federal regulations require that projects proposing to use federal funds are shown in the TIP before project approval. Projects that will not use federal funds, but that will require approval by federal agencies (such as conformity with the Clean Air Act) must also be in the TIP;
- In nonattainment areas or maintenance areas, all Regionally Significant projects, regardless of funding (federal, state or local), must be in the Statewide Implementation Plan (SIP) (see **Section 3.4.5.1**);

A nonattainment area is defined as a geographic area that has air quality levels that exceed the national ambient air quality standards (NAAQS) for one or more pollutants.

A maintenance area is defined as an area that was formerly in nonattainment but has monitored attainment and is currently under a maintenance plan.

These areas can be found at TxDOT's Open Data Portal.

- In nonattainment and maintenance areas, the TIP and MTP must be found to conform with the SIP. The projects in the TIP must contribute to a reduction in emissions;
- In all areas, locally funded, Regionally Significant projects let in the previous fiscal year, must be listed in the Annual Project List provided to the FHWA/FTA at the end of the fiscal year for every year in the TIP/STIP;
- The STIP must be consistent with expected funding levels and is fiscally constrained;
- Before approval of the STIP, there must be an opportunity for public comment;
- All projects listed in the STIP must be included in a TIP and MTP (MTP only where applicable);
- All federal-aid projects must be included in the STIP before federal funds may be authorized for the phase of project development and before federal reimbursement of work will be authorized; and
- Federal Project Authorization and Agreement (FPAA) (see **Section 3.5.2**) to obligate federal funds must be obtained before incurring reimbursable project costs.

TPP compiles the STIP, which is then approved by the Executive Director acting on behalf of the TTC (acting on behalf of the Governor). TPP forwards the STIP to the FHWA and the FTA for review and approval.

Authority documents:

- ☐ 43 TAC §16.101 et seq.
- ☐ EPA: Federal regulation and enforcement

Resources to consult:

- ☐ Texas Transportation Plan
- ☐ eSTIP Portal webpage
- ☐ Texas Air Quality Portal
- ☐ TxDOT.gov Metropolitan Planning Organizations in Texas webpage
- ☐ TxDOT.gov Project Letting Information webpage
- ☐ TxDOT.gov Transportation Planning STIP webpage
- ☐ TxDOT.gov Transportation Planning UTP webpage

Coordination:

- ☐ District planning staff
- ☐ MPO staff
- ☐ TPP staff

Tools to use:

- ☐ Form 2440 – DSR

Available training:

- ☐ DES100 – Introduction to Highway Transportation at TxDOT
- ☐ DES121 – Building Roads the TxDOT Way
- ☐ ENV403 – Planning and Environment Linkages (PEL)
- ☐ TPD331 – TxDOTCONNECT Unified Transportation Program Overview
- ☐ TPD332 – TxDOTCONNECT Viewing Planning Targets
- ☐ TPD333 – TxDOTCONNECT Managing the District/Division Program
- ☐ TPD334 – TxDOTCONNECT Managing the Statewide Program
- ☐ TPD335 – Unified Transportation Program Training

* All training can be found in TxDOT's Training Catalog

2.7 Project Authorization

For a project to become reality it must pass through many developmental steps including establishing a need or problem, exploring alternatives, studying potential environmental impacts and costs, gathering input from the public and local officials, acquiring ROW, designing structures and roadways, and awarding construction contracts.

At any point along this path, TxDOT and its planning partners (MPOs and regional transportation authorities) may alter their decisions to implement projects as a result of changing conditions, expectations, community needs, environmental findings or cost considerations.

Before a project reaches construction, it proceeds through TxDOT's three major stages of project authorization: **PLAN Authority**, **Develop Authority** and **Construct Authority** as shown in **Figure 2-6**. In addition to **PLAN, Develop, and Construct Authorities**, there are Candidate PLAN Authority (CANDPA) and Feasibility Studies (FEAS) funding categories.

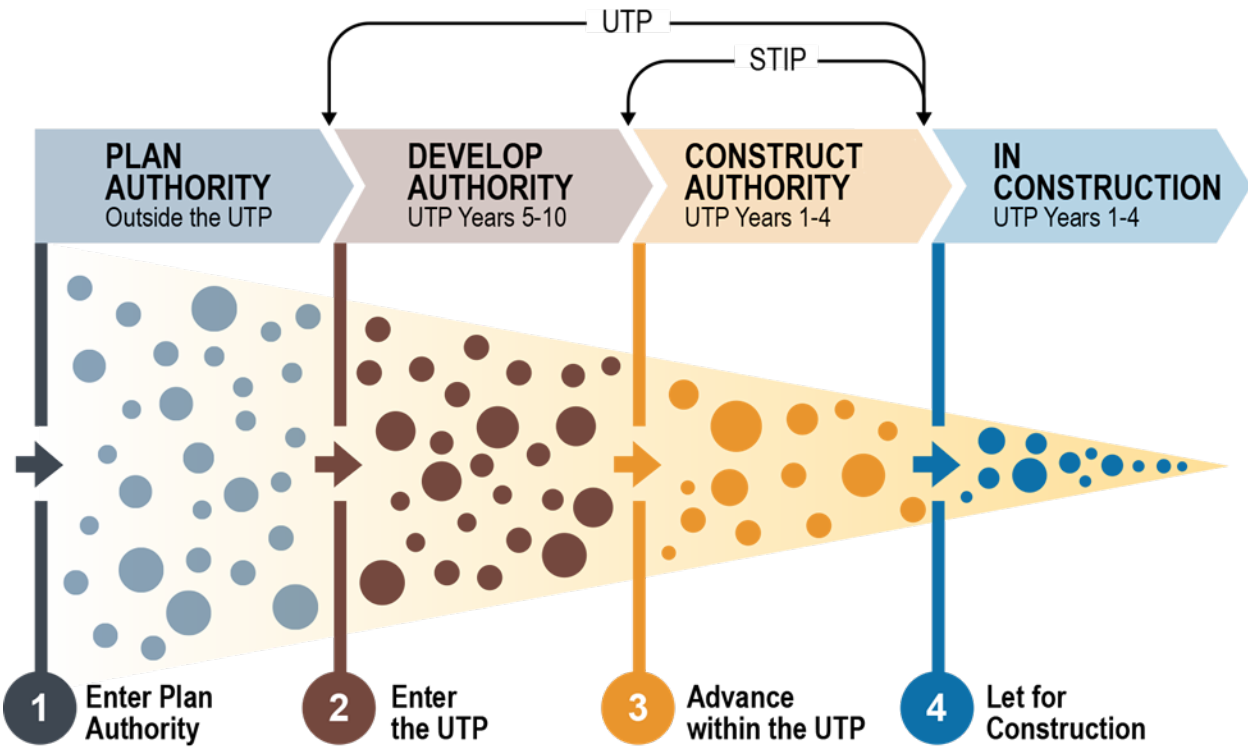

Figure 2-6: TxDOT's Project Authorization Process

In each stage, a project is authorized for specific progressive steps in the development and funding process as shown in **Table 2-1**.

Table 2-1: Allowable Development Activities by Project Authority

Source: Adapted from the 2025 UTP Programming Guidance

	UTP Authority	Cost Estimate*	Preliminary Engineering[1]	Environmental[1]	Right of Way & Utilities[1]	Plans, Specification and Estimate	Other Approvals
OUTSIDE THE UTP	**Candidate** *CANDPA*	Initial cost estimate	X No activities	X No activities	X No activities	X No activities	Initial discussion with TxDOT Rail Division (new construction large scale projects)
OUTSIDE THE UTP	**Plan Authority** *PLAN*	Development of planning level estimate	Preliminary engineering for schematics (internal and external resources) (up to 100% schematic)	Begin preliminary environmental review *Environmental clearance[2,3]*	Preliminary utility investigations & coordination preliminary ROW scoping *Rare Exception: ROW may be acquired with direct Commission authorization*	X No activities	Begin formal railroad coordination
INSIDE THE UTP	**Develop Authority** *DDA, SWDA, 6DA, 8DA and UTP Categories 1-12*	Refine and monitor cost estimate and update at significant milestones or project changes	Preliminary engineering, schematic approval	Environmental clearance[2,3]	Right of way acquisition and Utility relocations *(ENV clearance and legal descriptions is a prerequisite)*	Develop PS&E[4]	Continue railroad coordination
INSIDE THE UTP	**Construct Authority** *UTP Categories 1-12*	Refine and monitor cost estimate and update at significant milestones or project changes	N/A	Environmental clearance[2,3]	Right of way acquisition, Utility relocations *(ENV clearance and legal descriptions is a prerequisite)*	Final PS&E[4]	Finalize federal/state requirements (FPAA), Local agreements (AFA), Finalize railroad agreements, and receive permits (USACE and USCG)

Complete programming guidance is available on the UTP Crossroads Site.
Link to Crossroads here.
Link directly to programming guidance here

*Inflation is applied by TxDOTCONNECT. Cost estimates should be updated annually at a minimum.

1. In non-attainment areas, ROW and PE phases must be listed individually in the STIP. This is required for ROW or PE FPAA's to be processed in advance of the CST phase being listed in the TIP/STIP. The ROW and PE amounts listed do not impact the fiscal constraint tables in the STIP as that hits the District's ROW/PEPS budget.
2. MPO: (1) Individually listed for construction in MPO's MTP/RTP (unless the project will be grouped for STIP purposes) and (2) grouped or individually listed in STIP ("E," "R," or "C" are all ok), or if project is outside 4-year STIP window, listed in appendix of TIP for informational purposes.
3. Rural: Grouped or individually listed in STIP ("E," "R," or "C" are all ok). If a project is not fully funded in the 10-year UTP window, the project must be listed for informational purposes in statewide financials to the STIP (see "Rural Development Authority Project List").
4. Exception Design-Build (Alternative Delivery) projects where design is limited to 100% schematic.

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2.7.1 Candidate PLAN Authority (CANDPA)

CANDPA is for projects not in active development and for which no resources can be assigned, and no expenditures can be made. CANDPA projects must be programmed outside of the 10-year UTP development window and are not eligible for development activities (non-chargeable).

The District approves projects for CANDPA Authority. CANDPA Authority ends when the project is prioritized to move to Develop Authority and initiate development activities.

2.7.2 Feasibility Studies (FEAS)

FEAS is a planning study to determine the viability of proposed improvements through evaluating possible alternatives, and the potential economic, social, and environmental impacts. Authorized activities for these projects include design concepts, general ROW requirements, alternative project solutions, traffic analysis, environmental fatal flaws, and planning-level cost estimates.

FEAS is outside the scope of PLAN Authority and doesn't require any of the three level authorities. The associated "construction costs" of feasibility studies represent the cost of the study.

TPP Corridor Planning Coordinator approves projects in FEAS Authority. FEAS Authority ends at the completion of the feasibility study.

2.7.3 PLAN Authority

PLAN Authority is a fiscally constrained project authority which corresponds to project development outside the 10-year UTP. PLAN Authority supports TxDOT's long-range transportation planning efforts and is prioritized for interstates, U.S. routes, state highways (SHs), and long-term corridor development. PLAN Authority provides a link between TxDOT's SLRTP and the UTP.

PLAN Authority is reserved for statewide transportation initiatives and large, regionally impactful planning projects on SLRTP Corridors of Statewide Significance that contribute to the transportation goals of the SLRTP. The Corridor Planning Branch of TPP approves projects for PLAN Authority.

To be eligible for PLAN Authority, there are several scenarios that are considered, including the following :

- Project contributes to meeting the goals of the SLRTP;

- Project is part of a fiscally constrained metropolitan, rural, and other regionally adopted transportation plan;
- If a project is outside an MPO boundary, it is on a:
  - SLRTP Corridors of Statewide Significance; or
  - Phase I Trunk System; or
  - Connectivity Corridor Network; or
  - Statewide and Rural Connectivity Task Force Corridor

To request PLAN Authority for a project, the Director of Transportation Planning & Development (TP&D) should submit a request through TxC.

- Project is part of a larger corridor initiative, such as interstate development;
- Project fills a gap in a corridor currently being developed in the UTP; or
- Project is a candidate for UTP funding Categories 2 (Metropolitan and Urban Area Corridors), Category 4 (Statewide Connectivity Corridors), and Category 12 (Strategic Priority Corridors) (see **Section 3.5.1**).

Other factors for PLAN Authority eligibility include roadway classification, project classification, TxDOT roadway network, and activity type as outlined in TPP's *PLAN Authority Guidebook*.

TPP Corridor Planning Coordinator approves projects for statewide initiatives or large, regionally impactful planning projects for PLAN Authority. PLAN Authority ends when the project is prioritized by the Districts or MPO for the UTP 10-year window to continue development activities.

2.7.4 Develop Authority

Develop Authority is for projects within years 5 to 10 of the UTP.

Develop Authority funds represent the balance of the UTP Categories 1 to 12 that have not yet been programmed on specific projects. Districts may collectively program Develop Authority up to the amount of the current UTP balance, which is subject to TPP - UTP Section review for constraint.

Develop Authority projects may be eligible for eventual funding from any UTP category but **should not be maintenance projects**. Develop Authority projects should be fully programmed to warrant development activities. Fully programmed means the combination of programming (UTP Categories 1 to 12 and Develop Authority funds) equals the current/latest construction estimate. Any Develop Authority projects no longer in active development should be moved to CANDPA.

Different work programs within Develop Authority are approved by Divisions shown in **Table 2-2**:

Table 2-2: Develop Authority Approvals

Work Program	Terminology	Approval
DDA	District Develop Authority	TPP – UTP
6DA	Bridge Develop Authority	BRG
8DA	Safety Develop Authority	Traffic Division (TRF)
SWDA	Statewide Develop Authority	TPP (for large strategic projects and future statewide initiatives)

Develop Authority ends when a project is fully funded and ready to move to Construct Authority based on its stage of development. Once fully funded, projects can remain in Develop Authority if the stage of development does not warrant a move into Construct Authority.

2.7.5 Construct Authority

Construct Authority is granted for projects within years one to four of the current UTP – the projects in this timeframe are listed in the STIP. All phases of work are permitted for projects in Construct Authority such as: final design development, ROW acquisition, utility relocation, railroad adjustments and local agreement execution.

Projects with Construct Authority are typically the highest ranked projects that have proposed letting dates within the next four years and are eligible to be selected for the 2-year letting schedule based on readiness.

Construct Authority includes all 12 UTP Categories. Projects must be fully funded with no DDA/SWDA/etc. or partially funded projects. Projects in the 2-year Letting Schedule must be ready to let (RTL) (see **Section 8.2.2**) or projected to be RTL by the scheduled letting date. Federally funded and regionally significant projects with Construct Authority must be approved in the current FHWA approved 4-year STIP.

Commission authorization is required for projects in funding categories 2, 4, and 12 to be moved to Construct Authority. Districts and Divisions decide on other category programming as outlined in the UTP Programming Guidance specific to each funding category. Construct Authority ends when all development activities are complete, and the project goes to letting.

LET Authority is considered a subset of Construct Authority that allows a project to advance to letting.

Resources to consult:

- ☐ PLAN Authority Guidebook

Tools to use:

- ☐ Form 2440 - DSR

Available training:

- ☐ DES121 – Building Roads the TxDOT Way
- ☐ PLN302 – Highway Program Funding
- ☐ TPD307 – TxDOTCONNECT Letting Management

* All training can be found in TxDOT's Training Catalog

Chapter 3 Programming

3.1 Overview

After a project is identified through the planning process, it is programmed into TxC – the agency's custom-built system for managing the delivery of transportation programs, projects and ROW.

This chapter discusses the tasks associated with the **Programming** phase of project development as shown in **Figure 3-1**.

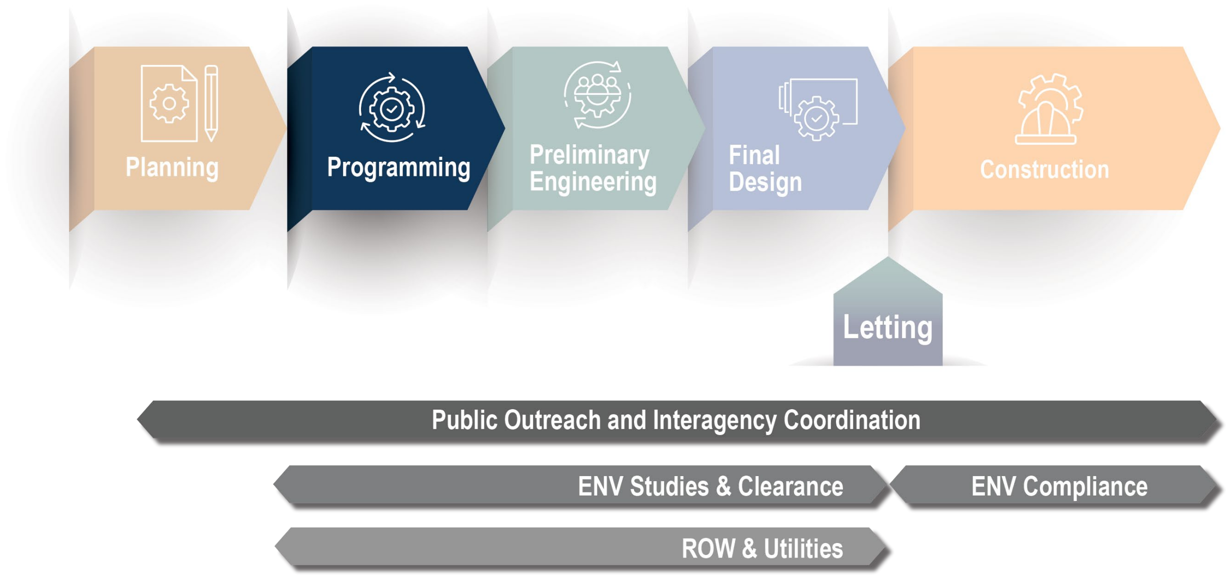

Figure 3-1: TxDOT's Project Development Process - Programming

This chapter includes discussion on the following topics that go into the Programming of a transportation project.

3.2 Project Initiation;

3.3 Project Scoping;

3.4 Project Planning;

3.5 Project Funding; and

3.6 Project Setup in TxC.

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3.2 Project Initiation

Project initiation consists of activities to begin the identification of a project's goals and objectives. These tasks include data collection and performing a site visit.

If the project is a LG project , refer to TxDOT's *Local Government Policy Manual* and the *Local Government Project Management Guide* for details on LG project initiation.

3.2.1 Data Collection

Data collection will vary depending on project type, rigor and phase of development. The type of data collected in this phase should be sufficient to appropriately scope the project and determine the project's goals and objectives.

The following is a list of data that may be collected during this phase of project development.

- As-built plans;
- Bridge inspection reports (Statewide Planning Map);
- Context classification;
- Crash data (TxDOT Traffic Safety Data Portal);
- Existing ADA maps (TAMES/TxDOT Comprehensive Accessibility Program(TCAP) Toolbox);
- Existing drainage plans/Federal Emergency Management Agency (FEMA) studies;
- Existing plans (i.e., Division, District or other available planning documents) (Plans Online);
- Existing railroad information;
- Existing ROW Maps (Real Property Asset Map);
- Existing studies (e.g., feasibility, corridor, etc.);
- Existing traffic counts (TxDOT Traffic County maps; STARS II);
- Existing utility layouts;
- Functional classification (Statewide Planning Map);
- High-level environmental constraints;
- Pavement Scores (Pavement Management Information Systems (PMIS)); and
- Project applications (e.g., program/project calls such as Highway Safety Improvement Program, Highway Bridge Program, Carbon Reduction, etc.).

3.2.2 Site Visit

Site visits should be performed periodically during project development to accurately assess project needs to adequately scope a project. The purpose of the site visit is to identify needed improvements and physical or environmental constraints. Planning stage site analysis of land, location, signs of wildlife activity and possible environmental concerns can improve scope development and minimize oversight of key features.

Although maps, satellite imagery, or aerial photography may give an overview of a project area, a site visit is essential to obtain a more complete understanding of the existing conditions and constraints of the project area.

Site visits should include Subject Matter Experts (SMEs) from all applicable project disciplines (e.g., roadway, drainage, bridge, environmental, utility, ROW, traffic, etc.) as well as District construction, bicycle coordinator, ADA pedestrian, area office, and maintenance section staff. Site visits for LG projects should also include the appropriate government officials (e.g., county commissioner, county road maintenance supervisor, city manager, city engineer, etc.). Site visits can reveal pedestrian and bicycle demand as well as potential design constraints.

Some bridge projects require a detailed on-site bridge condition assessment prior to project scoping. Consult with District bridge staff to determine if this level of site visit is needed.

A **Right of Entry** (ROE) or other written evidence of permission must always be obtained before entering private property on a site visit. Coordinate the ROE letter with District environmental, survey and geotechnical staff to streamline the number of ROE letters a property owner might receive. See **Section 4.2.3.1** for more information on obtaining a ROE.

Resources to consult:

- ☐ STARS II
- ☐ Texas Access Management Enterprise System (TAMES)
- ☐ Traffic and Safety Analysis Procedures Manual
- ☐ Traffic Forecasting Analysis SOP and Guide
- ☐ TxDOT Open Data Portal – TxDOT Bridges
- ☐ TxDOT Pavement Management Information System (PMIS) (TxDOT intranet only)
- ☐ TxDOT Plans Online (TxDOT intranet only)
- ☐ TxDOT Traffic Safety Data Portal
- ☐ TxDOT.gov Real Property Asset Map webpage
- ☐ TxDOT.gov Right-of-Entry for Environmental Investigations webpage
- ☐ TxDOT.gov Traffic Count Maps webpage

Coordination:

- ☐ District planning, design, pavement, construction, bridge, traffic, ROW/Utility and environmental staff
- ☐ Area office staff
- ☐ Maintenance section staff
- ☐ Local government staff

Tools to use:

- ☐ Form 2440 – DSR
- ☐ Right-of-Entry Agreement form
- ☐ Statewide Planning Map
- ☐ TAMES/TCAP Toolbox

Available training:

- ☐ EL2017 – Records Retention, Open Records, and Litigation Holds
- ☐ EL2032 – Building and Using a File Plan

* All training can be found in TxDOT's Training Catalog

3.3 Project Scoping

Project scoping is part of the programming process that involves determining and documenting a list of specific project goals, objectives, deliverables, costs, outcomes and deadlines. Defining the project scope requires input from the project SMEs. SMEs work with the TxDOT PM to establish the key elements of budget, objectives and schedule.

It is important to clearly define the project scope when a project is first considered for programming. An accurate scope of work ensures the design addresses the project goals and objectives and is also necessary to develop a planning level cost estimate.

The project scope should be documented in the DSR (see **Section 1.5**).

3.3.1 Project Scoping Meeting

Project scoping establishes the baseline project scope at the early stages of the project. The project scoping team is a multi-disciplinary team of appropriate District leadership and SMEs who evaluates the project needs, proposed outcomes, the working budget and the schedule for designing and developing the project as well as other project details during a project scoping meeting.

Outcomes from the project scoping meeting should include:

- Environmental impacts and potential mitigation measures;
- Evaluation of ADA barriers which have implications for the project scope;
- Evaluation of existing elements (e.g., existing alignments meet design standards, pavement scores, bridge condition reports, etc.);
- Identification of stakeholders;
- International bridge structures;
- Impacted navigable waterways or waterway activity;
- Other project data collection needed (i.e., type of survey needed, additional traffic counts, geotechnical needs, etc.).
- Project assumptions that are considered during the current project development lifecycle (e.g., no ROW to be acquired, type of construction, project limits, etc.);
- Project constraints that might limit the project team (e.g., funding constraints, resources, schedule, etc.);
- Project construction and total project cost;
- Project delivery method (i.e., traditional plans or digital delivery);
- Project goals and objectives;

- Project performance metrics (e.g., increased mobility, enhanced safety, improved operations, etc.);
- Project procurement method (i.e., design-bid-build or design-build);
- Project schedule;
- Proposed activities (e.g., add lanes, reverse ramps, extend culverts, replace bridges, etc.);
- Proposed design standards (i.e., 4R, 3R, 2R, Special Facilities, etc.);
- Multimodal needs as well as current and future demand (e.g., freight, rail, transit, bicycle and pedestrian);
- Traffic and safety analysis and procedures; and
- Traffic forecasting methodology.

Not all the outcomes may be determined at the time of the project scoping meeting; however, the DSR provides the ability to document the desired outcomes and assign responsibility of project team members to compile the information.

3.3.1.1 Statewide Planning Map Information

The Statewide Planning Map provides many details of the project area that should be reviewed and documented in the DSR as part of project scoping. The Statewide Planning Map displays data in support of planning operations at TxDOT. It contains the "Common Overlays" and other "Additional Overlays". It can provide valuable information for project scoping and should be referenced for any source of information used in the DSR.

3.3.1.2 Stakeholder Identification

Project stakeholders should be identified during project scoping to ensure that projects are developed with local, regional and statewide goals in mind. Coordination with local, regional and statewide stakeholders can result in commitments to project development that must be carried forward throughout project development. All stakeholder commitments should be documented in the DSR.

Inquire from all stakeholders their input on additional interested parties that should be contacted.

Potential stakeholders may include:

- ADA complainants;
- Adjacent property and business owners;
- Bicycle advocates and/or local bicycle and pedestrian committee members;
- Chambers of commerce and regional economic development organizations;
- Community leaders;
- Councils of Government (COG)s/MPOs;
- Developers;

- Disability advocacy and interest groups;
- Economic development agencies;
- Municipal departments;
- Neighboring states and Mexico;
- Professional and nonprofit local organization chapters;
- Public housing;
- Public utilities;
- Railroads, ports/harbors, bus companies;
- Redevelopment and community development agencies;
- Regional transit authorities and rail districts:
- School districts;
- Special authorities and improvement districts;
- State and federal agencies (i.e., Texas Historical Commission, Texas Parks and Wildlife, Corp of Engineers, etc.);
- Transit authorities; and
- Utility companies.

3.3.1.3 Multimodal and Intermodal Connections

All projects should be assessed for multimodal and intermodal needs as part of project scoping. There are a range of multimodal considerations (i.e., highway, street, transit, bicycle, and pedestrian) or intermodal freight transport (i.e., air, rail, and port to surface freight transport) to address mobility needs. Projects must be assessed to determine if design elements for current and future multimodal and intermodal needs are included in project scope.

Coordinate with SMEs with specific knowledge in these areas to develop the framework for comparing and assessing modes and alternatives that may apply to the proposed project.

Multimodal and intermodal connections are discussed in more detail in the RDM.

The MPO's MTP and TIP may warrant amendment based on the evaluation of these connections.

3.3.1.4 Plan Development Delivery Type Selection

Determination of plan development delivery type should be determined early in project scoping to guide the needed level of survey and project set up.

TxDOT delivers projects in two ways including:

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- **Traditional Plan Development** – design and generation of paper (or pdf) plans for use by the contractor to construct the project; and
- **Digital Delivery** – design and generation of the Model as the Legal Document (MALD) for use by the contractor to construct the project.

If the digital delivery method is chosen, specific tasks must be determined to set the project up correctly. The decision to prepare a project as digital delivery should be made in consultation with District decision makers (i.e., Director of TP&D, Director of Construction, Area Engineer, District Design Engineer, District Surveyor, etc.) and staff from DES - Digital Delivery Section.

3.3.1.5 Construction Project Delivery Type Selection

Texas legislative authority allows two forms of project procurement: Design-bid-build (DBB) and Alternative Delivery.

DBB is a traditional construction project delivery method that involves separation of the three distinct processes:

- **Design phase** – requires the services of a designer who will be the "engineer of record";
- **Bid phase** – when a contractor is selected; and
- **Build (or construction) phase** – the project is build by the selected low bid contractor.

In DBB, construction does not begin until the design process is complete, and a bid is accepted – there is no overlap between design and construction. Risk associated with the design and design gaps or changing field conditions remains with the Department.

Alternative delivery projects include Design-build (DB). DB is a delivery method used by the Department to share the risks and responsibilities of design, construction, and possible maintenance with the DB contractor. Carefully crafted contract documents appropriately transfer risks and responsibilities for design, constriction, and possible maintenance to the DB contractor when the DB contractor is the party in the best position to mitigate and mange those risks.

DB delivery employs both performance-based specifications and more common prescriptive specifications, allowing flexibility for the DB contractor to be innovative. DB compresses the project lifecycle and time by encouraging overlap between the design and construction phases.

Consideration for a project to use DB delivery method should occur when the project has potential for:

- Sharing of the risks and responsibilities for design, construction, and possible maintenance with DB contractor; or

- Alternative Technical Concepts (ATCs) creating project innovations and improving project value (may include faster delivery, cost savings, and other factors).

Once the project scope, goals, and characteristics are known and well understood, determination of project delivery type should be made by District decision makers (i.e., District Engineer, Director of TP&D, Director of Construction, etc.). Decisions to pursue DB delivery method should also be made in coordination with Alternative Delivery Division (ALD) staff.

3.3.2 Project Risk Assessment

Risk management is the **continuing** process to identify, analyze, prioritize, mitigate and monitor the threats and opportunities to a project's cost and schedule. Performing an initial risk assessment of the project is recommended to better determine the project's schedule and planning estimate.

A high-level risk assessment should be performed in the early stages of project planning and more detailed levels of risk assessment should be performed as the project development advances. The level of risk management should correlate to the project's rigor. **Table 3-1** illustrates suggested levels of risk management based on project rigor.

Transportation Programs Division (TPD) can assist in the facilitation of risk management and risk workshops.

A **Risk Register** is the outcome of the risk management process and is a living document that should be reviewed and updated at regular project milestones. An example of a simple Risk Register is included in the DSR and illustrated in **Figure 3-2**.

For Risk Assessments related to major projects, see Section 3.4.6.

3.3.3 Project Planning Estimate

To request adequate funding for a project, a planning level cost estimate should be developed during project scoping. At the planning stage of project development, many project details are unknown. Estimating techniques that are used to develop a planning/programming estimate include:

Parametric Estimating (scalable estimation);
  - Typical sections on a per mile basis
  - Bridges on a dollars per square foot basis

Analogous Estimating (similar projects); and
Historical bids based (base estimate + allowances + contingency)

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Table 3-1: Suggested Levels of Risk Management for Project Rigor

Risk Management Techniques	Type of Risk Evaluation	Suggested Tool	Project Rigor		
			Low	Medium	High
Project Team Informal Risk Assessment	Qualitative	Risk Register Spreadsheet	•		
Project Team Informal Risk Assessment	Qualitative/ Quantitative	Risk Register Spreadsheet 3 Point Estimating		•	
Formal Risk Workshop	Qualitative/ Quantitative	Risk Register Spreadsheet 3 Point Estimating/Monte Carlo Analysis		•	•
FHWA CSRA Major Projects > $500M	Qualitative/ Quantitative	Risk Register Spreadsheet Monte Carlo Analysis			•

Project Risk Register									
Risk Identification			Risk Assessment			Risk Response		Risk Monitoring	
Risk ID No.	Risk Name	Risk Description	Probabilit y	Impact	Rating Index	Response	Mitigation Measures	Risk Owner	Comments

Figure 3-2: Example Simple Risk Register

TxDOT's Construction Cost Estimating Guidance (CCEG) and spreadsheet tool provides a method to develop the planning/programming level cost estimate and update a project's construction cost throughout the project life cycle using **risk-based contingency** calculations.

In addition to the construction cost, ROW costs (see **Section 6.3.2**) are estimated and entered into TxC during project scoping. It is important for this information to be correct so that the project and funding data will be correct in FIN PeopleSoft project information.

Texas Accessibility Management Enterprise System (TAMES) includes an ADA remediation cost estimating tool to work with identified ADA barriers (i.e., physical elements that prevent access for a person with a disability) to project cost in improvements for inclusion in project planning.

Reasonable and accurate cost estimating, and regularly scheduled updates of these costs helps maintain public confidence and trust throughout the life of a project. When a project cost estimate escalates, it impacts the funding for other needed projects. The District should document the reasons for rising estimated costs in the CCEG spreadsheet.

3.3.4 Initial Project Schedule

The initial project schedule is the first planned project schedule before preliminary engineering begins. The initial project schedule will establish the anticipated letting date of the project along with high-level milestones for project delivery.

Not every project is expected to have a schedule, although the vast majority of projects do require a schedule. Refer to the resources below for additional information and guidance in preparing the initial project schedule.

Authority documents:

- ☐ 23 USC §217(g)(1)
- ☐ 36 CFR Chapter XI
- ☐ TTC Chapter 223, Subchapter A
- ☐ TTC Chapter 223, Subchapter F

Resources to consult:

- ☐ American Association of State Highway and Transportation Officials (AASHTO) Practical Guide to Cost Estimating
- ☐ Construction Cost Estimating Guidance (CCEG)
- ☐ Design-Build Administration Manual
- ☐ FHWA Roadmap to Risk Management for Transportation Planning
- ☐ MPO's MTP
- ☐ Project Management Institute (PMI) Risk Management
- ☐ PS&E Preparation Manual
- ☐ Risk Management Community of Practice (TxDOT intranet only)
- ☐ Roadway Design Manual
- ☐ Schedule Guide for Transportation Development Projects
- ☐ Special purpose studies (e.g., studies on transitioning an area into an intermodal hub or expanding a port).
- ☐ TxDOT Highway Improvement Contract and Project Delivery
- ☐ TxDOT.gov Alternative Delivery Projects webpage
- ☐ TxDOT.gov Digital Delivery webpage
- ☐ TxDOT.gov Project and Portfolio Management Publications webpage

Coordination:

- ☐ District Engineer
- ☐ District Director of TP&D
- ☐ Director of Construction
- ☐ Area Engineer
- ☐ District planning staff
- ☐ District design and survey staff
- ☐ District multimodal coordinators (public transportation, bicycle, pedestrian, freight, rail, aviation and ports)
- ☐ DES– Digital Delivery Section staff
- ☐ ROW – Survey Section staff
- ☐ TPP staff
- ☐ ALD staff
- ☐ Local government staff/MPO staff for additional traffic data

Tools to use:

- ☐ Form 2440 - DSR
- ☐ CCEG spreadsheet
- ☐ Risk Register Spreadsheet
- ☐ Statewide Planning Map
- ☐ Traffic Forecasting Initiation Form (TxDOT intranet only)

Available training:

- ☐ DES119 – Preliminary Design Process
- ☐ DES750 – OpenRoads Designer for Plan Development
- ☐ DEV129 – AASHTO Management Institute
- ☐ DEV417 – Project Management - Risk Assessment
- ☐ EPI100 – Effective Public Involvement
- ☐ EPI200 – Effective Public Involvement – Advanced
- ☐ PMD120 – Project Scope Management
- ☐ PMD207 – Project Stakeholder Management
- ☐ PMD142 – Construction Cost Estimating
- ☐ PMD151 – Transportation Project Risk Management
- ☐ ROW602 – Conducting Effective Kickoff Meetings in ROW
- ☐ ROW640 – Stakeholder Management for Right of Way Projects
- ☐ TCC348 – Fundamentals of Traffic Operations
- ☐ TPD102 – Project Delivery & Governance
- ☐ TPD103 – Performance Based Planning

* All training can be found in TxDOT's Training Catalog

3.4 Project Planning

Project planning should be coordinated with various local, regional and statewide plans and documents to ensure that the project complies with previously developed local, regional and statewide objectives. It is equally important during this stage to identify any additional studies that may be needed to ensure that the project achieves its goals and objectives.

3.4.1 Project Planning Partners

Local, regional and other state planning partners are a critical component in TxDOT's integrated planning process. Depending on the project type and rigor, other applicable requirements should be determined and complied with. Examples of entities to coordinate projects with include but are not limited to:

- **MPO** – Urbanized Areas (UZAs) (greater than census 50,000 population) are required to have an MPO. The MPO is the local decision-making body responsible for planning and coordinating a multimodal transportation system that facilitates high quality and efficient transportation development in the urban area. MPOs can provide information, studies, or analyses for portions of the transportation system located in metropolitan planning areas. The MPO may also function as the designated contact for rural plan development. A map of Texas MPOs can be found in the Statewide Planning Map. MPOs work with TxDOT to develop the TIP (see **Section 2.6.1.2**). UZAs greater than census 200,000 population are designated as Transportation Management Areas (TMAs). TMAs are required to have a Congestion Management Process (CMP) to address congestion (see **Section 3.4.5.2**). An MPO in a TMA has a strong voice in setting priorities for implementing projects listed in the TIP and is responsible for additional planning products.
- **Rural Planning Organization (RPO)** – In Texas, RPOs provide rural transportation planning support to places located outside of designated metropolitan planning areas that are served by an MPO. Regional development organizations (known locally as Councils of Government or COGs) have formed and operate RPOs to help address the rural transportation needs of their multi-county regions. RPOs work with TxDOT Districts to develop the TIP for rural areas that are incorporated into the STIP (see **Section 2.6.1.2**). A map of Texas RPOs is shown in the resource link below.
- **Regional Planning Councils** – Regional planning councils, also referred to as Council of Governments (COG) or Planning Commissions, are comprised of city, county and special district members working together to implement strategies that address statewide and local needs on a regional level. A map of Texas regional councils can be found in the resource link below.

- **Local government planning staff** – Local governments/municipalities frequently have information that is critical to a project's development. Some of the plans they can provide include:
  - ADA Self-Evaluation or ADA Transition plans;
  - Bicyclist/pedestrian plans;
  - Comprehensive plans;
  - Economic/commercial development plans;
  - Greenway/trail plans;
  - Neighborhood plans;
  - Other land use plans;
  - Regional transit plans;
  - Street or transportation plans;
  - Tax Increment Reinvestment Zone (TIRZ) project plans or other similar plans for other value capture districts; and
  - Transit-oriented Development (TOD) plans.

- **Local and Regional Economic Development Councils (EDC)** – EDCs are non-profit professional associations dedicated to the development of economic and employment opportunities.
- **Chambers of Commerce (CoC)** – CoCs are local associations that promote and protect the interests of the business community in a particular place. A list of Texas CoCs can be found in the resource link below.

3.4.2 Compliance with Existing Planning Documents

All existing planning documents and programs on the State, regional and local levels that could influence the project scope should be identified and documented in the DSR. The project can encounter significant delays if the proper coordination with stakeholders is not performed during project scoping. Ensure that the project complies with existing plans such as:

- **TxDOT:** UTP or STIP, ADA Transition Plan, and other statewide plans;
- **Regional:** TIP, MTP, and transit plans; and
- **Local:** Thoroughfare plans, master street plans, bicycle plans, economic development plans, water/wastewater, utility, transit, aviation, railroads and ports.

3.4.3 Applicable Related Studies

Related studies may be available that could provide additional information when planning a project and determining its relationship with nearby projects. Obtaining and reviewing these studies gives a broader perspective of regional needs and assists in determining project goals.

Types of related studies include but are not limited to:

- ADA transition plans;
- Corridor studies;
- Drainage Impact Studies/Stormwater Master Plans/State Flood Plan;
- Feasibility studies;
- Route studies;
- Similar studies that propose transportation capital investments which could include city or county thoroughfare maps/plans;
- Traffic Impact Assessment (TIA) study (typically completed by developers); and
- Value engineering (VE) analysis.

3.4.4 Traffic and Safety Analysis

Planning phase analysis is typically a low-detail analysis applied to projects. Per the HCM, planning phase analyses are "directed toward broad issues such as initial complication identification, long-range analyses, and regional and statewide performance monitoring." While planning phase analysis is often applied to high-level projects and large areas, it could also be applied to specific locations and projects that use many data inputs.

Refer to TxDOT's *Traffic and Safety Analysis Procedures Manual* (TSAP) for details on the data and tasks to complete for traffic and safety analysis procedures to complete during this phase.

3.4.5 Compliance with Environmental Requirements

Projects in nonattainment or maintenance areas of the State must be developed in compliance with requirements as determined by federal and state laws and policies.

3.4.5.1 State Implementation Plan

For projects in nonattainment or maintenance areas, the MPO must have an MTP and TIP in conformance with the SIP. The SIP is the State's comprehensive plan to improve air quality and meet federal air quality standards. The department is required to produce and regularly update a SIP which is enforced by the Environmental Protection Agency (EPA). The Clean Air Act requires each state to develop a SIP that outlines a series of steps over time to improve air quality. These include mobile source plans affecting transportation planning and programming. FCAA revisions have been prepared for specific areas in the State (e.g., Dallas-Fort Worth, Houston Galveston).

Consult the SIP to determine whether it includes the project. If the project is not included in the SIP and is required to be, work early with the MPO to amend the local TIP and allow time for the redetermination of air quality conformity.

Include this activity in the project schedule.

The Texas Commission on Environmental Quality (TCEQ) is responsible for air quality planning and has an interface with TxDOT on all transportation planning and programming in areas that are in nonattainment or maintenance for “criteria pollutants.”

These pollutants include particulates, carbon monoxide, ozone, volatile organic compounds, and nitrous oxides.

Document the applicability of the SIP to the project in the DSR.

Proposed projects must be in a conforming MTP to be eligible for federal funding.

3.4.5.2 Congestion Management Process (CMP)

A CMP is required in metropolitan areas with populations greater than 200,000. The CMP is a systematic process for managing congestion that provides information on transportation system performance and on alternative strategies for alleviating congestion and enhancing the mobility of persons and goods to levels that meet state and local needs.

A CMP is a living document that includes methods to monitor and evaluate performance of the multimodal transportation system, identify and evaluate alternative actions, identify causes of congestion, assess and implement cost effective actions, evaluate the efficiency and effectiveness of implemented actions, provide for data collection and system performance monitoring and identify an implementation schedule, responsibilities and funding options.

Transportation Control Measures (TCM) is a developed congestion management strategy, which includes Transportation System Management (TSM), roadway system operational improvements, and Transportation Demand Management (TDM). TCMs are maintained, on a rolling basis, for at least five years.

The Clean Air Act Amendments requires the TCEQ and MPOs that are in nonattainment areas to include TCMs in the SIP (see **Section 3.4.5.1**). Examples of TCMs, TSMs, and TDMs are listed below in **Table 3-2**.

Table 3-2: Example Congestion Management Strategies

TCM	TSM	TDM
• Traffic flow improvements • Trip-reduction ordinances • Involve public transit	• Traffic signal optimization • Intersection improvements • Roundabouts • Capacity expansion • Intelligent vehicle/highway system elements • Speed reduction and enforcement • Bicycle and walking facilities • Incident management	• Ride Share (real time service arranged between drivers and passengers) • Car Share (short-term vehicle access without ownership or traditional rental) • Bike Share (short-term bicycle use, rented as needed) • Transit incentives (employer trip reduction program, carpools, vanpools) • Transit improvements (expanding service to underserved traffic generators, park and ride facilities) • Employer (flexible work hours, compressed workweeks, or telecommuting) • Congestion pricing (parking, toll lanes, HOV lanes)

Added capacity projects (except safety improvements or elimination of bottlenecks) in nonattainment areas may not be programmed for funding unless the project is addressed through a CMP.

3.4.6 Navigable Waterways or Waterway Activity

The Maritime Division (MRD) must be included in all project planning, research, construction, or maintenance activities for projects that directly or indirectly affect navigable waters or waterway activity.

Navigable waters of the United States are those waters that are subject to the ebb and flow of the tide and/or are presently used, have been used in the past, or may be susceptible for use to transport interstate or foreign commerce.

3.4.7 Inclusion of Managed Lanes

Managed lane facilities are appropriate only in urban and suburban freeway corridors where significant traffic congestion is observed or forecasted, and where the feasibility of meeting demand by adding lanes is limited. Managed lanes are single or multiple lanes separated from general purpose lanes by a physical structure, barriers or by pavement markings.

Texas typically uses three main categories of managed lanes:

- **Access control** – Express lanes, reversible lanes;
- **Vehicle eligibility** – HOV lanes, truck lane restrictions, off-peak use of HOV lanes by non-HOV vehicles; and
- **Pricing** – Value-priced lanes, toll lanes, high-occupancy tolled lane (HOT).

If HOV lanes are underutilized, conversion to HOT lanes allows single occupant vehicles to use the managed lane under congestion priced tolls. HOV lanes must be monitored for vehicle and occupancy level eligibility and operating hours. Managed lanes must be evaluated for their ability to reduce congestion and increase throughput in urban and suburban routes.

By statute, Texas has four tolling authorities:

- County Toll Authority;
- Regional Mobility Authority;
- Regional Toll Authority; and
- Statewide highway tolling projects (TxDOT projects).

3.4.8 Major Project Feasibility

A major project is defined by FHWA as having federal funding and a **total project cost** greater than $500 million. FHWA may also classify other projects that are not over $500M as major projects.

FHWA has delegated oversight of major projects to TxDOT. Documents and guidance can be found on the DES - Project Delivery Section webpage.

Major projects, operationally independent and non-concurrent construction projects requiring Federal assistance with a minimum estimated cost of $500 million, or projects that have been otherwise identified by FHWA as major projects will have cradle-to-grave oversight by FHWA. Involvement is due to the inherent high risk of these projects.

NEPA responsibilities are assumed by the department and FHWA audits the program to ensure procedures are followed. Department projects considered a major project are automatically an FHWA TxDIP which involves FHWA oversight of the project.

Coordinate with DES – Project Delivery Section on all major projects.

Major projects require tools and programs – mandated by Congress and the FHWA – for the delivery of major projects. These include:

- Initial Financial Plan (IFP);
- Financial Plan Annual Update (FPUA);
- Project Management Plan (PMP); and

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- Cost and Schedule Risk Assessment (CSRA).

Projects between $100M and $500M, not designated as a major project by FHWA, also must have an IFP and annual updates. TxDOT must make these plans available to FHWA for review upon request.

3.4.9 Railroad Corridor Preservation

Projects with potential to use abandoned railroad corridors require a railroad corridor evaluation report. Railroad corridors constitute a source of ROW for future improvements to the transportation system. The corridor must first be identified as abandoned or under consideration of abandonment as verified by the Rail Division (RRD).

If a transportation project can be foreseen within all or a portion of the railroad property, the affected District must prepare a railroad corridor evaluation report recommending for or against corridor acquisition.

A title insurance 3-21 should be obtained for railroad corridor acquisition. Consult with RRD.

3.4.10 Additional Study Requirements Determination

Based on the project scoping meeting and the evaluation of existing plans and project requirements, additional studies may be needed to determine critical design elements and the economic feasibility of a proposed project.

3.4.10.1 Feasibility/Corridor/Route Studies

If previous feasibility, corridor or route studies have not been performed, one or all of these may be needed to determine design concepts, general ROW requirements and associated project impacts. See **Section 2.2** for details on requesting and performing any of these three study types.

3.4.10.2 Traffic Studies

The design of a new transportation facility is based on future traffic projections. Refer to the TSAP for information on the type and methods of traffic data to be collected during this phase of project development

TPP– Traffic Analysis Section performs several functions relating to traffic data collection and analysis, transportation analysis and forecasting, and other traffic related studies to support project planning and traffic data collection.

Traffic data requests can be made through TPP’s intranet webpage. Refer to the Traffic Forecasting Analysis SOP and Guidance document referenced below for additional information.

Request traffic data early as this task can take several months to complete – include this activity in the project schedule.

If major changes to a corridor are being proposed, future traffic may not be able to be projected until the preliminary design phase.

3.4.10.3 Historic Bridge Structures

For bridge projects involving a historic structure, a Historic Bridge Team must be assembled to determine the purpose and need for the project, and to evaluate alternatives that minimize harm to the historic structure. The alternatives analysis dictates the scope of the project (bridge rehabilitation or replacement). This analysis should be completed prior to developing the bridge project.

Authority documents:

- ☐ 23 CFR §450.322
- ☐ 23 CFR Section 500.109
- ☐ 30 TAC Chapter 114 §114.260-§114.270
- ☐ 33 CFR §329.4
- ☐ 43 TAC §2.201 et seq.
- ☐ 43 TAC §2.251 et seq.
- ☐ 43 TAC §2.301 et seq.
- ☐ 43 TAC Part 1 Chapter 21
- ☐ 43 TAC Subchapter G
- ☐ Clean Air Act
- ☐ Department of Transportation Act of 1966
- ☐ Historical and Archeological Data Preservation Act of 1974
- ☐ Intermodal Surface Transportation Efficiency Act of 1991.
- ☐ Migratory Bird Treaty Act of 1918 (MBTA), as amended
- ☐ National Environmental Policy Act of 1969 as amended
- ☐ National Historic Preservation Act of 1966
- ☐ TCEQ: Texas regulation and enforcement
- ☐ Texas Roadside Parks Study - Historic Context & National Register Requirements

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Resources to consult:

- ☐ Historic Bridge Manual
- ☐ Traffic and Safety Analysis Procedures Manual
- ☐ Transportation Planning and Programming Manual
- ☐ MPO's CMP plan
- ☐ MPO's MTP and TIP
- ☐ Municipal Transit-Oriented Development (TOD) plans
- ☐ ProjectWise for previous project records
- ☐ Traffic Forecasting Analysis SOP and Guidance (TxDOT intranet only)
- ☐ TxDOT ADA Self-Evaluation and Transition Plan
- ☐ TxDOT ADA Self-Evaluation and Transition Plan Supplement
- ☐ TxDOT Plans Online (TxDOT intranet only)
- ☐ TxDOT.gov Accessibility webpage
- ☐ TxDOT.gov Environmental Compliance Toolkits webpage
- ☐ TxDOT.gov Managed Lanes webpage
- ☐ TxDOT.gov Projects and Studies webpage
- ☐ TxDOT.gov Texas-Mexico Border Transportation Plan
- ☐ TxDOT.gov Transportation Planning webpage
- ☐ DES - Project Delivery Section webpage (TxDOT intranet only)
- ☐ FHWA Congestion Management Process webpage
- ☐ FHWA Major Projects webpage
- ☐ Texas Association of Regional Councils webpage
- ☐ Texas Chambers of Commerce webpage
- ☐ Texas Commission on Environmental Quality (TCEQ) webpage
- ☐ Texas Rural Transportation webpage
- ☐ TPP webpage (TxDOT intranet only)

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Coordination:

- ☐ District planning staff
- ☐ District environmental staff
- ☐ District bridge staff
- ☐ District multimodal coordinators for other modes (e.g., transit, pedestrian, bike, port, railroad, aviation)
- ☐ District railroad coordinator
- ☐ ALD Division staff
- ☐ ALD staff
- ☐ BRG– Bridge Management section staff
- ☐ BRG Division – Bridge Management Section staff
- ☐ DES – Landscape Architecture section staff
- ☐ DES – Project Delivery section staff
- ☐ Environmental Affairs (ENV) Division (ENV) – Cultural Resources Branch - Historical staff
- ☐ PFD Division staff
- ☐ RRD Division staff
- ☐ TPP Division staff
- ☐ MRD staff
- ☐ PFD staff
- ☐ RRD staff
- ☐ TPP– Traffic Analysis Section staff
- ☐ TRF staff
- ☐ MPO and regional planning staff
- ☐ Local government staff

Tools to use:

- ☐ Form 2440 – DSR
- ☐ Major project document templates (TxDOT intranet only)
- ☐ Statewide Planning Map
- ☐ TAMES/TCAP Toolbox

Available training:

- ☐ ENV216 – Overview of TxDOT's Environmental Review Process for Engineers, Planners, and Others.
- ☐ ENV414 – EMS Awareness Training & Orientation
- ☐ TPD342 – TxDOTCONNECT Create a Feasibility Study Project
- ☐ TPD343 – TxDOTCONNECT Manage Major Projects
- ☐ TPD345 – TxDOTCONNECT Feasibility Study Training
- ☐ TPD346 – TxDOTCONNECT Major Projects Training
- ☐ TRF201 – Intro to Traffic Operations

* All training can be found in TxDOT's Training Catalog

3.5 Project Funding

This section discusses activities involved in identifying potential design and construction funding sources including state, federal, and outside sources. Outside sources could include local governmental entities, other public agencies, and private sources. Typically, federal funds are not available to functional classifications of rural minor collectors and local roads. However, this rule does have exceptions including bridge projects, Transportation Alternatives projects, Recreational Trail projects, HSIPT projects and other exceptions.

3.5.1 Design and Construction Funding

The UTP is used to authorize funds for planning, development and construction activities for highways, public transportation, aviation, state and coastal waterway and rail projects.

Twelve specific purpose UTP categories of funds have been established by state legislation and commission policy for highway transportation programs, as listed below in **Table 3-3**. Funding for each category is determined by the Commission and then programmed for projects that match eligible funds, based on a project's type and characteristics. Projects are selected by MPOs, Districts, certain TxDOT Divisions, or the TTC depending on the category.

Categories are either allocation programs or project specific. Refer to the STIP and UTP documents for more information regarding how projects are programmed.

Table 3-3: UTP Funding Categories

UTP Funding Categories	
1	Preventive Maintenance and Rehabilitation
2	Metropolitan and Urban Area Corridor Projects
3	Non-Traditionally Funded Transportation Projects
4	Statewide Connectivity Corridor Projects
5	Congestion Mitigation and Air Quality Improvement
6	Structures Replacement and Rehabilitation (Bridge)
7	Metropolitan Mobility and Rehabilitation
8	Safety
9	Transportation Alternatives Set-Aside Program
10	Supplemental Transportation Programs
11	District Discretionary
12	Strategic Priority

3.5.2 Local Government Project Funding Agreements

Project funding agreements are used when other entities participate in funding project development along with TxDOT or make improvements within the State Highway System ROW. When LG funding is involved, it may be directed toward preliminary engineering, construction, ROW, utility relocation costs, maintenance or any other project expense.

For LG projects, refer to TxDOT's *Local Government Policy Manual* and the *Local Government Project Management Guide* for details on LG project funding agreements.

Funding for LG projects are constrained by the funding limitations of the specific funding categories discussed in **Section 3.5.1**. For example, if LG requests work outside of the scope of Category 6 funding, the LG is responsible for the cost of that work.

Funding agreements state the entity responsible for performing the various project activities. The available project funding agreements and the applicability of each in varied situations are indicated in **Table 3-4**. Contact the specific Division referenced below for additional information and procedures for obtaining required agreements and permits. Additional discussion on Advanced Funding Agreements (AFA), State Letter of Authority (SLOA) and Federal Project Authorization Agreement (FPAA) as they pertain to LG projects follows (**AFA, SLOA and FPAA also pertain to non-LG projects as well**):

- **AFA** – an AFA is the form of contract most frequently used for development of projects with LGs. The AFA is an agreement under which TxDOT and the LG allocate participation in a transportation improvement project. The AFA defines the scope of work, labor and material resources, and funding participation to be contributed by each party necessary to accomplish a transportation project

Bridge specific AFAs are available for bridge work to local structures.

- **SLOA** - the SLOA is a Notice to Proceed or an authorization to commence work issued by TxDOT on all LG projects whether the work is competitively bid or performed by the LG. Up to three SLOAs may be required and issued during the course of the project.
- **FPAA** – up to three FPAAs may be required and issued along with the SLOA during the course of the project (if federal funds are used). The FPAA is required in addition to the SLOA for all federally funded projects (it is not required for projects that only include local and/or state funds). The primary function of this form is to obligate federal funds for the project by phases. By completion of the FPAA, federal funds are authorized through an agreement between FHWA and TxDOT for reimbursement of eligible costs. The FPAA is required prior to TxDOT issuing a SLOA for each phase of a project that includes federal funds..

Table 3-4: Agreements and Permits

Agreement/Permit Type								
Type of Entity	**Donation Agreement**	**Driveway Permit**	**Municipal Maintenance Agreement**	**Landscape Maintenance Agreement**	**Multiple Use Agreement (MUA)**	**Local On-System Agreement (LOSA)**	**Voluntary Advance Funding Agreement (VAFA)**	**Advance Funding Agreement (AFA)**
Brief descriptions of allowable improvement types by agreement type	Private entity funded for improvements such as deceleration lanes /signals. Constructed by private entity contractor or TxDOT and maintained by TxDOT.	Provide improved access between edge of State roadway and adjacent property line	Defines construction and maintenance responsibilities for roadways on State Highway System within municipal limits of cities	Defines construction and maintenance responsibilities for landscaping on State Highway System within municipal limits of cities	Authorizes local government to construct and maintain facilities within TxDOT ROW at local government's expense	Local government funded for improvements such as decelaration lanes /signals. Constructed by Local Government and maintaned by TxDOT	Local government funded improvement project being performed by TxDOT such as construction change order	An improvement project being jointly performed, funded, or maintained by TxDOT and/or a local government
District/Division "Owner" of Agreement								
	Contract Services (CSD)	Districts	Maintenance (MTN)	Maintenance (MTN)	Maintenance (MTN)	Contract Services (CSD)	Contract Services (CSD)	Contract Services (CSD)
Entity entering agreement with TxDOT								
Private Entity	X	X						
City		X	X	X	X	X	X	X
Other Local Government		X			X	X	X	X
Available funding sources								
FHWA or TxDOT			N/A	N/A				X
Private Entity	X	X	N/A	N/A				
City		X	N/A	N/A	X	X	X	X
Other Local Government		X	N/A	N/A	X	X	X	X
Entity managing/performing construction								
TxDOT	X		X	X			X	X
Private Entity	X	X						
City		X	X	X	X	X		X
Other Local Government		X			X	X		X
Entity responsible for maintenance								
TxDOT	X		X	X		X	X	X
Private Entity		X						
City		X	X	X	X	X	X	X
Other Local Government		X			X	X	X	X
Link to location of information								
	Contact CSD when initiating a Donation Agreement	Driveway Permits	Municipal Maintenance Agreement	Landscape Maintenance Agreement	Mulitple Use Agreements	Contact CSD when initiating a LOSA	Contact CSD when initiating a VAFA	Contact CSD when initiating an AFA

Other agreement types (e.g., Inter-Agency, interlocal, etc.) not listed in the **Table 3-4** can be found on the CSD webpage.

Table 3-5 indicates which funding type (fixed price or specified percentage) is recommended based upon the category of work, who is managing the work and whether the project is on or off the state highway system or is a non-construction project. If the AFA proposes a funding type that is not aligned with the recommendation in the chart, special approval by the executive director or their designee is required. For more information on funding types, refer to TxDOT's *Local Government Projects Policy Manual.*

For all LG projects, coordinate with TPD – Local Government Programs staff

Table 3-5: Recommended Funding Type Chart

Who is Managing the Work Item	Category of the Work Item?	Recommended Funding type for LG Participation	Who is Managing the Work Item	Category of the Work Item?	Recommended Funding type for LG Participation	Who is Managing the Work Item	Category of the Work Item?	Recommended Funding type for LG Participation
On-System			**Off-System**			**Non-Construction**		
TxDOT Managed	ROW Acq	Fixed	TxDOT Managed	ROW Acq*	Spec %	TxDOT Managed	Plng Study	Fixed
	Utl Reloc*	Fixed		Utl Reloc**	Spec %		Traf Mgmt	Fixed
	Env	Fixed		Env	Spec %		Air Quality	Fixed
	Design	Fixed		Design	Spec %	LG Managed	Plng Study	Spec %
	Constr.	Fixed		Constr.	Spec %		Traf Mgmt	Spec %
	Service Proj.	Spec %		O/S Bridge	Fixed		Air Quality	Spec %
LG Managed	ROW Acq	Spec %	LG Managed	ROW Acq	Spec %			
	Utl Reloc	Spec %		Utl Reloc	Spec %			
	Env	Spec %		Env	Spec %			
	Design	Spec %		Design	Spec %			
	Constr.	Spec %		Constr.	Spec %			

* TxDOT is not authorized to purchase ROW for anything other than state highway projects.

** Agreement for minimum local contribution towards the cost of reimbursable utilities(Agreement to Contribute ROW Funds); For guidance on individual AFAs for voluntary utility relocations (joint bid utilities) see TxDOT's *Utility Manual*.

Examples of Non-Construction projects:

Traffic Management:
- Freeway incident management
- ITS

Air Quality:
- Transit, van pool, ride share
- Clean vehicles

Execute AFAs at the beginning of project development to ensure that the responsibilities of each party and their funding responsibilities are agreed to before incurring preliminary design costs, which could include review time completed by professional staff.

Execute LOSA prior to District approving project plans and specifications and prior to authorizing LG construction activities within the state ROW.

Authority documents:

- ☐ 23 USC 133(c)
- ☐ 43 TAC §15.50 et seq.
- ☐ 43 TAC §15.52
- ☐ Clean Air Act
- ☐ Texas Constitution, Article III. Legislative Department. Section 49-k

Resources to consult:

- ☐ Bridge Project Development Manual
- ☐ Local Government Policy Manual
- ☐ Local Government Project Management Guide
- ☐ Transportation Planning and Programming Manual
- ☐ TxDOT Transportation Funding in Texas brochure
- ☐ CSD webpage (TxDOT intranet only)
- ☐ TxDOT.gov TxDOT FIN – Funding Needs and Potential Sources webpage

Coordination:

- ☐ District planning staff
- ☐ District driveway coordinator – driveway permits
- ☐ District maintenance staff
- ☐ Director of TPD
- ☐ TPD – Local Government Programs staff
- ☐ TPP staff
- ☐ FIN staff
- ☐ Contract Services Division (CSD) staff – Donation agreements, LOSA, VAFA, AFA, workflow diagrams
- ☐ Maintenance Division (MTN) staff – driveway permits SOP, municipal maintenance agreements, landscape maintenance agreements, multiple use agreements
- ☐ BRG project manager – consult on bridge AFAs (not the same as the long form AFA)

Tools to use:

- ☐ Form 2440 – DSR

Available training:

- ☐ CTR110 – Advance Funding Agreements
- ☐ LGP101 – Local Government Project Procedures Qualifcation for TxDOT
- ☐ LGP102- Local Government Projects Construction Administration
- ☐ PLN302 – Highway Program Funding
- ☐ PLN308 – Federal-Aid Highways 101
- ☐ TCC327 – Bridge Preservation Guide
- ☐ TPD101 – Overview of Project Development & Delivery at TxDOT
- ☐ TPD302 – TxDOTCONNECT Funding Lines Demo
- ☐ TPD333 – TxDOTCONNECT Managing the District/Division Program
- ☐ TPD359 – TxDOTCONNECT Advance Funding Agreements

* All training can be found in TxDOT's Training Catalog

3.6 Project Setup in TxC

A project must be set up in TxC prior to beginning work on the project. Details on the items listed below are found in the TxDOTCONNECT Reference Guide. The items that are completed in project set up in TxC include:

- Construction Estimate;
- Control Section Job (CSJ);
- Control Section;
- Controlling Project ID;
- County;
- District;
- Estimated Let Date **(see Figure 8-2)**;
- Highway;
- Project ID;
- Project Name;
- Project Stage;
- Project Status;
- Project Subtype; and
- Project Type.

On-system roads mean these roads are on the State system. On-system roads and the ROW associated with them are owned and maintained by TxDOT. TxDOT also participates in many **off-system** road projects. These are not on the TxDOT system, and TxDOT typically does not maintain them. Any off-system work requires agreements with outside entities.

Control-Section-Job numbers (**CSJs**), **Project Numbers** and **TxC Project ID** numbers are assigned to all TxDOT construction projects. Each number is unique for a specific TxDOT project. CSJs are the most commonly used project identifier. **Table 3-6** illustrates commonly used identifiers.

Table 3-6: Commonly Used Identifiers

TxC Field	Description	Example	Reference
District/Division	Two-digit number associated with each District and Division	18 = Dallas 43 = Finance	TxDOT Districts and Counties map
CSJ	Nine-digit number that stands for Control, Section, Job; a unique identifier for tracking purposes • First four digits = Control • Middle two digits = Section • Last three digits = Job	1204-47-248	Statewide Planning Map for Control and Section numbers
TxC Project ID	The project identifier for which the request was submitted – automatically assigned in ascending order when the project is created in TxC.	A00126022	-
TxDOT Project number	A numeric and alpha combination usually indicating the type of project and the federal contract number if the project will have federal funds.	CC 0918-47-248 = non-federal 2001323 CM 2001(323) = A congestion mitigation project with federal funds and the federal contract number is 2001323	-

When ROW acquisition or utility relocation is needed, a separate ROW CSJ (RCSJ) should be created in TxC (see Section 6.3.2).

3.6.1 CSJ Numbers

Control numbers are assigned to all on-system roadways. Control numbers are constant for each roadway and do not change. They consist of four (4) digits. Off-system highway projects are assigned “09XX” control numbers, where the last two digits reflect the number of the District where the project is located.

Each on-system road is further divided into **Sections**, which are designated by 2 digits, that typically are numbered sequentially, and generally increase from west-to-east and north-to-south.

Together, the control with the section number (CS XXXX-XX) designate unique road sections of all on-system roads, so they can be used to geographically locate projects. Control and section numbers can be found for all roadways in the Statewide Planning Map. District numbers can be found on the TxDOT Districts and Counties map.

The **Job number** is tied to specific work and funding programmed for a specific Control and Section. Together, **the CSJ is unique for all TxDOT projects**. Job numbers are assigned sequentially. This is helpful to know, especially when searching previous records and As-Built plans. You can base searches in Plans Online based on the job number, which helps you find the most recent as-builts that reflect the existing highway properties currently in place.

In summary, the nine-digit CSJ number is interpreted as follows:

- **Control** (4 digits) – a section of highway with a defined geographic begin and end points, usually 25 to 30 miles in length;
- **Section** (2 digits) – parts of the control that are shorter, logical, and practical in length; and
- **Job** (3 digits) – number assigned in sequence within the limits of each control section.

Exceptions are as follows:

- **Off-System projects** – If the control section is Off-System (these begin with a letter, e.g., A9XX-XX), the CSJ field becomes a drop-down menu in which the correct control section job must be selected in TxC.
- **Various locations** – In TxC, various locations can be selected in the Highway and Control Section fields, the CSJ field becomes a drop-down menu in which a control section must be selected. When the project is saved, the next number in sequence will be assigned to complete the CSJ number.

The CSJ is assigned automatically upon creating and saving a project in TxC, based on the Control-Section selected on the Location page.

3.6.1.1 Controlling & Subordinate CSJs

The Controlling CSJ, or **CCSJ**, is used to identify a project and track documents related to a project's contract and is listed on final PS&E documents. **The CCSJ is typically the lowest CSJ of all CSJs included in a construction contract**. Subordinate CSJs are CSJs that are linked to the CCSJ and are also part of the final PS&E. The CCSJ and Subordinate CSJs are all part of the same contract and combined engineer's estimate that is bid on when a project is let. All CSJs related to a project's construction contract are found under the Letting tab in TxC, and the CCSJ is identified in this location and in the TxC page header. These CSJ types are the ones that are programmed into the Statewide Planning Map and also viewed in the Location tab in TxC. See **Figure 3-3** for an example of Controlling and Subordinate CSJs in TxC.

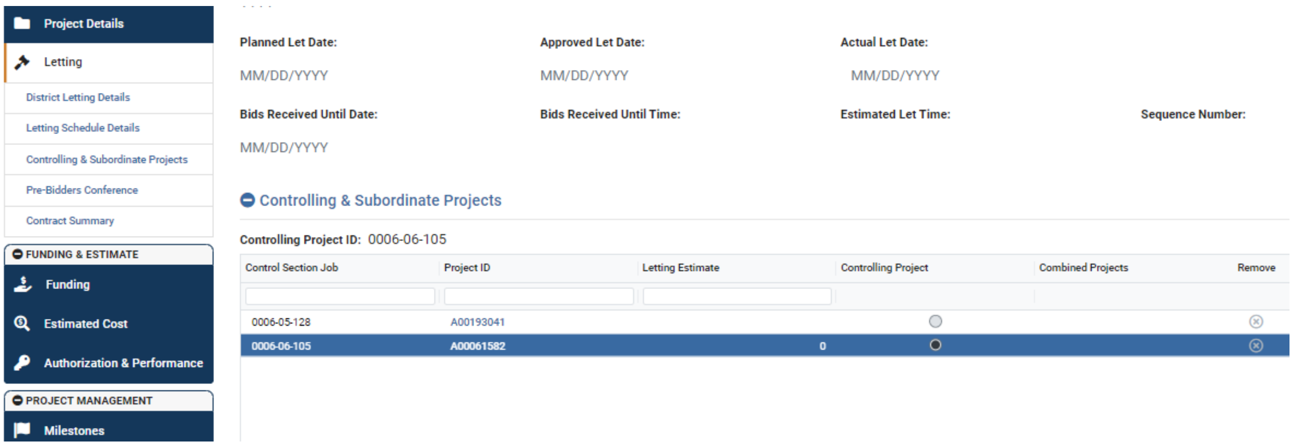

Figure 3-3: Example of Controlling and Subordinate CSJs in TxC

3.6.1.2 Main/Associated CSJs

Associated CSJs differ from subordinate CSJs since they are specifically tied to the limits of the environmental document. These CSJs are tracked in the Environmental Compliance and Oversight System (ECOS) (see **Section 5.3**) but are identical to other project CSJs with the same number. The only difference is that they are grouped together, or “associated,” in ECOS under a Main CSJ and are based on the limits of the environmental document. TxC pulls these CSJs in from ECOS.

Associated CSJs are shown under the major projects tab in TxC, and the Main CSJ is identified. Associated CSJs are important because a Main CSJ cannot be environmentally cleared until all associated CSJs are clear. Also, the costs related to associated CSJs are what are used to determine total project cost. Total project cost is what is used to determine cost thresholds, which in turn, determines the need to meet certain FHWA requirements such as VE analysis and major and other projects (Financial Plans, Project Management Plans, etc.), since those costs are based on the limits of the environmental document. See **Figure 3-4** for an example of associated CSJs as shown in TxC.

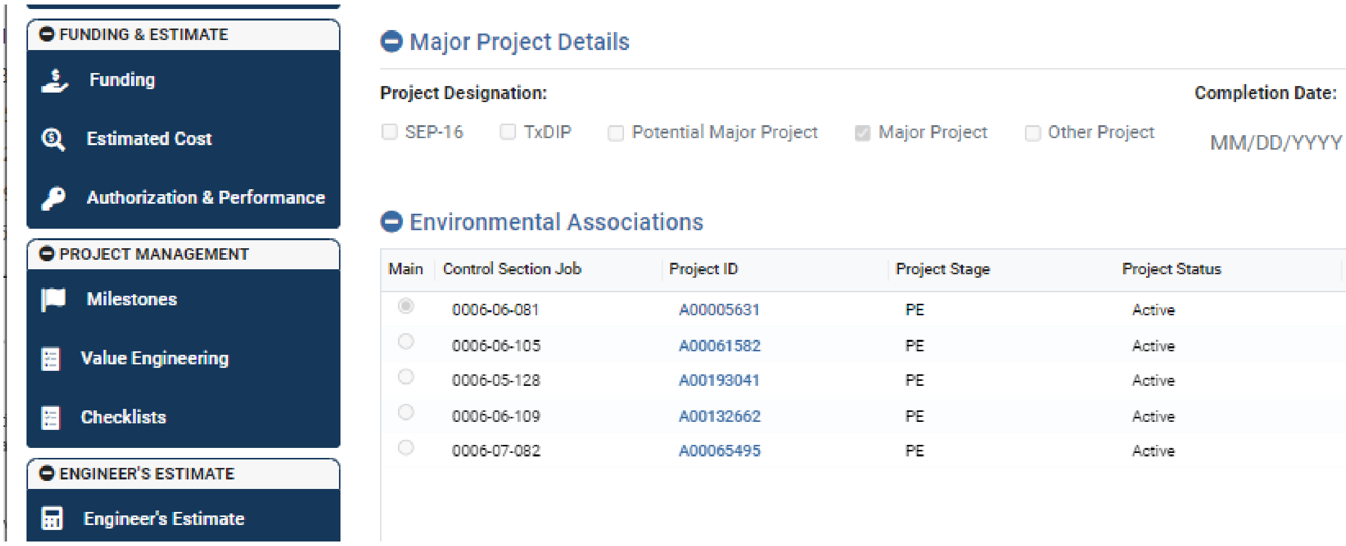

Figure 3-4: Example of Associated CSJs in TxC

3.6.1.3 Ancestor/Descendant CSJs

Ancestor and descendant CSJs are used to link CSJs that change over time. These are typically used for larger projects since a CSJ may be assigned to a corridor during the planning stage that is later dissected into smaller breakout projects. It is necessary to link older and newer CSJs so project history is not lost since many important documents of these large projects that sometime span over decades may be developed and tracked under an older CSJ that still needs to be referred to when a newer CSJ is created. "**Ancestor**" refers to the previous CSJ used. "**Descendant**" is the new CSJ used to replace an older CSJ. There can be multiples of each type listed under one CSJ record. In TxC, the fields can be found under the "Project Details" tab.

3.6.2 Project Numbers

Project numbers are assigned by FIN and are associated with a project's funding and type of project. The format of the number can relay if federal funds are included in a project or not. A federal project number is assigned if any amount of federal funding is included in a project. A federal project number is used by FHWA for project identification and to help track federal funds. State project numbers are assigned to projects that have no federal funding and are solely funded using state funds. State project numbers typically partly consist of the project's CSJ number. Project numbers are included on the PS&E Title Sheet.

3.6.3 TxC Project ID Numbers

TxC Project ID numbers are assigned sequentially as new records are created in TxC. They can be found in the TxC page header and are another identifier used to search and track project records. See **Figure 3-5** for an example of a Project ID number as shown in TxC.

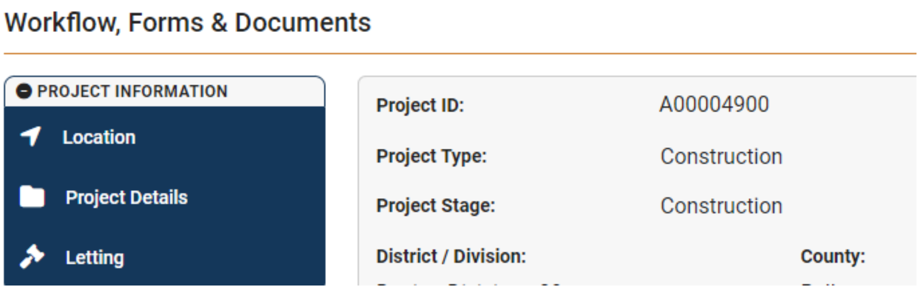

Figure 3-5: Example of TxC Project ID Number

3.6.4 ROW CSJs

ROW CSJs (RCSJ) are used to track costs related to ROW/utilities. The ROW CSJ is the unique CSJ for the ROW project, generated by TxC when a ROW Resource Request is approved. RCSJs can be found under the "Project Details" tab and the "Right of Way" tab in TxC. See **Chapter 6** for more information on obtaining a RCSJ.

Authority documents:

- ☐ 43 TAC Part 1 Chapter 21

Resources to consult:

- ☐ TxDOT.gov Districts and Counties map
- ☐ TxDOT Open Data Portal
- ☐ TxDOT GIS Community of Practice – Linear Referencing document
- ☐ TxDOTCONNECT Reference Guide - Project Information

Coordination:

- ☐ District planning staff

Tools to use:

- ☐ Form 2440 – DSR

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Chapter 4 Preliminary Engineering

4.1 Overview

Preliminary Engineering is the phase of project development that includes preliminary design tasks, the examination of environmental and community impacts, and initial ROW and utility investigations. After transportation projects have been planned and programmed, preliminary engineering activities begin.

Some form of preliminary engineering occurs on every transportation project, however, the tasks associated with this phase of project development vary depending on the project rigor. Some projects may go through an extensive preliminary engineering phase that takes years to complete, while others may experience more simple tasks that are accomplished in a few months. For many projects, the preliminary engineering stage also involves a high level of public involvement.

This chapter discusses the tasks associated with the **Preliminary Engineering** phase of TxDOT's project development process as shown in **Figure 4-1**.

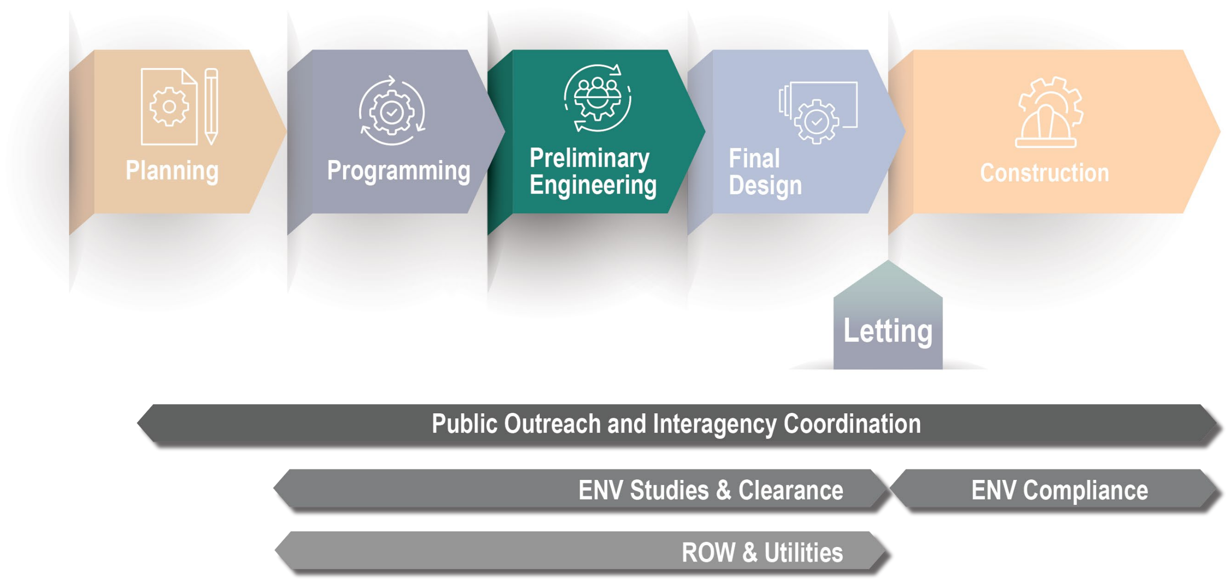

Figure 4-1: TxDOT's Project Development Process – Preliminary Engineering

This chapter includes discussion on the following tasks that typically take place in the Preliminary Engineering phase.

4.2 Preliminary Design Concept Conference;

4.3 Geometric Alternatives Analysis;

4.4 Design and Prepare the Geometric Schematic;

4.5 Value Engineering;

4.6 Finalize the Geometric Schematic;

4.7 Right of Way Footprint Determination;

4.8 Review and Approval of Geometric Schematic;

4.9 Identify, Prepare and Execute Additional Agreements; and

4.10 Geometric Layouts.

4.2 Preliminary Design Concept Conference

The Preliminary Design Concept Conference (PDCC) is a meeting of key individuals used to evaluate and update the project scope and establish additional fundamental aspects of a project. The PDCC facilitates agreements on basic project features by concerned stakeholders and enhances relationships among those parties.

The PDCC is conducted prior to beginning preliminary engineering activities (i.e., preliminary design, environmental investigations, public involvement activities, ROW determination, and preliminary utility investigations).

Since a great deal of time can pass between the Planning/Programming and Preliminary Engineering phases, it is essential to revisit the project scoping information including data collection and site visit activities.

Preliminary design activities undertaken prior to the NEPA environmental clearance must not materially undermine consideration of project alternatives.

The PDCC decisions are documented in the DSR (see **Section 1.5**) to help ensure that the project team does not overlook potentially critical issues and to ensure continuity of the project throughout development. The DSR constitutes an understanding of basic features of the project by FHWA, Divisions, Districts, Area Offices and LGs.

The PDCC includes attendees from all SME areas applicable to the project (e.g., area office, maintenance, roadway, bridge, drainage, traffic, construction, utilities, ROW, and environmental)

Outcomes from the PDCC Meeting include:

- Anticipated pavement structure options (consideration to resiliency for different climates);
- Baseline Oracle Primavera Cloud (OPC) schedule;
- Construction phasing/traffic handling;
- Design and construction schedules and consideration of accelerated construction techniques or contract provisions;
- Design criteria determination;
- Determination of additional data collection needs and responsible persons;
- Existing and future traffic volumes;
- Existing bridge data (i.e., condition assessments; bridge inspection reports; type, size and location; historical bridge data, etc.);

If the project is deemed a major project per Section 3.4.8, include FHWA staff as part of PDDC.

- Federal letter of authority for preliminary engineering;
- FHWA Cost and Schedule Risk Analysis (CSRA) – for major projects (see **Section 3.4.8**);
- Geometric design elements;
- Geotechnical data requirements;
- Hydraulic elements;
- Identification of multimodal needs (e.g., bicycle, pedestrian, transit, freight, etc.);
- Identification of needed agreements and permits;
- Identification of project stakeholders and needed coordination;
- Identification of roadway, bridge, drainage, traffic/safety, ADA pedestrian, bicycle, environmental and ROW/utility tasks to be performed;
- Key Dates / Special Events when roadway closures are prohibited;
- Maintenance concerns that may influence design;
- Potential ROW needed;
- Potential utility adjustments;
- Railroad impacts;
- Review of planning estimate, project programming and funding data;
- Status of environmental/public involvement process;
- Status of schematic completion;
- Surveying/photogrammetric requirements;
- Type of Geometric Schematic/Layout required;
- Updated project scoping documents (e.g., goals, objectives, constraints, and risks); and
- Value engineering analysis requirements (see **Section 4.5)**.

Scheduling the PDCC and facilitating the meeting should be accomplished by the TxDOT PM directly responsible for the design and development of the project. Suggested attendees are as follows:

- Area Office staff who will have design and/or construction responsibilities;
- Maintenance Supervisor who will be responsible for maintenance of the roadway;
- District design and review staff (i.e., roadway, bridge, drainage, traffic, landscape and railroad);
- Bicycle/pedestrian coordinator;
- Transit coordinator;
- District construction office staff;
- District survey staff;
- District environmental, ROW, and utility staff; and

- Local government staff directly involved with the project development or impacted by the completed project (i.e., funding responsibilities, review responsibilities, etc.).

All design decisions are documented in the DSR and can be reviewed by DES at the request of the PM.

4.2.1 Project Scoping Documents Review

Obtain and review the original project scoping documents from the DSR and the planning/programming estimate and schedule prepared during the planning and programming phases of project development. These initial documents serve as a baseline to guide the proposed preliminary engineering and final design of the project.

Project scoping documents to be reviewed and updated include:

- Project objectives and goals;
- Proposed project activities;
- Planning estimate;
- Letting year and milestone submittal dates;
- Environmental document type, concerns, constraints, and specific compliance requirements;
- ROW needs and utility conflicts;
- Railroad issues;
- Stakeholder log;
- Risk register; and
- Traffic and safety scoping form.

Changes or updates to the project scope are documented in the DSR.

Project schedules are expected to have an Original Baseline type for all state-let projects with an Estimated Let Date in TxC that is within the first four years of the 10-year UTP portfolio window and for any project that is actively being developed.

4.2.2 Design Criteria and Controls

The design criteria and controls to be used on the project are established and documented in the DSR at the beginning of project development. The design criteria to be used is determined by the type of construction that is proposed and other selection considerations including:

- Whether the project is on the Federal National Highway System (NHS), State Highway System, or off-system roadway;

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- Whether the project is or needs access control (i.e., conventional or access-controlled facility);
- Functional classification of the roadway (i.e., freeway, arterial, collector, or local);
- Context classification of the roadway (i.e., rural, rural town, suburban, urban, or urban core);
- Terrain classification of the roadway (i.e., level, rolling, or mountainous);
- Traffic characteristics of the roadway (e.g., current/projected Average Daily Traffic (ADT), operations, safety); and
- Funding category of the project (certain funding categories pertain to specific design criteria).

Table 4-1 gives definitions of the different highway construction categories.

Table 4-1: Highway Construction Category Definitions

Highway Construction Category	Definition
Resurfacing	Limited existing pavement surface repairs such as milling, spot patching, seal coat, rut repair, crack sealing, and fog sealing.
Restoration	Existing pavement structure repairs such as patching or rebuilding short sections of road, hot mix overlays, shoulder edge repairs, or minor safety improvements (i.e., guardfence, pipe headwalls, etc.).
Rehabilitation	Partial or full depth pavement reconstruction on existing profile/alignment such as removal and replacement of the existing riding surface and base material, driveway improvements, ditch regrading or safety improvements (i.e., guardfence, pipe headwalls, etc.). If approved, minor lane/shoulder widening, adding medians/curbing, minor improved drainage design or intersection improvements are included.
Reconstruction	Projects that utilize an existing roadway alignment (or make only minor changes to an existing alignment) but involve a change in the basic roadway type. Changes in the basic roadway type include widening a road to provide additional through lanes or adding a raised or depressed median where none currently exists, and where these changes cannot be accomplished within the existing roadway width (including shoulders).
New Construction	Projects on a new alignment or new construction.

The applicable design criteria are based on construction type is shown in **Table 4-2**. Additional categories of design criteria are discussed in the RDM and in **Table 4-3**.

Table 4-2: TxDOT Construction Types and Applicable Design Criteria

Roadway Design Criteria	Highway Construction Categories	Definition
2R	Resurfacing and Restoration	• Projects consist of non-freeway work on facilities not on the National Highway System (NHS) with a current ADT ≤ 2500 per lane that propose to restore the pavement to its original condition. ○ Includes restoration of pavement structure, ride quality, or other necessary components to its existing cross section configuration. The principal purposes of these projects are surfacing and repair of the pavement structure. ○ The addition of continuous two-way left-turn lanes (TWLTL), acceleration/deceleration lanes, turning lanes, and shoulders are acceptable as restoration work as long as the existing through lane and shoulder widths are maintained as a minimum. ○ Work **DOES NOT** include the addition of through travel lanes.
3R	Resurfacing, Restoration and Rehabilitation	• Projects consist of transportation projects that extend the service life and enhance the safety of a roadway including freeways and NHS roadways. • In addition to the work described under resurfacing and restoration, the activities include upgrading the geometric design and safety of the facility. Work may include the upgrading of geometric features such as roadway widening, minor horizontal and vertical realignment (typically less than 10% of the project length) and improving bridges to meet current standards for structural loading and to accommodate the approach roadway width. • Work **DOES NOT** include the addition of through travel lanes.
4R	Resurfacing, Restoration, Rehabilitation, and Reconstruction and New Construction	• Projects on a new alignment or new construction. • Projects that upgrade an existing roadway to meet geometric criteria for a new facility. • Projects that include substantial changes in the geometric character of the highway, such as widening to provide additional through lanes, significant horizontal or vertical realignments, and major improvements to the pavement structure to improve long term service. • Bridge replacement projects with ADT > 400.
5R	Mobility Corridors	Projects that are intended to regenerate, or produce new, long-term transportation opportunities including multiple modes such as rail, utilities, freight, and passenger characteristics.

The appropriate design criteria for the construction type are chosen according to guidance found in the RDM based on the functional and context classification of the roadway. Refer to Chapters 1 – 12 of the RDM for more guidance on the selection of the applicable design criteria.

Design controls that are established according to the selected design standards include:

- Design loading structural capacity;
- Context classification;
- Design speed;
- Capacity and Level of Service (LOS);
- Project traffic;
- Design vehicle;
- Pedestrian and bicycle requirements;
- Physical constraints (e.g., existing ROW, approach roads, railroads, and major utilities);

- Environmental constraints (e.g., public parks, historic and cultural features, displacements, wetlands, and floodplains);
- Type of stormwater facilities;
- Navigation requirements; and
- High water requirements.

Table 4-3: Other Construction Types and Applicable Design Criteria

Roadway Design Criteria		Definition	Reference
PM	Preventative Maintenance	Projects with work to preserve, rather than improve, the structural integrity of the pavement and/or structure. Includes ACP overlays (maximum 2" thick); seal coats; cleaning and sealing joints and cracks; patching concrete pavement; milling or bituminous level-up, shoulder repair; micro-surfacing; scour countermeasures; restoring drainage systems, cleaning and painting steel members to include application of other coatings, cleaning and sealing bridge joints, bridge deck protection, cleaning and resetting bearings, cleaning rebar/strand, and patching structural concrete.	Maintenance Management Manual and Maintenance Operations Manual
5R	Mobility Corridors	Projects that are intended to regenerate, or produce new, long-term transportation opportunities including multiple modes such as rail, utilities, freight, and passenger characteristics.	Roadway Design Manual
Special Facilities	Highway Safety Improvement Program (HSIP)	Projects involving highway safety improvements including medians, turn lanes, intersections, traffic signals, and rumble strips. Projects must align with the emphasis areas in the Texas Strategic Highway Safety Plan (SHSP) such as roadway and lane departures, intersections, older road users, and pedestrian safety.	Highway Safety Improvement Program Guidelines
	Off-System Bridge Replacement & Rehabilitation	Projects that are included in the off-system bridge replacement and rehabilitation program; the facility is not likely to be added to the designated state highway system; and has a current ADT of 400 or less. High-volume (current ADT > 400) off-system bridge replacement and rehabilitation projects should use the appropriate 3R or 4R criteria.	Roadway Design Manual
	Historically Significant Bridges	Projects that contain a designated historically significant bridge.	Historic Bridge Manual
	Texas Parks and Wildlife Department (TPWD)	Projects that include work on Park Roads (PR) and Wildlife Roads (PW). This includes constructing, repairing and maintaining roads in and adjacent to state parks, state fish hatcheries, state wildlife management areas and their support facilities.	Texas Parks and Wildlife Department Design Standards for Roads and Parking

4.2.3 Additional Data Collection

Prior to the PDCC, additional data may be needed for making engineering and environmental decisions related to project design. Data collection efforts must be as complete as possible so project solutions providing the most benefit are selected.

4.2.3.1 Right of Entry

ROE must be obtained in writing on a form that is legally binding before entering private property. ROE is permission granted by a landowner for others to enter the landowner's property for a specific purpose. Activities such as surveying and geotechnical and environmental studies should be coordinated and covered under one ROE if possible (landowners can be confused by multiple requests). Include all property in the ROE where work activities will be performed as well as property that will be traveled on to reach work sites.

Conditions may exist for entry onto railroad property. ROE requests to access railroad property must be processed through the District railroad coordinator or through the RRD - Rail Letting Section.

Property requiring entry should be identified and coordinated early – several rounds of ROE requests may be needed to obtain the needed permission. It may be advantageous to send ROE letters by certified mail to maintain documentation of receipt.

It is a best practice to contact the landowner a few days prior to crews being on the property as a courtesy and show of good faith.

Pay close attention to instructions from the landowner on the ROE form (e.g., call before coming, close all gates, use a specific entrance location, etc.).

If ROE cannot be acquired through standard means (e.g., ROE letters sent by certified mail, personal contact with property owners, etc.), a request for a court order can be provided to the ROW - Survey Section for review and processing. It is encouraged to avoid court orders if possible, in order to maintain good relations with the public.

An example of a ROE letter is given in the references below.

ROE can take several months to complete – include this activity in the project schedule.

4.2.3.2 Initial Survey Data

Survey data includes digital maps, terrain models, and orthophotography. The data may already exist (e.g., Google Maps, Nearmap, etc.) or, depending on project requirements, may need to be created. Geospatial data can be created using various technologies. Coordinate with District survey staff to determine the extent of available data.

The following methods are suggested for gathering geospatial data:

- Small areas, less than 10 acres:
    - Land surveying using conventional optical or global positioning system (GPS) surveying equipment; or
    - Static (terrestrial) Light Detection and Ranging (LiDAR).
- The following are more cost-effective for areas greater than 10 acres:
    - Aerial photogrammetry;
    - Airborne LiDAR;
    - Close-range photogrammetry: terrestrial, mobile, or unmanned aircraft system (UAS); or
    - Mobile LiDAR.

If the project is a Digital Delivery project, a higher level of survey data will be needed.

Coordinate survey requirements for a Digital Delivery project with the DES and ROWs.

A land surveying task is accomplished using either optical surveying equipment (e.g., a total station) or by GPS. Individual points on the ground are located by the surveyor. In the office, the surveyed point data is processed creating a planimetric map and digital terrain model (DTM).

The procedures in Static LiDAR surveying are like land surveying in that a surveying instrument is set up on a tripod at the project site. Rather than locate individual points on the ground, the LiDAR scanner collects thousands to millions of individual points creating a dense “cloud” of located points. In the office, data is extracted from the “point cloud” using specialized software.

Aerial photogrammetry typically uses piloted aircraft equipped with a large-format metric mapping camera; however, UAS and small format cameras can also be used.

Airborne LiDAR uses one or more scanners mounted on an aircraft. The aircraft can be rotary-wing, like a helicopter, or fixed-wing. The mapping data is extracted from the point cloud.

Close-range photogrammetry can be static with the camera held in a fixed position, mobile, or airborne. Three-dimensional data is extracted from the imagery to produce planimetric maps and DTM data.

UAS is a tool used to collect qualitative (i.e., visual) and quantitative (i.e., metric) data. The role of UAS is similar to other tools sued to collect these same types of data: GPS, LiDAR, RADAR, Sonar, optical surveying equipment, and close-range and vertical photogrammetry.

Mobile LiDAR uses one or more scanners mounted on a moving vehicle in contact with the earth's surface. The vehicle can be a car or truck operating on a roadway, a vehicle operating on a rail line, or even a boat. Mobile LiDAR systems produce dense point clouds from which data can be extracted.

Planimetric mapping and DTM extraction are done using stereoscopic viewing equipment and specialized software.

Most mapping is done using a network of ground control points. These are points that have been precisely located on the ground using surveying equipment. The control points form a geospatial reference frame for the subsequent mapping task. Often the ground control points are "targeted" using a painted "X" or similar figure. The target allows easy identification of the ground control point in the point cloud or on the photograph. Targeting is typically done prior to data collection.

Aerial photography can be collected, but not controlled. In this case, the imagery is primarily used to give an overview of a proposed corridor project or other large study area. The imagery can roughly be georegistered but must not be used for precise mapping.

4.2.3.3 Traffic and Safety Analysis

Current and projected traffic data is a key element in highway design. Obtaining traffic data early can assist in defining the typical section. However, if a project is on a new location or the alternatives being considered present a major change to the network (e.g., new location or ramp changes), it is recommended to r**equest the proposed traffic projections after a preferred alternative is agreed upon** and geometric elements (i.e., ramp locations) are further developed. Traffic data that has been previously requested in the planning project development phase must be reviewed for applicability and additional data may need to be obtained.

Traffic data is also used for other work including environmental studies and pavement design. Coordinate with the District environmental staff to determine what type of traffic data is needed for environmental tasks. Coordinate with District pavement/laboratory staff for traffic data needed for pavement design.

Preliminary engineering phase analysis is a medium-detail analysis applied to projects at a middle development stage. Per the HCM, preliminary engineering phase analyses are "conducted to support planning decisions related to roadway design concept and scope and when alternatives analyses are performed."

Refer to the TSAP Manual for details on the data and tasks to complete for traffic and safety analysis procedures to complete during this phase.

4.2.3.4 Related Data, Plans, Studies, and Reports

Existing studies and reports can provide information that will assist in decision making and help avoid rework.

Consider the following sources for additional data, plans, studies and reports:

- "As-built" construction plans;
- Bridge condition assessments;
- Bridge inventory data;
- Crash analysis and safety data;
- Environmental studies and schematics for previous or adjacent projects;
- Existing ADA barriers (TAMES/TCAP Toolbox);
- Existing hydrologic/hydraulic reports;
- FEMA floodplain studies;
- Formal or informal studies addressing a specific issue;
- Green Ribbon Master Plans for urban corridors with populations greater than 100,000;
- Pavement analysis data from Pavement Management Information System (PMIS);
- Pedestrian and bicycle plans;
- Previously studied but suspended projects;
- Project history files;
- Relevant project information for adjoining or parallel routes;
- ROW maps;
- Studies conducted by other agencies or special districts (e.g., MPO, flood control district, and city and county planning studies/maps) related to the proposed project concept or having possible impacts on project design;
- Texas Reference Markers, GIS data for railroads, city limits, and public roads;
- Traffic signal studies/Streetlight Data;
- TxDOT Bicycle Tourism Trails Example Network; and
- United States Geological Survey (USGS) data.

4.2.3.5 Existing Utilities Information

Utility locations must be identified early in project development. Coordination with utility owners is required when existing utilities are present. Utility locations should be identified early so there is time to consider the impacts in alternative selection.

Document any observation of utility locater markers and signs during the site visit. Contacting Texas 811 will alert utility owners of pipelines, telecommunication cables and power line to mark their buried assets on the project site. Coordinate this activity with survey staff to have lines marked prior to the field topo survey.

Be aware of local utilities such as regional water authorities that may not be included in a Texas 811 alert.

Early coordination with these type of underground utility owners is critical to correctly identify potential conflicts.

Utilities that are carried by a locally owned bridge or that will be impacted by bridge construction require coordination between the utility owner and the bridge owner (if different than the utility owner) to remove the utility conflict prior to letting the project. Category 6 funding is not permitted to pay for relocating utilities.

4.2.3.6 Early Coordination with Stakeholders

Early coordination with resource and regulatory agencies and other stakeholders is vital in identifying concerns and opportunities for a proposed project. The project development process can be streamlined by proactively seeking out potential stakeholders not previously identified.

Opportunities may be identified to perform joint activities with a project planned by an outside agency (e.g., MPO or LG). Early coordination with regulatory agencies may identify required actions that could be time-consuming and require long lead times in the schedule.

It is critical that all stakeholder commitments from TxDOT be documented and carried out through design of the project.

It is important to understand the needs of each stakeholder (individuals and groups) and develop an engagement plan that is best suited to their needs. This activity is closely coordinated with District environmental staff as part of the public involvement process (see **Section 5.7**).

4.2.4 Site Visit

Prior to the PDCC, it is desirable to perform a site visit to update the existing site conditions from the scoping meeting site visit with the applicable SMEs. See **Section 3.2.2** for additional information on performing the site visit and needed ROE to be obtained prior to accessing any property outside of state ROW.

Authority documents:

- ☐ 23 CFR Part 626
- ☐ 23 CFR Part 752
- ☐ 23 USC §319
- ☐ 43 TAC, §11.200 et seq.
- ☐ TTC §203.031

Resources to consult:

- ☐ AASHTO A Policy on Design Standards – Interstate System
- ☐ AASHTO A Policy on Geometric Design of Highways and Streets
- ☐ AASHTO Guide for High Occupancy Vehicles
- ☐ AASHTO Guide for the Development of Bicycle Facilities
- ☐ AASHTO Guide for the Planning, Design, and Operation of Pedestrian Facilities
- ☐ AASHTO Highway Safety Manual
- ☐ AASHTO Roadside Design Guide
- ☐ Access Management Manual
- ☐ AssetWise (BRG Inspections)
- ☐ Bridge Project Development Manual
- ☐ Crash Records Information System (CRIS) database
- ☐ FEMA.gov/Flood-Maps
- ☐ FHWA Managed Lanes a Primer
- ☐ Historic Bridge Manual
- ☐ HSIP Guidelines
- ☐ Hydraulic Design Manual
- ☐ Maintenance Management Manual
- ☐ Maintenance Operations Manual
- ☐ Planning Estimate (from previous planning phase)
- ☐ PMIS database (TxDOT intranet only)
- ☐ Project Schedule (from previous planning phase)
- ☐ Project Scoping Documents (from previous planning phase)
- ☐ Roadway Design Manual
- ☐ ROW Utilities Manual
- ☐ Texas Parks and Wildlife Department Design Standards for Roads and Parks
- ☐ TMUTCD
- ☐ Traffic and Safety Analysis Procedures Manual
- ☐ Traffic Forecasting Analysis SOP and Guide (TxDOT intranet only)
- ☐ TRB Highway Capacity Manual
- ☐ TxDOT Open Data Portal

- ☐ TxDOT Survey Manual
- ☐ TxDOT.gov 2024 Standard Specifications
- ☐ TxDOT.gov Reference Marker Maps webpage
- ☐ TxDOT.gov Surveyors' Toolkit webpage
- ☐ TxDOT.gov Unmanned Aircraft System (UAS) Services webpage
- ☐ TxDOT.gov Utility Accommodations Toolkit webpage

Coordination:

- ☐ District planning, design, drainage, bridge, ROW/utilities and environmental staff
- ☐ District pavement/laboratory staff
- ☐ District bicycle/pedestrian coordinator
- ☐ District landscape architect
- ☐ District utility coordinator
- ☐ Area office staff
- ☐ ROW staff
- ☐ TPP staff
- ☐ DES staff
- ☐ Utility owners
- ☐ Business owners
- ☐ Railroads
- ☐ Local government officials
- ☐ MPO staff

Tools to use:

- ☐ Form 2440 - DSR
- ☐ Oracle Primavera Cloud (OPC) software
- ☐ Right-of-Entry Agreement form
- ☐ Statewide Planning Map
- ☐ TAMES/TCAP Toolbox
- ☐ Traffic Forecasting Analysis tool (TxDOT intranet only)
- ☐ TxDOT Utility Conflict Analysis Template

Available training:

- ☐ DES116 – Introduction to Highway Project Development
- ☐ DES119 – Preliminary Design Process
- ☐ DES740 – GPS/RTK Survey
- ☐ DES746 – GNSS RTK Project Control and Data Collection
- ☐ DES751 – OpenRoads Designer for Survey
- ☐ ENV112 – Public Involvement for NEPA
- ☐ LGP101 – Local Government Project Procedures Qualification for TxDOT
- ☐ PLN304 – Introduction to Urban Travel Deman Forecasting
- ☐ PMD110 – Pre-Letting Schedule Using OPC
- ☐ ROW100 – Identifying and Managing Utility Conflicts
- ☐ ROW101 – TxDOT Utility Coordination
- ☐ ROW640 – Stakeholder Management for Right of Way Projects
- ☐ TCC205 – 3D Engineered Models for Construction Series: Surveying and 3D Engineered Models
- ☐ TxDOT UESI Information Exchange Sessions
- ☐ Utility Conflict Analysis Template Training

* All training can be found in TxDOT's Training Catalog

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4.3 Geometric Alternatives Analysis

The process of identifying and evaluating different geometric elements to determine the best option to satisfy a project's goals and objectives is accomplished through an alternatives analysis. Geometric alignments, typical sections and intersection types are the major engineering variables to evaluate along with any needed ROW, utility and environmental impacts.

The results of the geometric alternatives analysis may conclude in the preparation of a **geometric schematic** or a **geometric layout**.

A **geometric schematic**, review and approval process is required for projects that are a:

- New location project;
- Added capacity project (including frontage roads);
- Reconstruction with added ROW;
- Interstate ramp relocation project;
- Other improvements that would require an IAJR; or
- Environmental Impact Statement project.

For other project types, a **geometric layout** (see **Section 4.10**) may be developed at the District's discretion.

4.3.1 Multiple Route Concepts

For a geometric design, several route concepts may be prepared for evaluation and public input. Routes should be defined enough to determine basic requirements such as initial locations of bridge structures, ROW, business or home relocations, major utility conflicts, and connection to existing cross streets. Routes should be designed to fit constraints that were identified in previous sections.

Horizontal alignments may or may not be developed for ramps, crossroads and interchanges at this stage, however, if they are, ensure that design controls are satisfied. Vertical alignments may be designed at this time as well, especially for the mainlanes, to evaluate project impacts, but are typically not required at this high-level evaluation stage.

Figure 4-2 illustrates an example of multiple route alignments to be considered.

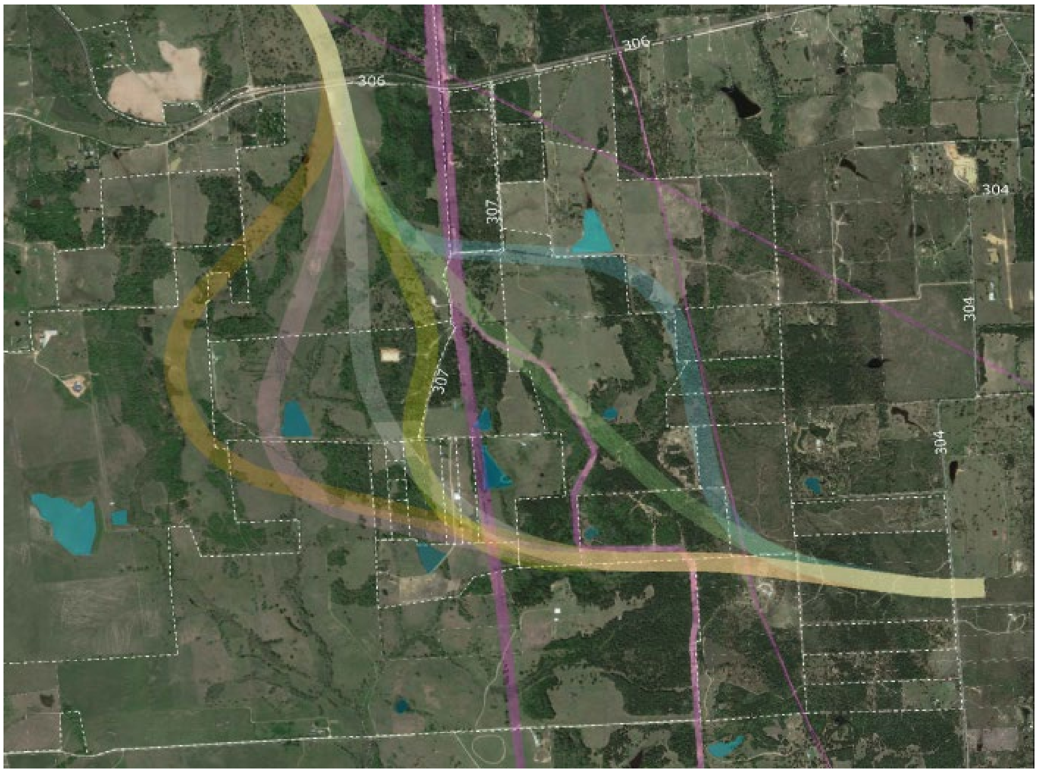

Figure 4-2: Example of Multiple Route Alignments for Consideration

4.3.1.1 Develop Existing and Proposed Conceptual Typical Sections

Typical sections are developed to determine the cross sectional elements of the existing and proposed roadways. Multiple typical sections may be developed as part of selecting route alternatives. Design criteria for features shown on typical sections can be found in the RDM.

Conceptual typical sections typically include:

- Number and type of lanes (determined by calculating traffic volumes for the desired LOS);
- Mainlane and shoulder width;
- Bicycle and pedestrian accommodations width;
- Type and range of median width;
- Possible frontage roads; and
- Range of offset to ROW limits (e.g., side slopes, ditch/curb and gutter, etc.).

Details such as cross slopes, pavement structure and station limits are typically not needed to define a particular route during the conceptual stage.

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4.3.1.2 Identify High-Level Environmental Constraints

A high-level environmental constraints map is developed to guide the design of conceptual routes. Environmental technical studies will not begin until a recommended alternative is selected, however, high level environmental constraints can be identified using public databases. Some of these constraints include:

- Floodplains, streams and wetlands;
- Historic structures;
- Schools;
- Cemeteries;
- Parks and recreation areas;
- Culturally significant areas;
- Wildlife habitats; and
- Community boundaries.

Determine the location of as many of these types of constraints as possible to help design and evaluate the route concepts.

4.3.1.3 Conceptual Route Layouts

Conceptual route layouts are prepared to clearly indicate the alternatives to be considered by the pubic and should be easily understood by stakeholders outside of TxDOT (i.e., layouts do not contain detailed engineering information). Alignment alternatives can be narrowed down at this point to present the most reasonable choices to the public for feedback – presenting too many options can cause confusion and make the selection process unmanageable.

Screening criteria for this evaluation may include but are not limited to:

- Alignments to avoid existing homes or displacements;
- Alignments to avoid dividing properties;
- Alignments to avoid railroads;
- Alignments to avoid oil or gas lines/wells;
- Alignments to avoid known cemeteries, grave sites, schools or churches;
- Alignments to avoid potential hazardous material sites;
- Alignments to avoid public park lands;
- Alignments to avoid designated critical habitat and protected species;
- Alignments to avoid impacts to water features and wetlands; and
- Alignments to reduce impacts to floodplains.

Some best practices for preparing "**public friendly**" conceptual route layouts include:

- Ensure that a clear and easily understandable naming convention is established for the alternatives to avoid stakeholder confusion (e.g., Blue Route, Purple Route, Yellow Route, or Alt A, Alt B, Alt C);
- Prepare a base map for the layout's plan view showing existing topographic features. The base map is not necessarily created from detailed field survey data – use aerial imagery if available;
- Add existing ROW limits, locations of major utilities, etc.;
- Add constraints such as proximity to historic structures, hazardous and petroleum materials, threatened and endangered species, national forest boundaries, known water features and wetlands, floodplain boundaries, etc. (refer to TxDOT's Open Data Portal, TxGIO – formerly TNRIS data hub, and other online sources to gather information);
- Add typical sections to layout;
- Include property owner information;
- Show significant impacts to existing municipality facilities which may include, but are not limited to, water towers, transmission lines, or police/fire stations;
- Show locations of churches, cemeteries and schools with easily identifiable icons;
- Show significant utility conflicts. Add labels to layouts and identify potential utility conflicts;
- Make the schematic as uncluttered as possible; and
- Use enlarged drawings to show areas of a project having significant amounts of detail.

Consult with TPP - Public Involvement Section for additional ideas and/or feedback.

4.3.1.4 Route Alternatives Cost Estimates

Construction and ROW cost estimates are developed to assist in the evaluation of alternatives. The planning level estimate should be updated for each alternative. Use TxDOT's Construction Cost Estimating Guidance (CCEG) and CCEG spreadsheet tool to develop the conceptual construction cost estimate for each alternative (see **Section 3.3.3**). Include costs for risk contingencies such as potential environmental mitigation, contamination, unknown geotechnical issues or other project unknowns.

Preliminary ROW costs should be calculated according to guidance in *TxDOT's ROW Appraisal and Review Manual* and the *ROW Acquisition Manual*. For additional discussion on developing ROW costs see **Section 6.3.2**.

If funding authorization involves federal funds and the preliminary estimates indicate the total project cost may approach the threshold for a Value Engineering analysis (see Section 4.5), contact the DES to discuss options.

4.3.1.5 Public Meetings for Route Concepts

Public meetings provide an opportunity for the public to engage in a free exchange of views and ideas and to share individual concerns. They are an effective method of obtaining public support for a project and may help avoid controversial public hearings (see **Section 4.6.2**) later in project development. A public meeting is held to exchange ideas and collect input on the need for possible changes to design features, alternatives to, and potential impacts of, in addition to mitigation for, a proposed project.

Coordinate any type of public involvement with the District Environmental Coordinator prior to any meeting and/or contact with project stakeholders.

Public meetings are intended to gather input from the public and to keep the public informed during any phase of a project. Public meetings encourage public involvement in the decision-making process, assisting the project team to have a better understanding of needs and concerns within the project area.

A public meeting can be held at any stage of project planning and development. Public meetings occur as early as TxDOT determines it is feasible to provide an opportunity for public input in project planning, location, design alternatives, and potential mitigation. Public meetings are recommended for projects that require large amounts of ROW, projects that propose access changes, or projects where displacements, impacts to historic properties, substantial public interest, or substantial public controversy are anticipated.

There are many options for effectively engaging the public in addition to the traditional public meeting, and many strategic approaches for promoting a required public meeting. Consult with TPP – Public Involvement Section and TxDOT's statewide *Strategic Public Engagement Guidance* to develop.

The geometric schematic used for public viewing should be easily understood by the public. See the Schematic QC Checklist for items to include on the public meeting geometric schematic.

See **Chapter 5** for more information on conducting public meetings.

4.3.1.6 Route Alternatives Analysis

An alternatives analysis is a decision-making process where multiple route alternatives are evaluated and a recommended route or alignment is selected. The evaluation process developed for selecting recommended routes and alignments is typically based on criteria addressing the project's purpose and need, project goals and objectives (such as safety and operational improvements), environmental impacts, affected property owners, project cost and stakeholder input.

Refer to the TSAP for more discussion on performing alternative analysis and documentation of analysis results.

The level of alternatives analysis is dependent on the rigor of the project including the level and types of environmental impacts. If NEPA is involved or is intended to be involved in the future such as in the creation of an Environmental Impact Statement (EIS) or an Environmental Assessment (EA) then the NEPA guidance for alternative analysis must be followed. See **Chapter 5** for detailed information on types of NEPA documents and required alternative analysis procedures.

Alternatives analysis must **clearly demonstrate minimization and avoidance of impacts** to indicate the selected alternative is the least environmentally damaging alternative.

An objective alternative analysis process is necessary to compare the project alternatives so the options can be reduced to a final set or to a single preferred alternative. **Figure 4-3** illustrates the overall evaluation process.

A separate alternatives analysis is required for historic bridges. Refer to TxDOT's *Bridge Project Development Manual* for additional information on performing an alternatives analysis for a historic bridge.

Some evaluation criteria may be less relevant than others in the decision-making process. Therefore, it is important that each element is weighted if a matrix/numerical analysis is performed (i.e., some categories might be weighted differently if they are important to the adjacent community/project area).

Quality, organization, documentation and presentation of data are critical to the success and credibility of the evaluation and selection process. Thorough analysis of alternatives supports a well-defined scope and minimizes scope creep and incremental cost effects later.

An alternatives matrix and associated narrative is developed to document and present the results of the alternatives analysis (refer to TxDOT's TSAP).

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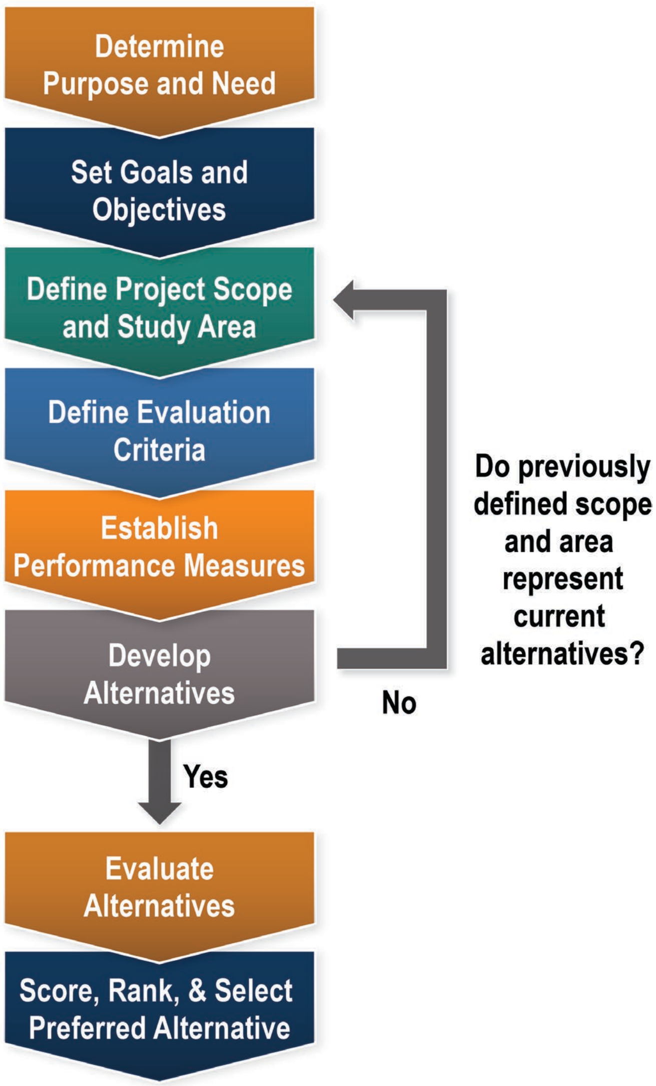

Figure 4-3: Alternative Analysis Process

Table 4-4 depicts a Quantitative Evaluation Matrix example and Table 4-5 depicts a Qualitative Evaluation Matrix example that can be used to document the results. **Each project will have different criterion of evaluation based on its unique objectives and needs**. The project team collaborates to determine what criterion is chosen to evaluate.

Table 4-4: Quantitative Evaluation Matrix Example

Criterion Type	Criterion	Unit	Alternatives			
			No Build	Extend Widening	Couplet	Bypass
Safety	Predicted crash frequency	Crashes per Year	60	60	50	40
	Net Present Value (NPV) of crash savings	Dollars	$-	$-	$10,000,000	$20,000,000
Mobility	LOS - Intersection 1	Grade	C	B	F	C
	Delay - Intersection 1	sec/veh	25	18	87	21
	LOS - Intersection 2	Grade	B	B	D	C
	Delay - Intersection 2	sec/veh	14	10	51	26
Access	Bicycle lane-miles	Miles	-	3	6	-
	Transit lane-miles	Miles	-	3	6	8
Other	Proposed ROW Acquisition (Actual)	Square Feet	105,037	105,037	91,016	121,489
	*Residential Parcels Impacted	Number	19	19	25	104
	*Commercial Parcels Impacted	Number	-	-	1	-
	Cost	Dollars	$1,000,000	$8,000,000	$12,000,000	$15,000,000

*Impacted is defined as parcels with ROW is impacted by the alternative design

Table 4-5: Qualitative Evaluation Matrix Example

Criterion	Measures	Alternative with *Rating (1-5)							
		No-Build		Extend Widening to Third Street		One-Way Couplet		Two-Lane Elevated Bypass	
Safety	Conflict points and driver expectancy	2	Merge, no access management	4	No merge, installed access manageme nt	4	Two-to-one-way conversion, introducing uncommon operation, fewer conflict points at intersections	2	High speeds, introducing uncommon operation
Mobility	Travel speed, roadway capacity, and intersection capacity (Delay and LOS)	1	No increased capacity	3	Increased capacity	4	Increased capacity, fewer phases at traffic signals	5	Increased capacity
Access	Property entry/exit points and local route distance	4	No access management	3	Restricted access (raised median)	2	Limits access, increases trip distance	1	Access controlled
Property Impacts	Environmental and historic impacts	5	No ROW necessary	3	50-foot ROW necessary	5	No ROW necessary	1	100-foot ROW necessary
ROW Cost	Cost of ROW expected to be purchased	5	No ROW necessary	3	50-foot ROW necessary	5	No ROW necessary	1	100-foot ROW necessary
Construction Cost	Cost of materials to construct improvements	5	No improvement	3	Widening Main Street	3	Reconstructing Main Street, widening Washington Avenue	1	Elevated structure, widening Main Street
Development Potential	Potential economic benefits	2	None	3	Increased volume	5	ROW made available for social/aesthetic improvements	1	None

*Rating scale is from 1-5. 1 signifies the best rating and 5 signifies the worst rating

4.3.1.7 Preferred Route Selection

The project team selects a preferred route using input from stakeholders, planning partners and detailed information about potential impacts as evaluated using the process described in **Section 4.3.1.6**. The preferred route provides a solution consistent with the purpose and need for the project. Selection of the preferred route considers and implements previously provided stakeholder input.

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The selection of the preferred route is documented based on the requirements of District policy and in coordination with the ENV and the District Environmental Coordinator.

4.3.2 Multiple Alternatives along the Preferred Route

Once the preferred route is selected, the design is optimized by evaluating alternate typical sections, horizontal and vertical alignments and intersections.

The principles of Performance Based Practical Design (PBPD) as described in the RDM should be used to ensure that the design alternatives considered meet the project's goals and objectives and related criteria that were established during project scoping.

This is an iterative process and may result in one or more alternatives to present to the public to obtain stakeholder feedback.

4.3.2.1 Roadway Typical Section and Alignment Alternatives Refinement

Roadway typical sections should be optimized, and horizontal and vertical alignments more fully developed to determine the best alignment for the project. Some options that are typically considered in this refinement include:

- Roadway typical sections:
  - Different lane and shoulder widths;
  - Use of medians (depressed, flush, or raised);
  - Sidewalks and ADA ramps; and
  - Bicycle accommodations, etc.
- Alignments:
  - Shifting alignments to one side of the road or the other (e.g., eastern alignment vs. western alignment);
  - Using the existing alignment of the road;
  - Using a combination of existing alignment and alignment shifts;
  - Vertical clearances for structures; and
  - Sight distance requirements.

4.3.2.2 Intersection Control Evaluation

It is important to perform Intersection Control Evaluation (ICE) at this stage in project development to determine the intersection type that best increases safety and operations. The ICE process is typically used in evaluating the intersection traffic and geometric control at new or modified intersections.

ICE provides a framework of quantifiable measures to evaluate alternatives so that public agencies, engineers, and planners make enhanced and more informed decisions. Quantitative measures are considered alongside qualitative measures such as multimodal needs and community vision goals to provide a well-rounded perspective when selecting the preferred alternative.

Refer to TxDOT's TSAP for guidance on performing a Stage 1 and Stage 2 ICE analysis. Similar to typical sections and alignments, the intersection controls need to consider cost, ROW, environmental impacts, utility impacts, etc. as part of the intersection type determination. **Figure 4-4** illustrates the ICE Stage 1 and Stage 2 workflows.

Refer to the ICE directive published by DES.

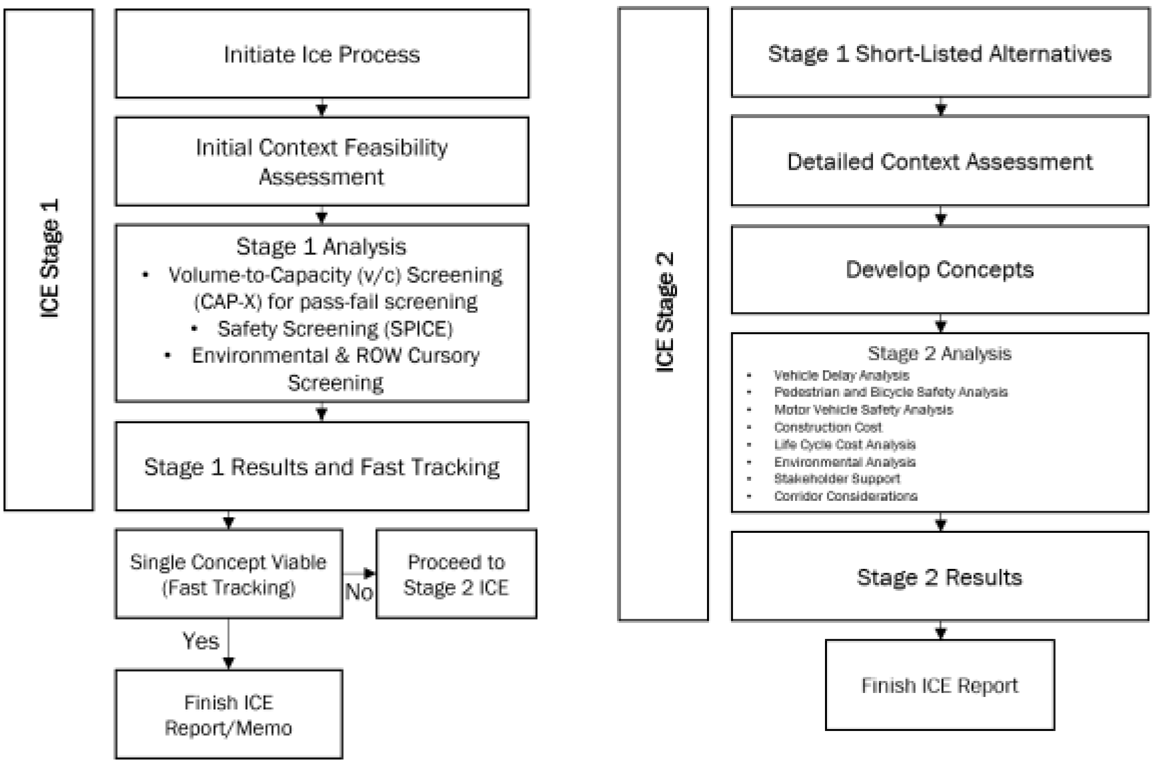

Figure 4-4: ICE Stage 1 and Stage 2 Workflows

4.3.2.3 Potential ROW Needs, Utility Conflicts and Environmental Impacts Identification

For each alternate developed for evaluation, the amount of potential ROW needed, utility conflicts and obvious environmental impacts are identified along with any "fatal flaw" elements that may eliminate an alternative (e.g., high-pressure gas line along one side of the roadway, cemetery or historical structure).

4.3.2.4 Alternative Alignment Layouts Development

If needed, alternate alignment layouts are developed for each alternative for review by the District and presentation to the public to obtain stakeholder feedback.

If the layouts are being prepared for public display, they should be developed similarly to the conceptual route layouts described in **Section 4.3.1.3** – the layouts should be easily understood by the public. Additional details such as proposed ROW, locations of ramps, control of access, dedicated bike/ped facilities, dedicated transit facilities, retaining wall locations, bridge structures, driveways, existing utilities and intersection types are shown on the layouts at this stage.

4.3.2.5 Alignment Alternatives Cost Estimates

Construction and ROW cost estimates are developed for each of the alignment alternatives to assist in the evaluation and selection of a preferred alignment. Update the planning level estimate for each alternative using TxDOT's CCEG and CCEG spreadsheet tool (see **Section 3.3.3**).

If funding authorization involves federal funds and the preliminary estimates indicate the total project cost may approach the threshold for a VE Analysis (see Section 4.4), contact the DES to discuss options.

4.3.2.6 Public Meetings for Alignment Alternatives

If desired, a public meeting can be conducted to obtain additional input from stakeholders on the alignment alternatives. The public meeting should be organized and conducted similarly to the conceptual layout public meeting described in **Section 4.3.1.5.**

There are many options for engaging the public beyond, or in addition to, a public meeting. There are also many effective ways to promote public engagement opportunities. Consult with TPP – Public Involvement Section for assistance.

If the project is going through the NEPA process (see **Chapter 5**), coordinate all public involvement with the District Environmental Coordinator to ensure that all engagement with the public is documented correctly and included in the environmental document.

4.3.2.7 Alignment Alternatives Analysis

Each alignment alternative is evaluated based on scoring criteria as determined by the project's purpose and need and goals and objectives. Evaluation of alignment alternatives typically involves more detailed analysis and determination of project level impacts.

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The project team along with appropriate SMEs determine the scoring criteria to be used for evaluation of the alternatives and any associated weighting of criteria. Commonly used scoring criteria of multiple alignments includes:

- Safety;
- Mobility;
- Access;
- ROW costs;
- Utility impacts;
- Environmental impacts;
- Funding; and
- Project specific objectives.

The alignment alternatives analysis is documented as described in **Section 4.3.1.6** and coordinated with the District Environmental Coordinator. **Figure 4-5** depicts an alternatives analysis matrix used to compare different alignments within different route segments.

US 69 RELIEF ROUTE ALTERNATIVES MATRIX																
		NORTH ALTERNATIVES						MIDDLE ALTERNATIVES			SOUTH ALTERNATIVES					
IMPACTS	UNIT OF MEASUREMENT	ALTERNATIVE 1	ALTERNATIVE 2	ALTERNATIVE 3	ALTERNATIVE 4	ELEVATED ALTERNATIVE	RECOMMENDED ALTERNATIVE	ALTERNATIVE 5	ELEVATED ALTERNATIVE	RECOMMENDED ALTERNATIVE	ALTERNATIVE 6	ALTERNATIVE 7	ALTERNATIVE 8	ELEVATED ALTERNATIVE	RECOMMENDED ALTERNATIVE
Big Thicket National Preserve	Acres	0	0	0	0	0	0	0	0	0	0	0	0	0	0
100-YR Floodplain Zones	Acres	55	54	71	71	7	113	0	0	0	131	68	68	0	179
Oil/Gas Well Sites	Each	2	2	2	0	0	2	1	0	0	5	2	2	0	4
Pipeline Conflicts	Linear Feet	7,731	7,731	2,025	7,731	440	880	12,179	220	400	1,790	1,428	1,428	684	1,428
Transmission Line Conflicts	Linear Feet	783	782	804	783	4,086	1,264	1,883	19,289	755	3,803	2,029	4,512	37,182	1,568
School	Number	0	1	0	1	1	0	0	0	0	0	0	0	1	0
Places of Worship	Number	2	2	2	0	2	0	0	0	0	0	1	1	6	1
Cemeteries	Number (within 100 feet)	1	1	1	1	2	0	1	0	0	0	0	0	0	0
Public Facility/Parks	Number (Impacted Parcels)	0	0	0	0	4	0	0	1	0	1	1	1	3	0
Parcels Impacted	Number	39	46	59	42	225	36	11	191	4	32	28	39	66	22
Potential Displacements	Number	2	2	4	3	54	3	0	0	0	3	5	10	106	4

DESIRABLE	AVERAGE	LESS DESIRABLE

Figure 4-5: Example of Alignment Alternatives Analysis Matrix

4.3.2.8 Recommended Alternative Selection

Once the alternatives are independently evaluated, analyzed and documented, the recommended alternative is selected and is used to develop the geometric schematic for final approval.

Authority documents:

- ☐ 23 CFR Part 626
- ☐ 23 USC §217(g)(1)
- ☐ 43 TAC §2.105
- ☐ 43 TAC Part 1 Chapter 21
- ☐ TTC §201.811

Resources to consult:

- ☐ AASHTO Practical Guide to Cost Estimating
- ☐ Construction Cost Estimating Guidance
- ☐ FHWA Intersection Control Evaluation webpage
- ☐ Roadway Design Manual
- ☐ ROW Acquisition Manual
- ☐ ROW Appraisal and Review Manual
- ☐ Traffic and Safety Analysis Procedures Manual
- ☐ TxDOT.gov Environmental Compliance Toolkits webpage
- ☐ TxDOT.gov Innovative Intersections webpage
- ☐ TxDOT.gov NEPA and Project Development Toolkit webpage
- ☐ TxDOT.gov Public Involvement Toolkit webpage
- ☐ TxDOT.gov Strategic Public Engagement Guidance

Coordination:

- ☐ District Environmental Coordinator
- ☐ TPP – Public Involvement Section (TxDOT intranet only)
- ☐ Public Involvement and Outreach Community of Practice (TxDOT intranet only)
- ☐ District Traffic Engineer
- ☐ DES –Roundabout and Alternative Intersection Design (RAID) Section staff

Tools to use:

- ☐ Form 2440 – DSR
- ☐ CCEG spreadsheet tool
- ☐ Schematic QC Checklist

Available training:

- ☐ DES129 – Using Interactive Highway Safety Design Model (IHSDM)
- ☐ EPI100 – Effective Public Involvement
- ☐ EPI200 – Effective Public Involvement - Advanced ENV112 – Public Involvement for NEPA
- ☐ ENV127 – NEPA Project Management FHWA
- ☐ ENV207 – New District Environmental Staff Orientation
- ☐ ENV216 – Overview of TxDOT’s Environmental Review Process for Engineers, Planners, and Others
- ☐ ENV402 – Public Involvement in the Transportation Decision Making Process
- ☐ ENV403 – Planning and Environment Linkages (PEL)
- ☐ PMD142 – Construction Cost Estimating
- ☐ ROW001 – ROW Project Delivery Overview
- ☐ ROW099 – Introduction to Right of Way
- ☐ TCC244 – NEPA Overview – Refining Alternatives
- ☐ TRF700 - Traffic Analysis Tool FHWA

* All training can be found in TxDOT’s Training Catalog

4.4 Geometric Schematic Design

Once all alignment alternatives have been fully analyzed, a recommended alternative is selected. Additional design tasks are performed to prepare the geometric schematic. The geometric schematic is submitted to the District for review through multiple milestone submittals (e.g., 30%/60%/90% or Preliminary/Final) and is submitted for final review and approval by the District and possibly FHWA (if warranted). See **Section 4.6** for further guidance on submission, review and approval of the geometric schematic.

The completed geometric schematic may serve as the Initial (30%) milestone submittal for project development (refer to TxDOT's *PS&E Preparation Manual* for milestone submittals) and should accomplish the following goals:

- Formulate final design concepts for the project;
- Show interrelating design elements such as typical sections, intersection control; bridge and drainage structures, traffic and turning data, project constraints, etc.;
- Serve as the basis for development of the Preliminary Bridge Layout Review (PBLR) submittal (refer to TxDOT's *PS&E Preparation Manual* and the *Bridge Project Development Manual* for more details);
- Serve as a basis for approval, agreement on scope, design, etc., between Districts, Divisions, FHWA, counties, cities, and railroads, as applicable;
- Establish relationships between the project and the environment;
- Define ROW and access control requirements;
- Act as a public information communication tool. For better public understanding of a project, a schematic may be supplemented by a three-dimensional graphics demonstration, computer animation or a physical scale model. These may be needed for costly, controversial, or complex projects; and
- Serve as the guide for the detailed design and plan preparation.

See the Schematic QC Checklist for guidance on developing the Geometric Schematic for review and approval.

The following subsections describe the preliminary engineering design tasks that are typically performed to develop the Geometric Schematic.

4.4.1 Roadway

4.4.1.1 Typical Section Optimization

Typical sections are optimized to reflect any changes to the recommended alternative and incorporate results of the Safer by Design tool (see **Section 4.4.1.3**).

Once the recommended alternative is selected, typical sections are optimized to ensure that all design criteria is met and all desired elements are incorporated into the typical section including multimodal accommodations, clear zone, border width, utility strip, etc. Typical sections must meet the design criteria specified in the RDM and **must be developed for all roadway components** including mainlanes, frontage roads, ramps, turnarounds and cross streets.

Evaluate the typical sections in accordance with the RDM's Performance Based Practical Design methodology.

4.4.1.2 Horizontal and Vertical Alignment Refinement

Horizontal and vertical alignments are fully designed once a recommended alternative is selected. Horizontal/vertical alignments are designed for **all roadway components** including mainlanes, frontage roads, ramps, turnarounds and cross streets. All alignments must meet the design criteria specified in the RDM.

Considerations in horizontal/vertical alignment design include:

- Ensure vertical clearances are met for bridge structures including bridges over turnarounds – determine if route is on the Texas Highway Freight Network (THFN (Statewide Planning Map);
- Determine if the route is part of a hurricane evacuation route (Statewide Planning Map);
- Avoid changes to ROW limits and locations of ramps shown on the schematic after DES approval review or FHWA Federal action interstate access approval; and
- Consider underground features, such as utilities, storm sewer systems and septic tank systems, when making alignment adjustments.

Changes to the horizontal and vertical alignments after a public meeting or hearing may require TxDOT to repeat the review and approval process for the environmental document and hold additional meetings/hearings. Minor adjustments to alignments may be made by the designer if the change is feasible and does not compromise project design criteria.

Substantial changes to an approved geometric schematic will require submission of the revised schematic to DES.

Coordinate any changes to the design with the District Environmental Coordinator to ensure that environmental studies and documents are appropriately updated. Some changes may warrant revisions to previously completed environmental studies. See **Chapter 5** for more information regarding the coordination of design and environmental tasks.

4.4.1.3 Safer by Design Tools

TxDOT developed the Safer by Design tools (formerly the Safety Scoring Tools) that are used to assist designers in evaluating potential safety enhancements during project development and design.

The Safer by Design Tools incorporate quantified effects of changes in design parameters such as lane and shoulder width, horizontal and vertical curve geometry, rumble strips and clearances to objects, thereby allowing designers to examine the effects and tradeoffs involved in design decisions.

The Safer by Design tools should be used prior to obtaining any additional survey and/or SUE to ensure that ROW that may be needed for the optimized design is identified. Districts are required to document the initial and final safety score, for applicable projects, on the Form 1002, which are required with interim and final PS&E submissions.

The tool is not designed or intended to make decisions for the designer, but rather to provide an objective, data-driven aid that allows the designer to assess and evaluate how changes in design parameters can affect safety.

4.4.1.4 Bicycle and Pedestrian Accommodation Development

Per the USDOT Bicycle and Pedestrian Planning, Program, and Project Development Guidance memo: “Providing safe, accessible, comfortable, equitable, and interconnected networks for bicycling and walking creates an integrated, intermodal transportation system that provides travelers with a real choice of transportation modes. Bicyclists, pedestrians, and micromobility users have the same origins and destinations as other transportation system users. It is important for all users to have safe, accessible, equitable, and convenient access to destinations such as airports, ports, ferry services, transit stations and stops, and other intermodal facilities as well as access to jobs, education, health care, and other essential services. Transportation professionals are encouraged to plan, design, construct, and maintain transportation facilities to support complete networks, especially on urban and suburban nonfreeway arterials with posted speed limits less than 50 miles per hour (mph), or to rural arterials that serve as main streets in smaller communities".

Where these active, non-motorized transportation modes are expected, preliminary plans must be developed to include safe bicycle and pedestrian transportation accommodation. Bicycle and pedestrian design criteria and considerations can be found in the RDM.

Considerations in the design of bicycle and pedestrian accommodations include:

- Determine if the project location is part of the TxDOT Bicycle Tourism Trials Example Network to determine design requirements for this type of facility;
- Consult local, regional and District bicycle and pedestrian plans if available (refer to the Active Transportation Plan Inventory webpage);
- Provide safe accommodations on replaced or rehabilitated bridges by providing accommodation of pedestrians or bicyclist if provided at a reasonable cost;
- Refer to TAMES/TCAP Toolbox to identify existing ADA barrier information;
- Coordinate with public transportation providers to facilitate provision of intermodal connections; and
- Where new bicycle and pedestrian facilities are proposed, include sufficient information to explain the reasons for facility selection in the environmental effects statement.

4.4.2 Additional Survey and Subsurface Utility Engineering Needs

Additional survey and subsurface utility engineering (SUE) investigations may be needed to obtain more specific field data once the recommended alternative is selected and the design elements have been optimized.

4.4.2.1 Survey

Additional survey may be needed to tie-in project-specific details including:

- Blank spots from previous LiDAR surveys;
- Existing above ground utilities;
- Existing bridge details;
- Existing drainage structure details (culverts, manholes, etc.);
- Existing driveway details;
- Existing ROW limits;
- Existing signals/pushbuttons, curb ramps, and sidewalk;
- Hydrographic survey for drainage design;
- Location of proposed geotechnical boreholes; and
- Location of wetlands.

4.4.2.2 SUE

Additional subsurface utility investigations may be needed to determine location and depth of existing underground utilities. The level of SUE investigation needed depends on the potential for utility conflicts. See **Chapter 6** for more discussion on SUE.

4.4.3 Drainage Design

The preliminary drainage design is performed to a sufficient level of detail to determine the placement, size and performance of proposed drainage structures on a project. The proposed drainage structures are placed on the geometric schematic. **The design of these structures should provide sufficient information to determine ROW needs and/or temporary or permanent drainage easements.**

4.4.3.1 Hydrology Design

A hydrologic study is performed to estimate flood magnitudes (i.e., Annual Exceedance Probability (AEP)) caused by precipitation. An analysis provides the designer with fundamental data necessary to perform preliminary sizing of drainage facilities and bridges. Data compiled includes peak runoff (discharge) and discharge hydrographs. Refer to TxDOT's *Hydraulic Design Manual* to determine what projects require a hydrologic study to be performed and methods to use.

Any previous hydrologic studies, reports, as-built construction plans, bridge inspection reports and available stream gage data should be obtained and reviewed prior to beginning the hydrologic design.

Other valuable reports to obtain include soil surveys, U.S. Natural Resources Conservation Service (NRCS) reports, as well as USGS and FEMA flood maps.

Coordinate with LGs for any type of zoning and land use maps, or specific local requirements to incorporate when performing the hydrologic design.

4.4.3.2 Hydraulic Design

The purpose of the hydraulic design is to determine the approximate elevations and sizes of cross drainage structures and to establish their effects on the roadway profile. The analysis conducted must result in an estimate of the most efficient, cost-effective drainage facilities that can accommodate the design storm.

A hydraulic analysis is required to create the roadway's preliminary profiles for all projects affecting existing drainage, including those that add a concrete median barrier to an existing facility.

The type of drainage facilities provided in the hydraulic design will be determined by the highway classification, ROW, geometry and other considerations. The primary focus at this stage is to balance traffic safety and hydraulic efficiency and to comply with any regulations such as FEMA.

Other major considerations must be determined, such as the need for large storm drain structures, detention ponds, pump stations, and other hydraulic facilities; these must be assessed for cost and ROW requirements. Refer to TxDOT's *Hydraulic Design Manual* for specific details in performing the hydraulic design.

A preliminary drainage report is developed and submitted for review by the District and DES - H&H Section. The preliminary drainage report details all of the hydrologic and hydraulic analysis and design including the scour analysis for bridge structures over streams.

4.4.4 Traffic Control Planning

Preliminary traffic control planning is needed during the development of the geometric schematic to ensure that the ultimate design is constructable. Planning for traffic control in this phase of schematic development allows for the anticipation and mitigation of potential traffic disruptions during construction.

Early planning will reduce overall project costs by avoiding delays and redesign later on during the project due to requirements that are not considered soon enough (e.g., buffer zones, edge drop-offs, temporary pavement, temporary pedestrian access route (TPAR) barrier locations, extension of drainage structures, detention areas and offsets to travel lanes). Early traffic control planning also incorporates stakeholder input for preferred alternative routes, detours and construction scheduling.

Refer to the RDM for temporary traffic control criteria. Consult the TMUTCD and the Traffic Standards to develop the preliminary traffic control plan.

4.4.5 Structures

4.4.5.1 Bridges

The location of proposed bridges must be determined early in project development. Characteristics such as limits of bridge, bent locations, and span type and lengths of bridges crossing water can usually be set with strong certainty early in project development. Planning for overpasses, underpasses and interchanges requires an iterative process to satisfy structural capability and horizontal and vertical clearance requirements between roadways and bridges.

Culverts with a total span greater than or equal to 20 feet are considered bridge-class culverts and their design must follow span bridge guidelines.

Bridge layouts can be created once horizontal/vertical alignments, typical sections and drainage design are developed. The bridge layouts are sent to the District and BRG for review. This submission is referred to as the Preliminary Bridge Layout Review (PBLR) and it typically occurs between the Initial (30%) and Detailed (60%) plans milestones (refer to the *PS&E Preparation Manual* and the *Bridge Project Development Manual* for more details). Accommodations for future bridge widening should be considered during the preliminary planning. Preliminary bridge layout reviews include bridge class culverts.

If the project is on or near railroad ROW, the RRD will coordinate with the specific railroad. Refer to the TxDOT.gov Railroad Design Guidelines webpage for details on design, coordination and agreements required for specific railroads.

Considerations in the preliminary planning for bridges include:

- Identify applicable Federal Emergency Management Agency (FEMA), U.S. Corps of Engineers (COE) and U.S. Coast Guard (USCG) constraints, studies required, and coordination and permits required;
- Review railroad requirements and coordinate with RRD for railroad crossings;
- Identify and determine historic age considerations and constraints;
- Identify hazardous materials issues and abatement requirements;
- Identify type, size, and location of existing and proposed bridges and document in the DSR;
- Determine vertical and horizontal clearance requirements;
- Identify utilities that will need to be removed from the existing bridge prior to construction;
- Identify potential conflicts with foundations, including existing foundations or subsurface utilities – obtain as-built plans from all structures previously constructed to determine locations of buried foundations;
- Determine load rating for bridge widening and obtain condition survey;
- Consider rehabilitation and widening of the existing structure versus replacement;
- Review proposed bridge cross sections with local public agency or railroad company when grade separation structures involve facilities not owned or maintained by TxDOT; and
- Coordinate with District TP&D to determine if Advanced Funding Agreement is in place, if applicable.

Coordinate with the District Bridge Engineer to determine District specific PBLR submission requirements. Detailed bridge design should not begin prior to approval of the PBLR.

4.4.5.2 Retaining/Sound Walls

Preliminary retaining wall locations are established as part of developing the geometric schematic. Preliminary sound wall locations are established based on the traffic noise analysis. Retaining wall or sound wall locations may be revised as the project development progresses.

4.4.5.2.1 Sound Walls

A sound wall is a structure designed and constructed to reduce the impact of traffic-related noise on nearby communities and sensitive areas. A noise study analysis must be performed to determine where noise impacts are predicted and will determine recommendations for placement of sound walls.

Considerations in the placement of sound walls include:

- Refer to the traffic noise analysis for the location and dimensions of the proposed sound wall;
- Determine if aesthetics are to be included as this will affect the design. For sound walls adjacent to residential areas and parklands, aesthetics may play an important role in developing the wall. Coordinate with planners, landscape architects and community groups early in project development;
- The placement of the sound wall often depends on existing or proposed utility lines. Coordinate early with utility owners to determine locations of existing and proposed lines;
- Determine if a berm may be effectively used to mitigate noise. It may be used with a sound wall barrier and allow for a shorter, more aesthetically pleasing wall;
- Evaluate the need for future access to adjacent property and potential openings in the wall; and
- Determine if placement of the sound wall can be made within the existing ROW (consider the design and construction of the wall footing) or if additional ROW or permanent easements are needed.

Locating retaining walls and/or sound walls will assist in determining locations of needed soil core borings for foundation design.

4.4.5.2.2 Retaining Walls

A retaining wall is a structure designed and constructed to resist the lateral pressure of soil. TxDOT divides retaining walls into permanent and temporary walls. A permanent retaining wall is designed to have a service life of 75 years, while a temporary wall has a service life of 3 years.

Considerations in the placement of retaining walls include:

- Compare retaining wall cost to bridge cost to determine height at which bridge is more cost effective (typically at 20-ft height, bridge structure becomes more feasible);
- Determine if the retaining wall also needs to act as a sound wall;
- Determine if the retaining wall will be supporting traffic lanes. If so, the design must account for traffic loading and barrier affect loading;
- Check sight distance for walls in cut sections at intersecting streets and driveways;
- Determine if street lights, overhead bridge signs, concrete traffic barriers, or traffic signs will be attached to the wall;
- Consider width of retaining wall base during construction and placement near ROW line (buried portions of permanent structures cannot be placed outside of the ROW line);
- Ensure adequate clear zone between travel lanes and the retaining wall is provided; and
- Do not place the retaining wall in a gore area.

4.4.6 Geotechnical Surveys

Preliminary geotechnical surveys can vary from simple, visual inspections to various forms of subsurface exploration, depending on information needed. Once preliminary bridge, retaining wall and sound wall locations are determined, preliminary geotechnical surveys can be performed. Preliminary geotechnical surveys are performed to guide early project layout and design and determine feasibility of the preliminary design and limitations on construction staging. Preliminary geotechnical survey can help determine if certain design options are viable. (i.e., below grade/tunnel options). Preliminary geotechnical testing also serves to determine if additional, more in-depth geotechnical testing is needed.

For large structures, preliminary geotechnical surveys form the basis for more rigorous testing. On major projects, a small number of preliminary borings must be obtained to aid in the preliminary project layout.

Geotechnical surveys for pavement design may also be needed and may include roadway pavement testing such as Falling Weight Deflectometer (FWD) testing.

Considerations for performing preliminary geotechnical surveys include:

- Consult existing as-built construction plans and District laboratory staff to obtain existing test information if available – this can assist in determining the extent of additional testing that might be needed;
- Obtain ROE prior to entering private property for geotechnical testing;
- Locate utilities prior to testing – geotechnical firms will typically do this prior to testing, however, additional coordination with the geotechnical firm and utility companies to ensure this happens should be performed; and

- Coordinate with District environmental staff for any type of hazardous soil materials in the testing areas.

4.4.6.1 Preliminary Pavement Design and Report

A preliminary pavement design is performed early in project development to ensure a viable design is generated. The pavement structure represents one of the costliest items in a typical highway project budget. The objective for completing a preliminary pavement design early is to select a pavement structure capable of carrying traffic loads safely, comfortably and with minimum physical deterioration and to ensure the project is adequately funded for the desired pavement section. Waiting to develop the pavement design often results in reduction of the pavement structure due to restricted project funding.

The cost of different pavement options should be evaluated prior to pavement section selection.

A pavement design and pavement design report are required for the following project types that are over 500 ft. long:

- New location (flexible and rigid);
- Reconstruction (flexible and rigid);
- Rehabilitation (3R) (flexible and rigid); and
- Unbonded concrete overlays of existing rigid pavements.

Each District maintains and updates a pavement design standard operating procedure (SOP). The SOP will also establish the final authority for pavement design within the District.

4.4.7 Utilities

Known utility facilities within the ROW (existing and proposed) are shown on the geometric schematic. The designer should obtain information on existing utilities from utility owners and include the location of existing utilities on the geometric schematic.

A utility layout may be prepared more easily by performing the following steps:

- Send the schematic to utility owners who do not have utility plans readily available;
- Ask utility owners to draw their utilities on the schematic with distances referenced to the ROW or other reference points; and
- Use additional SUE to identify underground utilities.

Refer to TxDOT's ROW *Utilities Manual* for details on the TxDOT-Utility Cooperative Management Process.

4.4.7.1 Potential Utility Conflicts Identification

Utility conflicts refer to physical conflicts between existing utilities and the proposed transportation facility construction. Utility conflicts also refer to utilities not complying with TxDOT's Utility Accommodation Rules (UAR), such as utilities not complying with location, cover, or clearance requirements. After developing a utility layout, the designer can determine potential utility conflicts. If geospatial data is available, a 3D model review can be performed. Knowledge of these conflicts assists the utility owners in budgeting for anticipated adjustment costs.

Early utility coordination cuts construction time extension claims and delays that increase project costs.

Considerations to avoid utility conflicts:

- Revise alignments and project features to avoid utilities when possible before requesting that the utilities be moved. Utility adjustment can be expensive and time-consuming so it must be done only when it is unavoidable; and
- Advise utility owners of potential conflicts as soon as possible. **One to two years** may be needed to budget, design, and complete required adjustments.

For more detailed information on the utility accommodation process, see **Chapter 6**.

It is It is important to notify utility owners of potential noise mitigation locations proposed for a project to avoid relocating utilities that could provide conflict for the proposed sound wall.

4.4.8 Traffic Design

4.4.8.1 Large Guide Signs

Large guide signs direct road users along streets and highways and are shown on the geometric schematic. Large guide signs show route designations, destinations, directions, distances, services, points of interest, and other geographical, recreational or cultural information.

Freeways and expressways use large guide signs that exceed the requirements and specifications for conventional roads. These include advance guide signs for interchange exits, supplemental signs, exit direction signs, diagrammatic signs and several other miscellaneous sign types. Refer to the TMUTCD for more information on guide signs for freeways and expressways.

Existing guide signs should be evaluated to determine if they are still applicable for the project. Based on traffic and crash data, the designer should determine the guide signs needed to increase roadway operational efficiency and safety and these signs are shown on the geometric schematic.

4.4.8.2 Preliminary Illumination Locations

Preliminary illumination locations should be developed and shown on the geometric schematic. Illumination infrastructure must meet the requirements of the American Association of Highway and Transportation Official's (AASHTO) *Roadway Lighting Design Guide* and the TxDOT standard equipment and spacing as detailed in the standard specifications and the *Highway Illumination Manual*.

Electrical systems must be designed in accordance with the *National Electrical Code*.
A preliminary illumination layout must be prepared showing pole locations and power sources. Also provide a layout showing the photometry and foot-candle reading.

Federal Aviation Administration (FAA) requires notification of construction for above ground level structures planned near airport facilities. Refer to the FAA Obstruction Evaluation/Airport Airspace Analysis (OE/AAA) for more information and the latest required forms.

The department uses two types of illumination systems:

- **Continuous illumination systems** – Provides continuous lighting of main lanes, direct connectors, ramp entrances and exits, and merge and diverge areas; and
- **Safety lighting systems** - Provides lighting at interchanges, highway intersections, or other decision-making points of nighttime hazard. The designer determines the need for safety lighting based on geometric hazards, high crash rates, etc.

Preliminary cross-sections, locations of proposed roadside barriers, topographic maps and information on existing luminaire locations are needed before lighting plans can be developed.

Considerations in designing illumination include:

- Install lighting systems on eligible roadways where conditions warrant such installation; and
- Review illumination proposed for residential areas and minimize undesirable impacts on residences.

Determination of the eligibility of the project for illumination and compliance with warranting conditions must be initiated when preliminary illumination locations are established.

4.4.8.3 Intelligent Transportation System Needs

Intelligent Transportation System (ITS) needs should be evaluated and placed on the geometric schematic. ITS uses advanced wireless communications in vehicles and infrastructure to improve safety, mobility, and reduce environmental impact. Real–time data capture and management from vehicles (trucks, transit, cars), mobile devices, and infrastructure improves operating performance of the surface transportation system. Dynamic mobility applications make the system safer, smarter and more economical.

- **Traffic Management Centers (TMC)** – TMCs manage department ITS equipment. Large metropolitan areas have dedicated facilities, operators, and support staff. Smaller offices are managed by operators with other duties. A TMC works as a central facility with agencies supporting toll collection, vehicular security, enforcement, and safety.
- **Dynamic Message Signs (DMS)** – Controlled by the TMC. Signs inform motorists of emergency weather hazards, travel-related Homeland Security advisories, or any incidents on the highway. During non-incident times, travel time messages are displayed to assist with congestion management. They give motorists the choice to continue their route or divert to a less congested highway or street.

The District's Transportation Systems Management and Operations (TSMO) plan should be consulted to determine which ITS elements are recommended.

4.4.8.4 Interstate Access Justification Report

An Interstate Access Justification Report (IAJR) is a comprehensive report that addresses the FHWA Interstate Access Policy Points. For access changes on all Interstates, an IAJR is required to be prepared and submitted for approval by FHWA. Based on the finalized typical sections, horizontal/vertical alignments and intersection evaluation, the need for changes to access can be determined. Regardless of funding, project delivery type (i.e., DBB or DB) or oversight, new or revised access points on Interstate highways must be approved by FHWA.

Revised access is considered to be a change in configuration even though the number of actual points of access may not change.

Generally, any new or revised access to the Interstate system will require FHWA's review and action, including the following:

- New freeway-to-freeway interchange;
- New service interchanges providing access between a non-freeway local roadway network (arterial, collector, or local road) and the Interstate;
- Modification of freeway-to-freeway interchange configuration, for example, adding new or abandoning/removing ramps, completing basic movements;
- New partial interchanges or new ramps to/from continuous frontage roads that create a partial interchange;
- Modification of existing interchange configuration, such as adding a loop to a diamond interchange;
- Completion of basic movements at partial interchange, for example, completing a partial diamond interchange by adding a ramp;
- Locked gate access, for example, access via locked gates for emergency response;
- Access from the street network to special uses lanes, such high occupancy vehicle (HOV), high-occupancy toll (HOT) or truck only lanes;
- Relocation of a terminal of a ramp to a different local road;
- Changes in operation of managed-lane access to general-purpose access to the Interstate; or
- Relocation of a ramp gore along an Interstate mainlane. (Under some circumstances, if a ramp is shifted within the same interchange configuration, which results in ramp spacing that meets FHWA's design criteria, and/or if the interchange is reconfigured in such a way that the travel patterns change with the same number of access points, coordination would be performed with FHWA to determine if an approval through IAJR is required or some other process/coordination).

Each entrance, exit, “locked gate,” new or modified freeway-to-crossroad interchange inside a TMA (urbanized area with a population > 200,000), ramp, or access to a collector-distributor is considered an access point. FHWA must ensure there is either no or only minimal adverse effect on the operation of the Interstate facility.

“Locked gate” access points on the Interstate system are used in remote areas in special circumstances for emergency management, border patrol, utility, or maintenance forces.

Refer to TxDOT’s IAJR Engineering, Operation and Safety Analysis Standard Operating Procedure (SOP) for additional information regarding the IAJR development, submission and review process. Also refer to TxDOT’s TSAP for discussion on evaluation tools for developing the IAJR.

Early coordination between the District, DES, and FHWA is needed to ensure proper preparation, review and acceptance. IAJR approval is contingent on the quality and adequacy of the process and documentation. Preparation, review and approval of an IAJR is typically **18 months**.

If a freeway is planned as a future Interstate, coordinate with DES for IAJR requirements.

All IAJRs must be submitted to DES for review prior to submittal to FHWA. Include this task duration in the project schedule.

IAJR Re-evaluation

The following primary conditions will require re-evaluation of **previously approved IAJRs**:

- Change in approved IAJR design concepts:
    - Due to environmental impact;
    - Due to final design adjustment; and
    - Due to design-build proposal.
- Significant changes in following conditions:
    - Traffic;
    - Land use; and
    - Environment.
- Time lapse before construction:
    - If the project does not progress to construction phase within **3 years** of approval.

Final approval of access cannot precede environmental clearance/NEPA completion.

4.4.9 Railroad Coordination

All work on or within 50-ft of the railroad ROW must be coordinated with the railroad owners. Work within 500-ft of railroad ROW should be evaluated by the District Railroad Coordinator to determine if there is any impact (temporary traffic control, preemption, etc.) to the railroad.

TxDOT enters into a **Construction and Maintenance (C&M) Agreements** with railroad companies when planning construction projects which impact railroad right of way. C&M Agreements with railroad companies can take anywhere from **6 months to 2 years** or more to complete. For this reason, it is essential to begin coordination with the railroad as early as possible in the project development process.

Routine maintenance projects or projects with minimal impact on railroad right of way use the Maintenance Notification Letter process (Letter Agreement) and do not require the types of agreements and plan sheets detailed in the remainder of the section.

Refer to TxDOT's *Rail Highway Operations Manual* for more information on timelines and flow charts for obtaining a C&M Agreement on construction projects and information on the Letter Agreement process for maintenance projects.

Early coordination with railroad companies is essential to reduce project delivery delays. Depending on the impact to the railroad, the negotiations, plans, and final agreement can take **4 months to 48 years** to complete. Federal Aid Highway Program projects are subject to a compliance audit for railroad agreements completed prior to the project construction authorization date.

TxDOT may not perform work within railroad ROW without the proper agreements and certifications.

Add this task to the project schedule.

Approval for new, at-grade railroad crossings is difficult to obtain. Existing at-grade crossings in the project area may need to be closed or grade separated so no net increase in at-grade crossings results. TxDOT usually bears the burden of finding these "trade off" crossings and negotiating with third parties if crossings are located off the State highway system.

Refer to TxDOT's *Rail Highway Operations Manual* for detailed discussion of preliminary engineering tasks associated with work near a railroad. Considerations for projects with railroads include:

- Locate all potential railroad ROW within 500-ft of the project limits;
- Determine existing crossing conditions and traffic control. Investigate the need for railroad-traffic signal interconnection between various signals;
- Identify opportunities to close or consolidate at-grade crossings;
- Obtain train traffic from railroad owners. Inquire into major railroad line improvement plans;
- Obtain approval of clearances for grade separated structures - railroad preference is an overpass that will clear span their ROW at a right angle;
- Develop recommendations for proposed rail-highway crossings;
- A separate design and agreement may be needed for TxDOT utilities such as storm water, ITS, power, etc.; and
- Document all correspondence regarding the design of the railroad features.

Initial railroad coordination must be conducted before selecting a recommended alignment because railroad issues may affect final alternative selection.

4.4.10 Miscellaneous Design

4.4.10.1 Landscape

If the project is in a city with a Green Ribbon Master Plan, coordinate to implement requirements of the project. A Green Ribbon Master Plan provides conceptual guidance to planning and design in cities with populations greater than 100,000. If the project is within a plan, then ensure that the plan policies are incorporated into the design.

A Landscape and Aesthetics Assessment (LAA) is a tool for identifying landscape and aesthetic issues associated with a specific highway corridor segment. A landscape architect must be consulted to prepare an LAA. Procedures involve field observation and participation in or review of public involvement events. The goal is to maximize design flexibility. Refer to TxDOT's *Landscape and Aesthetics Design Manual* for more information on preparing the LAA.

4.4.10.2 Motorcyclist

Designers should consider the safety of motorcyclists in their development of projects. Refer to the RDM, Chapter 20 for specific guidance and motorcyclist design considerations.

4.4.10.3 Transit

Highways and streets must often accommodate transit vehicles as well as passenger cars and trucks. Refer to the RDM, Chapter 22 for specific guidance on the implementation of transit accommodations.

4.4.10.4 Wildlife Crossings

Wildlife crossings are used to mitigate environmental impacts of a project by providing animals a way to safely cross roadways. Refer to the RDM, Chapter 24 for specific guidance on the design of wildlife crossing.

4.4.10.5 Commercial Motor Vehicle Inspection Stations

The need for infrastructure improvements for Commercial Motor Vehicle (CMV) inspection stations should be shown on the geometric schematic. Determination of their location must be coordinated between TxDOT administration and the Department of Public Safety (DPS). DPS provides permanent scales, if needed, and provides operators for inspection stations.

The need for “weigh-in-motion” (WIM) detectors and locations are determined by TPP - Freight and International Trade Office. These detectors are used to gather vehicle information not for law enforcement.

Construction of new inspection stations must be authorized by TTC minute order. The District should clarify funding for the planning and design of such improvements.

Projects that serve existing inspection stations must consult DPS for needed infrastructure improvements as part of the project.

4.4.11 Design Exceptions, Waivers, Variances or Deviations

Prior to the Final Design phase of project development, the need for a design exceptions, waivers, variances or deviations should be identified.

- **Design exception** –required when existing or proposed design elements do not meet the minimum values of controlling criteria shown in the RDM. A design exception is not required when values exceed the minimum guidelines.
- **Design waiver** – required when minimum values of TxDOT’s non-controlling criteria as outlined in the RDM are not met.
- **Design variance** - required to be sent to the Texas Department of Licensing and Regulation (TDLR) whenever the design guidelines specified in the Texas Accessibility Standards (TAS) Public Rights-of-Way Accessibility Guidelines (PROWAG) are not met.
- **Design deviation** - required for projects that do not meet specified bridge vertical clearance requirements for highways on the Texas Highway Freight Network (THFN).

Form 1002, PS&E Submission Data is the official place where project design criteria are documented. Design exception/waiver/variance/deviation locations and issues are noted on this page with an approval date and authorized District signature.

An explanation of why design exceptions/waivers/variances/deviations are needed must be sent to the District design exception committee for approval. **Documentation of the Design Exception/Waiver/Variance/Deviation Record of Decision must be retained in District design exception files**. Furnish a copy of all documents to the DES when submitting the Ready To Let (RTL) plans submission.

Refer to the RDM for additional information on the submission, review and approval process of design exceptions, waivers, variances and deviations.

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Tasks to be performed in determining the need for design exceptions, waivers, variances and/or deviations include:

- Identify design exceptions/waivers/variances/deviations;
- Thoroughly document why design exceptions/waivers/variance/deviations are needed;
- Evaluate the safety, operational and other impacts of the proposed and alternative designs;
- Prepare design exception/waiver/variance/deviation requests;
- Process design exceptions and waivers at the District level;
- Submit Interstate design exception requests to DES Project Delivery Section (refer to the Design Exception Request for Interstate Highways TxDOT SOP);
- Submit design variance requests to TDLR for review and approval;
- Submit THFN design deviation request to DES – Project Delivery Section for review and approval;
- Document approved design exceptions/waivers/variances/deviations on Form 1002;
- Obtain District or FHWA approval of design exception/waivers/variances/deviations requests or revise schematic or plans; and
- Identify and submit additional design exceptions/waivers/deviations as the project progresses.

4.4.12 Constructability Review

Requirements for construction, including construction phasing, must be considered throughout development of the geometric schematic. Identifying constructability issues reduces change orders and delay costs and results in less inconvenience to the traveling public. Future maintenance problems may also be eliminated. Use of 3D modeling can help provide a view of construction conflicts and **may be required for FHWA FAHP projects greater than one million dollars**.

A multi-disciplinary review team should conduct the constructability review as it relates to areas of maintenance, traffic, design and construction. The review team should review requirements for access and operation of construction equipment to ensure that the geometric design can be built.

Safety of the traveling public and construction workers is a primary focus of the constructability review.

4.4.13 Cost Estimate Updates

Construction and ROW cost estimates, and corresponding TxC data, must be updated periodically to reflect project changes. Typically cost estimates are updated at milestone deliverables, however, the cost may need to be updated more frequently depending on the project's development schedule.

Any cost overruns will affect District programming of projects and must be identified as early as possible and shared with District planning/funding staff. The cost estimates must accurately identify approved funding sources (federal, State, and local participation).

Some categories of funding will require approval for changes to the estimate. Coordinate with the funding category's funding manager prior to updating estimates.

Use TxDOT's CCEG and CCEG spreadsheet tool to develop the cost estimate for each geometric schematic submittal. Eligible utility adjustment costs must be included in the ROW cost estimate.

If updated estimate total cost meets or approaches the VE threshold, consider conducting a VE analysis (see Section 4.5.)

4.4.14 Geometric Schematic Layout Development

Typically, the geometric schematic layout is developed with multiple milestone submittals (e.g., 30%/60%/90%/100% or Preliminary/Final). The District may reduce or add interim milestone submittals as deemed reasonable.

4.4.14.1 District Review of Geometric Schematic

The geometric schematic must be reviewed by a multi-disciplinary District review team at milestone submittals. The geometric schematic is made available for review and approval according to the District's schematic review process.

Suggested SME reviewers include, but are not limited to:

- Area Office;
- District Design;
- Drainage;
- Environmental;
- ROW/Utilities;
- Structures;
- Survey; and
- Traffic Engineering.

All review comments from the District review team should be documented and addressed in the Schematic QC Checklist.

4.4.14.2 Geometric Schematic Review with Stakeholders

Stakeholders must be kept involved throughout project development. When local entities, MPOs, and LG officials are stakeholders in a project, it is advisable to obtain their review and input on the schematic during development. The review will allow for discussion and consensus building on decisions and can be useful if project changes involve significant funding changes. The PM should ensure that all public comments are captured and addressed.

4.4.14.3 Geometric Schematic

At the District's discretion, another public meeting may be conducted if desired. The public meeting should be conducted as described in **Section 4.3.2.6** and **Chapter 5**. If desired, other effective outreach methods can be conducted in place of or in addition to a public meeting. Consult with TPP - Public Involvement Section and TxDOT's statewide *Strategic Public Engagement Guidance*.

4.4.14.4 Revise Design if Needed

Based on stakeholder input from the public meeting and local entities' review of the project, the geometric schematic design may need to be revised. If the design and/or layout is revised, the District's review team should review the revised materials.

Ensure that all public comments are captured and addressed. Consult with the TPP – Public Involvement Section on ideas for closing the "feedback loop" with the public and stakeholders to demonstrate how the project team responded to public comments.

Substantial changes in design may require additional environmental studies and/or documentation. Coordinate all changes with the District Environmental Coordinator.

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Authority documents:

- ☐ 14 CFR §77.7
- ☐ 14 CFR §77.9
- ☐ 23 CFR Part 620 Subpart A
- ☐ 23 CFR Part 626
- ☐ 23 USC §111
- ☐ 23 USC §117
- ☐ 23 USC §167
- ☐ 23 USC §217
- ☐ 23 USC §217(g)(1)
- ☐ 23 USC §329
- ☐ 23 USC Chapter 1
- ☐ 36 CFR §1119.1
- ☐ 41 CFR §102.76
- ☐ 43 TAC §11.100 et seq.
- ☐ 43 TAC §25.11
- ☐ 43 TAC Part 1 Chapter 7
- ☐ 43 TAC Part 1 Chapter 21
- ☐ 49 CFR §37.9
- ☐ TTC §201.902
- ☐ Executive Order - Accelerating Broadband Infrastructure Deployment
- ☐ FHWA, Directives and Memorandum, Notice - Interstate Access
- ☐ Government Code §411.0099
- ☐ National ITS Architecture
- ☐ Texas Government Code Chapter 469

Resources to consult:

- ☐ A Guide for Sequencing and Placement of Noise Walls and Retaining Walls on TxDOT Projects
- ☐ AASHTO A Policy on Design Standards – Interstate System
- ☐ AASHTO Practical Guide to Cost Estimating
- ☐ AASHTO Roadway Lighting Design Guide
- ☐ Access Management Manual
- ☐ Bridge Design Manual - LRFD
- ☐ Bridge Detailing Manual
- ☐ Bridge Project Development Manual
- ☐ Construction Cost Estimating Guidance
- ☐ Design Exception Request for Interstate Highways TxDOT SOP
- ☐ DES Safer by Design webpage (TxDOT intranet only)
- ☐ DES webpage (TxDOT intranet only)
- ☐ District specific Pavement Design SOPs – no link
- ☐ FAA.gov OE/AAA webpage
- ☐ FHWA Bicycle and Pedestrian Program
- ☐ FHWA Bridges & Structures publications
- ☐ FHWA Hydraulics Policy and Memos
- ☐ Freeway Signing Handbook
- ☐ Geotechnical Manual – LRFD
- ☐ Highway Illumination Manual
- ☐ Hydraulic Design Manual
- ☐ IAJR Engineering, Operation and Safety Analysis SOP
- ☐ IAJR Standard Operating Procedures FAQs
- ☐ Landscape and Aesthetics Design Manual
- ☐ National Electrical Code
- ☐ NRCS webpage
- ☐ Pavement Manual
- ☐ PS&E Preparation Manual
- ☐ Rail Highway Operations Manual

- ☐ Roadway Design Manual
- ☐ ROW Utilities Manual
- ☐ Sign Guidelines and Applications Manual
- ☐ Survey Manual
- ☐ TMUTCD
- ☐ Texas Parks and Wildlife Department Design Standards for Roads and Parks
- ☐ Traffic and Safety Analysis Procedures Manual
- ☐ TxDOT Bridge Standards
- ☐ TxDOT Roadway Standards
- ☐ TxDOT SUE Deliverables Best Practices Document
- ☐ TxDOT Traffic Standards
- ☐ TxDOT.gov Bicycle Tourism Trails Study webpage
- ☐ TxDOT.gov Bicycle Tourism Trials Example Network
- ☐ Design Tools and Training webpage
- ☐ TxDOT.gov Geotechnical webpage
- ☐ TxDOT.gov Project Development Resources webpage
- ☐ TxDOT.gov Railroad Design Guidelines webpage
- ☐ TxDOT.gov Safer by Design webpage
- ☐ TxDOT.gov Surveyors' Toolkit webpage
- ☐ TxDOT.gov Active Transportation Plan Inventory
- ☐ TxDOT.gov Traffic Design Standards for Signs, Signals and Markings webpage
- ☐ TxDOT.gov Traffic Noise Analysis toolkit webpage
- ☐ Traffic and Safety Analysis Procedures Manual
- ☐ TxDOT.gov Transportation Systems Management and Operations webpage District's TSMO plan
- ☐ TxDOT.gov Utility Accommodations Toolkit webpage
- ☐ TxDOTCONNECT Reference Manual – Engineer's Estimate
- ☐ USDOT Bicycle and Pedestrian Planning, Program, and Project Development Guidance memo

Coordination:

- ☐ District Bridge Engineer
- ☐ District Drainage Engineer
- ☐ District Environmental Coordinator
- ☐ District Bicycle/Pedestrian Coordinator
- ☐ District Laboratory Engineer
- ☐ District Pavement Engineer
- ☐ District Utility Coordinator
- ☐ District Traffic Engineer
- ☐ District Railroad Coordinator
- ☐ District Landscape Architect
- ☐ Area office and District maintenance and construction staff for agreements with local entities
- ☐ Public Transit Coordinator
- ☐ BRG staff
- ☐ RRD staff
- ☐ DES – LA Section staff
- ☐ TPP – Freight and International Trade Office staff
- ☐ MTN - Pavement Asset Management Section for FWD, ground penetrating radar, dynamic cone penetrometer, and seismic pavement testing.
- ☐ DES – H&H Section staff
- ☐ TRF - Engineering Operations Branch staff
- ☐ Utility owners
- ☐ Power companies (location of power sources)
- ☐ Department of Public Safety (weigh stations)

Tools to use:

- ☐ Form 1002 – PS&E Transmittal Data
- ☐ Form 2440 – DSR
- ☐ Form 2442 – APD Stage Gate Checklist
- ☐ CCEG spreadsheet tool
- ☐ Design exception, waiver, variation and deviation forms (TxDOT intranet only)
- ☐ PS&E QC Milestone Checklist
- ☐ Safer by Design tools
- ☐ Schematic QC Checklist
- ☐ Statewide Planning Map
- ☐ TAMES/TCAP Toolbox
- ☐ Utility Conflict Analysis Template

Available training:

- ☐ BRG105 – Bridge Workshop – TxDOT
- ☐ BRG106 – Load and Resistance Factor Rating of Highway Bridges
- ☐ BRG108 – LFD for Highway Bridge Superstructures
- ☐ DES102 – Design Concepts from AASHTO
- ☐ DES106 – Freeway Design and Operations
- ☐ DES119 – Preliminary Design Process
- ☐ DES122 – Design & Construction for Pedestrian Access
- ☐ DES132 – Designing for Pedestrian Safety
- ☐ DES601 – Basic Hydrology & Hydraulics
- ☐ DES611 – Introduction to Hydrologic Modeling with HEC-HMS
- ☐ DES621 – Advanced Hydrologic Modeling with HEC-HMS
- ☐ DES808 – Practical Highway Hydrology
- ☐ DES823 – Performance Based Intersection Design and Operations FHWA
- ☐ GEO191 – Basic Geotechnical Engineering for Roadway
- ☐ GEO202 – Soils and Foundations Workshop
- ☐ MTN803 – Flexible Pavement Designs
- ☐ PMD142 - Construction Cost Estimating
- ☐ ROW001 – ROW Project Delivery Overview
- ☐ ROW100 – Identifying and Managing Utility Conflicts
- ☐ ROW101 – TxDOT Utility Coordination TCC153 – Concrete Series: Design of Pavement
- ☐ TCC205 – 3D Engineered Models for Construction Series: Surveying and 3D engineered Models
- ☐ TCC341 – Fundamentals of Bicycle Infrastructure
- ☐ TCC357 – Strategies for Accommodating Pedestrians, Bicyclists, and Motorcyclists in Work Zones
- ☐ TRF201 – Introduction to Traffic Operations
- ☐ TRF303 – Basic Networking for Traffic Systems
- ☐ i.eTRF504 – Principles of Freeway Guide Signing

  TRF450 – TxDOT Roadway Illuminations and Electrical Installations

* All training can be found in TxDOT’s Training Catalog

4.5 Value Engineering

A VE analysis is a systematic process to evaluate a project by a multidisciplinary team of individuals not directly involved in the project. The VE analysis provides recommendations which could potentially reduce the time to complete the project, improve the value and quality of the project, and provide a project which functions safely and efficiently at the lowest cost. For maximum benefit, the VE analysis must be conducted as early as possible during the planning or preliminary design phase.

Consult with DES Division as early as possible if assistance is needed with the VE analysis.

The following project types require a VE analysis:

All projects on the NHS that utilize FAHP funding with an estimated total project cost of $50 million or more. Total cost threshold considers **all project related costs**, not just construction cost.

- All bridge projects on the NHS utilizing FAHP funding with an estimated total project cost of $40 million or more. Bridge projects include projects with the primary purpose to construct, reconstruct, rehabilitate, resurface, or restore a bridge;
- Any major project (see **Section 3.4.8**) located on or off of the NHS that utilizes FAHP funding in any contract or phase comprising the major project; and
- Any project FHWA considers appropriate and that uses FAHP funding.

FHWA encourages conducting an additional VE analysis if a major project is split into individual contracts and their combined costs meet or exceed the threshold values.

A VE analysis is not required for projects delivered using the design-build method of construction. If the PM chooses to conduct a VE analysis, this must be performed before the Request for Proposal (RFP) release.

No exceptions to the federal VE requirement will be granted by FHWA.

4.5.1 VE Analysis

A VE analysis has the potential to optimize the value and quality of a project. Review and assessing a project by a multidisciplinary team evaluates the constructability, safety, ROW, economic, environmental and operational benefits of alternative designs.

A VE Job Plan is a systematic action plan led by a Certified Value Specialist (CVS).

The VE Job Plan must include and document the following seven phases:

1. **Information Phase:** gather project information, commitments, and restraints (may be done prior to the actual study).
2. **Function Analysis Phase:** analyze the project to understand required functions.
3. **Creative Phase:** generate ideas to accomplish required functions which improve the project's performance, enhance its quality, and lower project costs.
4. **Evaluation Phase:** evaluate and select feasible ideas for development.
5. **Development Phase:** develop the selected alternatives into fully supported recommendations.
6. **Presentation Phase:** present the VE recommendation to the project stakeholders.
7. **Resolution Phase:** evaluate, resolve, document and implement all approved recommendations (District completes the VE Form).

Upon completion of the VE workshop:

- A final report is prepared by the facilitator and sent to the District and DES;
- Recommendations and values are entered into the TxC Value Engineering Form by the CVS;
- TxC routes the Form for revisions and approval tracking;
- District management determines resolution of recommendations; and
- Completed TxC Approval 1 completes the VE Job Plan.

Considerations when performing a VE workshop include:

- Consider a VE analysis when the total project cost is approximately $10 million less than the required threshold to mitigate for inflation or late changes in the estimate;
- Schedule the VE workshop to be performed during the preliminary design phase of project development;
- Perform VE analyses on high cost and complex projects (regardless of funding source);
- Consider inviting representatives from local public agencies, utility companies, commercial interests, and special event facilities to participate in VE workshops on projects in highly urbanized areas that will impact these stakeholders; and
- Consider any environmental commitments that will be required to obtain environmental clearance for the project.

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4.5.2 Design Revisions Based on VE Recommendations

Depending on the results of the VE workshop, the geometric schematic may need to be modified. If the design and/or layout is revised, the District's review team should review the revised materials as discussed in **Section 4.4.14.1**.

All review comments from the District review team should be documented and addressed in the Schematic QC Checklist.

Environmental studies or approvals may need to be reevaluated to incorporate VE recommendations and design modifications.

Authority documents:

- ☐ 23 CFR Part 627
- ☐ 23 USC §106(e-g)
- ☐ FHWA Order 1311.1B

Resources to consult:

- ☐ Roadway Design Manual
- ☐ DES webpage (TxDOT intranet only)
- ☐ FHWA VE FAQs webpage

Coordination:

- ☐ DES – Project Delivery Section staff
- ☐ DES - VE coordinator

Tools to use:

- ☐ Form 2440 – DSR
- ☐ Schematic QC Checklist

Available training:

- ☐ DES119 – Preliminary Design Process
- ☐ TPD349 – TxDOTCONNECT Value Engineering Training
- ☐ TPD350 – TxDOTCONNECT Value Engineering

* All training can be found in TxDOT's Training Catalog

4.6 Geometric Schematic Finalization

4.6.1 Additional Public Meetings

Depending on the recommendations of the VE workshop or other changes to the preferred alternative geometric schematic, another public meeting might be warranted to obtain additional input from project stakeholders.

Coordinate with the District environmental coordinator and District-designated TPP Public Involvement Section staff to determine if additional public outreach is needed, and to strategically determine the nature of that outreach.

4.6.2 Public Hearing Requirement

A public hearing and/or Notice Affording an Opportunity for a Public Hearing (NAOPH) is required for specific projects. See **Section 5.7.1.4** for more guidance on when to conduct a public hearing.

4.7 Right of Way Footprint Determination

After the preliminary engineering tasks are complete, the District reviews have occurred, and the geometric schematic has been presented to the public for stakeholder feedback, the ROW footprint should be established to allow the ROW surveying and the environmental technical studies to be started.

All design, coordination and public involvement should be completed to such a level as to clearly establish the limits of ROW on the geometric schematic at this time.

4.7.1 ROW Surveying

See **Chapter 6** for discussion on ROW surveying and preparing the needed ROW parcels and property descriptions.

4.7.2 Environmental Technical Studies

See **Chapter 5** for discussion on the environmental process and technical studies that are needed in order to obtain environmental clearance. The ROW footprint should be firmly established to begin detailed environmental studies.

This is a critical step in the project development process. Changes to the ROW footprint after this point could result in environmental studies rework and could negatively impact the project's schedule and budget.

Authority documents:

- ☐ 43 TAC Part 1 Chapter 21

4.8 Geometric Schematic Review and Approval

Once the geometric schematic has been through reviews by the District review team and VE workshops (as applicable) and public meetings/hearings have occurred, the geometric schematic can be sent to DES for review. **DES should review schematics for all projects on Interstate and those in which a project's TxDIP Stewardship & Oversight Plan (TxDIP S&O Plan) identifies that the project's schematic is to be reviewed by FHWA**. For schematics identified in a TxDIP S&O Plan that require FHWA review, Districts should submit those schematics to DES for review. DES will review those schematics prior to submitting them to FHWA for review. DES will review all other schematics upon request by the District. The District approves all schematics, unless approval authority is otherwise noted in a TxDIP S&O Plan.

FHWA sometimes reviews schematics associated with an IAJR or an Interstate design exception. The District does not approve IAJRs or Interstate design exceptions, but schematics associated with those documents are still approved by the District.

Based upon comments from DES and FHWA (if applicable), the geometric schematic may be updated, and final approval is given by the District. All schematic reviews for completion are considered "pending"

All schematic reviews for completion are considered "pending" prior to environmental clearance.

4.8.1 Geometric Schematic Reevaluation

The need may arise that a reevaluation of the approved geometric schematic is needed. Generally, a reevaluation may be performed if:

- **Change in the project design** - a reevaluation is required if there is a change in the limits, ROW requirements, alignment, project features, layout, or other aspect of the design that was the basis for the environmental clearance;
- **Substantial change in affected environment prior to start of construction** – a reevaluation is required if there is a substantial change in the baseline traffic volumes, land use, population, displacements, or any other aspect of the affected environment that was the basis for the environmental clearance;
- **Three-year delay between environmental clearance and start of construction** (does not apply to projects that were cleared as expedited (c)(22) CEs) - if more than three years have elapsed since the environmental clearance, and construction has still not begun,

then a reevaluation must be conducted after the reason for the delay has been resolved and the project is ready to be built, but prior to the actual start of construction;

- **Three-year suspension in all construction activities on the project** (does not apply to projects that were cleared with expedited (c)(22) CEs) - if all construction activities on the project are completely suspended for a three-year period, then a reevaluation must be conducted after the reason for the suspension has been resolved and construction is ready to resume, but prior to the actual recommencement of construction; or
- **Omission/new information** - a reevaluation is required if an omission or new information is discovered that could affect the validity of the environmental clearance (e.g., Section 4(f) property missed, public hearing was required but not conducted, or noise analysis was required but not conducted).

For EIS projects, a reevaluation is required in the following situations (in addition to those listed above):

- Three-year delay between Draft EIS (DEIS) and Final EIS(FEIS)/Record of Decision (ROD);
- No major steps to advance the project for three years after the FEIS/ROD (or FEIS supplement); or
- Three-year delay between major steps to advance the project after the FEIS/ROD.

The reevaluation may invalidate the original environmental decision. More information on reevaluations can be found in TxDOT's *Environmental Guide: Volume 1 Process*.

Additional public involvement may be required for the reevaluation.

Resources to consult:

- ☐ TxDIP S&O Plan (TxDOT intranet only)
- ☐ TxDOT.gov FHWA Stewardship & Oversight Agreement webpage
- ☐ Environmental Guide: Volume 1 Process

4.9 Identify, Prepare and Execute Additional Agreements

Identification of existing agreements helps determine the possible need for additional agreements. Existing agreements and contracts that TxDOT has with public entities, railroad companies, utility companies, and other agencies need to be identified and taken into consideration during project development. Some agreements may need to be amended and the appropriate Division can assist.

Agreements or permits between TxDOT and other entities are required in the following situations:

- Work is performed within the jurisdiction of another entity (e.g., railroads);
- Other entities construct facilities (e.g., driveways or utilities) on department ROW;
- Funds are provided by another entity (see **Section 3.5.2**); and
- Other entities agree to maintain the facility.

Table 4-6 lists the coordinating Division of each type of additional agreement.

Table 4-6: Types of Additional Agreements

Type of Agreement	Coordinating Division
Bridge projects between Texas and other states or between Texas and Mexico	BRG
Drainage agreements	ROW or MTN
Joint-use agreements	ROW
Natural Resource Conservation Service (NRCS)	ENV
Railroad	RRD
Right of way (agreement to contribute funds)	ROW
U.S. Coast Guard (USCG)	ENV
U.S. Army Corps of Engineers (USACE)	ENV
U.S. Fish and Wildlife Service	ENV
U.S. Geological Survey (USGS) - gaging stations	BRG
Utility (pipelines, telephone, etc.)	ROW

4.9.1 Advanced Funding Agreement Review

An Advance Funding agreement (AFA) in which TxDOT and a local government allocate participation is the most frequently used contract for project development. TxDOT and LGs negotiate an agreement that determines which party is responsible for conducting work, providing funding or contributing items in-kind.

TxDOT or the LG may be financially responsible for all or a portion of the work regardless of which party is responsible for performing the work.

Bridge specific AFAs are available for bridge work to local structures.

Examples of work included in an AFA are:

- Acquiring ROW;
- Drafting engineering plans;
- Providing for utility relocation;
- Performing environmental studies and environmental mitigation;
- Supplying construction services; and
- Providing maintenance of a transportation project.

See **Section 3.5.2** for an in-depth discussion of AFAs.

Authority documents:

- ☐ 43 TAC §15.50 et seq.
- ☐ 43 TAC §15.70 et seq.

Resources to consult:

- ☐ Roadway Design Manual
- ☐ Local Government Project Management Guide
- ☐ Local Government Policy Manual
- ☐ Environmental Guide: Volume 1 Process

Coordination:

- ☐ District planning staff
- ☐ District Environmental Coordinator
- ☐ CSD staff – Donation agreements, LOSA, VAFA, AFA, workflow diagrams
- ☐ MTN staff – driveway permits SOP, municipal maintenance agreements, landscape maintenance agreements, multiple use agreements
- ☐ BRG project manager – consult on bridge AFAs (not the same as the long form AFA)
- ☐ DES – Project Delivery Section staff

Tools to use:

- ☐ Form 2440 – DSR
- ☐ Schematic QC Checklist
- ☐ Reevaluation Form

Available training:

- ☐ CTR110 – Advance Funding Agreements
- ☐ LGP101 – Local Government Project Procedures Qualifcation for TxDOT
- ☐ LGP102- Local Government Projects Construction Administration
- ☐ TPD359 – TxDOTCONNECT Advance Funding Agreements

* All training can be found in TxDOT's Training Catalog

4.10 Geometric Layouts

Projects that do not require the formal geometric schematic as defined in **Section 4.3** can use a more simplified geometric layout to convey project information if the District desires. A geometric layout can be developed for a single preferred alignment to gain feedback from project stakeholders.

The geometric layout can be used as the Initial (30%) milestone submission in lieu of plan and profile sheets at the discretion of the District.

The geometric layout typically contains the following design elements:

- Typical sections of existing and proposed roadways;
- Roadway horizontal and vertical alignments;
- Pavement edges, faces of curbs and shoulder lines;
- Proposed structure locations;
- Direction of traffic flow;
- Preliminary ROW requirements; and
- Property ownership data.

Resources to consult:

☐ Roadway Design Manual

Tools to use:

☐ Form 2440 – DSR

☐ Schematic QC Checklist

Chapter 5 Environmental and Public Involvement

5.1 Overview

A sustainable approach to transportation project design and construction provides decision makers with balanced choices among environmental, economic, and social values that will benefit current and future road users. In early project development, it is vital for the transportation engineer to work closely with District environmental staff to identify the environmental, economic, and social concerns for a given a project.

Environmental tasks are often on the critical path in a transportation project's schedule; therefore, those issues must be identified in the early phases of project development. The transportation engineer should have a solid understanding of the environmental process to ensure that transportation project designs comply with environmental regulations, minimize impacts on the environment and are let or awarded on time. **District environmental staff should be part of the project scoping, PDCC, and Design Concept Conference (DCC) meetings to ensure the processes are followed correctly.**

Environmental tasks occur concurrently with the project development life cycle as shown in **Figure 5-1**. Environmental compliance tasks occur during construction of the project.

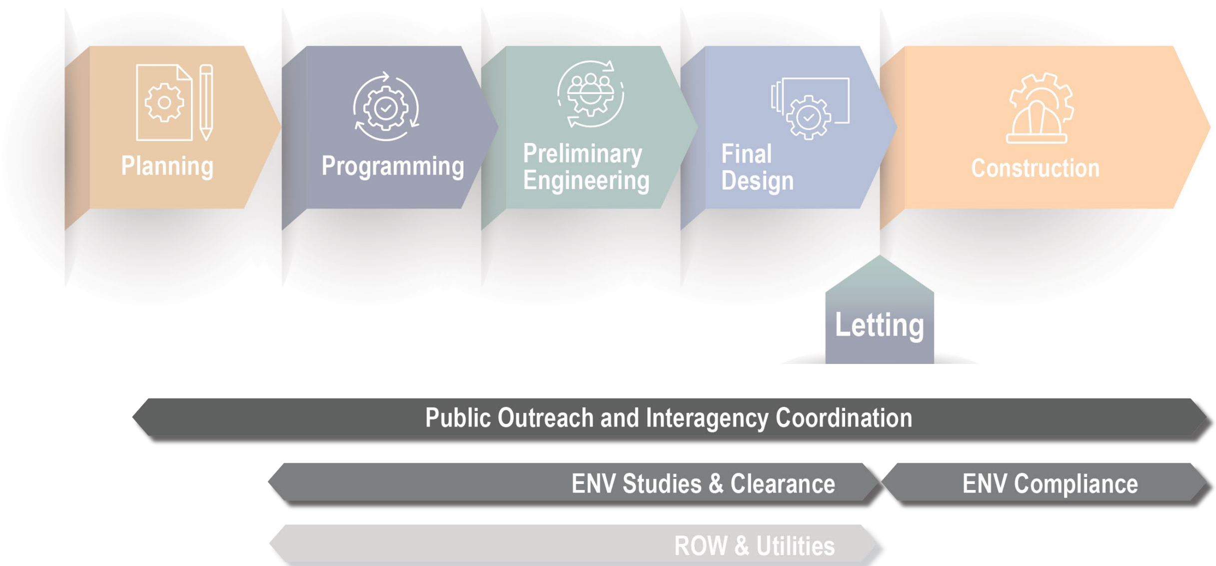

Figure 5-1: TxDOT's Project Development Process – Environmental and Public Involvement

This chapter includes discussion on the following topics that the transportation engineer should be familiar with concerning environmental studies, clearance, and public involvement.

5.2 Responsibility of TxDOT in the Environmental Process

Under a Memorandum of Understanding (titled "Assignment MOU") with the FHWA, TxDOT has been assigned review and approval responsibilities/ authority under NEPA for Texas projects with respect to federally-funded transportation projects. In addition, TxDOT is responsible for complying with Title 43, Chapter 2 of the Texas Administrative Code (TAC) for transportation projects receiving state funding. The environmental process is an integral part of the project development process in that it requires TxDOT to assess the environmental effects of proposed projects prior to making final decisions. There are also state environmental laws, rules, and regulations that TxDOT must follow regardless of the federal or state clearance processes.

By the Assignment MOU between the US Department of Transportation (USDOT) through the FHWA and the State of Texas through TxDOT, TxDOT has accepted jurisdiction of the federal courts for the compliance, discharge, and enforcement of any responsibility assumed under the Assignment MOU. This Assignment MOU gives TxDOT the authority to act as FHWA with respect to the environmental review, consultation and other actions required under the assumed responsibilities. The Assignment MOU is subject to renewability (through application by TxDOT to FHWA) every 5 years. Assignment MOU status and additional information can be found at the TxDOT.gov National Environmental Policy Act (NEPA) assignment documentation webpage.

NEPA is a federal law that requires federal agencies to assess the environmental effects of their proposed actions prior to making decisions.

Authority documents:

- ☐ First Renewed Memorandum of Understanding Between the Federal Highway Administration and the Texas Department of Transportation Concerning State of Texas' Participation in the Project Delivery Program Pursuant to 23 U.S.C. 327
- ☐ National Environmental Policy Act (NEPA)

Resources to consult:

- ☐ TxDOT.gov National Environmental Policy Act (NEPA) Assignment Documentation webpage

Coordination:

- ☐ District environmental staff

5.3 General Environmental Guidance

A TxDOT environmental clearance and compliance with TxDOT's environmental review process is **required** for the following categories of projects (refer to 43 TAC 2.3):

- A federally funded transportation project; or
- Any portion of a state transportation project that will take place on the state highway system or other real property owned by the department.

Environmental clearance is required before federal funding is authorized and before a project can go to letting.

Common projects that do **not require** a TxDOT environmental clearance and are not subjected to TXDOT's environmental review process include:

- Local government or private entity projects that do not take place on the state highway system or other property owned by TxDOT but will be funded by TxDOT with state funds, with no FHWA funding or approval;
- TxDOT actions that are not transportation projects (e.g., new TxDOT office building), with no FHWA funding or approval;
- TxDOT maintenance programs and projects covered by the April 2011 TxDOT Maintenance Environmental Assessment, with no FHWA funding or approval;
- Projects in state parks that are on a road that is not listed on the state highway system, but is owned and operated by the TPWD, with no FHWA funding or approval (i.e., "Parks and Wildlife Road" projects);
- Governor's Community Achievement Awards that are transportation projects and that will not take place on the state highway system or other TxDOT-owned property, with no FHWA funding or approval;
- Governor's Community Achievement Awards that are not transportation projects, with no FHWA funding or approval;
- FTA projects, with no FHWA funding or approval (these are subject to FTA's NEPA process); and
- Issuance of driveway permit and construction of a driveway (not associated with a transportation project), with no FHWA funding or approval; and 100% privately funded access improvement projects (i.e., turn lane, acceleration or deceleration lane, traffic signal, or other project of which the sole purpose is to facilitate access to or from a privately owned driveway or privately owned roadway, such as a shopping mall or apartment complex), with no FHWA funding or approval.

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TxDOT uses a database system known as **Environmental Compliance and Oversight System (ECOS)** to manage the NEPA process for TxDOT transportation projects, as defined in 43 TAC 2.5. The primary functions of ECOS are to:

- Develop a project work plan for performing the activities needed to environmentally clear a transportation project;
- Manage and keep track of the workflow for those activities; and
- Preserve a record of the completion and outcomes of those activities.

The following references should be used as guidance for TxDOT's environmental review process for transportation projects:

- **Environmental Guide – Volume 1 Process**: This document explains how to use ECOS to environmentally approve transportation projects;
- **Environmental Guide – Volume 2 Activity Instructions**: This document contains individual instructions for completing each of the Activities, Reviews, and Coordinations generated in ECOS that may be required to environmentally approve a given transportation project; and
- **Environmental Compliance Toolkits:** Toolkits contain forms, templates, and technical guidance that may be needed to complete activities generated in ECOS and other required activities in the environmental review process.

Authority documents:

- ☐ 43 TAC 2
- ☐ National Environmental Policy Act (NEPA)

Resources to consult:

- ☐ ECOS
- ☐ Environmental Guide – Volume 1 Process
- ☐ Environmental Guide – Volume 2 Activity Instructions
- ☐ TxDOT.gov Environmental Compliance Toolkit webpage

Coordination:

- ☐ District environmental staff

Available training:

- ☐ ENV211 – ECOS for Environmental Consultants and Local Government Representatives
- ☐ ENV216 – Overview of TxDOT's Environmental Review Process for Engineers, Planners, and Others
- ☐ Environmental Management System Training Matrix

* All training can be found in TxDOT's Training Catalog

5.4 Environmental Review and Documentation

Environmental impacts are considered throughout the planning, programming, preliminary engineering, final design, and construction processes; however, the majority of environmental review and documentation occurs during preliminary engineering and is dependent on the rigor of the project.

This section describes the different types of environmental review and documentation based on the project's potential social, economic, and environmental impacts.

5.4.1 Stage Gate Checklists

Stage Gate checklists are used as awareness and communication tools to facilitate the development of projects. These checklists help facilitate communication between project development, construction and environmental staff. Each stage of project development requires the completion of the applicable checklist prior to the project advancing to the next phase of development (i.e., preliminary engineering to final design, final design to construction, and construction to project closeout). The following forms should be completed by the appropriate staff as designated by the District and submits the forms as a final deliverable for each stage.

- **Form 2442 – Advance Planning and Development (APD) Stage Gate Checklist**: intended to be an awareness and communication tool. It should help facilitate communication between personnel developing projects during the APD process (including producing of schematic) and environmental personnel, thereby addressing what is required in the environmental document and/or permits as early as possible in project development.
- **Form 2443 – Plans, Specifications, Estimates (PSE) Stage Gate Checklist**: intended to be an awareness and communication tool. It should help facilitate communication between personnel developing projects during the PSE process with APD and environmental personnel, thereby addressing what is required in the environmental document and/or permits as early as possible in the design process. It should also help to ensure environmental document and/or permits are updated/obtained by identifying issues during project development and then proper direction be given to the contractor in the PS&E package to ensure environmental requirements and commitments are met.
- **Form 2448 – Construction Stage Gate Checklist (CSGC)**: intended to be a construction project inspection and communication tool. It should be completed with both designated TxDOT and contractor personnel present to help facilitate communication between project personnel. The CSGC helps ensure that TxDOT

and the contractor meet their commitment to environmental compliance by providing a comprehensive overview of all environmental requirements and identifying areas where improvements, additional attention and/or actions are needed.

5.4.2 Environmental Documentation Types

All federal actions and state transportation projects require documentation that details TxDOT's review of potential environmental impacts. The three classes of actions that prescribe the level of documentation required in the environmental process are described below:

- **Environmental Impact Statement (EIS).** An EIS is prepared for a project that has significant social, economic, or environmental impacts. An EIS is very prescriptive in process and requires extensive stakeholder and public feedback. An EIS often takes the longest amount of time to complete of the three documentation types.
- **Environmental Assessment (EA)**. An EA is necessary for a project that has not clearly established the significance of potential impacts. Occasionally, an EA is initiated for a project that results in a finding of significant social, economic, and environmental impacts, which then requires preparing an EIS. When a project has a Finding of No Significant Impact (FONSI), the EA is useful to share those findings with stakeholders and the public. An EA is often completed in a shorter timeframe than an EIS; however, longer than a Categorical Exclusion since it summarizes the technical reports that came to the determination of a FONSI.
- **Categorical Exclusion (CE).** A CE determination is required for projects which do not individually or cumulatively have significant environmental effects and are excluded from the requirement to prepare an EIS. A CE determination typically is the shortest of the three documentation types since only technical reports supporting that determination are needed.

Detailed information on type of environmental studies and documentation are included in TxDOT's *Environmental Guide – Volume 1 Process* document.

5.4.3 Environmental Reevaluations

The sole purpose of an environmental reevaluation is to determine whether the original environmental decision remains valid. Typically, a reevaluation is required in the following situations:

- Change in project design such as a change in project limits, ROW requirements, project features, layout or other aspects of the design that was the basis for the environmental clearance;
- Substantial change in affected environment prior to start of construction;
- Three-year delay between environmental clearance and start of construction;
- Three-year suspension in all construction activities on the project;
- Omission of or new information;
- Three-year delay between the Draft EIS (DEIS) and Final EIS/Record of Decision (FEIS/ROD);
- No major steps to advance the project for three years after the FEIS/ROD (or FEIS supplement); or
- Three-year delay between major steps to advance the project after the FEIS/ROD.

The purpose and need statement for a project may not be changed for a reevaluation. Change to the purpose and need for a project will initiate a new project.

Project reevaluations are not needed if there is no project design or scope change, nor any change in affected environment between environmental decision and project construction withing the timeframes listed above.

Authority documents:

- ☐ 23 CFR 771.129
- ☐ 43 TAC §2.81 et seq.
- ☐ 43 TAC § 2.85
- ☐ TTC §201.752

Resources to consult:

- ☐ Environmental Guide – Volume 1 Process
- ☐ Environmental Guide – Volume 2 Activity Instructions
- ☐ TxDOT.gov Environmental Management System webpage
- ☐ TxDOT.gov Environmental Compliance Toolkits webpage
- ☐ TxDOT.gov National Environmental Policy Act and Project Development Toolkit webpage

Coordination:

☐ District environmental staff

☐ ENV staff

Tools to use:

☐ Form 2440 – DSR

☐ Form 2442 – APD Stage Gate Checklist

☐ Form 2443 – PSE Stage Gate Checklist

☐ Form 2448 – CSGC Stage Gate Checklist

Available training:

☐ ENV211 – ECOS for Environmental Consultants and Local Government Representatives

☐ ENV216 – Overview of TxDOT's Environmental Review Process for Engineers, Planners, and Others

☐ Environmental Management System Training Matrix

* All training can be found in TxDOT's Training Catalog

5.5 The Environmental Process through Project Development

The environmental process is detailed in TxDOT's *Environmental Guide – Volume 1 Process* document. The guidance gives specific details for the environmental professional to carry out the tasks associated with TxDOT's environmental review process. Throughout this process, the coordination between environmental staff and the project design team is critical.

This section discusses the activities needed for seamless coordination of the project regarding environmental review and documentation throughout the phases of project development.

5.5.1 Project Planning

For projects outside of the UTP, environmental responsibilities begin with public involvement (see **Section 5.7**). Public involvement provides valuable input and insights to inform the transportation planning process. Public involvement allows TxDOT to educate the public about the transportation planning process, agency roles and responsibilities, system performance, and emerging transportation technology considerations. It also gives the public the opportunity to weigh in on transportation issues, comment on draft plan components, and better understand the tradeoffs between different investment strategies. In addition to providing important input to transportation planning, the public involvement effort satisfies several State and federal planning requirements.

This engagement is typically achieved through several methods including:

- Technical working groups;
- Newspaper ads;
- Email campaigns;
- Social media;
- Surveys;
- Open houses and stakeholder workshops; and
- Feedback from MPOs and LG officials.

5.5.1.1 Environmental Activities

Many of the studies and planning activities discussed in **Chapter 2** involve the coordination of District planning and environmental staff. To perform feasibility, corridor, and/or route studies, major environmental impacts and concerns must be identified to determine the viability of the project.

See **Table 2-1** for allowable development activities that can be performed on projects outside of the UTP. Preliminary environmental review activities can be performed including:

- Identifying major environmental concerns (floodplains, historical constraints, socioeconomic factors, etc.);
- Development of high-level environmental constraints map; and
- Identification of affected stakeholders.

5.5.2 Project Programming

Once a specific project has been identified, more detailed environmental review and studies are needed to help guide the design of the project. During this phase of project development, a project's scope is developed to document the specific project goals, objectives, deliverables, costs, outcomes, and deadlines.

The use of a Project Scoping Meeting (see **Section 3.3.1**) is critical to establish the baseline project scope. District environmental staff should be included in the Project Scoping Meeting.

Many environmental resource disciplines should be addressed during project scoping to help guide the design of the project. Those that most frequently impact project scoping decisions include:

- Air quality;
- Archeological sites and cemeteries;
- Protected species and critical habitat;
- Chapter 26, Parks and Wildlife Code;
- Community impacts assessment;
- Hazardous materials;
- Historic resources including historic bridges;
- Section 4(f);
- Section 6(f);
- Traffic noise;
- Water resources; and
- Public involvement.

Resource-specific templates, flowcharts, and guidance for these impacts can be found on the TxDOT.gov Environmental Toolkits webpage.

5.5.2.1 "Purpose and Need" Statement

The "Purpose and Need" statement is the foundation for NEPA alternatives analyses and evaluations done under other laws and is applicable to EA and EIS projects.

If a project is being considered and/or is ultimately determined to be a CE, the term "Purpose and Need" **should not be used in any capacity** through project development so as to not potentially adversely affect the CE determination; more appropriate terminology in supporting engineering documentation for CE projects would be "intent of the project" or something similar. Additionally, for EIS and EA projects where engineering documentation requires "Purpose and Need" to be reiterated or discussed, there should be no departure from the "Purpose and Need" language that is documented in the EIS or EA.

During project scoping, the identification of a project's goals and objectives should help shape the "Purpose and Need" statement. The "Purpose and Need" statement includes a clear statement of the objectives that the proposed project is intended to achieve. It explains both "purpose" for the project and considerations justifying "need" for the project.

The evaluation of need is based on current and future conditions, not on an assumption that prior decisions from previous studies (if applicable) are still valid. The statement provides facts and/or data to support problems or unsatisfactory conditions identified in the need sentence.

The TxDOT PM or transportation engineer should coordinate with environmental staff during the PDCC to develop an initial "Purpose and Need" statement.

The statement should be continuously referred to during project development to ensure that it remains applicable to the project design.

The "Purpose and Need" statement should heavily draw on the reason the project has been programmed or identified in planning. Considerations in the development of the "Purpose and Need" statement include:

- Supporting legislation – is there a legislative mandate for the project?
- Safety – is the project necessary to correct an existing or potential safety hazard?
- Maintenance and operational deficiencies – does the project correct existing deficiencies such as substandard geometrics, load limits, roadway cross-section, or high maintenance costs?
- Transportation demand exceeding capacity – what is the LOS of the existing and proposed facility?

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- Is the project in conformance with adopted state and urban transportation plan(s)?
- Transportation system linkage – are modes of transportation linked?
- Sustainable environmental, economic, and social transportation planning – what projected economic development trends or land use changes show the need to improve access and movement of people and goods (not just vehicles)?
- Access for other transportation modes, including those that promote physically active communities;
- How will the facility interface with and serve to complement air, rail, port and freight facilities, mass transit, etc.? Is the project part of the national highway freight network?
- Are there data gaps to assess the transportation needs in the project area? How will the gaps be managed?
- For nonattainment or maintenance areas - ensure the project is part of the current conforming MTP and TIP; and
- Include results of preliminary planning studies.

5.5.2.2 Compliance with Environmental Requirements

As discussed in **Chapter 3**, projects in certain areas of the State must be developed in compliance as determined by federal and state laws and policies. These include:

- **State Implementation Plan (SIP)** – nonattainment or maintenance areas (see **Section 3.4.5.1**); and
- **Congestion Management Process (CMP)** – metropolitan areas with populations > 200,000 (see **Section 3.4.5.2**).

5.5.3 Preliminary Engineering

The following impacts should be evaluated during preliminary engineering and determination of the recommended alternative. General descriptions of these elements are given here; however, more information can be found on TxDOT.gov Environmental Toolkits webpage.

District environmental staff should be included the PDCC (see **Section 4.2**). Their inclusion is critical to understanding the required processes and associated timelines for obtaining environmental clearance for the project.

The TxDOT PM should ensure that all needed timelines for environmental studies and clearance are included in the project schedule.

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5.5.3.1 ROW Relocation Impacts

For projects involving displacement of individuals, families, businesses, farms, and nonprofit organizations, potential displacements should be identified and included in the environmental documentation. These impacts should be identified while determining the recommended alternative and incorporated into the alternatives analysis (see **Section 4.3.1.6** and **Section 4.3.2.7**)

5.5.3.2 Section 4(f), Section 6(f), and Chapter 26 Property Impacts

Impacts to Section 4(f), Section 6(f), and Chapter 26 properties should be identified as early as possible in project development and avoided if at all possible. Descriptions of these properties follows.

Section 4(f), U.S. Department of Transportation Act

Section 4(f) refers to the original Department of Transportation Act of 1966, which implemented policy for preservation of parklands and policy on public lands, wildlife and waterfowl refuges, and historic sites.

Section 4(f) requires consideration of:

- Parks and recreational areas of national, state, or local significance that are both publicly owned and open to the public;
- Publicly owned wildlife and waterfowl refuges of national, state, or local significance that are open to the public to the extent that public access does not interfere with the primary purpose of the refuge; and
- Historic sites of national, state, or local significance in public or private ownership regardless of whether they are open to the public (refer to 23 U.S.C. § 138(a) and 49 U.S.C. § 303(a)).

Section 4(f) properties cannot be used for a federally funded transportation project, unless it is determined that:

- There is no prudent and feasible avoidance alternative that completely avoids the use of Section 4(f) property; and
- The project includes all possible planning to minimize harm to the Section 4(f) property resulting from the transportation use (23 CFR 774.3(a)(1) and (2)).

Projects with minor Section 4(f) involvement properties may qualify for a Programmatic Section 4(f) Evaluation, or a *de minimis* finding.

Section 4(f) **does not apply** to recreational areas, parks, or wildlife and waterfowl refuges owned by private institutions, organizations, or individuals, even if such areas are open to the public. If a permanent easement is needed on these properties, TxDOT, acting on behalf of FHWA, will determine on a case-by-case basis whether the property should be considered publicly owned and therefore a Section 4(f) property.

Regardless of ownership or public use, historic sites listed or eligible for inclusion in the National Register of Historic Places at the local, state, or national level are Section 4(f) properties.

Section 6(f) of the Land and Water Conservation Fund Act (LWCF Act)

Section 6(f) refers to recreational lands purchased or improved with Land and Water Conservation Fund (L&WCF) assistance and may be subject to Section 6(f)(3) L&WCF Act of 1965, administered by the National Park Service (NPS) (e.g., Wimberley Blue Hole Regional Park or Matagorda Bay Park & Preserve).

Section 6(f) provides that property acquired or developed with LWCF assistance shall be retained and used for public outdoor recreation. Any property so acquired and/or developed shall not be wholly or partly converted to anything other than public outdoor recreation uses without the approval of NPS pursuant to the LWCF Act (54 U.S.C. § 200305(f)(3)) and conversion requirements outlined in regulations (36 C.F.R. § 59.3).

A Section 4(f) evaluation does not necessarily include a Section 6(f) property but impacting Section 6(f) property will trigger the Section 4(f) process.

A “conversion” is any acquisition of ROW or an easement or any other arrangement that will allow for a non-public outdoor recreation use of a portion of the property protected by Section 6(f). NPS will only approve a conversion if a suitable replacement property is acquired.

Chapter 26, Parks and Wildlife Code

Chapter 26 of the Texas Parks and Wildlife Code (PWC) prohibits the use or taking of any public land designated and used prior to the arrangement of the program or project as a park, recreation area, scientific area, wildlife refuge, or historic site, unless the department, agency, political subdivision, county, or municipality, acting through its duly authorized governing body or officer, determines that:

- There is no feasible and prudent avoidance alternative that completely avoids the use the land; and
- That the project includes all reasonable planning to minimize harm to the land, as a park, recreation area, scientific area, wildlife refuge, or historic site, resulting from the use or taking.

Chapter 26 of the PWC outlines public hearing notice requirements for projects that take public lands designated and used as parklands.

Section 4(f), Section 6(f), and Chapter 26 PWC properties should be avoided to the maximum extent feasible.

5.5.3.3 Impacts on Water Resources

Preliminary structure and hydraulic studies may be needed to evaluate environmental impacts of highway encroachments on waterways and floodplains. Impacts on water resources may require permitting.

Coordination with District environmental staff is needed to determine if permits may be needed.

- **Clean Water Act (CWA) Section 404 permit** - USACE: May be required for wetland area disturbance, work in channels, channel/stream modifications, dewatering/construction methods necessary to construct the water crossing structure, and/or any other regulated activity within jurisdictional water features.
- **33 USC Section 408/Section 14 permission** – USACE: Authorizes a project proponent, such as TxDOT, to alter a USACE Civil Works project. No improvement shall be passed over, under, or through flood protection facilities such as improved channels, floodways, and levees. This permission is requested outside of the environmental clearance process and only affects the environmental clearance process when a Section 404 or Section 10 USACE permit requires the 408 permissions be obtained by the applicant prior to the permit being issued to that applicant.
- **Rivers and Harbors Act of 1899 (RHA) Section 9 and 10 permits** – USCG and USACE, respectively: May be required for certain activities that affect navigable waters in the United States.
    - Section 9 – regulates bridges and causeways over navigable waters. Permits are typically required for bridge or causeway construction, replacement, repair, and alteration, and impose conditions relating to

construction, maintenance, and operation in the interest of public navigation.
    - Section 10 – regulates work and structures in, over, and/or under navigable waters; excludes bridges and causeways, which are regulated under Section 9. Permits are primarily intended to preserve the course, location, condition, and/or capacity of navigable waters.
- **Coastal Zone Management Act (CZMA)** - provides a basis for protecting, restoring, and responsibly developing the nation's coastal communities and natural resources. the Texas Coastal Management Program (CMP), administered by the Texas General Land Office (GLO), is a federally approved member of the CZM Program. The Texas CMP is a "networked program" that links together the existing regulations, programs, and local, state, and federal entities that manage various aspects of coastal resource uses.
- **Municipal Separate Storm Sewer System (MS4) Requirements -** TxDOT operates under an individual MS4 permit administered by TCEQ which allows the department to discharge stormwater and other authorized discharges to the ROW throughout the State. The permit requirements apply to areas of the State that meet certain population and population density criteria. The Advanced Outfall Tracking System (AOTS) outlines the jurisdictional boundaries of this permit. To comply with permit requirements the department has developed a Stormwater Management Plan (SWMP) to describe how the department will implement the program requirements. In order to meet each required minimum control measure, TxDOT utilizes best management practices (BMPs). Examples BMPs include:
    - Public education and outreach to prevent litter;
    - Installation of structural controls;
    - Maintenance procedures to prevent or reduce the discharge of pollutants;
    - Operating procedures;
    - Treatment requirements; and
    - Practices to control facility site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage areas.

5.5.3.4 Exhibits for Environmental Documentation

Environmental document exhibits are prepared to show existing social, economic, and environmental resources, and potential impacts to these resources. The environmental specialist, roadway design engineer, drainage engineer, and project manager typically contribute to developing certain exhibits. These exhibits may also be used to coordinate with other agencies and obtain required approvals and permits.

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5.5.4 Final Design

Include District environmental staff in the DCC meeting (see **Section 7.2**) and in subsequent project progress meetings to ensure that environmental studies and documents are appropriately updated. Results of environmental studies and the environmental commitments are included in plan sheets during final design. Refer to *TxDOT's PS&E Preparation Manual* and the PS&E QC Milestone Checklist for details on environmental information to include on plan sheets.

Be aware that changes to the project design may warrant revisions to previously completed environmental studies.

5.5.4.1 Environmental Permits, Issues and Commitments (EPIC) Sheet

The EPIC sheet must be completed by the District and lists all environmental permits, issues, commitments, and conditional requirements affecting the contractor and their work on that specific project. The sheet can be supplemented by specific details shown on other plan sheets, but the areas of concern should be shown on the EPIC for the contractor's information. **The sheet should not be used to reiterate what is already shown in environmental permits for all projects.**

5.5.4.2 Stormwater Pollution Prevention Plan (SWP3) Summary Sheet and Environmental Layouts

An SWP3 Summary Sheet and Environmental Layouts consist of information which addresses erosion control measures during project construction. An SWP3 is required (by 1990 Clean Water Act) for all projects with soil disturbance. Refer to the TxDOT.gov TxDOT's Stormwater Pollution Prevention Plan (SWP3) Guidance Document webpage for more information and guidance documents.

5.5.4.3 Environmental Mitigation Plans

Occasionally actions are needed to avoid, minimize, or mitigate through compensation for adverse environmental impacts resulting from projects. In Title 43 TAC, Chapter 2, mitigation efforts may be defined as:

- Avoiding an impact altogether;
- Minimizing the impact by limiting the degree or magnitude of the action;
- Rectifying the impact by repairing, rehabilitating, and restoring the resource;
- Reducing or eliminating the impact over time by preservation and maintenance activities; and

- Compensating for the impact by replacing or providing substitutes to the resource impacted.

When all reasonable and feasible methods to avoid damage at a project site are employed, a net resource loss remains, compensatory mitigation may be required. Compensatory mitigation can be handled via the following three options, as applicable:

- Withdraw wetland credits from one of the three TxDOT wetland mitigation banks (i.e., Anderson Tract Mitigation Bank, Blue Elbow Swamp, or Coastal Bottomlands Mitigation Bank);
- Purchase credits from a third-party stream/wetland mitigation bank; or
- Design and construct Permittee Responsible Mitigation (PRM).

If compensatory mitigation is required, the District must submit a mitigation plan with the permit application to the USACE project manager for their review and approval. TxDOT Districts are to adhere to one of the following two standard operating procedures when addressing compensatory mitigation. If the District is withdrawing wetland credits from a TxDOT owned bank or purchasing credits from a third-party bank, the District must adhere to the Standard Operating Procedure (SOP): Acquiring and/or Purchasing 404 Compensatory Mitigation Credits. This SOP outlines the process for the TxDOT delegate to acquire wetland mitigation credits from TxDOT mitigation banks, or purchase wetland/stream mitigation credits from a third-party mitigation bank. If the project requires PRM, the District must adhere to the SOP: Section 404 Compensatory Mitigation via Permittee Responsible Mitigation. This SOP outlines the process for a TxDOT District to fulfill the requirement of wetland/stream compensatory mitigation under Section 404 of the Clean Water Act via Permittee Responsible Mitigation.

The mitigation plan development schedule is driven by the permitting process.

5.5.4.4 Other Environmental Information in Plans

Other details are shown in plans (typically the environmental layout sheets) to indicate specific environmental issues and/or commitments. Refer to TxDOT's *PS&E Preparation Manual* for additional details. These include:

- Sensitive environmental features to be:
    - Designated critical habitat and other protected species habitat;
    - Water features; and
    - Vegetation and trees.

- Wildlife Crossing Areas and Structures;
- Historical Resources;
- Archeological Resources;
- Hazardous Materials; and
- Human Environment.

5.5.5 The Environmental Process with Local Governments

The environmental compliance phase of any transportation project occurs throughout project development. The LG should identify environmental compliance issues early in the project in cooperation with the TxDOT District environmental coordinator. Requirements may impact project initiation tasks including the details in the AFA.

The LG and the TxDOT District must perform their respective roles (as defined in the AFA) to properly address project scoping, prepare a CE or other appropriate environmental document and to identify and comply with environmental permits, issues and commitments for construction transportation projects.

Authority documents:

- ☐ 23 CFR 650
- ☐ 23 CFR §774.1 et seq.
- ☐ 23 CFR §774.5(b)
- ☐ 23 USC 138
- ☐ 33 CFR §208.10
- ☐ 33 CFR §323.3
- ☐ 33 CFR 238
- ☐ 33 USC §401
- ☐ 36 CFR Part 59
- ☐ 40 CFR §1500 et seq.
- ☐ 43 TAC Part 1 Chapter 21
- ☐ 49 CFR Part 24
- ☐ 49 USC 303
- ☐ CFR Title 33
- ☐ CWA §404(b)(1)
- ☐ TTC §201.615
- ☐ TTC §201.617
- ☐ US DOT Act of 1966, as amended, Section 4(f)
- ☐ Chapter 26 of the Texas Parks and Wildlife Code (PWC)
- ☐ Clean Water Act of 1972
- ☐ Executive Order 11988
- ☐ Section 401 Water Quality Certification
- ☐ Section 402 National Pollutant Discharge Elimination System
- ☐ Section 404 Regulatory Program
- ☐ Texas Health and Safety Code, Clean Air Act (TCAA)

Resources to consult:

- ☐ AAHSTO's Defining the Purpose and Need and Determining the Range of Alternatives for Transportation Projects
- ☐ Environmental Guide – Volume 1 Process
- ☐ Local Government Project Management Guide
- ☐ Local Government Projects Best Practices Workbook
- ☐ Local Government Projects Policy Manual
- ☐ PS&E Preparation Manual
- ☐ SOP: Acquiring and/or Purchasing 404 Compensatory Mitigation Credits
- ☐ Strategic Public Engagement Guidance
- ☐ TxDOT.gov Environmental Compliance Toolkit webpage
- ☐ TxDOT.gov Local Government Projects Toolkit – Environmental Compliance webpage
- ☐ TxDOT.gov TxDOT's Stormwater Pollution Prevention Plan (SWP3) Guidance Document webpage
- ☐ TxDOT's Guidance – Preparing a Purpose and Need Statement
- ☐ USACE
- ☐ USCG

Databases for potential environmental constraints:

- ☐ Air: epa.gov EPA Greenbook (also maintained in nonattainment and maintenance area table in the TxDOT.gov Air Quality Toolkit)
- ☐ Archeology: TxDOT.gov Potential Archeological Liability Maps (PALM)
- ☐ Bio: fws.gov IPaC: Home
- ☐ Bio: Texas.gov TPWD RTEST
- ☐ Bio: TxDOT Natural Resources Aggregator
- ☐ FEMA: FEMA.gov National Flood Hazard Layer
- ☐ HazMat: Texas.gov RRC Public GIS Viewer
- ☐ Historical: Atlas Map - Atlas: Texas Historical Commission; TxDOT Historic Resources Aggregator
- ☐ Socioeconomics: data.census.gov United States Census Bureau
- ☐ Water Quality (MS4): TxDOT.gov Advanced Outfall Tracking System
- ☐ Water: TxDOT Water Resources Companion Viewer

Coordination:

- ☐ District environmental staff
- ☐ ENV staff
- ☐ TPP – Public Involvement Section staff
- ☐ TPD Local Government Programs staff
- ☐ BRG staff for historical bridges
- ☐ MS4 cities and counties

Tools to use:

- ☐ Form 2440 – DSR
- ☐ Local Government Project Development & Delivery Checklist – Environmental Compliance
- ☐ PS&E QC Milestone Checklist

Available training:

- ☐ DES908 – How to Create an EPIC Sheet
- ☐ ENV112 – Public Involvement for NEPA
- ☐ ENV121 – USACE Section 404/10 and USCG Section 9
- ☐ ENV124 – Advanced NEPA Considerations in Project Development
- ☐ ENV127 – NEPA Project Management
- ☐ ENV204 – NRM Regional Field Course
- ☐ ENV211 – ECOS for Environmental Consultants and Local Government Representatives
- ☐ ENV214 – Wetland Delineation
- ☐ EPI100 – Effective Public Involvement
- ☐ EPI200 – Effective Public Involvement - Advanced

* All training can be found in TxDOT's Training Catalog

5.6 Specific Environmental Compliance Requirements

This section includes information regarding specific compliance requirements that may be applicable to the project. Not all requirements will be applicable to every project. Early coordination with District environmental staff is needed to understand the implications of these requirements and associated timelines for completing the studies.

Additional resources for environmental requirements during the project development process may be found on the TxDOT.gov Environmental Compliance Toolkits webpage.

5.6.1 Air Quality

The Clean Air Act (CAA), NEPA, and the Federal-Aid Highways code establish air quality requirements for transportation projects. Refer to the *Environmental Handbook - Air Quality* document which is located on the TxDOT.gov Air Quality Toolkit webpage for detailed information regarding compliance with these statutes.

5.6.2 Archeologic Sites and Cemeteries

The Antiquities Code of Texas (ACT) and the Health and Safety Code and Section 106 of the National Historic Preservation Act (NHPA) establish the environmental compliance obligations regarding archeological sites and cemeteries.

5.6.3 Biological Resources

Transportation projects must comply with federal regulations governing the method and requirements for protecting and managing many biological resources. ENV - Natural Resource Management Section performs the following functions:

- Develops policy and guidance for following biological resource laws and regulations;
- Conducts/oversees habitat assessments, presence/absence surveys and other field studies;
- Consults with US Fish and Wildlife Service and National Marine Fisheries Services; and
- Coordinates projects with TPWD and other national resource agencies and conservation organizations.

5.6.4 Climate Change and Greenhouse Gas Analysis

ENV recommends conducting a Climate Change and Greenhouse Gas Analysis for any EIS that has a workplan in ECOS approved, or Notice of Intent (NOI) issued, on or after January 2, 2024. For EAs, ENV recommends using an ENV prepared Statewide Climate Change and Greenhouse Gas Technical Report. ENV does not have specific recommendations for CEs.

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Federal policy is rapidly changing; ENV encourages contacting ENV staff for the latest available guidance at the preliminary stages of project development. Future policy may require more or different analyses. Contact ENV for templates and example disclosure statements.

5.6.5 Community Impacts

Community impacts include Environmental Justice (EJ), Limited English Proficiency (LEP) and Title VI.

The goal of the community impacts assessment process is to examine how TxDOT's projects will permanently affect the communities. This assessment examines displacements, changes to access and travel patterns, and changes to community cohesion to determine if it will be affected after the project is complete.

To ensure compliance with Title VI of the Civil Rights Act and the Executive Order on Environmental Justice, projects are examined to determine if they will unduly burden minority and/or low-income populations. Additionally, this assessment ensures that populations that do not speak English fluently have an equal opportunity to participate in the public involvement process.

5.6.6 Hazardous Materials

Hazardous materials may be encountered on practically any transportation project. Additionally, hazardous material sources can be found in existing, adjacent, and proposed ROW. Consequently, the potential for hazardous materials should be assessed as early as possible when developing transportation plans or during project programming and development.

Hazardous materials/waste sites can pose a myriad of legal, regulatory, financial and technical problems to the department. TxDOT becomes exposed to substantial liability when it purchases contaminated parcels of land or if it owned property when waste was disposed of there (either by past agency practices, by third-party illegal disposal practices or by the activities of tenants). Under several federal and state statutes, claims can be made against the department for a variety of cleanup costs, as well as for personal or property damages. In addition to these costs, the additional time delay that results from cleaning up a contaminated site can add significantly to overall projects costs.

TxDOT conducts Initial Site Assessment (ISA) to identify potential contamination, waste, or other hazardous materials related issues for TxDOT construction and maintenance projects.

5.6.7 Historic Resources

The requirements for Section 106 of the NHPA and the ACT are codified in the U.S. Code of Federal Regulations and the Texas Natural Resources Code, but the work to satisfy these requirements is conducted under the Section 106 Programmatic Agreement (PA) or Memorandum of Understanding (MOU) with the Texas Historical Commission (THC). As the PA and MOU are deliberately parallel, the TxDOT review process satisfies all requirements of both the PA and MOU.

5.6.8 Section 4(f), 6(f) and Chapter 26

See **Section 5.5.3.2** for discussion on these properties.

5.6.9 Traffic Noise Analysis

A traffic noise analysis is required for certain types of roadway projects, such as projects on new location or that add through-traffic lanes. A traffic noise analysis predicts existing and future traffic noise levels and determines if adjacent noise-sensitive land uses would be impacted by traffic noise. When traffic noise impacts are identified, noise abatement measures, such as sound walls, must be considered. If sound walls are determined to be feasible and reasonable, then noise abatement is incorporated into a project after detailed constructability analysis and public involvement.

Traffic noise compliance is governed by sections of NEPA that address the avoidance and mitigation of traffic noise impacts resulting from roadway projects and the Federal Aid Highway Act. This act mandates FHWA to develop and promulgate guidelines and standards for highway noise levels.

Refer to the TxDOT.gov Traffic Noise Toolkit webpage for more information and guidance on tools to prepare materials compliant with regulations.

5.6.10 Water Resources

See **Section 5.5.3.3** for discussion on Water Resources.

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Authority documents:

- ☐ 23 CFR Part 772
- ☐ 30 TAC Chapter 213
- ☐ 36 CFR Part 800
- ☐ 43 TAC §2.251 et seq.
- ☐ Clean Air Act
- ☐ Coastal Zone Management Act of 1972 (CZMA)
- ☐ Department of Transportation Act of 1966
- ☐ Executive Order 12898
- ☐ Executive Order 13166
- ☐ Federal-Aid Highway Act of 1970
- ☐ Health and Safety Code
- ☐ Historical and Archeological Data Preservation Act of 1974
- ☐ Intermodal Surface Transportation Efficiency Act of 1991
- ☐ Marine Protection, Research, and Sanctuaries Act of 1972 (MPRSA), as amended
- ☐ National Environmental Policy Act (NEPA)
- ☐ National Environmental Policy Act of 1969 as amended
- ☐ National Historic Preservation Act of 1966
- ☐ National Historic Preservation Act of 1966 (NHPA), as amended, Section 106
- ☐ Natural Resources Code, Title 9 - Chapter 191 Antiquities Code
- ☐ Noise Control Act of 1972
- ☐ Texas Roadside Parks Study - Historic Context & National Register Requirements
- ☐ Texas Historical Commission
- ☐ Texas Roadside Parks Study - Historic Context & National Register Requirements

Resources to consult:

- ☐ Antiquities Code of Texas
- ☐ Bridge Project Development Manual
- ☐ Environmental Handbook – Air Quality
- ☐ EPA's Environmental Justice webpage
- ☐ FHWA Community Impacts webpage
- ☐ FHWA Environmental Justice webpage
- ☐ FHWA Field Measurement Guidance
- ☐ FHWA Lists of Historic Bridges webpage
- ☐ FHWA Traffic Noise webpage
- ☐ Hazardous Materials in Project Development Manual
- ☐ Health and Safety Code
- ☐ Historic Bridge Manual
- ☐ National Historic Preservation Act
- ☐ Statewide Climate Change and Greenhouse Gas Technical Report
- ☐ Texas Historical Commission's Historic Sites Atlas
- ☐ TxDOT.gov Environmental Compliance Toolkit webpage

Coordination:

- ☐ District environmental staff
- ☐ ENV staff
- ☐ BRG staff for historic bridges

Tools to use:

- ☐ Form 2440 – DSR

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Available training:

- ☐ EL4005 – The Basics of Community Impacts Assessment at TxDOT
- ☐ ENV108 – Air Quality 101 for Rural Districts
- ☐ ENV109 – Air Quality 101 for Major Metropolitan Attainment Districts
- ☐ ENV110 – ESA and Interagency Cooperation
- ☐ ENV111 – Air Quality 101 for Non-attainment and Maintenance Districts
- ☐ ENV114 – Hazardous Materials Management
- ☐ ENV115 – Highway Traffic Noise Analysis
- ☐ ENV125 – Traffic Noise Basics
- ☐ ENV129 – Best Practices for Completing the Conformity Report Form
- ☐ ENV204 – NRM Regional Field Course
- ☐ ENV209 – Advanced CRM Seminar
- ☐ ENV210 - Intermediate CRM Seminar
- ☐ ENV213 – Introduction to Biological Resources
- ☐ ENV415-423 – eLearning courses
- ☐ ENV424 – Individualized ISA Training – request through ENV
- ☐ ENV460 – TxDOT Biology Workshop
- ☐ ENV700 – Natural Diversity Database Training
- ☐ TxDOT.gov Environmental Training and Development webpage

* All training can be found in TxDOT's Training Catalog

5.7 Public Involvement

Public involvement is an ongoing phase of the project development process that encourages and solicits public input and provides the public the opportunity to become involved and informed in a timely manner regarding project development. Public involvement is an integral continuous part of project development.

The public should have accurate timely access to project information and input in decision-making processes. The level of involvement should reflect department policy adopted by the Texas Transportation Commission on January 27, 2011, for public involvement best practices.

The TPP - Public Involvement section was created to assist District and Division offices with public involvement efforts in project development and planning. The Public Involvement section is an on-site resource that provides the following services:

- Assists with official correspondence with the media;
- Assists with planning and conducting public meetings and open houses;
- Assists with planning and executing public involvement efforts;
- Facilitates meetings;
- Provides innovate public outreach tools and techniques;
- Writes and reviews public involvement plans; and
- Writes and reviews public meeting scripts.

Follow TxDOT guidance and procedures for meeting public involvement requirements for projects, either state or federally funded, undergoing the environmental analysis project development process as outlined in the references listed below.

Required public involvement must be completed prior to the final environmental decision.

5.7.1 Formal Public Involvement and Additional Public Outreach

Requirements for "formal" public involvement (PI) are outlined in the Environmental Handbook – Public Involvement (i.e., a notice and opportunity to comment, public meeting, opportunity for public hearing, public hearing, and various types of required notices). However, consistent with TxDOT's overall public involvement policy, the project team is encouraged to perform additional informal outreach with affected members of the public. Such informal outreach may include small group meetings, telephone conferences, online engagement surveys or emails with individuals or groups. This outreach should be performed with stakeholders such as business owners, property owners, homeowners' associations, residents of the community that the project is serving, etc., as appropriate – this "additional public outreach" should be documented in ECOS.

The following gives a brief description of the formal public involvement activities. Additional information is included in TxDOT's *Environmental Handbook - Public Involvement* document. Information on additional formal and informal public involvement activities is included in the statewide *Strategic Public Engagement Guidance*.

5.7.1.1 Notice and Opportunity to Comment

The purpose of a notice and opportunity to comment (NOC) is to inform real property owners and affected local governments and public officials of the project and allow them an opportunity to submit comments prior to the environmental decision on the project.

A NOC is required in the following situations:

- Acquisition of new ROW (including a temporary or permanent easement);
- Added capacity; and
- Construction of a highway at a new location.

If a public meeting, opportunity for public hearing, or public hearing is held for a given project, then it is not necessary to also do a separate NOC to comment so long as the notice of the public meeting, opportunity for public hearing, or public hearing is provided directly to the entities that would otherwise be entitled to receive a NOC.

5.7.1.2 Public Meetings

Public meetings are meetings with the general public and can be conducted in person, virtually, or both. Public meetings are tailored to suit individual projects and anticipated audiences.

Public meetings are typically planned and coordinated by TxDOT; however, for projects where a municipality, county, group of adjoining counties, regional mobility authority, local government corporation, or transportation corporation is the official project sponsor, that entity can plan and coordinate public meetings as long as **the TxDOT format and requirements are adhered to**.

For more information on virtual public meetings, contact TPP – Public Involvement Section.

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A public meeting is held to exchange ideas and collect input on the need for possible changes to design features, alternatives, potential impacts, and mitigation for a proposed project. Public meetings are intended to gather input from the public and to keep the public informed during any phase of a project.

All public hearings are types of public meetings, but not all public meetings are hearings.

Public meetings provide early and continuing opportunities during project development for the public to be involved in the identification of social, economic, and environmental impacts and impacts associated with the relocation of individuals, groups, or institutions. **There is no limit to the number of public meetings that may be held for a project.**

Public meetings are recommended for projects that:

- Require large amounts of ROW;
- Propose access changes; or
- Where displacements, impacts to historic properties, substantial public interest, or substantial public controversy are anticipated.

Public meetings may be recommended for projects that have other needs as well (e.g., projects with conflicting public opinion).

5.7.1.3 Notice Affording an Opportunity for a Public Hearing (NAOPH)

An NAOPH is required for specific projects, as outlined below, to determine if the public desires a formal public hearing. A project sponsor can hold a formal public hearing in lieu of providing an opportunity for a public hearing. The decision to afford an opportunity for public hearing is made by a project sponsor in consultation with the department delegate.

An NAOPH informs the public that a hearing may be held for a project if **ten or more** individuals request a hearing, or if an agency with jurisdiction submits a request supported with reasons why a hearing will be helpful.

In lieu of holding a public hearing, an opportunity for public hearing must be afforded if the project meets any of the following conditions:

- The project requires the acquisition of significant amounts of ROW;
- The project has a substantial adverse impact on or abutting real property; or
- The project is the subject of an EA. An opportunity for a public hearing is the minimum public involvement requirement for an EA.

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5.7.1.4 Public Hearings

Public hearings are conducted to provide an opportunity during project development for the public to be more formally involved in the identification of social, economic, and environmental impacts and impacts associated with the relocation of individuals, groups, or institutions. Information regarding a proposed project – including project design information, project alternatives, and environmental findings – is presented at a public hearing, and the public is encouraged to provide comment on the proposed project.

A public hearing or an NAOPH is required for all EAs, and a public hearing is required for all EISs. CE projects with any of the characteristics below also require a public hearing.

TxDOT holds a public hearing if any of the following statements apply to the project:

- Ten or more individuals submit a written request for a hearing, or an agency with jurisdiction over the project submits a written request for a hearing that is supported by reasons why a hearing will be helpful. However, a public hearing is **not required** if:
  - A public hearing was held concerning the project before the requests are received;
  - The hearing request(s) are received after the environmental review document or CE determination for the project is approved;
  - The hearing request(s) are received after the deadline specified in an NAOPH; or
  - The project sponsor has addressed all the concerns of the agency or persons requesting the hearing and they have submitted written withdrawals of their hearing requests such that no agency request and less than 10 individual requests remain.
- The project involves substantial public interest or controversy;
- TxDOT approves a DEIS;
- The project substantially changes the layout or function of a connecting roadway or an existing facility (e.g., addition of managed lanes, HOV lanes, bicycle lanes, bus lanes, transit lanes, etc.)
- TxDOT determines it is in the public interest;
- The project bypasses a municipality;

- The project requires the taking of public land designated and used as a park, recreation area, wildlife refuge, historic site, or scientific area, as covered under Chapter 26 of the PWC; or
- The project requires the use or taking of private land encumbered by an agricultural conservation easement purchased under Chapter 183 of the NRC.

5.7.2 Public Involvement Comments

The public has the opportunity during public involvement activities to comment on the proposed project location, design and cultural, economic, historical, and environmental impacts. These comments in whatever form they are received, must be documented in a Public Comment Response matrix and a response formulated.

Documentation requirements vary based on the type of public involvement conducted. Templates and guidance for the required documentation format are available on the TxDOT.gov Public Involvement Toolkit webpage.

Authority documents:

- ☐ 16 USC 470
- ☐ 23 CFR §771.111
- ☐ 23 USC 128:
- ☐ 23 USC 139
- ☐ 36 CFR 800
- ☐ 40 CFR §1500 et seq.
- ☐ 42 USC 2000d(1-7)
- ☐ 43 TAC §1.5
- ☐ 43 TAC §2.101 et seq.
- ☐ 43 TAC §2.104
- ☐ 43 TAC §2.105
- ☐ 43 TAC §2.106
- ☐ 43 TAC §2.107
- ☐ Texas Transportation Commission Policy, Minute Order 112555, January 27, 2011
- ☐ TTC §201.811
- ☐ TTC §203.021
- ☐ TTC §203.022
- ☐ TTC §203.023

Resources to consult:

- ☐ TxDOT's Public Involvement Policy
- ☐ Environmental Handbook – Public Involvement
- ☐ TxDOT's Strategic Public Engagement Guidance
- ☐ TxDOT.gov Environmental Compliance Toolkit webpage
- ☐ TPP – Office of Public Involvement webpage (TxDOT intranet only)
- ☐ TPP– Public Involvement Materials Toolkit (TxDOT intranet only)

Coordination:

- ☐ District environmental staff
- ☐ TPP –Public Involvement staff

Tools to use:

- ☐ Form 2440 – DSR

Available training:

- ☐ EPI100 – Effective Public Involvement
- ☐ ENV112 – Public Involvement for NEPA
- ☐ ENV402 – Public Involvement in the Transportation Decision Making Process

* All training can be found in TxDOT's Training Catalog

5.8 Interagency Coordination/Permits

Early coordination with regulatory and resource agencies allows for identifying and assessing project potential to affect jurisdictional interests of other agencies. Regulatory agencies have permitting requirements for proposed construction activities in their jurisdictional areas.

This section discusses the activities involved in identifying permit requirements, through coordination with agencies during early project development, so required permits can be obtained.

Table 5-1 provides a list of the most common types of interagency coordination and potential permits that may be required for the different areas of environmental compliance. District environmental staff should be consulted to determine the project specific requirements and timelines.

Table 5-1: Summary of Agency Coordination and Permitting

Resource	Agency Coordination	Permit
Air Quality	TCEQ, FHWA	
Archeological	THC	Antiquities Permit
Biological Resources (Threatened and endangered species)	TPWD, US Fish and Wildlife Service (USFWS)	Documentation of Applicability of Programmatic Consultation with USFWS-and/or Biological Evaluation and USFWS Concurrence -or- Biological Assessment and USFWS Biological Opinion
Chapter 26	Person, organization, department or agency that has supervision of the land	
Farmland Protection Policy Act	NRCS	
Hazardous Materials	EPA, TCEQ	
Historic	THC, State Historic Preservation Offices (SHPO), County Historical Commission	Historic Resources Research Design
Noise	Local Officials	
Section 4(f)	Official with Jurisdiction over 4(f) Property, THC, Tribal Historic Preservation Office (THPO)	
Section 6(f)	TPWD, NPS	Conversion Proposal
Water Resources	USACE, USCG	USACE Nationwide Permit (NWP), NWP with Pre-Construction Notification (PCN), USACE Individual Permit, USCG Bridge Permit, USCG Bridge Permit Exemption, USCG Lighting Exemption

Authority documents:

- ☐ Chapter 84 of the Texas Parks and Wildlife Code
- ☐ Coastal Barrier Resources Act of 1982
- ☐ Coastal Zone Management Act of 1972 (CZMA)
- ☐ Endangered Species Act
- ☐ Farmland Protection Policy Act (FPPA)
- ☐ Texas Pollutant Discharge Elimination System (TPDES)

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5.9 Environmental Clearance

This section describes finalizing required environmental documentation and public involvement to obtain approval by the ENV or the District.

5.9.1 Obtain Environmental Clearance

As outlined in the Assignment MOU regarding project delivery, the ENV is responsible for the management, control, and oversight of the NEPA environmental review and approval process for department-approved highway projects.

The department uses a Quality Assurance/Quality Control (QA/QC) procedure to achieve compliance with applicable laws, regulations, and standards. The ENV has provided extensive guidance documents, flowcharts, and forms to assist the project core team with meeting the environmental requirements.

5.9.1.1 Categorical Exclusion (CE):

A federal action may be "categorically excluded" from a detailed environmental analysis when the federal action normally does not have a significant effect on the human environment.

The documentation for a CE is approved by the District.

5.9.1.2 Environmental Assessment (EA):

The EA determines whether or not a federal action has the potential to cause significant environmental effects.

Generally, the EA includes a brief discussion of:

- The purpose and need for the proposed action;
- Alternatives (as required by section 102(2)(E) of NEPA);
- The environmental impacts of the proposed action and alternatives; and
- A listing of agencies and persons consulted.

Based on the EA, the following actions can occur:

- If the agency determines that the action will not have significant environmental impacts, the agency will issue a FONSI. A FONSI is a document that presents the reasons why the agency has concluded that there are no significant environmental impacts projected to occur upon implementation of the action; or

- If the EA determines that the environmental impacts of a proposed Federal action will be significant, an Environmental Impact Statement is prepared.

The EA document is approved for clearance by the ENV Director.

5.9.1.3 Environmental Impact Statements (EIS)

Federal agencies prepare an EIS if a proposed major federal action is determined to significantly affect the quality of the human environment. The regulatory requirements for an EIS are more detailed and rigorous than the requirements for an EA.

Summary of the EIS Process

1. An agency publishes a Notice of Intent in the Federal Register. The Notice of Intent informs the public of the upcoming environmental analysis and describes how the public can become involved in the EIS preparation.

   This Notice of Intent starts the scoping process, which is the period in which the federal agency and the public collaborate to define the range of issues and potential alternatives to be addressed in the EIS.

2. A DEIS is published for public review and comment for a minimum of 45 days.

   Upon close of the comment period, agencies consider all substantive comments and, if necessary, conduct further analyses.

3. A FEIS is then published, which provides responses to substantive comments.

   Publication of the FEIS begins the minimum 30-day "wait period," in which agencies are generally required to wait 30 days before making a final decision on a proposed action.

   EPA publishes a Notice of Availability in the Federal Register, announcing the availability of both DEIS and FEIS to the public.

4. The EIS process ends with the issuance of the ROD. The ROD:

   - Explains the agency's decision;
   - Describes the alternatives the agency considered; and
   - Discusses the agency's plans for mitigation and monitoring, if necessary.

The EIS document is approved for clearance by the ENV Director.

Authority documents:

- ☐ 23 CFR Part 771
- ☐ 23 CFR §771.101 et seq.

Resources to consult:

- ☐ TxDOT.gov NEPA and Project Development Toolkit webpage
- ☐ TxDOT.gov Environmental Compliance Toolkit webpage

Coordination:

- ☐ District environmental staff
- ☐ Division environmental staff

Tools to use:

- ☐ Form 2440 – DSR

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Chapter 6 Right of Way and Utilities

6.1 Overview

The acquisition of ROW or other property interests, utility adjustments, relocation or removal located near or on property impacted by a transportation project requires close coordination between TxDOT, local governments, property owners, utility companies, and other stakeholders.

ROW acquisition and utility accommodation processes are often on the critical path in a transportation project's schedule, therefore these issues must be identified in the early phases of project development and the transportation engineering practitioner should have a solid understanding of the ROW acquisition and utility accommodation processes to ensure that transportation projects are let or awarded on time. **District ROW staff and utility specialists should be part of the project scoping, PDCC, and DCC meetings to ensure the processes are followed correctly.**

ROW and utility issues will need to be resolved prior to the Construction phase for most transportation projects per the Ready to Let (RTL) definition (see Section 8.2.2).

ROW and utility tasks occur concurrently with the project development life cycle as shown in **Figure 6-1**.

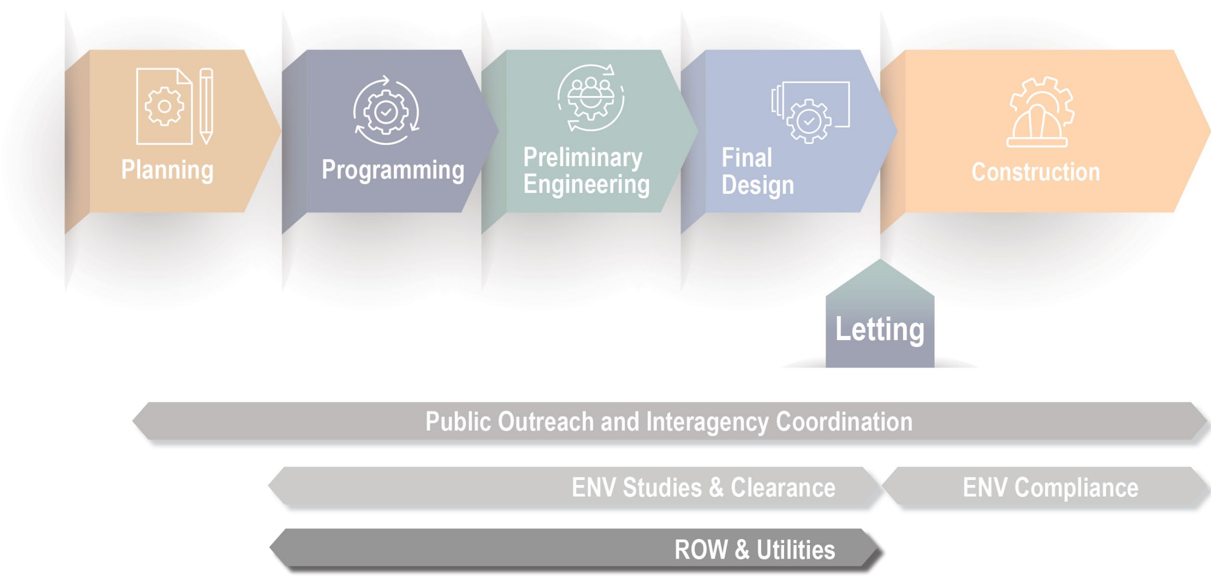

Figure 6-1: TxDOT's Project Development Process – ROW and Utilities

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This chapter includes discussion on the following topics that the transportation engineering practitioner should be familiar with concerning ROW acquisition and utility accommodations.

6.2 ROW and Utility Data Collection;

6.3 ROW Acquisition Process;

6.4 Utility Accommodation Process; and

6.5 ROW and Utility Participation Percentages.

6.2 ROW and Utility Data Collection

This section describes determining existing ROW limits and identification of utility owners that are in the existing ROW or on the proposed ROW. The design project manager and ROW project manager should work together with other SMEs (e.g., area office, survey, utility, SUE, etc.) to coordinate the work described.

6.2.1 Preliminary ROW Research

Determining existing ROW limits, restrictions to State ownership (e.g., easements, railroad licenses, etc.), and actual property ownership is a necessary first step in the identification of property interests. Property records and other records maintained by local public entities must be researched for this information.

This preliminary ROW data can be used in refining a recommended alignment to minimize ROW impacts to properties. Schematics for public view should also show ROW data collected, such as names of property owners and approximate locations of existing ROW limits.

Property ownership information can be obtained from:

- TxDOT records (real property asset map, as-built plans);
- Tax assessor maps from city, county and appraisal district offices; and
- Deed and easement records obtained from a county clerk's office.

Permission for ROE (see Section 4.2.3.1) or other written evidence of permission must always be obtained before entering private property to determine existing property ownership.

6.2.2 Utility Identification

Utility data is needed before establishing final alignments of the roadway and related features (e.g., storm drains and other excavation work) so that the design engineer may avoid or design around conflicts. This task involves identifying and marking the physical features of utilities and specifically determining elevations as well as horizontal positions. Examples might include manhole covers, gas pipes, overhead lines, water lines, sanitary sewer lines and fiber-optic cables.

The designer must **AVOID**, **MITIGATE**, or **ACCOMODATE** (in that order) for project utility conflicts to prevent delays and additional project costs. Early design and planning phases must include subsurface site characterization of various geologic, environmental, and utility features.

Existing utility locations must be furnished with the geometric schematic and/or plan sheets. Methods of identifying existing utility locations include:

- District Utility Installation Request records (utility permits);
- Existing Utility Joint Use Agreements from prior projects;
- Texas 811 call location services;
- SUE services (see **Section 6.2.2.1**);
  - Utility companies may be urged to consider SUE usage to determine critical or unknown locations of their facilities; and
  - TxDOT design teams are encouraged to make use of SUE services to optimize design.
- Known utilities that the district may be aware of, and can identify, or of other utility service providers/utility facilities in the nearby area; and
- Site visit and thorough examination of the proposed project location by TxDOT personnel.

While developing geometric schematics, there may be times when it is preferable to obtain some of the utility location data (i.e., for potentially very costly conflicts). Otherwise, most of this data is collected before beginning final design.

Undocumented utilities may have been installed without a record of their location. Electromagnetic line location (EMLL) or ground-penetrating radar (GPR) should be used to mark locations on the ground followed by potholing or excavation to determine the utility type. GPR can detect non-metallic targets without tracer wire.

Prior to performing any excavation work to identify underground utilities, a "locate request" through OneCall Board of Texas (OCB) (commonly referred to as "811") is required. A minimum 48-hour notice to 811 is required subject to the provisions in the Texas Utilities Code or TAC.

TxDOT or its contractor must contact the relevant railroad for any utilities within the railroad ROW including where the State crosses railroad ROW. **Utilities within railroad ROW are not identified in the OCB system.**

All utilities identified on a project should be documented in the Utility Conflict Analysis Template.

Considerations in identifying utilities:

- Engage District and utility SMEs to coordinate closely with utility owners. Utility owners will often supply copies of maps and as-built construction plans and do the potholing. It is in their interest to avoid relocating the utility and avoid damage by construction activities;
- **Rural water authorities** do not register with Texas 811 and are not included in the utility location request. Coordinate with these entities directly to have their lines marked, especially when the project is in a rural location;
- Typically, utility owners are responsible for accommodating TxDOT's proposed facilities subject to the provisions in Texas Utilities Code; therefore, it is advisable to meet with and inform utility owners of the proposed construction and potential for conflicts early in the planning phase. **Smaller utility owners may not be able to budget for relocations without extensive notice**; and
- For all bridge projects, this work must be completed prior to the project letting date. For locally owned bridges (i.e., off-system bridges), the cost for accommodating utilities is the responsibility of the bridge owner.

6.2.2.1 SUE

SUE is a non-destructive utility investigation to accurately locate, identify, and map underground utilities. It is an interdisciplinary service, involving professional engineers, geologists, and licensed land surveyors. SUE is a professional service resulting in signed and sealed deliverables. Accurate SUE information is critical to prevent costly redesign and change orders.

Major activities involved in SUE are:

- **Scope of Work**: A project-specific work plan that determines level of service versus risk allocation, schedule, and delivery method. SUE provider and TxDOT agree on work plan describing the SUE work to be performed.
  - Designating: Using surface geophysical techniques to determine the existence and horizontal position of subsurface utilities. Above ground surface markers (stakes, flags, etc.) or on the ground surface marking (paint) mark the locations.
  - Locating: Process of exposing precise horizontal and vertical position, size, and configuration of subsurface utilities.
- **Data Management**: Process of locating, surveying, and designating information and transferring it into project GIS files, plans, or CAD system.
- **Conflict Analysis**: Using a utility conflict matrix (UCM) or 3D model clash detection to do an engineering evaluation and comparing designated information with proposed

plans to inform all stakeholders of potential conflicts, possible resolutions, and costs to resolve.

The various levels of SUE investigations are described below.

- **Quality Level D (QL-D).** The most basic level of information. It comes from existing utility records or oral recollections. Its usefulness must be confined to project planning and route selection activities.
- **Quality Level C (QL-C)**. Involves surveying visible aboveground utility facilities, such as manholes, valve boxes, posts, etc., and correlating this information to Quality Level D. Its usefulness must be confined to rural projects where utilities are not prevalent or are not too expensive to repair or relocate.
- **Quality Level B (QL-B)**. Uses appropriate surface geophysical methods to determine the existence and approximate horizontal position of subsurface utilities. This two-dimensional horizontal mapping information is usually sufficient to accomplish preliminary engineering goals. Decisions can be made on where to place storm drainage systems and other design features to avoid conflicts with existing utilities. Slight adjustments in the design can produce substantial cost savings by eliminating utility relocations.
- **Quality Level A (QL-A).** Precise vertical and horizontal location of subsurface utilities obtained by exposure and subsequent measurement, usually at a specific point. Information provides the highest level of accuracy presently available. When surveyed and mapped, precise plan and profile information is available for use in making final design decisions. The use of nondestructive digging equipment, particularly vacuum excavation, eliminates damage to underground utility facilities traditionally caused by backhoes.

Commonly, Level C and Level D SUE are performed in the preliminary stages of project development to identify approximate utility locations. Level B SUE is typically performed to evaluate alternative alignments. When a recommended alternative has been identified, Level A SUE will be performed to affirm the exact utility location.

A consultant contract is typically needed to perform SUE services. It can take several months to execute a consultant contract. Coordinate with the District and Division SMEs to understand the timeframe to include in the project schedule.

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	Authority documents: ☐ Utilities Code Chapter 251
	Coordination: ☐ District ROW and utility staff ☐ ROW staff ☐ OneCall Board of Texas (OCB) – Also referred to as 811
	Tools to use: ☐ Form 2440 – DSR

6.3 ROW Acquisition Process

Under state and federal law, TxDOT can acquire the ROW needed for a transportation project. Identification of ROW for a project begins during preliminary engineering with the development of the geometric schematic and may continue into final design. It is important for the transportation engineer to understand the general ROW process and the importance of coordination with District and Division ROW and utility staff during project scoping and further project development.

Figure 6-2 details the general ROW process for on-system projects.

ROW cost is a significant part of overall project cost and should receive consideration with all engineering factors. When studying proposed project locations, the transportation engineering practitioner should consult with ROW staff regarding ROW impacts that may have prohibitive costs for:

- Acquisition of improvements;
- Major utility relocation;
- Severance damages;
- Wetland mitigation;
- Hazardous material site cleanup; and
- Relocation assistance.

All acquisitions and relocations of any displaced person or business must comply with all federal and state laws including the Uniform Relocation Assistance and Real Property Acquisition Act.

Clear communication amongst the project team is essential to ensure that all ROW needs are identified early in project development. For example, the drainage engineer may develop the need for a drainage easement, the traffic engineer may develop the need for additional fee title at an intersection, the roadway design engineer may develop the need for additional easements or fee title due to construction on soft soils, etc. All these conditions need to be identified and communicated as early as possible in preliminary engineering.

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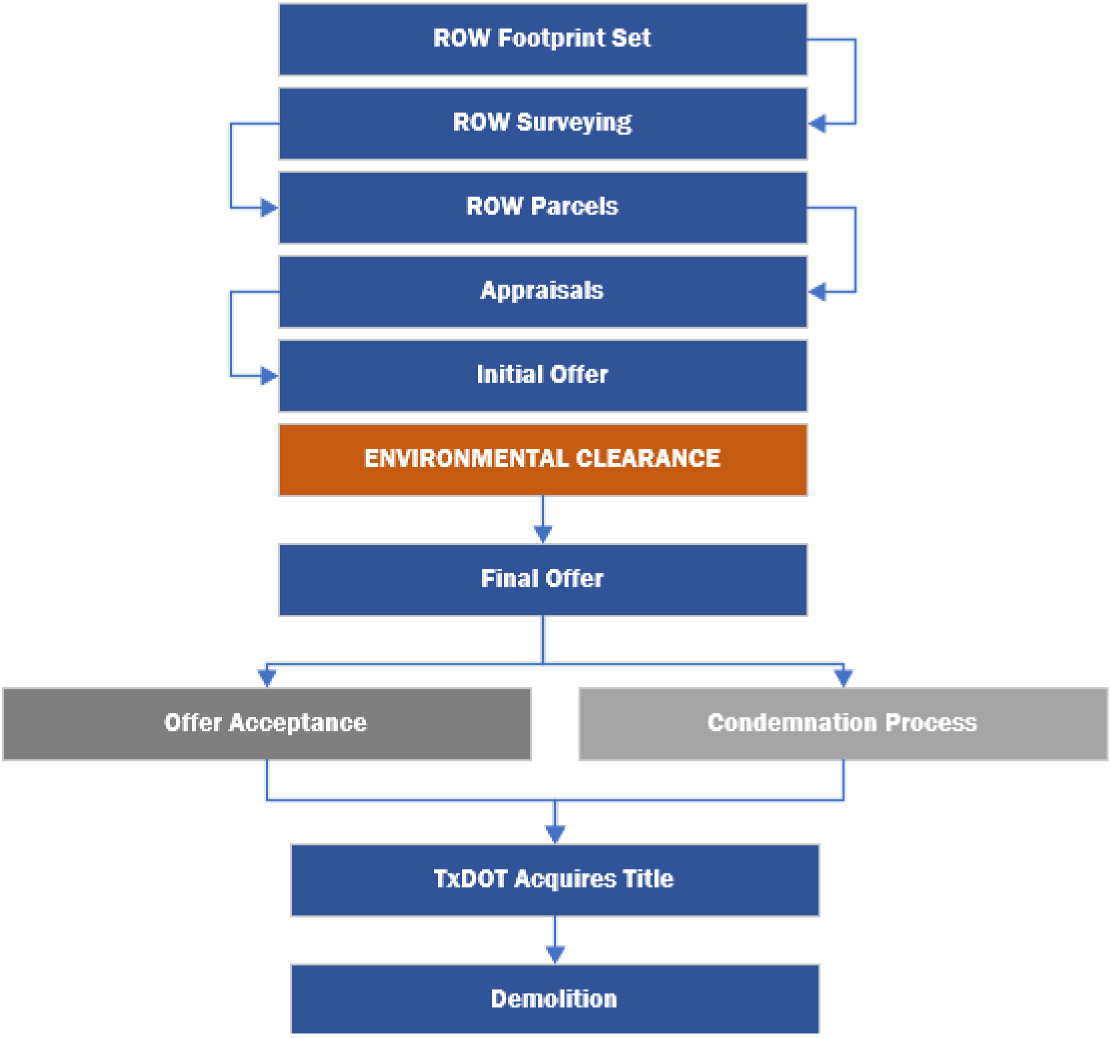

Figure 6-2: TxDOT's ROW Acquisition Process

Minor changes in design, such as change in alignment or adjustment of ROW width could affect the acquisition process and should be reviewed with District ROW staff prior to changes being made.

See **Chapter 4** and **Chapter 5** for information concerning preliminary engineering tasks, environmental studies/clearance and public involvement that lead to the ROW footprint determination (see **Section 4.7**). Once the ROW footprint has been determined and approved, tasks for acquiring ROW are started.

The District ROW and utility staff should be included in the Project Scoping Meeting (see Section 3.3) and the PDCC (see Section 4.2).

6.3.1 ROW Mapping

The definition of "ROW mapping" as used in this manual is the creation of GIS parcel features for the department's online mapping system (Real Property Asset Map) and signed and sealed property descriptions for each parcel.

6.3.2 ROW Control-Section-Job (RCSJ)

Costs associated with acquiring ROW must be charged to the **RCSJ (Project ID)**. This work can include:

- Appraising;
- Closing of transactions;
- Eminent domain (ED) proceedings;
- Negotiation;
- Relocation;
- Title certificates;
- Title insurance policies; and
- Utility agreements.

TxDOT personnel should request the RCSJ number, which is assigned by the ROW Program Office. To request a RCSJ number, TxDOT personnel must submit a completed form ROW-RM-CSJTPC Right of Way Total Project Costs (TPC). Once the TPC is received, funding for the entire project will be setup when the RCSJ is initiated.

TxDOT personnel can electronically submit the form to the ROW Program Office. Also, TxDOT personnel must enter the data into TxC. Once all the required information has been provided, the ROW Program Office will assign the RCSJ number upon receipt from the FIN.

A RCSJ must be generated before requesting a surveying consultant contract.

ROW cost should not be incurred or obligated without a formal authorization from the ROW - Contracts and Finance Section. Several requirements must be fulfilled as described in TxDOT's *ROW Acquisition Manual*. These requirements may include:

- Issuance of the FPAA (see **Section 3.5.2**);
- Geometric schematic approval (exceptions for advance acquisition parcels);

- Environmental clearance; and
- Public involvement (exceptions for advance acquisition parcels).

6.3.3 ROW Project in STIP/TIP

For non-attainment areas, the ROW Phase must be listed in the TIP and STIP, regardless of funding source.

6.3.4 ROW Footprint Determination

The first step in ROW acquisition occurs early in the design process and is the determination of the amount of land needed for the new or improved facility. Once this is completed, ROW parcels and legal descriptions of the individual parcels are prepared, as required by law, by a registered professional land surveyor.

On projects requiring additional ROW (including temporary or permanent easements), the goal of the department is to set the ROW footprint as early in the project development as possible. **Extreme care should be used in determining the ROW footprint** to ensure that all additional ROW needed for the project is finalized prior to commencing additional ROW acquisition tasks.

Changes in the ROW footprint may result in re-work of ROW mapping, parcel development and appraisals as well as re-study for environmental evaluation.

6.3.5 Parcel Features and Property Descriptions

Once the ROW footprint has been determined and approved by the District, parcel features are developed and uploaded to an ArcGIS geo-database known as the TxDOT Real Property Asset Map which takes the place of previous ROW maps. Development of parcel features and signed and sealed property descriptions is a ROW expense; therefore, funding approval and a RCSJ (see **Section 6.3.2**) must be obtained from the ROW after the Commission has given project DEVELOP approval before any work can begin.

Some parts of the ROW acquisition process (title and appraisal) can proceed with only the ArcGIS geo-database populated with the geometric schematic footprint. The final signed and sealed property description will be needed in the later stages of acquisition for the title policy, certified appraisal and as part of the deed.

Prioritize the sequence of parcel acquisition before beginning the acquisition process.

All surveying necessary for ROW acquisition must be performed under the supervision of a Registered Professional Land Surveyor

(RPLS). All surveying must conform to all applicable surveying laws, the Professional Land Surveying Practices Act and the General Rules of Procedures and Practices of the Texas Board of Professional Engineers and Land Surveyors.

Required information and format of property descriptions is found in TxDOT's *ROW Preliminary Procedures for the Authority to Proceed Manual.* The submission and approval process for ROW mapping is also found in previously mentioned manual.

Denial of access lines should be shown coincident with the ROW line on all parcels.

6.3.6 ROW Appraisals

After obtaining property descriptions, the ROW PM will request a title commitment prior to starting appraisals. Typically, appraisals are conducted using a Department Certified Appraiser selected through the ROWAPs contracts as outlined in TxDOT's *ROW Appraisal and Review Manual*. The certified appraiser conducts the appraisal of ROW acquisitions in accordance with state and federal guidelines.

Appraisal reviews and approval must be conducted by the District after appraisals are completed and before beginning parcel acquisition. The ROW may assist in the review and approval of appraisals. ROW has review and approval authority for values of acquisition by condemnation.

6.3.6.1 Project Data Information

The following project data should be supplied to ROW to assist with project development and the ROW appraisal:

- A general description of the type of facility contemplated, whether full or partial access control, facility length, and whether the project is a new location or widening of an existing ROW;
- A brief outline of the area to be traversed;
- Classification of properties involved;
- Physical and economic areas of similarity;
- Areas with and without utilities;
- Areas in transition from one classification to another; and
- Areas of special characteristics.

6.3.6.2 Contacting Property Owners

It is good practice for ROW – Project Delivery staff to make the initial contact with the property owner and secure permission for appraisers to appraise the property. If a property owner refuses to permit appraisers employed by TxDOT to enter the property to view it, the appraiser will take measurements and photographs, or make other necessary inspections, by legal means available which such entry can be gained.

6.3.7 Negotiations

Under Texas law, two offers must be made: an initial offer and a final offer. The Texas Property Code requires the **initial offer letter** to be sent via certified mail, return receipt requested.

Delivery of the offer constitutes initiation of negotiations and is the principal date for determination of relocation assistance entitlements. The landowner must be given at least **30 days** to review the initial offer.

Requirements for initial offers are:

- Initial offers on all on-system projects may be made before environmental clearance if the project is in the UTP (DEVELOP Authority) **and** legal descriptions are completed;
- State law prohibits initial offers being made prior to environmental clearance on Section 4(f) properties and property consisting of land protected under Chapter 26 of the Texas Parks and Wildlife Code (publicly owned land from a public park, recreation area, wildlife and waterfowl refuge, or any land from a historic site of national, state, or local significance as so determined by such officials; and public land that is designated and used as a park, recreation area, scientific area, wildlife refuge, or historic site; and
- Projects outside of the UTP (PLAN Authority) will still require TTC approval as indicated in the UTP programming guidance.

A **final offer letter** should be sent the same day, or as close as possible to the same day, as achieving environmental clearance. However, a final offer cannot be sent less than 30 days after the initial offer is sent. If a final offer letter prior to environmental clearance is desired, seek ROW Director approval.

More details concerning the negotiations process is found in TxDOT's *ROW Acquisition Manual.*

Everyone with an ownership interest in a parcel, including all tenants, must agree to the acquisition and sign the deed.

6.3.8 Environmental Considerations in setting the ROW Footprint

Environmental considerations in setting the ROW footprint and acquisition of property include:

- Community impacts of an acquisition, if any, should be determined prior to the acquisition;
- Acquisitions made prior to environmental clearance cannot influence the environmental review process including:
  - the need to construct the project;
  - the consideration of alternative routes; or
  - the selection of design or location of the project;
- All project activities proposed to take place on the parcel will be evaluated as part of the environmental review of the transportation project; and
- No activity that could have an adverse environmental impact (e.g., grading, clearing, demolition of structures, moving utilities) will take place on the parcel(s) prior to completion of the environmental review for the transportation project.

6.3.9 Local Public Agencies

Local Public Agencies (i.e., Local Governments (LG)) are often required to participate in transportation project development by performing or contracting directly for the acquisition of ROW and required adjustments of utility facilities .

Appraisals and ROW negotiations and acquisitions must be done in accordance with federal and state guidelines. More information on the purchase of ROW by LGs can be found in TxDOT's *ROW Real Estate Acquisition Guide for Local Public Agencies, Local Government Projects Policy Manual* and *Local Government Project Management Guide*.

Previously executed AFAs should be reviewed to determine LG responsibilities for ROW acquisition. If the LG is acquiring the ROW (e.g., off-system bridge projects may need wider ROW to accommodate a wider bridge width), TxDOT can prepare the ROW documents and provide them to the LG to begin acquisition.

Environmental clearance and ROW documents (e.g., maps, plats, and legal descriptions) must be completed before authorizing a LG to begin ROW appraisal and acquisition if the LG is asking for federal reimbursement for those tasks.

6.3.10 Impediments to Parcel Acquisition

Impediments to parcel acquisition are things that could adversely affect the ability to acquire ROW. These impacts may have prohibitive costs for major utility relocation, wetland mitigation, hazardous material site cleanup, acquired improvements, or could include parcels without clear record title, residents needing relocation, known contentious property owners, or severance damages.

The TxDOT PM, project engineers and ROW acquisition specialists should coordinate issues that might significantly affect the project schedule. They should prepare a prioritized schedule for acquiring parcels and a list of issues pertinent to each parcel.

This task must be done as soon as the impediment is identified. It will aid the acquisition team in prioritizing the parcel acquisition sequence.

6.3.11 Eminent Domain Process

TxDOT first attempts to acquire property through voluntary negotiations. If no agreement is reached, the department begins the eminent domain process, in which the State can purchase private property if an owner refuses to sell. Eminent domain is also used in cases to clear ownership and title issues. Refer to TxDOT's *ROW Eminent Domain Manual* for additional information.

Considerations for the eminent domain process:

- Eminent domain cannot be used to acquire property prior to environmental clearance; and
- Parcels may not be placed on the eminent domain minute order until environmental clearance is achieved.

Eminent domain proceedings can be time consuming, and the project's schedule should take this into account.

6.3.12 Joint-use/Multiple-use Agreements

Joint-use agreements are executed to permit TxDOT to use ROW owned by public entities (e.g., cities and counties) and quasi-public entities (e.g., utility and railroad companies) under certain conditions.

In most cases these entities will not sell ROW outright but will agree to share the ROW (e.g., shared ditch agreements). Sometimes ROW should not be purchased outright because this may involve assuming ownership and maintenance of utilities or other improvements within that ROW. Agreements can be used instead of buying ROW, such as railroad ROW, which is extremely difficult to buy. The agreement allows TxDOT to use the property subject to compatibility with use by the fee owner.

Multiple-use agreements are executed to allow use of TxDOT ROW for other than highway purposes. These agreements are executed with political subdivisions or state or federal agencies for public use of the ROW. These agreements are essentially a license to allow others to use TxDOT ROW. As an example, "unoccupied airspace" beneath elevated structures can be made available for parking lots, hike and bike trails, boat ramps, landscape areas, recreational, or other similar public facilities that may be operated without detriment to, or interference with, the utility of the highway.

Typically, **joint-use agreements** are between TxDOT and quasi-public entities; and multiple-use agreements are between TxDOT and public entities. Some of these agreements may have been prepared and executed during preliminary design preparation.

Responsibility for administering joint-use agreements is ROW. Responsibility for administering multiple-use agreements is shared by MNT and DES.

On highway projects that are in the design stage or under construction, proposals for multiple use development will be submitted to DES. On completed highway projects, proposals for multiple use will be submitted to MNT.

All property interests, including agreements, must be obtained before TxDOT activity may begin on a property.

6.3.13 Possession and Use Agreements

Possession and Use Agreements (PUAs) allow TxDOT to gain irrevocable possession of a parcel while at the same time allowing the landowner to continue contesting the ultimate compensation through the litigation process. The incentive is an independent market rental consideration paid to the property owner for the value of the advanced timing of possession. **PUAs with an incentive will be offered on every parcel, on every project, on a statewide basis.**

6.3.14 Right of Way Certification

A ROW certification is submitted for every project. The ROW certification certifies that required ROW acquisition is complete, or will be complete, by a certain date. Improvements on ROW must be removed, sold or demolished before construction begins.

Templates for certifications are found on the TxDOT.gov webpage referenced below.

ROW clearance certifications declaring that the ROW is clear or unclear must be prepared and submitted to DES before a project can be advertised for construction bids according to federal policy. If ROW acquisition is not clear before bid advertisement, the District must give anticipated acquisition completion dates that must include the status of acquisition and the effect on construction. These dates must be as accurate as possible since delays in ROW acquisition may result in contractor delays and claims.

The District Engineer signs project certifications which will be part of the project File of Record. A copy of the signed certifications is submitted, with other supporting documents, to DES for PS&E letting document review and processing.

Clear ROW certifications are required before a project can be advertised for construction bids except in certain cases.

6.3.15 Right of Way Encroachment Certification

The ROW Encroachment Certification is required for each project. An encroachment is typically an instance of privately-owned improvements existing on the State's project ROW. There are two requirements that must be met to properly address ROW encroachments:

- Requirements for Federally Funded Projects; and
- Requirements Under State Law.

Requirements for Federally Funded Projects – In order to advance a federally funded project, encroachments must be addressed as outlined in the *Federal-Aid Policy Guide, Section 1.23 (23 CFR 1.23)*. To meet these guidelines, the District can provide support documentation that leaving the encroachment in place will not impair the highway or interfere with the free and safe flow of traffic. When an encroachment is discovered on a project, this support documentation should be sent to DES with copies to CST and ROW. If this cannot be certified, then the encroachment must be addressed otherwise, which may involve removal or safety treatment, in order for the federal project to proceed and utilize federal funding.

Requirements Under State Law – The state requirements are derived from broad state laws involving the use of public property for private use. The current TxDOT interpretation applies this to highway ROW. The interpretation is that TxDOT must have a formal agreement with the owner of the encroachment to allow the encroachment to exist in the ROW. The options to comply with the state law have been determined to be: (1) remove the encroachment; (2) sell the area of the ROW to the owner of the encroachment; or (3) lease the area of the ROW to the owner of the encroachment. To address these requirements, the District should work with the ROW with copies of this information sent to DES and CST. These options must be pursued even if approval has been obtained in compliance with the *Federal-Aid Policy Guide* as discussed above.

6.3.16 Relocation Certification

A Relocation Certification is required for every project. If any ROW was acquired, certification of proper relocation assistance is necessary.

The District Engineer signs project certifications which will be part of the project File of Record. A copy of the signed certifications is submitted, with other supporting documents, to DES for RTL PS&E document review and processing.

For any certification that is not clear prior to letting, a **Triple-Zero – 000 – Special Provision** notification to the contractor must be included in the bid proposal identifying the items that are not clear (e.g., ROW parcels, relocations, etc.) and the anticipated date of clearance. A **Construction Management Plan (CMP)** must be developed and submitted prior to letting in accordance with the PS&E Review and Processing Schedule. Refer to the CMP SOP for additional guidance.

Authority documents:

- ☐ 23 CFR §635.112
- ☐ 23 CFR §710.503
- ☐ 23 CFR §710.505
- ☐ 42 USC Ch. 61 §4601 et seq.
- ☐ 43 TAC §11.21
- ☐ 43 TAC §15.50 et seq.
- ☐ 43 TAC §21.101 et seq.
- ☐ 43 TAC §21.111 et seq.
- ☐ 43 TAC §21.16
- ☐ 43 TAC §21.2
- ☐ 43 TAC §21.53
- ☐ 43 TAC §21.7
- ☐ 43 TAC Part 1 Chapter 21
- ☐ 49 CFR Part 24
- ☐ TTC §203.051
- ☐ TTC Chapter 203, Subchapter D
- ☐ Federal-aid Program or Projects: 49 CFR Subpart B
- ☐ Property Code § 21.046
- ☐ Texas Transportation Commission Minute Order No. 65169
- ☐ Uniform Standards of Professional Appraisal Practice

Resources to consult:

- ☐ Construction Management Plan SOP (TxDOT intranet only)
- ☐ General Rules of Procedures and Practices of the Texas Board of Professional Engineers and Land Surveyors
- ☐ Landowner's Bill of Rights
- ☐ Local Government Project Management Guide
- ☐ Local Government Projects Best Practices Workbook
- ☐ Local Government Projects Frequently Used Forms and Documents
- ☐ Local Government Projects Policy Manual
- ☐ Local Governments Projects ROW and Utilities workflow
- ☐ PS&E Preparation Manual
- ☐ PS&E Review and Processing Schedule (TxDOT intranet only)
- ☐ Real Property Acquisition Act
- ☐ ROW Acquisition Manual
- ☐ ROW Appraisal and Review Manual
- ☐ ROW Eminent Domain Manual
- ☐ ROW Preliminary Procedures for the Authority to Proceed Manual
- ☐ ROW Real Estate Acquisition Guide for Local Public Agencies
- ☐ ROW Utilities Manual
- ☐ Texas Property Code
- ☐ Texas Utilities Code
- ☐ TxDOT Submission Standards for ROW Mapping Data in the ArcGIS Format
- ☐ TxDOT.gov Local Government Projects Toolkit – Right of Way and Utilities webpage
- ☐ TxDOT.gov Real Property Asset Map webpage
- ☐ TxDOT.gov Right-of-entry for Environmental Investigations webpage
- ☐ TxDOT.gov Right of Way forms webpage
- ☐ TxDOT.gov Right of way Maps webpage
- ☐ TxDOT.gov Utility Accommodations Toolkit webpage
- ☐ Uniform Relocation Assistance
- ☐ UTP programming guidance

Coordination:

- ☐ District ROW and utility staff
- ☐ District survey staff
- ☐ ROW staff
- ☐ TPD Local Governments Support Section staff
- ☐ County appraisal district staff
- ☐ County clerk's office staff

Tools to use:

- ☐ Form 1002 – PS&E Transmittal Data
- ☐ Form 2440 – DSR
- ☐ Form 2443 – PSE Stage Gate Checklist
- ☐ Right-of-Entry Request form
- ☐ Utility Conflict Analysis Template
- ☐ ROW-RM-CSJTPC Right of Way Total Project Costs form
- ☐ Form 2044 or Form 2044-FED
- ☐ ROW-N-PUAIC Possession and Use Agreement with Additional Payment of Independent Consideration form
- ☐ TxDOT.gov Certifications – all template
- ☐ TxDOT.gov Unclear ROW for CMP template

Available training:

- ☐ CON812 – Local Government Project Procedures Qualification
- ☐ DES110 – Right of Way Considerations
- ☐ LPG101 – Local Government Project Procedures Qualification for TxDOT
- ☐ LGP102 – Local Government Project Construction Administration
- ☐ ROW001 – ROW Project Delivery Overview
- ☐ ROW099 – Introduction to Right of Way
- ☐ ROW690 – ROW Cost Estimating
- ☐ TPD319 – TxDOTCONNECT Right of Way and Utilities Overview
- ☐ TPD323 – TxDOTCONNECT Creating Parcels
- ☐ TPD359 – Advance Funding Agreements
- ☐ TxC training materials - Managing Right of Way

* All training can be found in TxDOT’s Training Catalog

6.4 Utility Accommodation Process

TxDOT highway and bridge projects often necessitate the adjustment of utility facilities to accommodate the design and construction of proposed transportation facilities. Failure to mitigate utility conflicts in the design process or to relocate facilities in a timely manner can result in unscheduled delays and increased project costs. This section describes activities associated with utility accommodations that the transportation engineering practitioner should be knowledgeable of to ensure that the project's schedule is inclusive of all utility accommodation tasks.

Public utility owners (companies) legally share state ROW, so when major changes are made to roadways, the changes very likely affect utilities. It is TxDOT's responsibility to formally notify all affected utility owners of proposed work as early as possible and to coordinate utility accommodations with the utility owners.

Typically, utility owners are responsible for moving their own facilities, including budgeting, locating existing lines, preparing plans, specifications and estimates, and letting contracts. Under some circumstances and depending on the funding type, TxDOT may fund utility adjustments. Furthermore, utility adjustment plans may be made part of the TxDOT project construction plans. These topics are discussed in more detail later in the section.

Figure 6-3 depicts the general utility accommodation process used by TxDOT.

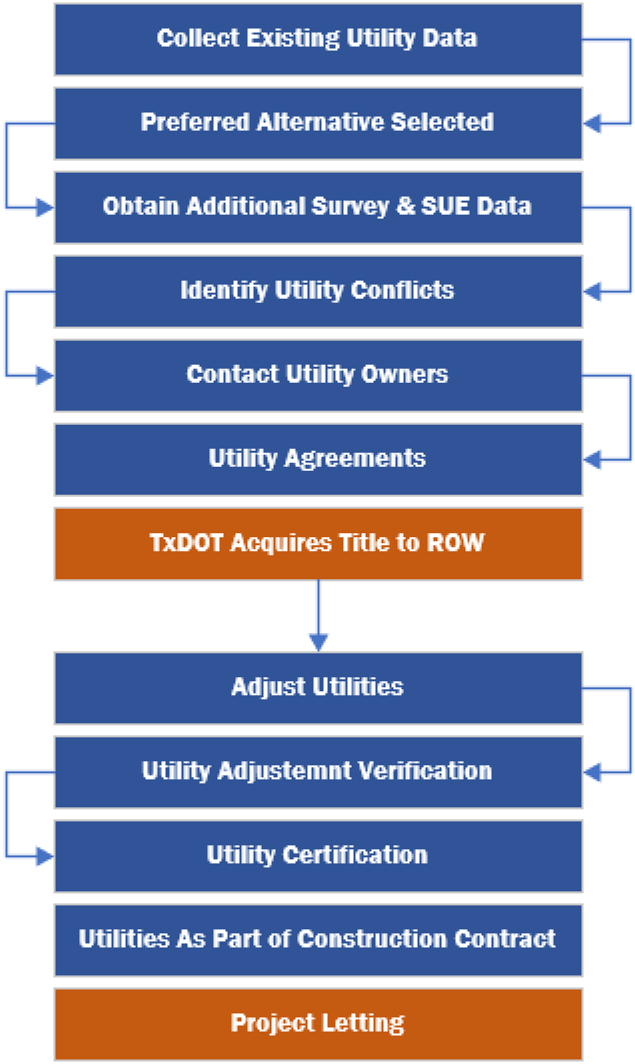

Figure 6-3: Utility Accommodation Process

6.4.1 Determination of Utility Conflicts

Once preliminary engineering is advanced to the point to set the ROW footprint (see **Section 6.3.4**), evaluation of utility conflicts can be identified. Roadway, bridge, drainage and traffic engineers should coordinate with the District utility coordinator to determine potential conflicts with the utilities. All utility conflicts should be documented using ROW's Utility Conflict Analysis Template.

The designer must AVOID, MITIGATE, or ACCOMODATE (in that order of preference) for project utility conflicts to prevent delays and additional project costs.

6.4.2 Contacting Utility Owners

To improve maintenance of traffic, mitigate work zone conflicts, and reduce construction delays, a multi-discipline planning and coordination meeting with utility owners, designers, and traffic engineers helps to ensure better coordination regarding designing, funding, and scheduling issues. After receiving TxDOT's plans or schematics, the utility owner must prepare their utility adjustment plans, which may include relocation.

Continuous coordination and involvement with the utility owners throughout project development is essential to maintain the project schedule and avoid costly delays. Utility owners must be advised of potential conflicts as soon as possible. **One or more years** may be needed to budget, design, and complete required adjustments.

Utility adjustment plans must:

- Show existing and proposed utilities;
- Show key TxDOT project features;
- Show temporary and permanent relocations - since temporary relocations may pose construction conflicts;
- Help resolve potential conflicts between utilities and construction activities; and
- Be incorporated into TxDOT PS&E, if the utility adjustment is included in the TxDOT construction contract (i.e., Joint Bid).

TxDOT may participate in the cost of eligible utility adjustments depending on the project funding type. This is called a reimbursable adjustment (see **Section 6.5.1**). When TxDOT acquires new ROW containing utilities, TxDOT typically participates in the cost of adjusting the utilities.

The department and the utility must negotiate a project utility agreement on terms of the relocation. If cost participation is sought, the utility will need to provide proof of the utility facility's underlying property interest.

TxDOT does not typically participate in the cost of adjusting the utilities when utilities do not have prior right, are in existing ROW and need adjusting. This is called a non-reimbursable adjustment (see **Section 6.5.2**).

Utility conflicts should be identified as early in project development as possible and coordination with affected utility owners should begin after the Design Concept Conference (DCC) (see **Section 7.2**). Once design of proposed features is substantially complete (i.e., Detail (60%) Milestone), plans should be sent to utility owners so they can begin designing their adjustments.

Considerations in coordinating utility adjustment plans include:

- Fabrication of major utility equipment may add **8 to 12 months** to the time required to complete the utility adjustment (e.g., transmission towers, greater than 18-in. diameter water pipe, or high-pressure pipelines);
- If TxDOT will participate in adjustment cost, the department's share must be included in the ROW project cost estimate; and
- The department may determine that it is preferable to design around a utility in accordance with the Utility Accommodation Rules, rather than require the owner to adjust the utility.

6.4.3 Utility Agreements

All required utility adjustments eligible for State cost participation must be performed in accordance with an executed "Utility Agreement." The agreement specifies each party's rights and responsibilities regarding the highway/utility interface.

Assignment of agreement approval authority, by the District or ROW, depends on the agreement type and other conditions. An agreement is required, even if the utility adjustment is incorporated in a TxDOT construction contract. More information on utility agreements can be found in TxDOT's *ROW Utility Manual*.

The Utility Agreement includes:

- Standard utility agreement form;
- Plans, specifications, and detailed cost estimates;
- Evidence of reimbursable interest; and
- The utility joint-use agreement.

6.4.4 Utility Adjustments

Utility companies cannot break ground or start the accommodation until after environmental clearance is obtained. Throughout the adjustment period, continuous coordination must be maintained between TxDOT and utility owners.

Changes in adjustment schedules and changes in field conditions can affect the overall construction schedule. Periodic inspection by TxDOT of the following items is essential during adjustment of the utility:

- Conformance with the TxDOT Utility Accommodation Rules;
- Conformance with plan requirements; and

- Traffic control in accordance with the TMUTCD and applicable Traffic Engineering Standard Sheets.

Considerations during utility adjustment include:

- Ensure effective communication among utility owners to prevent delays. A responsible party (e.g., Project Manager or Utility Coordinator) should follow up with utility owners on coordinating adjustments on a regular basis. One owner's facilities may not be able to be adjusted until another owner's facilities are adjusted; and
- Utility owners have legal rights to use highway rights of way in accordance with TxDOT policy, and they must be regarded as partners in the transportation business. Utility adjustments often require specialized equipment, trained crews, and expertise (e.g., fiber optic cables and electric transmission lines). They are often performed in advance of, and independently of, the transportation construction project. In some cases, the adjustment of a utility (e.g., water lines or drainage pipes) may be incorporated into the highway construction plans as joint bid to be executed by the contractor.

To avoid impacting proposed construction, start utility adjustments as soon as environmental clearance is obtained, necessary ROW is available, agreements are executed, and CONSTRUCT authority for the project is received.

6.4.4.1 Utility Adjustment Verification

The TxDOT Project Construction Engineer or the TxDOT Utility Inspector should check adjustment and relocation sites to ensure that:

- All items and equipment, including salvage and scrap, used in the adjustment process have been removed from the site;
- All backfill operations and site restoration have been successfully completed; and
- Utility markers have been placed in accordance with the UAR.

6.4.5 Utility Certification

A utility certification states that all utility work has been completed or that necessary arrangements have been made for it to be undertaken and completed as required for proper coordination with the physical construction schedule.

Clear utility certifications are required before a project can be advertised for construction bids except in certain cases.

For any certification that is not clear prior to letting, a **Triple-Zero – 000 – Special Provision** notification to the contractor must be included in the bid proposal identifying the items that are not clear (e.g., utility locations, etc.) and the anticipated date of clearance. A **Construction Management Plan (CMP)** must be developed and submitted prior to letting in accordance with the PS&E Review and Processing Schedule. Refer to the CMP SOP for additional guidance.

Templates for certifications are found on the TxDOT.gov webpage referenced below.

The District Engineer signs project certifications which will be part of the project File of Record. A copy of the signed certifications is submitted, with other supporting documents, to DES for RTL PS&E document review and processing.

Authority documents:

- ☐ 23 CFR §635.112
- ☐ 23 CFR 645 Subpart B
- ☐ 23 CFR Part 645
- ☐ 23 USC §123
- ☐ 43 TAC § 21.21 et seq.
- ☐ 43 TAC §21.22
- ☐ 43 TAC §21.31 et seq.
- ☐ 43 TAC Part 1 Chapter 21

Resources to consult:

- ☐ Construction Management Plan SOP (TxDOT intranet only)
- ☐ PS&E Preparation Manual
- ☐ PS&E Review and Processing Schedule (TxDOT intranet only)
- ☐ ROW Utilities Manual
- ☐ TxDOT.gov Utility Accommodations Toolkit webpage

Coordination:

- ☐ District utility staff
- ☐ ROW staff

Tools to use:

- ☐ Form 2440 – DSR
- ☐ Utility Conflict Analysis Template
- ☐ TxDOT.gov Certifications – all template
- ☐ TxDOT.gov Unclear Utilities for CMP template

Available training:

- ☐ ROW100 – Identifying and Managing Utility Conflicts
- ☐ ROW101 – TxDOT Utility Coordination
- ☐ TxDOT.gov TxDOT UESI Information Exchange Sessions webpages

* All training can be found in TxDOT's Training Catalog

6.5 ROW and Utility Participation Percentages

Table 6-1 details the percentage of participation by state, federal or local governments in ROW and utility eligible costs based on the type of project condition.

Table 6-1: ROW and Utility Participation

Condition	Right of Way or Eligible Utilities
Project is on the Interstate Highway System	100% State or 90% Federal/10% State or 80% Federal/20% State
Project is on the State Highway System (except Farm to Market System or Phase 1 Trunk System Corridor)	90% State/10% Local or 80% Federal/10% State/10% Local
Local On-system Improvement Project	Right of Way - N/A Utilities - 100% Local
Project is not on the State Highway System	100% Local or 80% Federal/20% Local
Project is on the FM/RM system (New FM/RM route)	100% Local
Project is on the FM/RM system (Existing FM/RM route)	100% State or 80% Federal/20% State
Project is on a Phase 1 Trunk System Corridor, On-System Turnpike Project, or Hurricane Evacuation Route	100% State or 80% Federal/20% State
State Park Road Program	100% State
On-State System Bridge Program	100% State or 80% Federal/20% State
Off-State System Bridge Program	100% Local
Off-State System Bridge Program - If bridge project connects Texas with a neighboring state	100% Local
On-State System Safety Program	100% State or 90% Federal/10% State
Off-State System Safety Program - If included in the Railroad Signal Safety Program	90% Federal/10% Local or 90% Federal/10% State
Transportation Enhancement Program, Transportation Alternatives Program, Transportation Alternatives Set Aside Program	80% Federal/20% Local
On-State System Safe Routes to Schools Program	100% State or 100% Federal
Off-State System Safe Routes to Schools Program	100% Local or 100% Federal

6.5.1 Reimbursable Utility Adjustment Costs

Costs of betterments that are necessitated by the requirements of the highway project are reimbursable (i.e., forced betterment). Where utility relocations are required for the project and costs are at the expense of the state, the District will review, approve, and forward the statement to the ROW along with its recommendation on reimbursement.

By statute, eligible reimbursable utility adjustment costs are included in ROW acquisition. Reimbursement will be according to the written agreement between the department and the utility.

Reimbursable Cost. Relocations of a utility facility are at the expense of the state, if:

- Improved segments on a state highway facility will occupy compensable property of a utility. This includes extension of a highway in an urban area; or
- The highway is designated as part of the National System of Interstate and Defense Highways. Relocation is eligible for federal participation. Document in the project Utility Agreement.

Shared Cost. The department and utility must share equal cost of the relocation of a utility facility that is required by:

- Improvement to a non-tolled highway that will add one or more tolled lanes;
- Improvement to a non-tolled highway that will be converted to a turnpike or toll project; or
- Construction on a new location for turnpike or toll project or expansion of such a turnpike or toll project.

After utility relocation is complete, utility owners must submit a final billing statement to the District. Utility relocation costs are the entire amount paid by the utility attributable to the relocation less:

- Increase in the value of the new facility;
- Salvage value of the old facility; and
- Other deductions established by regulations for federal cost participation.

6.5.2 Non-reimbursable Utility Cost

The department may cause or make a relocation of utility facilities, which are not reimbursable. The utility must reimburse the department for any amount expended by the department for relocation. This applies to a project, if:

- Relocation is essential to timely completion of a state highway improvement;
- Continuous service to utility customers is essential to the local economy or public well-being;
- Short-term funding situation for the utility would prevent a utility from being able to pay the cost of relocation in full or in part at the time of relocation, which would adversely affect their operations and essential services to customers; or
- The department has contacted the utility and reached an agreement that work activities will comply with laws and regulations, be done by qualified persons, and ensures disruptions of utility service will be minimized.

The utility must reimburse the department for the full cost of the relocation under terms of an approved advance written agreement for non-reimbursable utility work included in the PS&E.

Authority documents:

- ☐ 23 CFR 645 Subpart B
- ☐ 43 TAC § 21.21 et seq.
- ☐ 43 TAC §21.31 et seq.
- ☐ 43 TAC Part 1 Chapter 21
- ☐ TTC §203.092
- ☐ TTC §203.0921
- ☐ TTC §224.008

Resources to consult:

- ☐ ROW Utilities Manual
- ☐ TxDOT.gov Utility Forms and Publications webpage

Coordination:

- ☐ District ROW and utility staff
- ☐ ROW staff

Tools to use:

- ☐ Form 2440 – DSR

Available training:

- ☐ DES110 – Right of Way Considerations
- ☐ ROW101 – Utility Coordination
- ☐ TPD327 – TxDOTCONNECT Utility Functionality

* All training can be found in TxDOT's Training Catalog

Chapter 7 Final Design

7.1 Overview

Final Design is the phase of project development that occurs after the Preliminary Engineering phase (see **Chapter 4**) and includes the development of detailed and final PS&E. The final design phase results in a set of PS&E that is “ready to let” (RTL). Final design activities occur after a project has been granted DEVELOP authority as discussed in **Section 2.7.4**.

This chapter discusses the tasks associated with the **Final Design** phase of TxDOT’s project development process as shown in **Figure 7-1**.

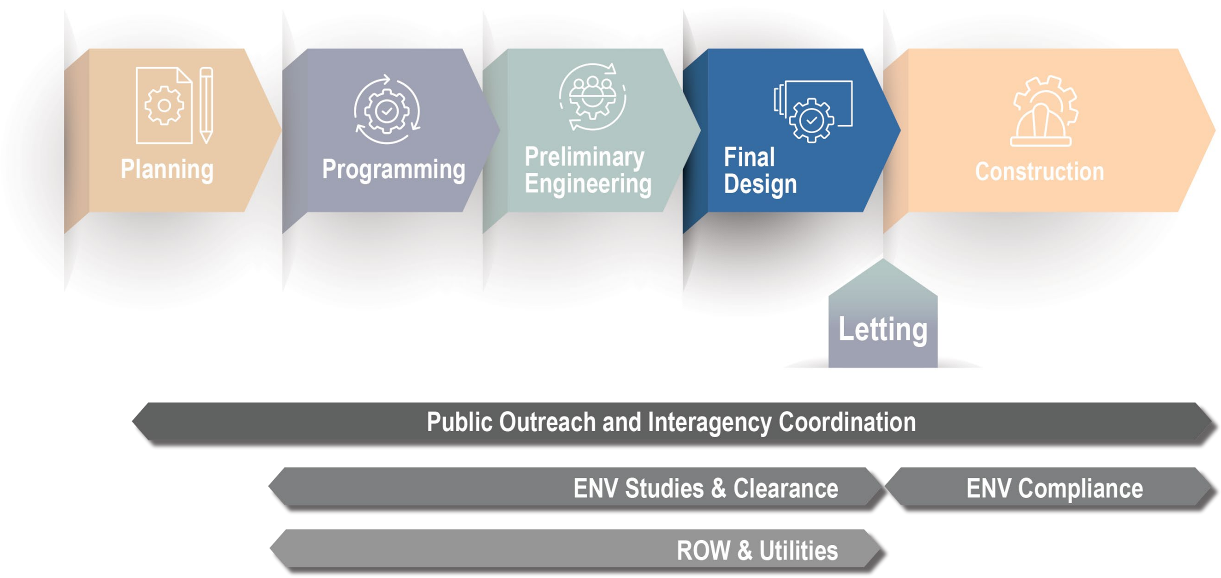

Figure 7-1: TxDOT’s Project Development Process – Final Design

This chapter includes discussion on the following tasks that typically take place in the Final Design phase.

7.2 Design Concept Conference;

7.3 Detailed Design;

7.4 Traffic Control Plan;

7.5 Roadway Design;

7.6 Retaining/Sound Walls & Miscellaneous Structures;

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7.7 Drainage Design;

7.8 Bridge Design;

7.9 Operational Design;

7.10 Railroad Design;

7.11 Environmental Design;

7.12 Miscellaneous Design; and

7.13 PS&E Submission, Review and Processing

7.2 Design Concept Conference

The Design Concept Conference (DCC) marks the beginning of the Final Design phase of project development and occurs after most of the preliminary engineering tasks have taken place. The DCC provides the opportunity for key people to review the preliminary engineering design and parameters, accept or change them, and formally endorse decisions. These decisions provide a foundation for the design team to commence detailed design work for plans production.

The DCC is especially useful for projects that:

- Have different design teams involved in the preliminary engineering and final design phases of project development; and
- Experienced a delay between the end of the preliminary engineering phase and the start of the final design phase.

For projects that have simple preliminary engineering tasks or no delay between preliminary engineering and final design, the DCC can be eliminated with the use of a PDCC (see **Section 4.2**) instead.

The purpose of the DCC is to:

- Review basic design parameters, concepts and criteria that were established during preliminary engineering;
- Confirm or change design criteria as necessary to commence detailed design work;
- Obtain concurrence with decisions made during Preliminary Engineering phase;
- Determine additional data to be collected;
- Evaluate the environmental document (if previously developed);
- Review the Risk Register to update status on previously identified risks and identification of new risks; and
- Update the DSR form (while all items will not be applicable to all projects, overlooking any item may significantly delay the project. This form will help ensure that the project team does not overlook potentially critical issues).

The following information should be available before holding the DCC as applicable:

- ADA non-compliant pedestrian facility data;
- Aerial photographs and topographic surveys;
- Approved environmental document and commitments;

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- Bike/Ped/Transit needs analysis;
- Environmental constraints (e.g., impacted properties, historical structures, wetlands, etc.);
- Existing utilities;
- Geometric schematic or geometric layout;
- Hydraulic studies and analyses;
- ICE documentation;
- Identification of required permits and agreements;
- LOS analyses;
- Most recent construction cost estimate;
- Preliminary geotechnical surveys;
- Preliminary pavement design;
- Preliminary typical sections;
- Public involvement documentation;
- Safety analyses;
- Site visit photos and notes;
- Traffic and crash data;
- Utility coordination documents; and
- VE analysis (if applicable).

If the Final Design team and Preliminary Engineering team are different, invite Preliminary Engineering team members to brief the Final Design team on project commitments, decisions, special problems or constraints.

7.2.1 Additional Data Collection

Additional or updated data is collected when this phase of project development begins. If the project is inactive for some time, it is possible that data may have changed and needs to be updated prior to commencing final design. Some of the items that are evaluated for changes include:

- **ROW maps.** ROW maps need to be obtained as part of data collection. ROW maps are used to define limits of, and rights to use, state property.
- **Easements.** If construction is proposed within existing easements, obtain a copy of the original conveyance document for the easement and check for restrictions on property use.
- **As built construction plans.** As built plans provide important data regarding project features not apparent from the surface and geometric features, such as vertical curvature, which are not readily obtained by field surveys.
- **Traffic data.** Traffic data is used to determine: the number of lanes needed, intersection channelization geometry, pavement design requirements, and desired safety-related improvements. If the project is part of the highway freight network,

design vehicle type will influence pavement design, width, and curvature of turnarounds and intersections.

- **Crash data**. Crash data can be obtained through the CRIS webpage to determine crash concentrated areas.
- **Site visit information.** The project team uses the site visit to identify issues requiring additional studies that are not readily apparent from a two-dimensional plan set or three-dimensional modeling and to identify items which have significantly changed from data collected during preliminary engineering. Use the site visit to observe existing traffic patterns and operational/safety issues that may need to be addressed.
- **Utility information.** Depending on the location of the project, in a rapidly growing area, utilities may have changed drastically during long lag periods between project development phases.
- **Preliminary cost estimates.** Preliminary cost estimates are prepared during preliminary engineering. Cost estimates may change substantially due to the amount of time since the preliminary design was completed or due to changes in project scope. Update the project cost estimate as necessary and update the estimate in TxC.

7.2.2 Environmental Document Reevaluation

A reevaluation of the environmental document is required in situations discussed in **Section 5.4.3**. The reevaluation establishes whether the environmental decision remains valid or additional work is needed.

7.2.3 Additional Survey, SUE and Geotechnical Tasks

Additional survey, SUE and geotechnical studies may be needed to commence final design activities. Most field data collection will have occurred during preliminary engineering. However, as a large project develops, it is common for the designer to determine that existing data may be insufficient or need updating.

Additional field survey, including survey needed for performing final hydraulic studies, is begun as soon as the final ROW footprint is set (see **Section 4.7**), if possible. Additional SUE tasks are initiated after potential utility conflicts have been determined.

Similarly, additional geotechnical cores for bridge and/or retaining walls and sound walls are identified and initiated after locations are set during preliminary engineering. Geotechnical investigations also include obtaining data for designing high mast illumination, signals, and overhead sign structures.

These tasks can take several months and should be included in the project schedule.

7.2.4 Traffic and Safety Analysis

Final design phase analysis is a high-detail analysis that is often performed with more data than projects in other stages of development. While study limits for projects in this stage could be broad or narrow, they are well defined.

Refer to the TSAP Manual for details on the data and tasks to complete for traffic and safety analysis procedures to complete during this phase.

Resources to consult:

- ☐ Statewide Traffic Analysis and Reporting System
- ☐ TAMES/TCAP Toolbox (ADA Barrier Information)
- ☐ Traffic and Safety Analysis Procedures Manual
- ☐ TxDOT Crash Records Information System (CRIS) webpage

Coordination:

- ☐ District planning, design, pavement, construction, bridge, traffic, ROW, utility, laboratory and environmental staff
- ☐ Area office staff
- ☐ Maintenance staff
- ☐ Division staff (as appropriate)
- ☐ Local government staff (if applicable)

Tools to use:

- ☐ Form 2440 – DSR
- ☐ Statewide Planning Map

Available training:

- ☐ DES110 – Right-of-Way Considerations
- ☐ ROW101 – Utility Coordination
- ☐ TPD327 – TxDOTCONNECT Utility Functionality

* All training can be found in TxDOT's Training Catalog

7.3 Detailed Design

Detailed design includes the design and preparation of the final PS&E for construction letting. Generally, detailed design does not begin prior to the review and approval of the geometric schematic for new location or added capacity projects. However, at the Districts' discretion, detailed design may be performed concurrently with the geometric schematic design to advance a project's letting or meet other requirements.

Obtain approval from the District TP&D prior to commencing concurrent schematic and detailed design tasks.

Detailed design includes the final design of the following project elements:

- Traffic Control Plan;
- Roadway Design;
- Retaining/Sound Walls and Miscellaneous Structures;
- Drainage Design;
- Utility Design;
- Bridge Design;
- Operational Design;
- Railroad Design;
- Environmental Design; and
- Miscellaneous Design.

7.4 Traffic Control Plan

Traffic control is planned during preliminary engineering, however detailed Traffic Control Plan (TCP) plan sheets, appropriate for the complexity of the project are developed during the final design phase of project development. TCP sheets provide for moving traffic (including bicyclist, pedestrians, and transit vehicles) through or around the construction work zone in a safe, expeditious, and clear manner.

A TCP typically consists of the following plan sheets:

- Traffic Control Plan Narrative;
- Traffic Control Plan Typical Sections;
- Traffic Control Plan Layouts;
- Traffic Control Plan Miscellaneous Details; and
- Traffic Control Standards.

TCP plan sheets for low rigor projects typically include the TCP Narrative sheet and applicable standards as a minimum.

The TCP must clearly show provisions to efficiently move users through or around a work zone with minimal delay and minimize potential hazards to transportation users in the vicinity of a work zone and highway workers at the work zone interface with traffic. Workers include, but are not limited to, contractor and subcontractor personnel, utilities, TxDOT, and law enforcement performing duties within the transportation ROW.

Coordination of work zone impacts may extend beyond the physical location of the work zone itself and to all modes of transportation, workers, and/or the regional transportation network. The scope of the coordination is based on the project characteristics to provide optimal development of the project TCP.

Refer to the RDM for temporary traffic control design criteria. Refer to the TMUTCD and TxDOT Traffic Standards for guidance on TCP design.

7.4.1 TCP Narrative

The TCP Narrative describes the sequence of work (i.e., the construction staging) to be performed as shown in subsequent TCP sheets. Construction staging plans detail the recommended phasing of project improvements. Staging must maximize mobility and safety during construction, while considering ease of construction.

Considerations in developing construction staging include:

- Evaluate potential of construction impacts on existing traffic (e.g., pavement drop offs, work adjacent to travel lanes, placement of barrier, lane closures, etc.);
- Consider the need for nighttime illumination of construction area;
- Coordinate with District Pavement Engineer to obtain temporary pavement designs;
- Make sure that nontypical and transition areas are modeled accordingly;
- Consider safe operation for pedestrians and bicyclists in all stages of construction including markings, traffic control devices, and barriers;
- Provide continuous safe access to all properties during construction. Staging must consider property owner access, and this must be included in the plans; and
- Evaluate the effects of construction on utility adjustments (e.g., ensure excavation does not impact utility foundations, etc.).

7.4.2 TCP Typical Sections and Layouts

The TCP Narrative (i.e., construction staging) is generally conveyed through TCP typical sections and TCP layouts. For traffic control on existing pavement and parallel routes, provide a detailed layout and arrangement of construction signs, construction pavement markings, traffic control devices (including temporary signals and signal heads), and drainage facilities for each construction stage. Bicycle, pedestrian, and transit vehicles should also be considered when developing a TCP layout.

Dimension typical sections and plans both horizontally and vertically as necessary to result in a safe product. Use various shading of shapes to differentiate the construction stages (e.g., solid shade for previous stage construction, hatched pattern for current stage construction, etc.).

TCP must maximize traffic operations and road user/construction worker safety during construction. Details may be needed for parallel routes or shifted traffic on existing pavement. Nighttime work may also be specified.

TxDOT standard sheets must be used whenever possible because of contractor and inspector familiarity with these sheets. Details may be developed to provide a higher level of information and direction than contained in the standard sheets.

7.4.3 TCP Miscellaneous Details

Miscellaneous layouts and details are included in the plan set to depict items such as detours, temporary ramp details, temporary retaining wall/shoring details, etc. Specific information on the design of detours is provided in **Section 7.4.3.1**.

7.4.3.1 Detour Plans

Detours may be required to maintain traffic during certain construction stages. Detours may include rerouting traffic to existing parallel routes, constructing temporary paved routes, or a combination thereof. Impacts to existing parallel routes and the capacity to handle additional traffic must be analyzed. Improvements to detour routes may be needed, such as pavement overlay, bridge widening, bridge replacements, adjustment to signal timing or intersection improvement for truck turning movements.

Detailed layout and arrangement of construction signs, construction pavement markings, traffic control devices, and interim drainage facilities must be provided for each detour. Coordinate with the District Pavement Engineer to obtain detour pavement designs. Plans must include typical section, grade, stopping sight distance, horizontal curve radii, and superelevation, as appropriate. Refer to the RDM for temporary traffic control criteria. Consult the TMUTCD and the Traffic Standards to develop the TCP.

Considerations in developing detour plans include:

- Determine if a temporary construction easement is required and coordinate this with District environmental and ROW staff;
- Coordinate detour plans with local entities and major traffic generators;
- Evaluate impact on existing utilities (e.g., access utility cover and clearances);
- Make sure that nontypical and transition areas are modeled accordingly;
- Consider safe operation for motorcycles, pedestrians and bicyclists in all stages of construction including pavement markings, traffic control devices, and barriers;
- Consider impacts to schools, emergency vehicles, pedestrians, bicyclists, and neighborhoods due to traffic rerouting;
- Detours must be designed to operate at the existing regulatory speed whenever possible. When this cannot be accomplished, an advisory speed may be used or a Request for Regulatory Construction Speed Zone (Form 1204) must be submitted. Design the detour to meet the approved lowered construction speed limit; and
- Provide continuous safe access to all properties during construction. Staging and detour design must consider property owner access, and this must be included in the plans.

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Coordination and preliminary approval of road closure/detour plans is initiated when a road closure or detour is first considered.

7.4.3.2 Approval Of Road Closure/Detour Plans

Closing a roadway during construction may impact local governments and businesses, emergency services, school districts, and the post office. Coordinate with entities such as the post office, county, city, school district, major employers, and emergency vehicle response teams to minimize the impact of a road closure on the community. Discussion and preliminary approval of road closure/detour plans is initiated when a road closure or detour is first considered.

On-system roadways must not be closed, unless highly unusual circumstances exist. On-system closures require an executed signed Form TEA30A “Agreement for Temporary System Closure of State Right of Way” obtained from CSD.

Impacts to off-system roadways may result from completely closing a roadway to rehabilitate or replace a bridge or from using an off-system facility as a detour route for an on-system closure. These impacts must be coordinated with the affected local entities. Obtain written concurrence from entities having jurisdiction over affected roadways. Place signed local entity concurrence documents in the project File of Record (see **Table 7-1**).

For all temporary road closures, prepare a Temporary Road Closure Approval Memorandum to be signed by the District Engineer that contains the following information:

- Project description;
- Detour route map (include location of the project site, the detour route including length and current physical condition, the amount of traffic (ADT), and the percentage of trucks using the road to be closed);
- Anticipated road closure duration;
- Recommendations to expedite project completion (i.e., calendar days, liquidated damages); and
- Documentation of required notifications, concurrence letters and/or agreements.

Submit a signed copy of the District Engineer’s Temporary Road Closure Approval Memorandum to DES with the RTL plans and supporting documents.

Impacts to the traveling public due to detours may be calculated in the form of road user costs. If these impacts are substantial, a special provision may be included in the PS&E to require payment of increased liquidated damages by the contractor. Refer to the TxDOT.gov Road User Costs webpage for information on calculating road user costs.

Table 7-1: Document Coordination with Affected Entities

Closed Route Type	Detouring To	Documentation Required
Off-System	Off-System On-System	Letter of concurrence signed by city and county officials
On-System	Off-System	Executed “Agreement for Temporary System Closure of State Right of Way” outlining the responsibilities between Contracting Parties
On-System	On-System	Return receipt or signature confirmation to document that notification was delivered to local government officials (including post office, fire, police, EMS, and school district)

7.4.4 TCP Contract Requirements

A TCP may require developing specific contract requirements. These requirements are shown on the plan sheets or are included in the General Notes along with required Special Provisions in the specification list. Request a copy of the District’s Master General Notes (refer to TxDOT’s *PS&E Preparation Manual*) to obtain specific language to address the following subjects:

- Work hour restrictions;
- Lane closure restrictions;
- Access to work area;
- Use of off-duty law enforcement personnel; and
- Accelerated construction provisions.

7.4.5 TCP Review

Each District must have a District Safety Review Team (DSRT). The DSRT is a multidisciplinary team of individuals having sufficient authority to implement, monitor, and review the application of safety techniques and strategies, including project traffic control plans.

The DSRT may be made up of members from the following list:

- District Design Engineer;
- District Construction Engineer;
- District Traffic Engineer;
- District Maintenance Engineer;
- Area Engineer;
- Traffic Safety Coordinator; and
- Public Information Officer.

The DSRT reviews as many traffic control plans as practical, but more importantly, the DSRT should be involved in developing the TCP to eliminate the need for lengthy reviews. The review process must address all areas which influence work zone operations. Some projects may require a focus on a particular area of concern. Apply lessons learned from previous projects' review efforts to address safety and mobility.

Generally, the DSRT reviews TCP during the Detailed (60%) milestone submission review by the District and subsequent milestone submissions as deemed necessary.

Authority documents:

☐ 23 CFR §630 Subpart J

☐ 43 TAC §22.12

☐ Government Code, Chapter 771

☐ Government Code, Chapter 791

☐ Transportation Code Chapter 201

☐ Transportation Code Chapter 221

☐ TTC §224.091

Resources to consult:

- ☐ Procedures for Establishing Speed Zones Manual
- ☐ PS&E Preparation Manual
- ☐ Roadway Design Manual
- ☐ TMUTCD
- ☐ TxDOT Traffic Standards
- ☐ TxDOT.gov Road User Costs webpage
- ☐ Use of Right of Way by Others Manual

Coordination:

- ☐ District Traffic Engineer
- ☐ District Pavement Engineer
- ☐ District ROW staff
- ☐ CSD staff
- ☐ Local government officials (if applicable)

Tools to use:

- ☐ Form 2440 - DSR
- ☐ Form 1204 – Request for Regulatory Construction Speed Zone
- ☐ Form TEA30A - Agreement for the Temporary Closure of State Right of Way (TxDOT intranet only)
- ☐ District specific Master General Notes file – no link

Available training:

- ☐ PLN210 – Plan Work Zone Traffic Control
- ☐ TCC358 – Temporary Traffic Control and Safety in Short-term Wok Zones

* All training can be found in TxDOT's Training Catalog

7.5 Roadway Design

This section discusses tasks necessary to finalize horizontal/vertical alignments; intersections and driveway design; earthwork of the proposed facility; bicycle and pedestrian facilities and additional details related to the roadway design. Refer to the RDM for design criteria required for the specific roadway functional classification and context classification.

7.5.1 Final Horizontal/Vertical Alignments

Finalizing horizontal and vertical alignments is necessary before proceeding into detailed roadway design and plans development. Environmental impact minimization, safety enhancement, operational improvement and constructability are elements that must be considered during this process. Drainage headwater elevation and hydraulic grade lines are also important determinants in setting roadway profile grades.

Issues that may warrant modifications include final design of superelevation rates, stopping sight distances (SSD), intersection geometry, grades, access connections, traffic management during construction, major utility adjustments, and drainage facilities. Changes may also be required for minimizing impacts to Section 4(f) properties, wetlands, ROW and threatened or endangered species.

Finalizing horizontal/vertical alignments is an iterative process with drainage design. Design considerations for drainage facilities may require curve or profile grade changes. This task should be coordinated closely with the drainage engineer.

Tasks to be completed in developing final horizontal/vertical alignments include:

- Evaluate the 3D model for preliminary alignments, including tie-ins at access connections;
- Evaluate preliminary alignments for opportunities to minimize environmental impacts and enhance constructability;
- Ensure compliance with basic design criteria;
- Ensure sight distance criteria is maintained at intersecting roads and driveways;
- Check construction staging when setting profiles to reduce large differences in grade during construction if possible;
- Ensure drainage considerations are addressed by adjusting roadway grades and curves with regard to hydraulic grade lines;
- Verify stream crossing elevations and hydraulics (i.e., set roadway profile to account for bridge structure depths and low chord elevation);

- Evaluate construction staging for major drainage structures in setting alignments and profiles;
- Carefully design intersection grading to accommodate drainage structure headwater elevations;
- Ensure that proposed ditch capacity is adequate; the interrelated elements of ditch capacity, roadside slope safety, and roadway grade need to be properly designed to provide a safe facility; and
- If the job is in a tidal area, consider storm surge (tide) analysis.

7.5.2 Intersections and Driveways

Intersections and driveways are designed to clearly show pavement contours, profile grades, drainage, locations of sidewalks, pedestrian ramps, pavement structure, and limits of construction.

Frequent access points cause both operational and safety issues. Ensure the driveway spacing is as large as possible and shared access for neighboring facilities has been explored during project development, per TxDOT's *Access Management Manual* (AMM). Tight spacing between driveways causes operational and safety issues which are exacerbated when multiple access points to one facility are present. Per the AMM, "as access density increases, crash rates increase".

7.5.3 Earthwork

Earthwork quantities should be developed from the 3D model using the final alignments. Side slopes and ditch grades should be evaluated and modified to provide a safe and economic design. Special attention should be paid to the tie-ins at intersections and driveways.

7.5.4 Bicycle and Pedestrian Accommodations

Preliminary bicycle and pedestrian facilities planned in preliminary engineering (see **Section 4.4.1.4**) should be finalized to provide safe passage for these modes of transportation. Bicycle and pedestrian facilities that have independent alignments (e.g., shared use paths (SUP) and separated bike lanes) will require their own layout sheets. The RDM provides extensive discussion and guidance on the use and design of bicycle and pedestrian accommodations.

For situations where bicycle and pedestrian bridges are independent structures from those mentioned in **Section 7.8**, reference AASHTO's *LRFD Guide Specifications for the Design of Pedestrian Bridges* for guidance on design elements and standard requirements.

7.5.4.1 Texas Department of Licensing and Regulation (TDLR) Inspections

If total bid items for all pedestrian elements (new or removed signals, pavement markings, walkways, ramps) are **greater than $50,000**, the plans must be reviewed and registered according to the requirements of TDLR. CST has contracts with a Registered Accessibility Specialist (RAS) to perform the needed reviews prior to letting and inspections during construction for TxDOT projects. All TDLR fees and RAS fees are paid by CST.

Refer to CST's *Construction Contract Administration Manual* (CCAM) and *TDLR Construction Accessibility Requirements Procedures* document for details on submitting plans for review to TDLR. Refer to TxDOT's *PS&E Preparation Manual* for details on items to include on the Title Sheet of the plans.

The plan submittal should be made to the RAS at least two months (preferably three months) before advertising the project in case the plan review results in significant revisions.

7.5.5 Roadway Plan Sheets

Roadway plan sheets typically include:

- Survey Control Sheets;
- Horizontal and Vertical Control Sheets;
- Removal Layouts;
- Alignment Data Sheets;
- Roadway Plan and Profile Sheets (commonly referred to as P&P Sheets);
- Crash Cushion Summary Sheet (if applicable);
- Intersection Layouts and details;
- Driveway Layouts and details;
- Miscellaneous Roadway details (e.g., curb types, traffic barrier modifications, sidewalk details, and curb ramps); and
- Roadway Standards.

Refer to the *PS&E Preparation Manual* and the PS&E QC Milestone Checklist for more information on the contents of these plan sheets.

Authority documents:

- ☐ 16 TAC §68.31
- ☐ 16 TAC §68.50
- ☐ 23 USC §217(g)(1)
- ☐ 43 TAC §11.50 et seq
- ☐ Texas Government Code Chapter 469

Resources to consult:

- ☐ AASHTO's LRFD Guide Specifications for the Design of Pedestrian Bridges
- ☐ Construction Contract Administration Manual
- ☐ Hydraulic Design Manual
- ☐ PS&E Preparation Manual
- ☐ Roadway Design Manual
- ☐ TDLR Construction Accessibility Requirements Procedures
- ☐ TxDOT Roadway Standards

Coordination:

- ☐ District design, bridge and drainage staff
- ☐ DES staff
- ☐ CST staff

Tools to use:

- ☐ Form 1002 – PS&E Transmittal Data
- ☐ Form 2440 – DSR
- ☐ PS&E QC Milestone Checklist

Available training:

- ☐ DES102 – Design Concepts from AASHTO
- ☐ DES106 – Freeway Design and Operations
- ☐ DES108 – Urban Street Design
- ☐ DES111 – Introduction to Roadway Design
- ☐ DES750 – OpenRoads Designer for Plan Development
- ☐ DES753 – Advanced ORD Modeling

* All training can be found in TxDOT's Training Catalog

7.6 Retaining/Sound Walls & Miscellaneous Structures

The need and location for retaining walls is a collaborative task involving roadway and structural design staff. District environmental staff should also be consulted to determine the need and location of sound walls. Close coordination is required between all parties to ensure that these types of walls are placed and designed appropriately.

7.6.1 Retaining/Sound Wall Design

Retaining and sound walls should be designed according to the guidance provided in TxDOT's *Geotechnical Manual - LRFD* and on the TxDOT.gov Retaining Walls webpage.

Considerations in the design of retaining/sound walls include:

- Obtain any additional geotechnical data necessary to finalize designs. Refer to TxDOT's *Geotechnical Manual - LRFD* for soil core boring information;
- Review all commitments made and studies performed during the preliminary engineering and public involvement phase of project development to determine if agreements were made relative to wall types, heights, locations, or aesthetic treatments;
- Coordinate the aesthetics of walls with a landscape architect and stakeholders;
- Coordinate with the drainage engineer regarding drainage needs at the top of, and possibly through and under walls;
- Coordinate wall locations with proposed utility adjustments for construction clearances;
- Establish a smooth vertical alignment along the top of retaining walls for a pleasing appearance;
- Coordinate retaining/sound wall layouts with bridge layouts to ensure compatibility of elevation, horizontal control, and proposed aesthetic treatments; and
- Coordinate with District maintenance personnel regarding maintenance requirements adjacent to walls.

Retaining walls exceeding a 25-ft height require BRG approval of the layout.

7.6.2 Retaining/Sound Wall Plan Sheets

Retaining/sound wall plan sheets include layouts and details for constructing the walls and related items such as footings, piles, drainage systems, and tiebacks. TxDOT standard sheets exist for walls, with various facings available and should be used to the maximum extent possible.

7.6.3 Miscellaneous Structures

Examples of miscellaneous structures include non-standard concrete traffic barrier (CTB) which accommodates parallel roadways with differing profiles, overhead sign bridges (OSB), high mast illumination or different applications of bridge rail.

Refer to TxDOT's *PS&E Preparation Manual* and the PS&E QC Milestone Checklist for more information on the contents of these plan sheets.

Resources to consult:

- ☐ Geotechnical Manual - LRFD
- ☐ PS&E Preparation Manual
- ☐ TxDOT Roadway Standards
- ☐ TxDOT.gov Retaining Walls webpage

Coordination:

- ☐ District design, bridge and drainage staff
- ☐ BRG staff

Tools to use:

- ☐ Form 2440 – DSR
- ☐ PS&E QC Milestone Checklist

Available training:

- ☐ DES111 – Introduction to Roadway Design

* All training can be found in TxDOT's Training Catalog

7.7 Drainage Design

Drainage design includes hydrologic and hydraulic (H&H) analysis. Hydrologic analysis provides estimates of flood magnitudes (i.e., Annual Exceedance Probability (AEP)) as a result of precipitation. These estimates consider processes in a watershed that transform precipitation into runoff and that transport water through the system to a project's location. A hydraulic analysis determines the water levels and how fast the water moves based on the calculated AEP for open channels, bridge structures, culverts, storm drains and stormwater management.

7.7.1 Final Hydrologic Design

Hydrologic analysis is the most important step prior to hydraulic design to establish stormwater flow rates, flow volumes, and locations of inflow and outflow to the highway facility for significant drainage areas. Recommendations from these analytical studies can affect such major items as roadway alignments, bridge lengths, bridge lateral restraints, bridge foundations, and channel design.

The initial hydrologic study is typically prepared during preliminary engineering (see **Section 4.4.3.1**). During final design, a refinement of the original study may be all that is needed. This refinement is usually needed to reflect detailed field survey data or a change in a basic design condition, an assumption, or to reflect revised methodology, or if there has been a significant delay between preliminary engineering and final design development.

If the project is in a tidal area, consider storm surge (tide) analysis.

Specific tasks to be performed include:

- Identify any new, relevant data;
- Verify validity of previous hydrologic study and determine if the study method used is still appropriate;
- Evaluate any existing hydrologic data/results from previous studies and update as appropriate or perform new hydrologic analysis for proposed hydraulic structure locations;
- Based on the model, determine whether watershed revisions change stream water surface elevations; and
- Coordinate with the local FEMA floodplain administrator (FPA) for changes to water surface elevations and flood maps.

7.7.2 Final Hydraulic Design

The initial hydraulic design is performed during preliminary engineering (see **Section 4.4.3.2**). During final design, refinement of the hydraulic design is needed to incorporate final roadway alignments and profiles into the design. The design storm frequency should be verified and all allowable velocities, allowable backwater/headwater, FEMA rules and regulations, National Flood Insurance Program (NFIP) requirements along with any other local or state agency requirements should be confirmed.

Coordinate with the local FEMA FPA early if applicable. The FPA can advise which base model to use and how much, if any, increase in backwater will be allowed. The FPA may also provide a copy of the original model or help locate one. It is advised to work closely with the FPA throughout the project.

Drainage design requires continuous coordination with roadway design activities.

Hydraulic design may result in the need for drainage easements in areas not already owned by or classified as waters of the State. In such instances, this task will have direct input into reviewing and obtaining additional ROW, access control, and easement requirements.

7.7.3 Final Drainage Report

A final drainage report must be prepared and submitted along with finalized hydraulic calculation sheets to the District for review and then submitted to DES – H&H section for review and approval before the Final (90%) milestone submittal. The final drainage report should be **signed and sealed** by the drainage engineer of record.

The drainage report and H&H calculations should be retained in the District project File of Record for permanent reference (refer to the HDM for more information on specific documentation retention requirements). Retaining these records provides many benefits, including:

- Ease of reference for future alteration or rehabilitation of the subject drainage structure;
- Justification of design decisions in case of future challenges or litigation;
- Valuable reference information for the design of other structures that cross the same stream or are in the same watershed; and
- Proof of intended compliance with regulations such as NFIP rules.

7.7.4 Channels

A roadside drainage channel is an open channel usually paralleling the highway embankment and within limits of the ROW. The primary function of a drainage channel is to collect surface runoff from the roadway and areas that drain to the ROW and to convey the accumulated runoff to acceptable outlet points.

Drainage channels must be designed to carry the design runoff and to accommodate excessive storm water with minimal roadway flooding or damage. The design frequency should correspond with the storm drain frequency. Refer to the RDM for details on ditch shape design and side ditches. When the RDM requirements can't be met, the channel must be enclosed in a storm drain system (see **Section 7.7.7**).

Refer to the HDM for more guidance on the design of channels.

7.7.5 Culverts

A culvert conveys surface water through the roadway embankment, away from the highway ROW, or into a channel along the ROW. In addition to the hydraulic function, the culvert must also support construction and highway traffic and earth loads; therefore, culvert design involves both hydraulic and structural design.

Culvert hydraulic design includes determining culvert sizes and grades to handle design stormwater flows. The designer must evaluate the land use to determine the best structure for the location.

Culverts with a total span greater than or equal to 20 feet are considered bridge-class culverts and are analyzed as a bridge (see Section 7.7.6).

7.7.6 Bridges

Bridges enable streams to maintain flow conveyance and to sustain aquatic life. Bridges include bridge structures and bridge-class culverts.

Stream crossings at highways often involve a constricted flow opening. The designer establishes a design storm frequency and other criteria and determines the size and type of opening. The design storm frequency is established considering factors such as functional classification of highway, size of the stream or by performing a risk assessment. Other criteria include allowable velocities, allowable backwater/headwater, FEMA rules and regulations, the NFIP, and any other local or state agency requirements.

FHWA requires a bridge scour evaluation as part of the hydraulic design process for span bridges across streams. The results of such an analysis may highlight the need for design

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adjustments such as increasing opening size, deeper foundations, pier and abutment protection, or other mitigation measures. Scour countermeasure design is approved by the Geotechnical Section of BRG. Include the bridge scour evaluation in the final drainage report (see **Section 7.7.3**).

Bridge class culverts may require inlet and outlet protection for scour and debris control. Inlet scour results from the flow contraction as the culvert barrel constricts the natural channel. Scour at culvert outlets is a common occurrence; sediment and debris in a turbulent flow can be erosive; however, a formal scour design is not required for bridge class culverts.

7.7.7 Storm Drains

The primary aim of a storm drain design is to limit the amount of water flowing along the gutters or ponding at low points to quantities which will not interfere with the passage of traffic or incur damage to the highway and local property. This is accomplished by placing appropriately sized inlets at the proper spacing.

Since storm drains receive water through inlets and carry the water through long underground conduits, it is desirable to maintain a minimum self-cleaning velocity in storm drains to prevent deposition and loss of capacity. Repair or replacement of storm drains can be expensive.

Considerations in the hydraulic design of storm drains include:

- Storm drains which drain sag points where runoff can only be removed through the storm drainage system must be designed for a minimum 50-year frequency storm;
- Maintain ongoing communication with the roadway design engineer regarding roadway design changes affecting drainage. Make recommendations concerning geometric modifications that would result in more desirable drainage improvements; and
- Perform clash detection to eliminate conflicts with existing or proposed utilities.

7.7.8 Stormwater Management

Stormwater management can be accomplished with gravity-fed open channel or closed conduit. In places where gravity drainage is impossible or not economically feasible, pump stations will be required to drain depressed sections of the roadway.

Discharge controls are often needed to mitigate the runoff quantity and/or quality impacts. Outlet controls can reduce the rate of discharge. Retention facilities are used to control the quantity and quality of runoff discharged to receiving waters and must be considered for use

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as a mitigation measure to reduce the runoff impact to receiving water quality. Refer to the HDM for additional discussion on the design of stormwater management drainage design.

7.7.8.1 Pump Station Hydraulic Design

Pump station design includes pump sizing, foundation design, outfall design, power/control design, and enclosure design for facilities to handle storm water in areas that cannot drain by gravity. Pumps may also be needed for wetland restoration or storm water detention facilities. The hydraulic design of pump stations includes selecting the type, capacity, and power of the pumps, determining the on/off cycling requirements, providing for trash collection, and designing a discharge chamber.

A pump station must be protected and secured with fences, gates, grates, and locks. Ample access for working areas and maintenance vehicles must be provided since pumps are mechanical, susceptible to failure, and require extensive maintenance. For this reason, pumps must be used only when absolutely necessary. Also, backup systems must be considered.

Texas Evacuation Routes must be designed to drain by gravity only, if possible, because the likelihood of a pump station failure may be greatest during the time of most critical need.

Considerations in the hydraulic design of pump stations include:

- Avoid the need for pump stations, if possible, as they require substantial maintenance; and
- Perform a site visit to determine a gravity flow alternative to a pump station if one exists. Such an alternative would likely require additional ROW or easements to be initiated as early as possible.

7.7.9 Drainage Plan Sheets

Refer to the *PS&E Preparation Manual* and the PS&E QC Milestone Checklist for information on specific elements to include on the drainage plan sheets.

7.7.9.1 Culvert and Storm Drain Plan Sheets

Culvert and storm drain plan sheets typically include:

- Drainage area maps;
- Hydraulic calculations;
- Culvert layouts (plan and cross section views);
- Special ditch plan and profile sheets (can be shown on roadway P&P sheets);
- Storm drain plan and profile sheets;

- Junction box details;
- Detention/retention facility details; and
- Miscellaneous drainage details (e.g., Special headwall/wingwall details, inlet modifications, outfall details, pipe bedding details, concrete collar details, and RC pipe connections).

Considerations in the preparation of culvert and storm drain layouts and details include:

- Evaluate the need for trench excavation and protection;
- Identify and resolve utility conflicts due to drainage elements;
- Evaluate the need for interim drainage elements due to construction phasing; and
- Coordinate with local agencies if connecting to local agency's system.

7.7.9.2 Pump Station Plan Sheets

Pump station detail sheets typically include:

- Pump outfall plan and profile sheets;
- Control house details
- Electrical service/motor control center details;
- Control panel details;
- Backup generator details and specifications;
- Wiring diagrams:
- Structural details for pump house wet wells and site plans;
- Pump station details and specifications; and
- Miscellaneous drainage details.

Considerations in the preparation of pump station plan sheets and details include:

- A suitable source of energy for the backup generator (e.g., gasoline, diesel, gas) must be determined;
- The pump station must be located outside the roadway clear zone. In cases where this is not feasible, the pump station must be positioned underground or in a protected area so it does not pose a hazard to motorists;
- Provide space around the facility to allow access for service vehicles and workers; and
- The control house must include electrical outlets and lights for convenient maintenance.

7.7.9.3 Bridge and Bridge-Class Culvert Hydraulic Data Sheets

Each bridge and bridge class culvert must have its own Hydraulic Data Sheet to convey delineated drainage areas, floodplain cross sections used in hydraulic modeling, run-off calculations used, and other elements to document the hydrology and hydraulic design for these structures.

Refer to TxDOT's *PS&E Preparation Manual* and the PS&E QC Milestone checklist for specific elements to include on the hydraulic data sheets.

Considerations in the preparation of hydraulic data sheets include:

- Design improvements in coordination with the roadway design and structural engineers as applicable;
- Contact local FEMA FPA early. The FPA can advise which base model to use and how much, if any, increase in backwater will be allowed. The FPA may also provide a copy of the original model or help locate one. It is advised to work closely with the FPA throughout the project;
- The backwater profile program used in original development of the study may have been one of several types and from one of several sources. In Texas, the model most commonly used is the Hydrologic Engineering Center's River Analysis System model (HECRAS) from the USACE. Typically, FEMA encourages that the project model be updated to the most current acceptable model. If the stream was originally modeled using HEC-2, subsequent models should be done using HEC-RAS; and
- Floodplain encroachments must be explained in the environmental document.

Resources to consult:

- ☐ Bridge Project Development Manual
- ☐ DES – H&H webpage (TxDOT intranet only)
- ☐ Geotechnical Manual – LRFD
- ☐ Hydraulic Design Manual
- ☐ PS&E Preparation Manual
- ☐ Roadway Design Manual

Coordination:

- ☐ District Drainage Engineer
- ☐ DES – H&H Section staff
- ☐ BRG staff

Tools to use:

- ☐ Form 2440 – DSR
- ☐ PS&E QC Milestone Checklist
- ☐ Atlas 14 rainfall intensity tools
- ☐ District and DES specific H&H spreadsheets to document calculations (TxDOT intranet only)
- ☐ Drainage Report template (TxDOT intranet only)

Available training:

- ☐ DES601 – Basic Hydrology & Hydraulics
- ☐ DES604 – Culvert Analysis and Design
- ☐ DES607 – Urban Drainage Design
- ☐ DES608 – Culvert Design
- ☐ DES612 – Introduction to Hydraulic Modeling with HEC-RAS
- ☐ DES613 – Introduction to Highway Hydraulics
- ☐ DES622 – 1D Unsteady Hydraulic Modeling using HEC-RAS
- ☐ DES624 – 1D/2D Coupling HEC-RAS Bridge Hydraulic Modeling

* All training can be found in TxDOT's Training Catalog

7.8 Bridge Design

Bridge structures refer to all overpasses, underpasses, interchanges and stream crossing structures. Bridge structures include span structures and bridge-class culverts. The following subsections describe tasks associated with developing bridge layouts and the associated bridge details.

Culverts with a total span greater than or equal to 20 feet are considered bridge-class culverts and their design must follow span bridge guidelines.

7.8.1 Final Geotechnical Surveys

Geotechnical investigations are necessary to design for satisfactory long-term performance of structure foundations. For some projects, geotechnical data may have been collected during preliminary engineering. All required data to finish designs must be obtained prior to beginning detailed bridge design.

To make a single data collection effort, coordinate obtaining geotechnical data for designing and planning of the following elements:

- Bridges;
- Radio towers;
- Retaining walls;
- Sound walls;
- Illumination structures;
- Overhead sign and signal structures;
- Pavement structures;
- Embankments;
- Soil in proposed cut;
- Trench excavation protection (shoring); and
- Excavation and backfill for structures.

Considerations in obtaining final geotechnical surveys include:

- Gather and review the existing geotechnical data obtained in preliminary engineering or existing geotechnical data from as-built plans;
- Evaluate project for changes made after original geotechnical investigations were performed during preliminary engineering (e.g., added structures or changed structure limits); and

- Identify additional data required to finalize design and prepare a boring layout to provide to the geotechnical firm obtaining data. Review the locations with roadway designers and structural designers to ensure placement of holes that can be accessed without special equipment if possible.

7.8.2 Bridge Layouts and Details

7.8.2.1 Final Bridge Layouts

After the PBLR (see **Section 4.4.5.1**) is approved, the bridge layout is finalized and detailed bridge design may commence.

Detailed design should not begin prior to approval of the PBLR.

7.8.2.2 Final Bridge Details

Bridge detail design includes determining superstructure and substructure of span bridges and culverts to handle design loads. Structure type is usually determined while preparing bridge layouts. Bridge details provide information for the contractor to build all structural elements.

Some things to consider when preparing final bridge details include:

- Continued coordination with the roadway and drainage design is needed to update the bridge structures to accommodate any changes in roadway or drainage design. Obtain updates to any of the following:
  - Typical sections;
  - Alignments;
  - Superelevation and transition locations;
  - Pedestrian features;
  - Bicycle accommodations;
  - Required clearances;
  - Proposed utilities;
  - Roadway lighting;
  - Drainage conveyance method and hydraulic design;
  - Construction staging;
  - Resource agency commitments; and
  - Information regarding special issues such as sound walls on bridges and overhead fiber optic and power line restrictions.
- BRG review of steel structures and spliced girders is required at each PS&E milestone (Initial/Detailed/Final);

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- Bridge design and detailing also includes retaining/sound walls, bridge rails, structural pedestrian features, lateral restraint, fender systems, utility attachments, bridge illumination, landscape/aesthetic components and drainage systems.

7.8.3 District Review of Bridge Plans

Once bridge plans and details are prepared, the District is responsible for a final review to determine what changes are made to the initial bridge layout and to verify the quantities. Review any significant changes made to the initial layout with the BRG – Project Development section. The District is also responsible for incorporating the structural details into the Sealed plan set (e.g., updating the index of sheets and numbering the plan sheets).

7.8.4 Bridge Plan Sheets

Bridge plan sheets typically include:

- Bridge Hydraulic Data Sheet (see **Section 7.7.9.3**);
- Bridge Layout;
- Estimate & Quantities Sheet;
- Structural Details; and
- Bridge Standards.

Resources to consult:

- ☐ Bridge Design Guide
- ☐ Bridge Design Manual - LRFD
- ☐ Bridge Detailing Guide
- ☐ Bridge Project Development Manual
- ☐ Geotechnical Manual - LRFD
- ☐ Hydraulic Design Manual
- ☐ Rail Highway Operations Manual
- ☐ Structure Design – Corrosion Protection Guide
- ☐ TxDOT.gov Bridge Design, Construction, Maintenance, Inspection, and Management webpage
- ☐ TxDOT.gov Bridge Publications webpage

TxDOT.gov Geotechnical webpage

Coordination:

- ☐ District roadway, bridge, laboratory and drainage staff

- ☐ District Railroad Coordinator
- ☐ BRG staff
- ☐ RRD staff

Tools to use:

- ☐ Form 2440 – DSR
- ☐ PS&E QC Milestone Checklist

Available training:

- ☐ BRG105 – Bridge Workshop – TxDOT
- ☐ BRG106 – Load and Resistance Factor Rating of Highway Bridges
- ☐ BRG108 – LRFD for Highway Bridge Superstructures
- ☐ BRG300 – OpenBridge Modeler CONNECT Edition

* All training can be found in TxDOT’s Training Catalog

7.9 Operational Design

Operational design involves design of signals, illumination, signs, pavement markings and intelligent transportation systems (ITS). Construction plans result from each of the tasks within this section.

7.9.1 Signals

A comprehensive investigation of traffic conditions and characteristics of potential signal locations is necessary to determine the need for signal installations and to collect data for the design and operation of signals.

Traffic control signals must not be installed unless the investigation reveals that at least one of the warrants contained in the TMUTCD is met. Meeting an hourly volume warrant is only the first step to justifying a traffic signal. The TMUTCD states that warrants are a threshold condition and not a substitute for engineering judgment. All traffic factors must be considered when determining if a signal(s) must be installed.

Signal operation types include full-actuated, semi-actuated, pre-timed or combinations thereof. They can also be operated at isolated intersections, in coordination with nearby signals or as mid-block operations.

If the department is not responsible for the traffic control signal system operation and maintenance (e.g., appurtenances, software, hardware and timing), then an agreement must be established with the controlling agency before the signal is installed and activated.

Considerations in the design of traffic signals include:

- Coordinate signal design and details with LG if signals will be operated and maintained by a LG. Obtain concurrence from the LG for locating signals within their jurisdiction and ensure that required agreements are executed as described in TxDOT's *Negotiated Contracts Procedures Manual;*
- Coordinate signal plans with roadway, drainage and utility plans;
- Coordinate to have geotechnical foundation design performed for traffic signal foundations with District bridge and laboratory staff;
- Coordinate intersection geometry, turn lane lengths, median types, and access control at signalized intersections with roadway and traffic engineers. In urban areas having remote signal timing control and coordinated signals, signal control design must be discussed with the local entity. If the project is located along a designated bike route, bicycle signals may be appropriate, and should be linked and timed with the vehicular traffic signals. Any through bicycle movements will require prohibiting

permissive movements for vehicles (e.g., not right on red), see the TMUTCD for further guidance.

- Signals and supports must be located to maximize safety and meet PROWAG and TAS accessibility requirements. All pedestrian features and pedestrian signal poles must be accessible to persons with disabilities;
- Detail intersection pavement markings, ramps, and walkways before preparing pedestrian signal layouts to ensure proper location of pedestrian poles and signal heads;
- Account for mid-block pedestrian signals as necessary; and
- Pedestrian crossing times must be sufficient for the expected user population to cross the street safely and meet or exceed the requirements contained in the TMUTCD.

7.9.2 Illumination

There are two types of roadway lighting: continuous lighting and safety lighting.

Safety lighting is typically needed at interchanges, decision points, high-volume rural or suburban intersections, weigh stations, rest areas, and for safety/security for pedestrians, bicyclists and transit users.

Continuous lighting provides uniform lighting on all mainlanes, ramp terminals, direct connectors and interchanges. Continuous lighting requires the financial participation of the city. Either type may use conventional roadway lighting or high mast poles.

An FAA form 7460-1 must be completed according to 14 CFR §77.9 when lighting exceeds the following conditions for public use airports, military airport, airport operated by a Federal agency or DOD, and airport or heliport with at least one FAA-approved instrument approach procedure. If lighting does not exceed the following conditions, then the form does not need to be filed. Required notification applies to any construction, alteration, or installation of illumination support:

- Exceeding 200 feet above ground level (AGL);
- Within 20,000 feet of any airport type listed above which exceeds 100:1 surface from any point on the runway of each airport, with its longest runaway is **more** than 3,200 feet;
- Within 10,000 feet of any airport type listed above which exceeds 50:1 surface from any point on the runway of each airport, with its longest runway no more than 3,200 feet; and
- Within 5,000 feet of any heliport listed above which exceeds a 25:1 surface.

Considerations in the design of illumination include:

- Coordinate illumination plans with roadway, drainage, traffic and utility plans;
- Coordinate with LG for maintenance of proposed continuous lighting;
- Design high mast foundations according to bore logs and HMIF standards;
- Determine illuminance design values according to roadway classification and AASHTO's Roadway Lighting Design Guide;
- Execute the appropriate continuous or safety lighting agreement with the LG when lighting is to be installed within a LG's jurisdiction;
- For lighting on bridges, coordinate illumination design with bridge details so conduit and bridge lighting brackets are included in the bridge plans; this will avoid unsightly conduit additions to bridges;
- Meet Texas statute Health and Safety Code Chapter 425 by using cutoff luminaires to minimize glare and light pollution when installing lighting using state funds;
- Prepare lighting justification report;
- Use breakaway devices according to TxDOT's *Highway Illumination Manual* and AASHTO requirements;
- When designing lighting for a walkway/bikeway adjacent to a roadway, the roadway must be lit to the same level as the walkway; and
- When possible, place lighting outside clear zone. If lighting must be in the clear zone, use breakaway poles or place poles behind or on a traffic barrier.

7.9.3 Signing and Pavement Markings

Signing and pavement marking plans include plan view layouts of final sign and pavement marking types and locations, account for applicable on-street bikeway pavement markings and bike route signs. Include cross section, sign size and legend details for the locations of all overhead signs. Detail all ground mounted large guide signs and reference locations on the plans. Use sign summary sheets to detail support type, color, number of posts, and size of structural steel.

7.9.4 Intelligent Transportation System (ITS)

ITS projects must be designed in accordance with the National ITS Architecture. The ITS system aims to solve congestion and safety problems and improve operating efficiency in freight and transit movement.

ITS applications include the following:

- Closed-Circuit Television (CCTV) to monitor traffic conditions and incidents;
- Communication infrastructure;

- Dynamic Message Signs (DMS);
- Integration of traffic control and transportation management systems;
- Lane Control Signals (LCS) to warn the public of lane closures due to incidents or construction;
- Traffic detection devices;
- Traffic maps - congestion, construction, weather;
- Traffic signals which adapt to traffic and change their timing in each cycle; and
- Travel time estimation.

ITS work must be coordinated with the District traffic staff, TRF – Traffic Management Section and the Information Management Division (IMD) to ensure compliance with IT core architecture and other TxDOT requirements.

The department maintains a statewide radio network providing signal and radio technical support and coordinating radio frequency licenses. The Highway Advisory Radio Stations (HARS) are low power AM stations that broadcast highway related information to the traveling public. FCC regulations require that traveler information stations transmit only noncommercial voice information pertaining to traffic and road conditions.

By Executive Order, June 14, 2012, federal-aid highways and ROW can be used to deploy both wired and wireless broadband infrastructure creating funding opportunities for state and local transportation infrastructure to help expand broadband infrastructure. Broadband access also affords public safety agencies better interoperability and effectiveness.

Considerations in the design of ITS include:

- Find out where traffic barrier will be located and try to place hazardous objects behind barriers that are already proposed for other purposes;
- Obtain current information on ITS alternatives, this is a rapidly advancing field;
- Incorporate standard communications equipment when possible;
- Consult with the District traffic staff and TRF – Traffic Management Section;
- When possible, submit plans to TRF for early review;
- Consider future maintenance requirements for the system. Design to minimize maintenance, but also consider how maintenance will be performed safely with minimum impact on traffic;
- Consider placement of DMS in areas where there is not a high probability of a simultaneous workload required for drivers (i.e., high-decision locations, high-speed merging, and weaving);

- Consider ITS regional opportunities and possible connections to manage traffic through long corridors; and
- Utilize existing structures and roadside barriers for ITS, if possible.

Authority documents:

- ☐ 14 CFR §77.7
- ☐ 14 CFR §77.9
- ☐ 23 CFR Part 620 Subpart A
- ☐ Health and Safety Code, Chapter 425

Resources to consult:

- ☐ AASHTO Roadway Lighting Design Guide
- ☐ Highway Illumination Manual
- ☐ Negotiated Contracts Procedures Manual
- ☐ TAMES/TCAP Toolbox
- ☐ TMUTCD
- ☐ Traffic Signals Manual
- ☐ TRF webpage (TxDOT intranet only)
- ☐ TxDOT Statewide TSMO ITS Standards and Specifications
- ☐ TxDOT Traffic Standards

Coordination:

- ☐ District roadway, bridge, traffic and utility staff
- ☐ DES staff
- ☐ TRF staff

Tools to use:

- ☐ Form 2440 – DSR
- ☐ PS&E QC Milestone Checklist

Available training:

- ☐ TCC322 – Signal Operations and Maintenance
- ☐ TCC348 – Fundamental of Traffic operations

- ☐ TRF302 – Signal Tech Training – Basic
- ☐ TRF450 – TxDOT Roadway Illuminations and Electrical Installations
- ☐ TRF504 – Principles of Freeway Guide Signing

* All training can be found in TxDOT's Training Catalog

7.10 Railroad Design

TxDOT routinely enters into Construction and Maintenance (C&M) Agreements with railroad companies when planning construction projects which impact railroad right of way. Several agreements and plan sheets are required for submittal, review and approval by the specific railroad company.

It is critical to consider bike and pedestrian connectivity over railroads early in the design process.

7.10.1 Exhibit A

The Exhibit A is a procedural document related to the development of a C&M Agreement between the department and the railroad. The C&M Agreement must be executed before a project can be awarded to a contractor.

An Exhibit A design is an Initial(30%) design or more **completed 12 or more months in advance** of the Sealed(100%) plans showing work to be performed within the railroad's ROW. Information must include:

- Title sheet with Index of Sheets (not required on replanking projects);
- Project layout sheet;
- Active warning device forms (if installing or modifying};
- Signing and striping forms (if not shown with active warning devices);
- Traffic signal layouts and phasing forms (if preemption is involved);
- Plan view of conduits, pipes, and culverts under track forms;
- Planking layout (if installing or modifying);
- Bridge or roadway plan and profile;
- Rail survey (bridge projects; out to 1000 feet on both sides of bridge on overpass projects and out to 1500 feet on both sides of bridge on underpass projects;
- Roadway typical sections (planking and construction projects);
- Rail typical sections (planking and underpass projects);
- Ditch cross sections on 100-foot centers (joint drainage projects); and
- Railroad requirements sheets (construction projects).

For a bridge project involving a railroad, Exhibit A includes the bridge layout with some additional information of interest to the railroad owner. Final Exhibit A must be signed, sealed, and dated by a licensed Texas Professional Engineer.

Maintenance-type project scopes with minimal impacts to railroad ROW are handled by a Letter Agreement. A few of the project types are:

- Minor bridge repair and inspection;
- Mowing;
- Overlays;
- Seal coats; and
- Surveying.

A Construction & Management Agreement is far more extensive for heavy construction within the railroad ROW.

Texas Railroad Information Management System (TRIMS) is a GPS and GIS-based data collection, inventory, and project management tool. The web-based Rich Internet Application (RIA) can be used to gather site data with a field computer, GPS unit, and digital camera. This system provides comprehensive railroad information to the designer.

Considerations when designing railroad crossings include:

- Evaluate existing at-grade crossings for field panel conditions and/or "humped" crossing that can cause long wheelbase vehicles to get stuck on the crossing;
- Obtain train traffic frequency and speed from the railroad company or through department internal TRIMS database;
- Obtain railroad company's design standards prior to project design development (available on TxDOT.gov Railroad Design Guidelines webpage);
- Ensure railroad Agreement provisions are included in the Sealed PS&E; and
- Projects will not be let until the railroad Construction & Maintenance (C&M) Agreement or Letter Agreement has been fully executed or with an approved Construction Management Plan (see **Section 8.2.2.1**).

Contact RRD at least 24 months before letting for railroad overpasses (new or modified), and 48 months before letting for railroad underpasses (new or modified) to coordinate rail planning and obtain a Construction & Maintenance Agreement.

7.10.2 Sealed(100%) Plans

Most railroad companies will request a review and approval of the Sealed(100%) plans (often referred to as an Exhibit B on construction projects) to verify certain elements of the design have not changed from the Exhibit A. Railroad company approval of the Sealed(100%) plans may be/is required for underpass and overpass projects.

Do not include the Exhibit A in the Sealed(100%) plans unless there is information which is not contained in the rest of the plans such as track realignments.

7.10.3 Plans Requirements

As part of the Sealed(100%) plan set on TxDOT construction projects, the following railroad specific plan sheets are required:

- Railroad Scope of Work Sheet; and
- Railroad Requirements Sheets (Bridge or Non-Bridge).

Information on how to complete the Railroad Scope of Work sheet, Railroad Requirements sheets, and approved ROE Agreements may be found on the TxDOT.gov Railroad-Highway Crossing Information webpage. Refer to the *PS&E Preparation Manual* and the PS&E QC Milestone Checklist for details on information to include on these sheets.

7.10.3.1 Railroad Scope of Work Sheet

The Railroad Scope of Work sheet identifies project specific work and requirements. It describes the scope of work at the crossing location(s), other project work in railroad ROW, the flagging requirements, any construction work to be performed by the railroad, the railroad insurance requirements, the ROE agreement, any railroad coordination meeting requirements and the emergency contact information.

Additional information and a copy of the Railroad Scope of Work sheet can be found on the TxDOT.gov Plans, Specifications & Estimate Requirements on Projects with Railroads webpage and in TxDOT's *Rail Highway Operations Manual*.

7.10.3.2 Railroad Requirements Sheets

The Railroad Requirements Sheets clarify various information for contractors, including:

- Need for safety training;
- Operational requirements when working near tracks;
- Minimum construction clearances;
- Shoring and demolition requirements (bridge projects); and
- Construction and as-built submittals (bridge projects).

7.10.3.3 Railroad Certification

A railroad certification is submitted for all projects. The certification describes the status of the coordination with railroad companies when railroad ROW is within the project limits, a railroad crossing (advance warning signs within the project limits) is near the project limits or parallels the project, a traffic signal is or will be linked to railroad signal devices, and the TCP will influence a railroad crossing. Examples of the required certifications for the various conditions are described below and a template can be found on TxDOT.gov:

- **No Railroad Work** – this certification applies when no work within or near the limits of railroad ROW is included in the project.
- **Agreement Executed – work prior to construction** – this certification applies to projects where the coordination and agreement are executed; railroad work is completed before letting; and only flagging is to be done during construction.
- **Agreement Executed – work during construction** – this certification applies to projects where the coordination and agreement are executed, and railroad work will be completed during construction.
- **Agreement not executed – work during construction** – this certification applies to projects where the coordination is complete and the railroad agreement will be executed without causing a construction delay for the contractor.

The District Engineer signs project certifications which will be part of the project File of Record. A copy of the signed certifications is submitted, with other supporting documents, to DES for RTL PS&E document review and processing.

Resources to consult:

- ☐ PS&E Preparation Manual
- ☐ Rail Highway Operations Manual
- ☐ TxDOT.gov Plans, Specifications & Estimate Requirements on Projects with Railroads webpage
- ☐ TxDOT.gov Railroad Design Guidelines webpage
- ☐ TxDOT.gov Railroad-Highway Crossing Information webpage
- ☐ TxDOT.gov Texas Railroad Information Management System (TRIMS)

Coordination:

- ☐ District Railroad Coordinator
- ☐ RRD staff

Tools to use:

- ☐ Form 2440 – DSR
- ☐ PS&E QC Milestone Checklist
- ☐ TxDOT.gov Certifications – all template
- ☐ Unclear Railroad Agreement/Maintenance Notification template

7.11 Environmental Design

7.11.1 Miscellaneous Permits

Numerous state and federal agencies and others regulate the impact of construction activities on their operations or environmental features. These entities have permitting requirements for this purpose (see **Table 5-1**). See **Chapter 5** for more information on the environmental process during project development.

Since approvals of impacts often require substantial completion of detailed plans, it is important to coordinate early with these entities. Some environmental permits may have been identified during preliminary engineering as part of the environmental work on the project. These permits may not be received until environmental clearance is obtained, but coordination must be well underway by this point in the project development process.

Considerations concerning environmental permits include:

- Communicate all assumptions and decisions made during preliminary engineering phase with District environmental staff;
- Coordinate with designers to evaluate impacts to resources and entities early and often;
- Investigate possible design modifications to reduce or eliminate impacts;
- Alert District environmental staff as soon as possible to any design modifications that may impact the environmental document; and
- Resource agencies consider impact minimization or avoidance of utmost importance. Conduct a thorough analysis of preliminary engineering assumptions and conclusions regarding impacts if not previously performed;

Obtaining permits can be a lengthy process and is often critical in the project development schedule. Coordination must begin as soon as the need is identified and must be followed throughout project development.

7.11.2 Environmental Permits, Issues and Commitments (EPIC) Sheet

The Environmental Permits, Issues and Commitments (EPIC) sheet is used to summarize the special requirements and restrictions related to the construction activity that has been permitted and the conditions of any permits. The EPIC sheet provides to the contractor a single point environmental guidance document. For example, it may depict areas to be

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avoided during construction due to the presence of endangered species, wetlands, etc. The EPIC sheet is not an engineering document and shall not be signed and sealed.

Consult Environmental district staff for assistance or to draft EPIC information to be put on the EPIC sheets.

Considerations concerning the EPIC sheet include:

- Review the environmental document and all permits and clearances to determine what requirements or restrictions apply to the project;
- Review Form 2443 – PSE Stage Gate Checklist to ensure incorporation of all requirements in the plans;
- Ensure that areas to be avoided during construction due to endangered species, wetlands, or for other reasons are clearly identified on the EPIC sheet and other environmental plans;
- Coordinate with the District environmental coordinator to review the draft EPIC sheet for compliance with the environmental document;
- Violating the condition of any permit may result in costs and delays to the project. Be sure that all conditions are clearly outlined on the EPIC sheet;
- Field conditions may change, and this can warrant additional data collection, especially in urban areas; and
- Other issues, such as environmental mitigation, roadway access, and retaining and noise wall locations, are often determined after performing initial field surveys.

7.11.3 Stormwater Pollution Prevention Plan (SWP3) Summary Sheet and Environmental Layouts

Designing erosion and sediment control devices includes determining the type and size of facilities for minimizing erosion and siltation during and after project construction. SWP3 Summary Sheet and environmental layouts are prepared to show the construction of devices that minimize erosion and siltation during construction. Various grasses, and other typically proprietary devices, are used to control long-term erosion.

For projects that do not disturb soil (traffic signals, overlays, seal coats, etc.) a standardized General Note and inclusion of Item 504 will serve as the project SWP3. Refer to TxDOT's *PS&E Preparation Manual* for more details on developing these sheets.

Considerations in preparing the SWP3 Summary Sheet and environmental layouts include:

- Prepare environmental layouts to indicate erosion control by construction stage if possible; and
- Consider roadside safety in selecting the type of devices to include.

7.11.4 Environmental Mitigation Plans

Mitigation for impacts due to highway improvements must be defined in project environmental documents, permit conditions, or agreements with regulatory or resource agencies. Mitigation measures are typically defined, without much detail, during preliminary engineering. Mitigation details to be implemented during construction must be delineated in plans and specifications.

Mitigation of environmental impacts due to the presence of hazardous materials may also be necessary. Mitigation measures typically include soil liners to contain hazardous materials, groundwater removal and treatment, and soil removal and disposal. Often, design modifications can be made to eliminate migration of underground contaminants and thereby eliminate the need for mitigation.

Mitigation details may include design drawing details showing special features such as protection of historic properties or mitigation of environmental concerns. Obtain design input from a landscape architect and biologist with knowledge of biologic processes and skills to meet the mitigation commitment.

Offsite mitigation may justify separate construction contracts and schedules for this work. Developing regional mitigation alternatives may be desirable for TxDOT and regulatory agencies. The TxDOT PM should consult with the Director of Transportation Planning and Development and ENV at the start of detailed design.

Considerations concerning mitigation plans include:

- Coordinate with District environmental staff, landscape architect and drainage design staff to determine the most cost-effective, sustainable solution to meet the environmental commitment;
- Mitigation may need to be completed before construction, and if mitigation requires the acquisition of property, acquisition of these parcels must be prioritized;
- For mitigation requiring post-construction monitoring, have the technical expert develop a reporting process for monitoring. Monitoring may likely be long term, and a defined reporting process will ensure uniformity during this time; and
- Timing of the completion of mitigation plans is project-specific and must be driven by the terms of agreement and permit requirements with resource agencies.

7.11.5 Hazardous Material Remediation Plan

Department personnel or environmental consultants under contract with the department will conduct an initial site assessment (ISA) and/or Phase I Environmental Assessment (ESA) of the project area to determine the likelihood that hazardous substances or petroleum contamination exist on the property and the extent to which further investigation and/or remediation may be necessary. On transportation projects, hazardous materials may vary from lead paint on bridges to asbestos in structures, or soil contaminated with gasoline from underground storage tanks.

The plans will provide a layout of anticipated areas of contamination within the project limits; the plan sheet(s) will have a list of contractor information notes to be followed while working in the layout area. An onsite qualified inspector will be required to monitor and supervise construction activities in the contaminated area.

Unanticipated hazardous materials encountered during construction must be properly handled and disposed of. Contact the District environmental project manager for procedures to follow.

Cleanup of contaminated materials will be done by properly trained and equipped personnel under a contract work authorization.

Authority documents:

- ☐ CWA §404(b)(1)

Resources to consult:

- ☐ PS&E Preparation Manual
- ☐ TxDOT.gov Stormwater Pollution Prevention Plan (SWP3) guidance document webpage
- ☐ SWP3 Standardized General Note
- ☐ SWP3 Guidance Manual Section 1
- ☐ SWP3 Guidance Manual Section 2
- ☐ SOP: Acquiring and/or Purchasing Section 404 Compensatory Mitigation Credits

Coordination:

- ☐ District environmental staff
- ☐ ENV staff

Tools to use:

- ☐ Form 2440 – DSR
- ☐ PS&E QC Milestone Checklist

Available training:

- ☐ EL4030 – Introduction to Construction Stormwater BMPs
- ☐ ENV114 – Hazardous Materials Management
- ☐ ENV291 – Basics of the SWP3 Summary Sheets
- ☐ ENV301 – Stormwater Erosion & Sediment Control
- ☐ ENV417 – Hazardous Materials Management: Defining Site Assessments
- ☐ ENV424 – Hazmat ISA

* All training can be found in TxDOT's Training Catalog

7.12 Miscellaneous Design

7.12.1 Landscape and Aesthetics

Landscaping and aesthetics can enhance public acceptance and appreciation of a project. A project does not necessarily need an area of land for "landscaping" to make the facility more attractive. For example, simple aesthetic treatments such as color and texture of materials used (e.g., retaining walls) can have a positive impact. Consult with a landscape architect, in the District or Division, to obtain ideas and assistance with developing landscape and aesthetic plans.

Federal cooperation with state and local agencies can provide opportunities for display of original works of art in the ROW. Designers must encourage the development of pollinator habitat, forage, and migratory way stations for monarch butterflies, honeybees, and other native pollinators by planting native forbs and grasses. Plant establishment durations must be sufficient for an expected survival in a highway environment.

Considerations in preparing landscape and aesthetics plans include:

- Understand the available funding for landscape and aesthetic improvements;
- Consider the need for future maintenance in the design of these items;
- Develop a Landscape and Aesthetics Assessment (LAA) if needed. An LAA is a tool for identifying landscape and aesthetic Opportunities and Constraints associated with a specific highway corridor segment. The procedure involves field observation and participation in the public engagement process;
- Coordinate with District designers, maintenance staff, and local entities (if applicable);
- A well written "program" can help justify spending funds on aesthetics and can be used when discussing the project with the public regarding decisions on facility appearance;
- Aesthetic improvements must not compromise safety, such as a reduction in sight distance caused by vegetation or a distraction to motorists. For this reason, the roadway design engineer and the landscape architect must work closely with each other; and
- Ensure that environmental justice issues are addressed.

7.12.2 Other Miscellaneous Details

Other miscellaneous detail sheets are typically developed to show design details that are not included on standard detail sheets and areas where more detailed information will benefit the contractor's understanding of the project. These miscellaneous detail sheets are typically shown in the plans with the other sheets they are detailing (e.g., Miscellaneous Roadway Details are included in the Roadway section of the plans and Miscellaneous Drainage Details are included with the Drainage section of the plans)

Examples include, but are not limited to, the following:

- Asphalt or concrete pavement construction details;
- Curb and gutter transitions;
- Ditch details;
- Drainage structure backfill diagrams;
- Grate and manhole covers;
- Intersection/ramp contour grading;
- Nonstandard inlets;
- Special connections; and
- Unique details and dimensions.

7.12.3 Design Exceptions, Waivers, Variations and Deviations

As the project progresses through final design, the need for a design exception, waiver, variation or deviation may be identified. Form 1002 PS&E Transmittal Data, is the official place where basic design criteria are documented, as well as exceptions, waivers, variations and deviations for design features that did not meet nominal safety design of the controlling criteria minimum values or ranges.

The RDM provides extensive discussion on the application, preparation of and submission for review and approval of design exceptions, waivers, variations and deviations.

Submit design exception, waiver, variation, and deviation requests to District design exception committee soon after identifying the need.

The design will have to be modified if the request is not approved.

Authority documents:

- ☐ 23 CFR Part 625
- ☐ 23 CFR Part 752
- ☐ 23 USC §319
- ☐ 23 USC §329
- ☐ 43 TAC §11.100 et seq.
- ☐ 43 TAC, §11.200 et seq.

Resources to consult:

- ☐ Design Exception Request for Interstate Highways TxDOT Standard Operating Procedures
- ☐ Gateway Monument Program Guide (TxDOT intranet only)
- ☐ Landscape and Aesthetic Design Manual
- ☐ Landscape Architecture Programs (TxDOT intranet only)
- ☐ Landscape Inspection Guide (TxDOT intranet only)
- ☐ Roadway Design Manual
- ☐ SOP for Tabulating Wildflower Seeding Efforts (TxDOT intranet only)
- ☐ Statewide Pedestrian Program (TxDOT intranet only)
- ☐ TxDOT Roadway Standards

Coordination:

- ☐ District roadway, environmental, area office and maintenance staff
- ☐ District review committee
- ☐ DES – LA section staff
- ☐ DES – PDS staff

Tools to use:

- ☐ Form 1002 – PS&E Transmittal Data
- ☐ Form 2440 – DSR
- ☐ ADA/TAS Design Variance Form (TxDOT Intranet only)
- ☐ Interstate and Non-interstate Design Exception templates (TxDOT intranet only)
- ☐ THFN Design Deviation template (TxDOT intranet only)

7.13 PS&E Submission, Review and Processing

Refer to TxDOT's *PS&E Preparation Manual* for detailed information on PS&E assembly, submittal and review processes.

7.13.1 Requirements For Proprietary/Sole Source Product Procurement and Approval

All requests for use of proprietary/sole source products must be submitted to the appropriate Engineering Division for review and approval based on subject matter expertise of the device in question. This request should be submitted during the construction/maintenance project's design phase to allow for adequate review time of this request.

This request must include product details (e.g., model name, number, etc.) and justification for why this specific product is required. Examples of acceptable justifications include:

- A specific project need justifies the use of a proprietary device or product in which no suitable alternate is available, or
- There is a need for compatibility because of:
    - **Function** - operates with an existing facility (e.g., the city's existing signal control system, which contains a significant percentage of intersections, is already working with only one brand and model of controller);
    - **Aesthetics** - matches the visual appearance of an existing facility (e.g., a specific light pole in a city historical area or specific light pole designated in the vicinity of previous projects);
    - **Logistics** - interchangeable with products in an agency's maintenance inventory (e.g., due to scarce county financial and labor resources, specifying one type of MASH compliant end treatment already in use and maintained by the county which will be responsible for maintenance of this location); or
    - **Safety** - upgrade to higher safety criteria (e.g., desire to use latest crash test criteria device (e.g., MASH) when there is only one such proprietary device available for that category of device, and the other devices within that category meet a lesser criteria).

For requests initiated by a LG, it is the District's responsibility to verify that the request justification is valid and state District concurrence in the request for approval.

A generic template for this request memo can be found on TxDOT.gov Design Forms and Guides webpage (Sole Source Request Form – template).

The final approval will be by the Division Director, or a designee as delegated by the Division Director. The final approved memo will be retained with the project File of Record.

Additional Subject Matter Expert points of contact for the form submittal can be contacted:

- **DES:** Project Delivery Section Director
- **BRG:** Bridge Standards Engineer
- **TRF-TM:** Engineering Support Branch Manager (ITS & Traffic Signals)
- **TRF-TE:** Engineering Operations Branch Manager (Signing & Illumination)
- **MNT:** Field Engineering Support

7.13.2 District Conducts Final Agreement/Permit and Public Interest Statement Reviews

Before submitting the RTL plans to DES, the District must conduct a final agreement and permit review to ensure that supporting documents are in order and that the project is in full compliance with agreements and permits.

Determine if there are any proprietary or patented items in the plans, which will need a Public Interest Statement. FHWA policy prohibits the use of proprietary material or processes unless:

- Item is purchased or obtained through competitive bidding with equally suitable unpatented items;
- Department certifies that either the proprietary/patented item is essential for synchronization with existing highway facilities or no suitable alternative exists; or
- Other equally acceptable materials are available; however, the department may require a specific material and FHWA approves its use as being in the "public interest".

Materials and products that are determined to be equal may be bid under generic specifications. If only patented or proprietary products are acceptable, they must be bid as alternatives with all, or at least a reasonable number of, acceptable materials or products listed.

7.13.3 Collect Outside, Additional Funding Based on AFAs

AFAs define the cost participation and payment method for outside funding participation on a project. The AFA must have been executed early in project planning. Local participation may be based on either a Specified Percentage AFA or a Standard AFA (Fixed Price) (see **Table 3-5**).

After completing PS&E and finalizing the project cost estimate, review all local participation agreements to determine whether sufficient funds are received according to the AFA.

To enable the contract to be let, funds must be received by TxDOT no later than **five (5) days** before state let bid opening. The District Engineer must verify the funds have been received by sending a "Notice of Financial Clearance" to CST. If the District Engineer cannot or does not make this verification, the project is subject to delay caused by withdrawal of the contract from bid opening, conditional award of the contract pending receipt of funds or withholding the project from the monthly bid list.

At post-bid, CST will not release any contract that includes local funding without "Notice of Financial Clearance" and District Engineer verification that the LG has indicated the bid prices are acceptable.

Authority documents:

- ☐ 23 CFR §635.411

Resources to consult:

- ☐ PS&E Preparation Manual
- ☐ Procedures for Sole Source Procurement - memo
- ☐ TxDOT.gov Design Forms and Guides webpage

Coordination:

- ☐ District review staff
- ☐ DES – FPP section staff

Tools to use:

- ☐ Form 1002 – PS&E Transmittal Data
- ☐ Form 2440 – DSR
- ☐ PS&E QC Milestone Checklist
- ☐ Sole Source Request Form - template

Chapter 8 Letting

8.1 Overview

TxDOT releases the plans and proposal to contractors for bidding through a request for submission of bids made by advertisement through a process known as **Letting**. After the bids are received and reviewed by CST to determine the lowest responsive bid submitted by a qualified bidder, a list of projects is forwarded to the TTC for approval or rejection for award of the contracts.

This chapter discusses the tasks associated with **Letting** as shown in **Figure 8-1**.

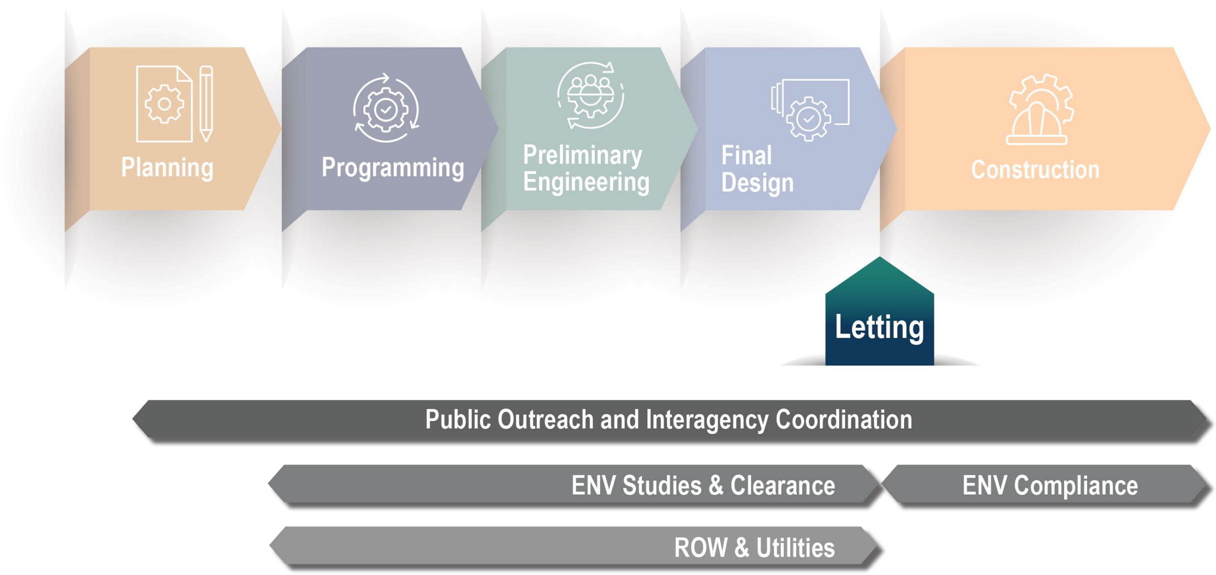

Figure 8-1: TxDOT's Project Development Process - Letting

More information about letting is addressed in TxDOT's *Letting Manual*. This chapter includes discussion on the three areas of Letting and other related topics.

8.2 Pre-Letting;

8.3 Letting;

8.4 Post Letting; and

8.5 Local Government Participation Projects.

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8.2 Pre-Letting

Pre-letting is defined as the time from when the list of candidate projects are posted by the FIN to the actual project let date defined below. Refer to the PS&E Review and Processing Schedule for actual dates for the tasks described below.

8.2.1 Let Date Definitions

Several terms are used in determining a project's "let date". **Figure 8-2** illustrates the different definitions used to describe "let date".

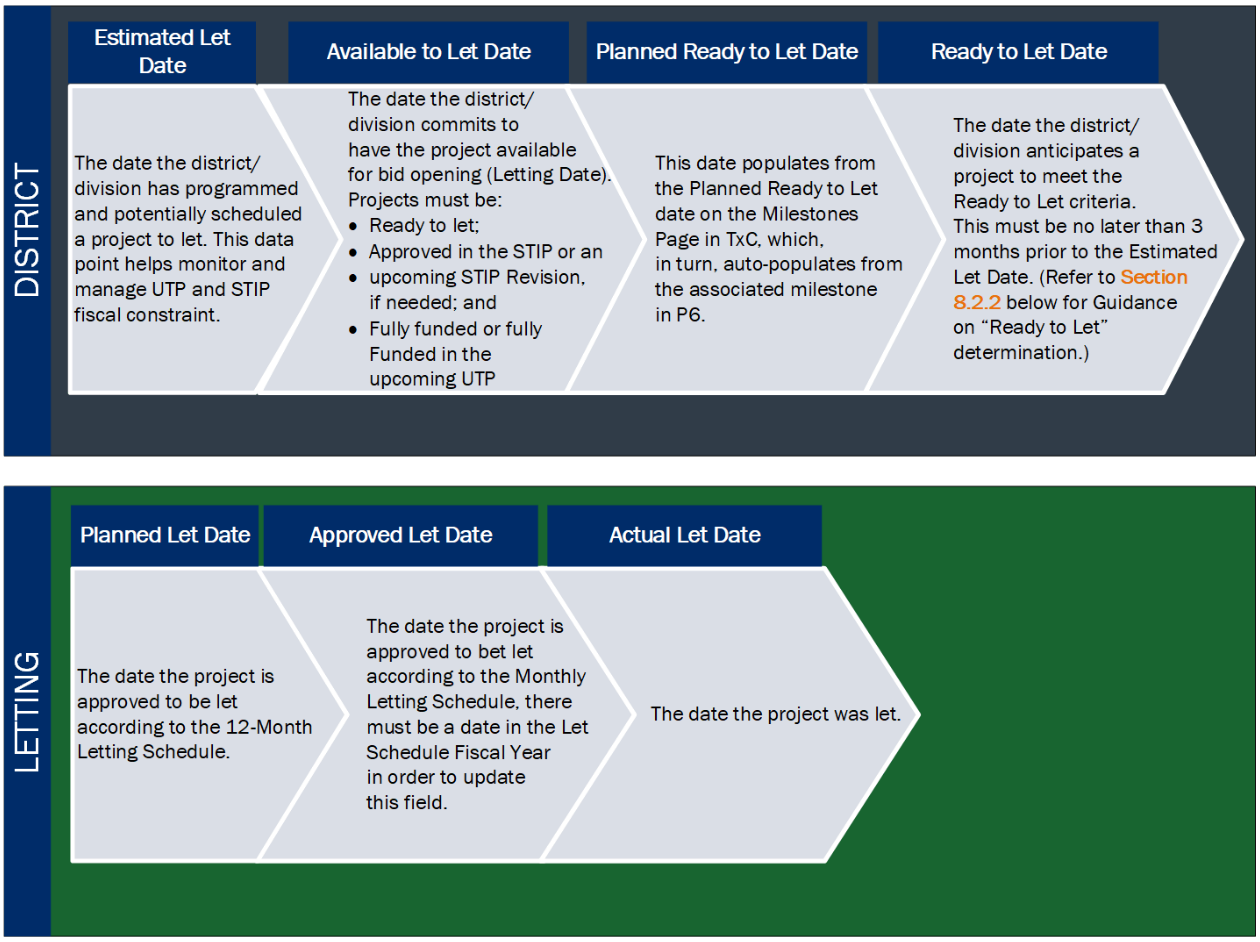

Figure 8-2: Let Date Definitions

8.2.2 "Ready to Let" Determination

The District is responsible for determining if the project is "Ready to Let" (RTL). Funding obligation and project authorization to advertise for construction bids will be issued when the project meets the RTL definition as outlined in the Chief Engineer's memo dated March 7, 2016.

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- ENV cleared and ENV mitigation complete (cleared sufficiently to proceed into construction without delays);
- ENV permits secured (cleared sufficiently to proceed into construction without delays);
- ROW cleared (cleared sufficiently to proceed into construction without delays);
- Sealed(100%) PS&E (includes completed and approved schematic, if applicable);
- Project agreements in place (includes local funding being received or an amount sufficiently received to proceed into construction without delays, for applicable projects);
- Railroad coordination complete and agreement in place (cleared sufficiently to proceed into construction without delays, if applicable); and
- Utility agreements in place and relocations in progress (cleared sufficiently to proceed into construction without delays, if applicable).

The above and any other remaining issues are to be resolved no less than four (4) months prior to letting date. Some of these issues are project specific and will not be applicable to every PS&E project.

8.2.2.1 Construction Management Plans

In cases where the project does not meet the RTL definition (e.g., unclear ROW or utilities, incomplete railroad coordination), the project may advance to letting with the inclusion of an approved Construction Management Plan (CMP). A CMP is an executive summary of the steps that will be shown in the plans to complete the project while mitigating the risk of delays in construction due to unclear project certifications including ROW acquisition, ROW encroachments, ROW relocation, utility conflicts, and/or outstanding railroad agreements.

According to the PS&E Review and Processing Schedule draft certifications for ROW Encroachment, ROW Acquisition, ROW Relocations, Utility Adjustments and Railroad Coordination are due approximately **four months prior to the letting date** (refer to the PS&E Review and Processing Schedule for exact dates). The status of the draft certifications is used to determine the need for a possible CMP.

A CMP is required on any project which does not meet the Ready to Let definition.

A CMP consists of the following elements:

- Memo;

- Project certifications for Utilities, ROW and Railroads
- Phase narrative;
- TCP layouts; and
- Contract time determination schedule.

Additional information on developing a CMP can be found in the Construction Management Plan SOP. The DES - FPP Section can also provide additional guidance.

8.2.3 Submit Letting Schedule Modification (if necessary)

Project letting dates are occasionally changed in TxC due to varying circumstances. One of the circumstances is if the bid is not awarded as discussed in **Section 8.4.2**. Other instances described below prior to letting may also require the use of a Letting Schedule Modification (LSM) form.

The LSM form is used to request any of the following changes:

- Add or reschedule a Let Date;
- Associate or disassociate projects; or
- Cancel a project.

If any of the following scenarios are present, a LSM form is required since TxC users will not be able to make changes to the Estimated Let Date, Associate/Disassociate Projects, or Cancel Projects:

- When the Estimated Let Date is in the current fiscal year;
- If there has been an Approved Let Date;
- A change is made that accelerates the project to the current fiscal year; or
- If changes are moving the Estimated Let Date to within 4 months of the current date.

The status of utilities, ROW, railroad, STIP and NEPA must be included in the LSM request in TxC.

If moving a project to within the next 4 months of lettings, add one of the following statements to the LSM request:

- The project is all clear with respect to Utilities, ROW, Railroad, STIP, and NEPA; or
- The project has unclear ______________(fill in the blank). We have submitted the project certifications, along with STIP and NEPA status, to DES for their review and approval.

The LSM is accessed, completed, submitted, and monitored until approval through TxDOTCONNECT on the Workflow, Forms & Documents page.

8.2.4 RTL PS&E Submittal to DES-FPP

The District is responsible for performing the RTL PS&E pre-submittal process prior to submission of the project to the DES-FPP staff.

Refer to TxDOT's 100% PS&E Pre-Submittal Preparation webpage for detailed information on the process which includes:

- Project submittal checklist;
- PS&E Review SOP;
- Electronic plan set guidance;
- Form 1002 – PS&E Transmittal Data;
- Engineer's estimate;
- Specification list;
- General Notes;
- Engineer's PE/Registered Landscape Architect Seal;
- Certifications for Utilities, ROW, and Railroads;
- Contract Time Determination Schedule;
- Form 2229 – Significant Project Procedures (TxDOT intranet only);
- Form 2699 – Determination of Additional Project-Specific Liquidated Damages;
- Form 2502 – Value Engineering Study Executive Decision Summary (TxDOT intranet only);
- Design exceptions, waivers, variances and deviations; and
- SWP3 Plan sheet requirements.

The District is responsible for preparing and submitting the completed RTL PS&E package to the DES-FPP section. Refer to the TxDOT.gov 100% PS&E Submittal to DES webpage and the *PS&E Preparation Manual* for detailed information on the process which includes:

- Building the contract proposal;
- Supporting documents for 100% PS&E Submittal;
- Submittal instructions;
- Multi-volume plan set submittal guidance; and
- Other useful files and links including:
  - DES-FPP final PS&E processing checklist;
  - PS&E Review and processing schedule; and

- Letting Schedule Modification (LSM) Workflow Requests.

8.2.5 Preliminary Construction Plans for Review Only

To improve the quality of bids, the department will provide early plans, cross sections, contract time determination (CTD) schedule and 3D models (if applicable) prior to advertisement of the contract for information only (FIO). For further guidance on projects that require providing plans, cross sections, CTD, and/or models online for contractor information, refer to the TxDOT.gov Digital Delivery webpage.

Cross sections do not need to be signed and sealed.

The TxDOT PM is responsible for ensuring the plans, cross sections, CTD, and models are posted **on or before the date advertisements are published on the TxDOT.gov Contract Letting webpage – Early plan posting** according to the PS&E Review and Processing Schedule and in the required format on the centralized ftp site in the project folder with other pre-letting documentation. The file should be clearly labeled for ease of identification.

Consultant engineering firms involved in TxDOT design projects must include this data as part of their deliverable to the District.

The following disclaimer must be included in the transmittal of the data:

Disclaimer: Preliminary – Subject to Revision
This plan set is released for preliminary review only.
It is not to be used for bidding, construction, or permit purposes.

© Current Year by Texas Department of Transportation; all rights reserved

All plan sheets, cross sections and CTD schedules should have a watermark included stating: "PRELIMINARY – SUBJECT TO CHANGE. NOT FOR BIDDING PURPOSES – CURRENT DATE" .

8.2.6 RTL PS&E for Letting Review by DES

Refer to TxDOT's *PS&E Preparation Manual* for information on performing the RTL PS&E review by the DES.

8.2.7 Plans/Proposal Published for Contractor Review and Bidding

The District builds, reviews and revises proposals before they are released to bidders. CST then releases the bid proposals for bidding.

The “Notice to Contractors” webpage is the unofficial source for monthly state and local construction and maintenance contracts. The Electronic State Business Daily (ESBD), the Electronic Bidding System - Integrated Contractor Exchange (iCX), and the project proposal are the official sources of advertisement and bidding information for the State and Local Lettings. These sources take precedence over information from other sources, including TxDOT webpages, which are unofficial and intended for informational purposes only.

Once a project is released to TxDOT.gov, questions may be submitted from the Notice to Contractors Dashboard, available on the TxDOT.gov Contract Letting webpage.

1. Navigate to TxDOT’s Contract Letting page;
2. Scroll to the Bidding section; and
3. Click the Pre-Bid Q&A link.

   The Notification to Contractors Dashboard opens.

The questions are routed to assigned contacts within TxDOT to facilitate a response. An authorized user (District or Division Project Manager, Professional Engineer, or Engineer’s Estimate Coordinator) should assign up to two contacts and approvers for answering questions and approval. Once the response is completed the question and answer are published to TxDOT.gov for all bidders to review. Refer to TxDOT’s Pre-Bid Question & Answer Job Aid for further guidance.

The TxDOT.gov Contract Letting webpage provides information on:

- Statewide Letting Dates;
- Bidding resources;
- Post letting resources; and
- Bidder resources.

8.2.8 Ads Published

The department must publish notice of the time and place at which bids on contracts will be read and awarded. The department posts online advertisement at ESBD and on TXDOT.gov.

TxDOT advertises all state construction and maintenance projects more than $25,000 on the Electronic State Business Daily (ESBD) system that is maintained by the Texas Comptroller of Public Accounts no less than 21 days prior to bid opening.

Bids are received through the department online electronic bidding system iCX. Electronic bid bonds are required. A secure online administrative account is set up for bidders; account set up can be facilitated by surety agents using department-approved electronic bond clearinghouses.

Refer to TxDOT.gov Contract Letting webpage and TxDOT's *Letting Manual* for additional details on advance notice of construction projects

8.2.9 Addendum Process

Changes required to the plans or proposal prior to the bid opening but after they are published are accomplished via addendum.

Refer to TxDOT's *PS&E Preparation Manual* for detailed information on the addendum process.

8.2.10 Prebid Conference

The District may conduct pre-bid conferences to provide specific project information, explain any unusual aspects of the project, and address any potential bidder questions. Refer to TxDOT's *PS&E Preparation Manual* and *Construction Contract Administration Manual* for additional information concerning the pre-bid conference.

Authority documents:

- ☐ 23 CFR §635.309
- ☐ 23 CFR 635 Subpart C
- ☐ 23 USC §106
- ☐ 23 USC §109
- ☐ 43 TAC §9.13(c)
- ☐ Texas Government Code §2155.083
- ☐ TTC §201.943(d)
- ☐ TTC §223.0042

Resources to consult:

- ☐ Addendum Standard Operating Procedure (SOP)
- ☐ Construction Contract Administration Manual
- ☐ Construction Management Plan SOP (TxDOT intranet only)
- ☐ Letting Manual (TxDOT intranet only)
- ☐ Letting Schedule Modification (LSM) Workflow Request (TxDOT intranet only)
- ☐ PS&E Preparation Manual
- ☐ PS&E Review and Processing Schedule (TxDOT intranet only)
- ☐ Electronic State Business Daily (ESBD) webpage
- ☐ Pre-Bid Question & Answer Job Aid
- ☐ TxDOT.gov 100% PS&E Submittal to DES webpage
- ☐ TxDOT.gov Contract Letting webpage
- ☐ TxDOT.gov Digital Delivery webpage
- ☐ TxDOT.gov Electronic Bidding System (iCX) webpage

Coordination:

- ☐ DES – Digital Delivery staff
- ☐ DES - FPP staff

Tools to use:

- ☐ Form 1002 – PS&E Transmittal Data
- ☐ Form 2229 – Significant Project Procedures (TxDOT intranet only)
- ☐ Form 2502 – Value Engineering Study Executive Decision Summary (TxDOT intranet only)
- ☐ Form 2699 – Determination of Additional Project-Specific Liquidated Damages
- ☐ PS&E QC Milestone Checklist
- ☐ DES-FPP 100% PS&E Submittal Checklist
- ☐ DES-FPP final PS&E processing checklist

8.3 Letting

8.3.1 Bid Opening

Bid openings are held in Austin each month and are conducted by the CST. CST prints a bid sheet for each project to let. The bid sheet is a list, by project, of bidders who have pulled proposals. All conditions of bid acceptance must be reviewed at the opening of each bid.

These conditions include any of the following:

- Mandatory pre-bid conference attendance (if required);
- Proposal Addenda Acknowledgment page "checked";
- Proper presentation of bids;
- Proposal guaranty check, etc.; and
- Signatures are complete.

Bid totals are read at bid opening. Unofficial lowest bid received for each contract is announced, but all bids will be analyzed by CST before the TTC announces award to the verified lowest responsive bid.

Authority documents:

☐ 23 CFR §635.113

☐ 43 TAC §9.15

☐ TTC §223.004

Resources to consult:

☐ Construction Contract Administration Manual

☐ Early Plans Posting for Contractor Review SOP (TxDOT intranet only)

☐ Letting Manual

☐ PS&E Review and Processing Schedule (TxDOT intranet only)

☐ TxDOT.gov Contract Letting webpage

Coordination:

☐ CST staff

☐ District construction staff

8.4 Post Letting

8.4.1 Bid Tabulation and Review

Refer to the *PS&E Preparation Manual, Construction Contract Administration Manual,* and *Letting Manual* for an in-depth discussion of bid tabulation and review.

8.4.2 Contract Award

Refer to the *PS&E Preparation Manual, Construction Contract Administration Manual,* and *Letting Manual* for an in-depth discussion of the contract award process.

8.4.3 Project Financial Clearance Analysis

Refer to TxDOT's *PS&E Preparation Manual* for information concerning the Notice of Financial Clearance for Bid Opening and Award.

Authority documents:

- ☐ Transportation Code Chapter 223
- ☐ 23 CFR §635.114
- ☐ 43 TAC § 9.15 - 9.17
- ☐ 43 TAC §9.18

Resources to consult:

- ☐ Letting Manual (TxDOT intranet only)
- ☐ Construction Contract Administration Manual
- ☐ PS&E Preparation Manual
- ☐ Letting Schedule Modification Request Form Job Aid

Coordination:

- ☐ District construction staff
- ☐ DES-FPP staff
- ☐ CST-CMCL staff
- ☐ FIN staff

Tools to use:

- ☐ LSM Form

8.5 Local Government Participation Projects

For information on the letting process for Local Government Projects, refer to the TxDOT.gov Local Government Projects Program webpage and the Local Government Projects Toolkit webpage.

Resources to consult:

- ☐ TxDOT.gov Local Government Projects Program webpage
- ☐ TxDOT.gov Local Government Projects Toolkit webpage

Coordination:

- ☐ TPD – Local Government Programs staff

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Appendix A Authority Documentation

PDP Section #	Authority Document	Description
1.4	Stewardship and Oversight Agreement	S&O agreement between TxDOT and FHWA
1.4.1	43 TAC §15.52	Federal state and local participation agreements
1.4.1	Texas Local Government Code	Texas law related to Local Public Agencies (LPA)
1.7	13 TAC §6.1 et seq.	Records retention scheduling
1.7	Government Code §441.1855	Retention of contracts and related documents by state agencies
1.7	Government Code Subchapter L	Preservation and management of state records and other historical
2.2	23 CFR Part 450	Statewide and metropolitan planning and programming definitions
2.4	43 TAC §11.100 et seq.	Green Ribbon projects
2.6.1	43 TAC §16.101 et seq.	Transportation programs (STIP, TIP, UTP, etc.)
2.6.2	EPA: Federal regulation and enforcement	Air quality
3.3.1.3	23 USC §217(g)(1)	Bike and pedestrian accommodations
3.3.1.3	36 CFR Chapter XI	Pedestrian -Architectural and Transportation Barriers Compliance Board
3.3.1.5	TTC Chapter 223, Subchapter A	Design-bid-build authority
3.3.1.5	TTC Chapter 223, Subchapter F	Design-build authority
3.4.4	43 TAC §2.301 et seq.	Memorandum of understanding with TCEQ
3.4.4	43 TAC §2.251 et seq.	Memorandum of understanding with THC
3.4.4	43 TAC §2.201 et seq.	Memorandum of understanding with TPWD
3.4.4	Migratory Bird Treaty Act of 1918 (MBTA), as amended	Migratory Bird Treaty Act of 1918 (MBTA), as amended
3.4.4	43 TAC Subchapter G	Mitigation memorandum of understanding with Texas Parks and Wildlife
3.4.4.1	TCEQ: Texas regulation and enforcement	Air quality
3.4.4.1	Clean Air Act	Clean Air Act
3.4.4.1	30 TAC Chapter 114 §114.260-§114.270	State Implementation Plan
3.4.4.2	Clean Air Act	Clean Air Act
3.4.4.2	23 CFR Section 500.109	CMS
3.4.4.2	23 CFR §450.322	Congestion management process
3.4.5	33 CFR §329.4	Navigable waterway definition

PDP Section #	Authority Document	Description
3.4.7	43 TAC Part 1 Chapter 21	Right-of-way
3.4.8.1	43 TAC Part 1 Chapter 21	Right-of-way
3.4.8.3	Texas Roadside Parks Study - Historic Context & National Register Requirements	Historic properties
3.4.8.3	National Historic Preservation Act of 1966	Historic properties
3.4.8.3	Department of Transportation Act of 1966	Historic properties
3.4.8.3	National Environmental Policy Act of 1969 as amended	Historic properties
3.4.8.3	Historical and Archeological Data Preservation Act of 1974	Historic properties
3.4.8.3	Intermodal Surface Transportation Efficiency Act of 1991.	Historic properties
3.4.8.3	43 TAC §2.251 et seq.	Memorandum of understanding with the Texas Historical Commission and historical properties
3.5	23 USC §133(c)	Exceptions to federal funds being used on functional classifications
3.5	Texas Constitution, Article III. Legislative Department. Section 49-k	Texas Mobility Fund - construction funding
3.5.1	Clean Air Act	Air quality
3.5.1	43 TAC §15.50 et seq.	Federal, state, local participation of funding
3.5.2	43 TAC §15.52	Federal, state, local participation agreements
3.5.2	43 TAC §15.50 et seq.	Federal, State, Local Participation of Funding
3.6.3	43 TAC Part 1 Chapter 21	Right-of-way
4.2	23 CFR Part 752	Landscape and roadside development
4.2	23 USC §319	Landscape and scenic enhancement
4.2	23 CFR PART 626	Pavement policy, federal-aid projects
4.2	43 TAC, §11.200 et seq.	Transportation Enhancement Program
4.2.2	TTC §203.031	Control of access
4.3.1.1	23 USC §217(g)(1)	Bike and pedestrian accommodations
4.3.1.1	23 CFR PART 626	Pavement policy, federal-aid projects
4.3.1.4	43 TAC Part 1 Chapter 21	Right-of-way
4.3.1.5	43 TAC §2.105	Public meeting
4.3.2.3	43 TAC Part 1 Chapter 21	Right-of-way
4.3.2.6	TTC §201.811	Public involvement policy
4.4.1.4	23 USC §217	Bicycle transportation and pedestrian walkways

PDP Section #	Authority Document	Description
4.4.1.4	23 USC §217(g)(1)	Bike and pedestrian accommodations
4.4.1.4	Texas Government Code Chapter 469	Elimination of Architectural Barriers
4.4.1.4	23 USC Chapter 1	Federal Aid Highways - Standards; Metropolitan transportation planning; and statewide and metropolitan transportation planning
4.4.1.4	TTC §201.902	Road use by bicyclists
4.4.1.4	49 CFR §37.9	Standards for accessible transportation facilities
4.4.10.1	23 USC §329	Eligibility for control of noxious weeds and aquatic noxious weeds and establishment of native species
4.4.10.1	43 TAC §11.100 et seq.	Green Ribbon projects
4.4.10.2	Government Code §411.0099	Commercial motor vehicle inspection stations
4.4.11	36 CFR §1119.1	Accessibility guidelines
4.4.11	41 CFR §102.76	ADA Standards and PROWAG
4.4.6.1	23 CFR PART 626	Pavement policy, federal-aid projects
4.4.8.2	43 TAC §25.11	Continuous and safety lighting systems
4.4.8.2	14 CFR §77.9	FAA "construction or alteration requiring notice
4.4.8.2	14 CFR §77.7	FAA "form and time of notice
4.4.8.2	23 CFR Part 620 Subpart A	Highway improvements in the vicinity of airports
4.4.8.3	Executive Order - Accelerating Broadband Infrastructure Deployment	ITS
4.4.8.3	National ITS Architecture	ITS
4.4.8.3	23 USC §167	ITS - National Highway Freight Program
4.4.8.3	23 USC §117	ITS - Nationally significant freight and highway projects
4.4.8.4	23 USC §111	Agreements relating to the use of and access to rights-of-way interstate system
4.4.8.4	FHWA, Directives and Memorandum, Notice - Interstate Access	Interstate access
4.4.9	43 TAC Part 1, Chapter 7,	Railroad coordination
4.4.9	43 TAC Part 1 Chapter 21	Right-of-way
4.5	FHWA Order 1311.1B	FHWA Value Engineering (VE) Policy, August 28, 2013
4.5	23 CFR Part 627	Value Engineering
4.5	23 USC §106(e-g)	Value Engineering project approval and oversight
4.7	43 TAC Part 1 Chapter 21	Right-of-way

PDP Section #	Authority Document	Description
4.9	43 TAC §15.50 et seq.	Federal, state, local participation of funding
4.9	43 TAC §15.70 et seq.	International bridge funding
5.2	First Renewed Memorandum of Understanding Between the Federal Highway Administration and the Texas Department of Transportation Concerning State of Texas' Participation in the Project Delivery Program Pursuant to 23 U.S.C. 327	Assignment MOU
5.2	National Environmental Policy Act (NEPA)	NEPA federal law
5.3	National Environmental Policy Act (NEPA)	NEPA federal law
5.3	43 TAC 2	Environmental review of transportation projects
5.4	TTC §201.752	Environmental reviews of state projects
5.4.2	43 TAC §2.81 et seq.	Environmental review of categorical exclusions
5.4.3	23 CFR 771.129	Reevaluations - federal projects
5.4.3	43 TAC § 2.85	State projects reevaluations
5.5.2	Texas Health and Safety Code, Clean Air Act (TCAA)	Air quality
5.5.2.1	40 CFR §1500 et seq.	Council on Environmental Quality - NEPA
5.5.2.1	TTC §201.615	Design considerations in developing transportation projects
5.5.3.1	49 CFR Part 24	Federal aid programs and projects uniform relocation assistance and real property acquisition for federal and federally assisted programs
5.5.3.1	43 TAC Part 1 Chapter 21	Right-of-way
5.5.3.2	Chapter 26 of the Texas Parks and Wildlife Code (PWC)	Chapter 26 Parks and Wildlife Code
5.5.3.2	23 CFR §774.1 et seq.	Section 4(f) - Policy on lands, wildlife and waterfowl refuges, and historic sites
5.5.3.2	23 CFR 774.5(b)	Section 4(f) de minimis impact determinations
5.5.3.2	23 USC 138	Section 4(f) of the U.S. Department of Transportation Act
5.5.3.2	49 USC 303;	Section 4(f) of the U.S. Department of Transportation Act
5.5.3.2	36 CFR Part 59	Section 6(f) - Parks, Forests, and Public Property
5.5.3.2	US DOT Act of 1966, as amended, Section 4(f)	Section 4(f) - US DOT Act of 1966, as amended
5.5.3.3	23 CFR 650	Bridges, structures, and hydraulics

PDP Section #	Authority Document	Description
5.5.3.3	Clean Water Act of 1972	Clean Water Act of 1972
5.5.3.3	Section 401 Water Quality Certification	Clean Water Act permits
5.5.3.3	Section 402 National Pollutant Discharge Elimination System	Clean Water Act permits
5.5.3.3	Section 404 Regulatory Program	Clean Water Act permits
5.5.3.3	33 CFR 238	Flood damage reduction measures in urban areas
5.5.3.3	Executive Order 11988	Floodplain management
5.5.3.3	33 CFR §208.10	Local flood protection works
5.5.3.3	CFR Title 33	Navigable waters
5.5.3.3	33 CFR §323.3	Permits for discharges of dredged or fill material into waters of the Unites States
5.5.3.3	33 USC §401	Protection of navigable waters and of harbor and river improvements generally
5.5.3.3	Coastal Zone Management Act of 1972	Protection, restoration, and development of the nation's coastal communities and natural resources.
5.5.4.3	CWA §404(b)(1)	Guidelines for more comprehensive standards for compensatory mitigation
5.5.4.3	TTC §201.617	Mitigation of adverse environmental impacts
5.6	30 TAC Chapter 213	Edwards Aquifer Act
5.6	Health and Safety Code	Health and Safety Code - project includes a cemetery
5.6	National Historic Preservation Act of 1966 (NHPA), as amended, Section 106	National Historic Preservation Act of 1966 (NHPA), as amended, Section 106
5.6	Natural Resources Code, Title 9 - Chapter 191 Antiquities Code	Natural Resources Code, Title 9 - Chapter 191 Antiquities Code
5.6	36 CFR Part 800	Protection of Historic Properties (Section 106)
5.6.1	National Environmental Policy Act (NEPA)	Air quality
5.6.1	Clean Air Act	Clean Air Act
5.6.2	Texas Roadside Parks Study - Historic Context & National Register Requirements	Historic properties
5.6.2	National Historic Preservation Act of 1966	Historic properties
5.6.2	Department of Transportation Act of 1966	Historic properties
5.6.2	National Environmental Policy Act of 1969 as amended	Historic properties

PDP Section #	Authority Document	Description
5.6.2	Historical and Archeological Data Preservation Act of 1974	Historic properties
5.6.2	Intermodal Surface Transportation Efficiency Act of 1991	Historic properties
5.6.2	43 TAC §2.251 et seq.	Memorandum of understanding with the Texas Historical Commission historic properties
5.6.3	Coastal Zone Management Act of 1972 (CZMA)	Coastal Zone Management Act of 1972 (CZMA)
5.6.3	Marine Protection, Research, and Sanctuaries Act of 1972 (MPRSA), as amended	Marine Protection, Research, and Sanctuaries Act of 1972 (MPRSA), as amended
5.6.5	Executive Order 12898	Address environmental justice in minority populations and low-income populations”
5.6.5	Executive Order 13166	Improving access to services for persons with limited english proficiency
5.6.7	Texas Roadside Parks Study - Historic Context & National Register Requirements	Historic properties
5.6.7	National Historic Preservation Act of 1966	Historic properties
5.6.7	Department of Transportation Act of 1966	Historic properties
5.6.7	National Environmental Policy Act of 1969 as amended	Historic properties
5.6.7	Historical and Archeological Data Preservation Act of 1974	Historic properties
5.6.7	Intermodal Surface Transportation Efficiency Act of 1991	Historic properties
5.6.7	43 TAC §2.251 et seq.	Memorandum of understanding with the Texas Historical Commission historic properties
5.6.7	Texas Historical Commission	Texas Historical Commission
5.6.9	Federal-Aid Highway Act of 1970	Noise - mitigation
5.6.9	23 CFR Part 772	Noise - procedures for highway traffic noise and construction noise
5.6.9	Noise Control Act of 1972	Noise - source control
5.7	43 TAC §2.105	Public meeting
5.7	40 CFR §1500 et seq.	Council on Environmental Quality - NEPA
5.7	23 USC 139	Efficient environmental reviews for project decision-making
5.7	23 USC 128:	Public hearings
5.7	23 CFR §771.111	Public involvement - federal projects

PDP Section #	Authority Document	Description
5.7	16 USC 470	Section 106 of the National Historic Preservation Act
5.7	36 CFR 800	Section 106 of the National Historic Preservation Act procedures for implementation
5.7	TTC §203.022	State projects notice and opportunity to comment
5.7	TTC §203.021	State projects public hearings
5.7	43 TAC §2.101 et seq.	State projects public involvement
5.7	43 TAC §1.5	State projects public involvement - public hearings
5.7	TTC §203.021	State projects Public Involvement - public hearings
5.7	TTC §203.023	State projects public Involvement - substantial change in design
5.7	42 USC 2000d(1-7)	Title VI of the Civil Rights Act of 1964
5.7	Texas Transportation Commission Policy, Minute Order 112555, January 27, 2011	TxDOT public involvement policy
5.7.1	TTC §201.811	Public involvement policy
5.7.1	43 TAC §2.104	Notice and opportunity to comment
5.7.1	43 TAC §2.105	Public Meeting
5.7.1	43 TAC §2.106	Opportunity for Public Hearing
5.7.1	43 TAC §2.107	Public Hearing
5.8	Coastal Barrier Resources Act of 1982	Coastal Barrier Resources Act of 1982
5.8	Coastal Zone Management Act of 1972 (CZMA)	Coastal Zone Management Act of 1972 (CZMA)
5.8	Endangered Species Act	Endangered Species Act
5.8	Farmland Protection Policy Act (FPPA)	Farmland Protection Policy Act (FPPA)
5.8	Texas Pollutant Discharge Elimination System (TPDES)	TCEQ: Texas Pollutant Discharge Elimination System permit
5.8	Chapter 84 of the Texas Parks and Wildlife Code	Texas Farm And Ranch Lands Conservation Program
5.9	23 CFR Part 771	Environmental impact and related procedures - environmental clearance
5.9	23 CFR §771.101 et seq.	FHWA environmental review
6.2.2	Utilities Code Chapter 251	Underground facility damage prevention and safety
6.3	TTC Chapter 203, Subchapter D	Acquisition of property

PDP Section #	Authority Document	Description
6.3	43 TAC §21.7	Land acquisition procedures donation of real properties
6.3	43 TAC §21.16	Land acquisition procedures use of options to purchase for advance acquisition of real property
6.3	43 TAC §21.2	Land acquisition procedures, controlled access highways
6.3	23 CFR §710.503	Protective buying and hardship acquisition
6.3	Federal-aid Program or Projects: 49 CFR Subpart B	Real property acquisition
6.3	23 CFR §710.505	Real property donations
6.3	43 TAC §21.111 et seq.	Relocation assistance and benefits
6.3	Property Code § 21.046	Relocation assistance program
6.3	43 TAC §21.101 et seq.	Right-of-way - disposal of real estate interests
6.3	42 USC Ch. 61 §4601 et seq.	Uniform Relocation Assistance and Real Properties Acquisitions Policies Act of 1970, as amended (Uniform Act),
6.3	49 CFR Part 24	Uniform relocation assistance and real property acquisition for federal and federally assisted programs
6.3	43 TAC Part 1 Chapter 21	Right-of-way
6.3.11	Property Code, Chapter 21	Eminent domain
6.3.12	43 TAC §21.53	Joint use agreement forms
6.3.12	43 TAC §11.21	Multiple use of highway right-of-way
6.3.12	Texas Transportation Commission Minute Order No. 65169	Use of right-of-way by others, pp 44-47
6.3.14	23 CFR §635.112	Advertising for bids and proposals
6.3.6	Uniform Standards of Professional Appraisal Practice	as promulgated by the Appraisal Standards Board (ASB) of the congressionally authorized nonprofit Appraisal Foundation.
6.3.8	TTC §203.051	Acquisition of property
6.3.9	43 TAC §15.50 et seq.	Federal, state, local participation of funding
6.4	23 CFR 645 Subpart B	Accommodation of utilities - federal projects
6.4	23 USC §123.	Relocation of utility facilities
6.4	43 TAC §21.21 et seq.	Utility adjustment, relocation, or removal - state participation
6.4	23 CFR Part 645	Utilities
6.4	43 TAC Part 1 Chapter 21	Right-of-way

PDP Section #	Authority Document	Description
6.4	43 TAC § 21.21 et seq.	Utility accommodations - federal projects participation
6.4	43 TAC § 21.21 et seq.	Utility accommodations - state projects participation
6.4.3	43 TAC §21.22	Utility agreements
6.4.5	23 CFR §635.112	Advertising for bids and proposals
6.5	43 TAC §21.31 et seq.	Utility accommodation - costs (reimbursable/non-reimbursable)
6.5	TTC §224.008	Utility relocation costs
6.5	43 TAC Part 1 Chapter 21	Right-of-way
6.5	23 CFR 645 Subpart B	Utility accommodations - federal projects participation
6.5	43 TAC § 21.21 et seq.	Utility accommodations - state projects participation
6.5.1	TTC §203.092	Reimbursement for relocation of utility facilities
6.5.2	TTC §203.0921	Department relocation of utility facilities for essential highway improvement
7.4	23 CFR §630 Subpart J	Work zone safety and mobility - TCP
7.4.3.1	TTC §224.091	Detour roads
7.4.3.1	Transportation Code Chapter 221	General provisions - road closures
7.4.3.1	Transportation Code Chapter 201	General provisions and administration - road closures
7.4.3.1	Government Code, Chapter 771	Interagency Cooperation Act - road closures
7.4.3.1	Government Code, Chapter 791	Interlocal cooperation contracts - road closures
7.4.3.2	Transportation Code Chapter 221	General provisions - road closures
7.4.3.2	Transportation Code Chapter 201	General provisions and administration - road closures
7.4.3.2	Government Code, Chapter 771	Interagency Cooperation Act - road closures
7.4.3.2	Government Code, Chapter 791	Interlocal cooperation contracts - road closures
7.4.3.2	43 TAC §22.12	Road closures
7.5.2	43 TAC §11.50 et seq	Access connections to state highways
7.5.4	23 USC §217(g)(1)	Bike and pedestrian accommodations
7.5.4	Texas Government Code Chapter 469	Elimination of Architectural Barriers
7.5.4.1	16 TAC §68.50	TDLR submission of construction documents
7.5.4.1	16 TAC §68.31	TDLR variance procedures

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Instructions
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PDP Section #	Authority Document	Description
7.9.2	14 CFR §77.9	FAA construction or alteration requiring notice
7.9.2	14 CFR §77.7	FAA form and time of notice
7.9.2	23 CFR Part 620 Subpart A	Highway improvements in the vicinity of airports
7.9.2	Health and Safety Code, Chapter 425	Light pollution - regulation of certain outdoor lighting
7.11.4	CWA §404(b)(1)	Guidelines for more comprehensive standards for compensatory mitigation
7.12.1	23 USC §329	Eligibility for control of noxious weeds and aquatic noxious weeds and establishment of native species
7.12.1	43 TAC §11.100 et seq.	Green Ribbon projects
7.12.1	23 CFR Part 752	Landscape and roadside development
7.12.1	23 USC §319	Landscape and scenic enhancement
7.12.1	43 TAC, §11.200 et seq.	Transportation Enhancement Program
7.12.3	23 CFR Part 625	Design standards for highways - design exceptions and waivers
7.13.1	23 CFR §635.411	Proprietary materials - regulation: material or product selection
8.2	23 CFR 635 Subpart C	Physical construction authorization
8.2	TTC §201.943(d)	Purposes for obligation to be issued
8.2	23 CFR §635.309	Authority to issue obligations
8.2	23 USC §106	Authorization to advertise for construction bids
8.2.3	23 USC §109	Project approval and oversight - submit PS&E to DES
8.2.3	TTC §223.0042	Standards - submit PS&E to DES
8.2.6	Texas Government Code §2155.083	Contract information on internet website
8.2.6	43 TAC §9.13(c)	Electronic state business daily; notice regarding procurements exceeding $25,000
8.2.6	Texas Government Code §2155.083	Notice of letting and issuance of bid forms
8.3.1	43 TAC §9.15	Electronic state business daily; notice regarding procurements exceeding $25,000
8.3.1	23 CFR §635.113	Acceptance, rejection, and reading of bids
8.3.1	TTC §223.004	Bid opening and bid tabulations, federal-aid contracts
8.4.1	Transportation Code Chapter 223	Filing, opening, and rejection of bids
8.4.1	43 TAC § 9.15 - 9.17	Bids and contracts for highway projects

PDP Section #	Authority Document	Description
8.4.1	43 TAC § 9.17	Contract and grant management, highway improvement projects
8.4.2	23 CFR §635.114	Award of contract
8.4.2	43 TAC §9.18	Award of contract and concurrence in award

Appendix B Resource Links

A Guide for Sequencing and Placement of Noise Walls and Retaining Walls on TxDOT Projects

AAHSTO's Defining the Purpose and Need and Determining the Range of Alternatives for Transportation Projects

AASHTO A Policy on Design Standards – Interstate System

AASHTO A Policy on Geometric Design of Highways and Streets

AASHTO Guide for High Occupancy Vehicle Facilities

AASHTO Guide for the Development of Bicycle Facilities

AASHTO Guide for the Planning, Design, and Operation of Pedestrian Facilities

AASHTO Highway Safety Manual

AASHTO's LRFD Guide Specifications for the Design of Pedestrian Bridges

AASHTO Practical Guide to Cost Estimating

AASHTO Roadside Design Guide

AASHTO Roadway Lighting Design Guide

Access Management Manual

Addendum Standard Operating Procedure (SOP) (TxDOT intranet only)

Antiquities Code of Texas

Atlas Map - Atlas: Texas Historical Commission

TxDOT Historic Resources Aggregator

Bridge Design Guide

Bridge Design Manual - LRFD

Bridge Detailing Guide

Bridge Management Section webpage (TxDOT intranet only)

Bridge Project Development Manual

Construction Contract Administration Manual

Construction Cost Estimating Guidance (CCEG)

Construction Management Plan SOP (TxDOT intranet only)

Corridor Planning Guidebook

Crash Records Information System (CRIS) database

CSD webpage (TxDOT intranet only)

Data.census.gov United States Census Bureau

DES - Project Delivery Section webpage (TxDOT intranet only)

DES – H&H webpage (TxDOT intranet only)

DES Safer by Design webpage (TxDOT intranet only)

DES webpage (TxDOT intranet only)

Design-Build Procurement Overview Manual

Design Exception Request for Interstate Highways TxDOT Standard Operating Procedures

District Specific Pavement Design SOP – no link – request from each District

Early Plans Posting for Contractor Review SOP (TxDOT intranet only)

ECOS

Electronic State Business Daily (ESBD)

Environmental Guide: Volume 1 Process

Environmental Guide: Volume 2 Activity Instructions

Environmental Handbook – Air Quality

Environmental Handbook – Public Involvement

Environmental Management System Training Matrix

epa.gov EPA Greenbook

EPA's Environmental Justice webpage

eSTIP Portal webpage

FAA.gov OE/AAA webpage

FEMA.gov National Flood Hazard Layer

FEMA.gov/Flood-Maps

FHWA Bicycle and Pedestrian Program

FHWA Bridges & Structures publications

FHWA Community Impacts webpage

FHWA Congestion Management Process webpage

FHWA Environmental Justice webpage

FHWA Field Measurement Guidance

FHWA Hydraulics Policy and Memos

FHWA Intersection Control Evaluation webpage

FHWA Lists of Historic Bridges webpage

FHWA Major Projects webpage

FHWA Managed Lanes a Primer

FHWA Planning & Environment Linkages Handbook

FHWA Planning and Environment Linkages webpage

FHWA Roadmap to Risk Management for Transportation Planning

FHWA Traffic Noise webpage

FHWA VE FAQs webpage

Freeway Signing Handbook

fws.gov IPaC: Home

Gateway Monument Program Guide (TxDOT intranet only)

General Rules of Procedures and Practices of the Texas Board of Professional Engineers and Land Surveyors

Geotechnical Manual - LRFD

Hazardous Materials in Project Development Manual

TxDIP S&O Plan (TxDOT intranet only)

Health and Safety Code

Highway Illumination Manual

Historic Bridge Manual

HSIP Guidelines

Hydraulic Design Manual

IAJR Engineering, Operation and Safety Analysis SOP

IAJR Standard Operating Procedures FAQs

TxDOT.gov Electronic Bidding System (iCX) webpage

Landowner's Bill of Rights

Landscape and Aesthetics Design Manual

Landscape Architecture Programs (TxDOT intranet only)

Landscape Inspection Guide (TxDOT intranet only)

Letting Manual (TxDOT intranet only)

Letting Schedule Modification (LSM) Workflow Request (TxDOT intranet only)

Letting Schedule Modification Request Form Job Aid (TxDOT intranet only)

Local Government Policy Manual

Local Government Project Management Guide

Local Government Projects Best Practices Workbook

Local Government Projects Frequently Used Forms and Documents

Local Government Projects Policy Manual

Local Governments Projects ROW and Utilities workflow

Maintenance Management Manual

Maintenance Operations Manual

National Electrical Code

National Historic Preservation Act

Negotiated Contracts Policy Manual

NRCS webpage

Pavement Manual

PLAN Authority Guidebook (TxDOT intranet only)

PMIS database (TxDOT intranet only)

Pre-Bid Question & Answer Job Aid

Procedures for Sole Source Procurement - memo

Procedures for Establishing Speed Zones Manual

Project Management Institute (PMI) Risk Management

PS&E Preparation Manual

PS&E Review and Processing Schedule (TxDOT intranet only)

Rail Highway Operations Manual

Real Property Acquisition Act

Records Management Manual (TxDOT intranet only)

Records Retention Schedule

Risk Management Community of Practice (TxDOT intranet only)

Roadway Design Manual

ROW Acquisition Manual

ROW Appraisal and Review Manual

ROW Eminent Domain Manual

ROW Preliminary Procedures for the Authority to Proceed Manual

ROW Real Estate Acquisition Guide for Local Public Agencies

ROW Utilities Manual

Schedule Guide for Transportation Development Projects

Sign Guidelines and Applications Manual

data.census.gov United States Census Bureau

SOP: Acquiring and/or Purchasing 404 Compensatory Mitigation Credits

SOP for Tabulating Wildflower Seeing Efforts (TxDOT intranet only)

STARS II

Statewide Climate Change and Greenhouse Gas Technical Report

Statewide Traffic Analysis and Reporting System

Statewide Pedestrian Program (TxDOT intranet only)

Strategic Public Engagement Guidance

Structure Design – Corrosion Protection Guide

Survey Manual

SWP3 Guidance Manual Section 1

SWP3 Guidance Manual Section 2

SWP3 Standardized General Note

TDLR Construction Accessibility Requirements Procedures

Texas Air Quality Portal

Texas Association of Regional Councils webpage

Texas Carbon Reduction Strategy

Texas Chambers of Commerce webpage

Texas Commission on Environmental Quality (TCEQ) webpage

Texas Historical Commission's Historic Sites Atlas

Texas Local Government Code

Texas Parks and Wildlife Department Design Standards for Roads and Parks

Texas Property Code

Texas Rural Transportation webpage

Texas Transportation Plan

Texas Utilities Code

Texas.gov RRC Public GIS Viewer

Texas.gov RRC Public GIS Viewer

Texas.gov TPWD RTEST

Texas Manual on Uniform Traffic Control Devices (TMUTCD)

TPP – Office of Public Involvement webpage (intranet only)

TPP – Public Involvement Materials Toolkit (TxDOT intranet only)

TPP webpage (TxDOT intranet only)

Traffic and Safety Analysis Procedures Manual

Traffic Forecasting Analysis SOP and Guide (TxDOT intranet only)

Traffic Signals Manual

Transportation Planning and Programming Manual

TRB Highway Capacity Manual

TRF webpage (TxDOT intranet only)

TxDOT ADA Self-Evaluation and Transition Plan

TxDOT ADA Self-Evaluation and Transition Plan Supplement

TxDOT Bridge Standards

TxDOT Crash Records Information System (CRIS) webpage

TxDOT Highway Improvement Contract and Project Delivery

TxDOT Natural Resources Aggregator

TxDOT Open Data Portal

TxDOT Open Data Portal – TxDOT Bridges

TxDOT Pavement Management Information System (PMIS) (TxDOT intranet only)

TxDOT Plans Online (TxDOT intranet only)

TxDOT Pre-Bid Question & Answer Job Aid

TxDOT Records Management webpage (TxDOT intranet only)

TxDOT Roadway Standards

TxDOT Statewide TSMO ITS Standards and Specifications

TxDOT Strategic Plan

TxDOT Submission Standards for ROW Mapping Data in the ArcGIS Format

TxDOT SUE Deliverables Best Practices Document

TxDOT Survey Manual

TxDOT Traffic Safety Data Portal

TxDOT Traffic Standards

TxDOT Transportation Funding in Texas brochure

TxDOT Water Resources Companion Viewer

TxDOT.gov 2024 Standard Specifications

TxDOT.gov Accessibility webpage

TxDOT.gov Active Transportation Plan Inventory

TxDOT.gov Advanced Outfall Tracking System

TxDOT.gov Alternative Delivery Projects webpage

TxDOT.gov Bicycle and Pedestrian Local and Federal Funding Programs webpage

TxDOT.gov Bicycle Tourism Trails Study webpage

TxDOT.gov Bicycle Tourism Trials Example Network

TxDOT.gov Bridge Design, Construction, Maintenance, Inspection, and Management webpage

TxDOT.gov Bridge Publications webpage

TxDOT.gov Contract Letting webpage

TxDOT.gov Design Forms and Guides webpage

TxDOT.gov Design Tools and Training webpage

TxDOT.gov Digital Delivery webpage

TxDOT.gov Districts and Counties map

TxDOT.gov District Classification map

TxDOT.gov Environmental Compliance Toolkit webpage

TxDOT.gov Environmental Management System webpage

TxDOT.gov FHWA Stewardship & Oversight Agreement webpage

TxDOT.gov Geotechnical webpage

TxDOT.gov Highway Safety Engineering webpage

TxDOT.gov Houston Planning and Environmental Linkage (PEL) Studies webpage

TxDOT.gov Innovative Intersections webpage

TxDOT.gov Local Government Projects Toolkit – Environmental Compliance webpage

TxDOT.gov Local Government Projects Toolkit – Right of Way and Utilities webpage

TxDOT.gov Local Government Projects Toolkit webpage

TxDOT.gov Managed Lanes webpage

TxDOT.gov Metropolitan Planning Organizations in Texas webpage

TxDOT.gov National Environmental Policy Act (NEPA) Assignment Documentation webpage

TxDOT.gov NEPA and Project Development Toolkit webpage

TxDOT.gov Plans, Specifications & Estimate Requirements on Projects with Railroads webpage

TxDOT.gov Potential Archeological Liability Maps (PALM)

TxDOT.gov Project and Portfolio Management Publications webpage

TxDOT.gov Project Development Resources webpage

TxDOT.gov Project Letting Information webpage

TxDOT.gov Projects and Studies Statewide webpage

TxDOT.gov Projects and Studies webpage

TxDOT.gov Public Involvement Toolkit webpage

TxDOT.gov Railroad Design Guidelines webpage

TxDOT.gov Railroad-Highway Crossing Information webpage

TxDOT.gov Real Property Asset Map webpage

TxDOT.gov Reference Marker Maps webpage

TxDOT.gov Retaining Walls webpage

TxDOT.gov Right-of-Entry for Environmental Investigations webpage

TxDOT.gov Right-of-Way forms webpage

TxDOT.gov Right-of-way Maps webpage

TxDOT.gov Road User Costs webpage

TxDOT.gov Safer by Design webpage

TxDOT.gov Statewide Active Transportation Plan webpage

TxDOT.gov Statewide Multimodal Transit Plan webpage

TxDOT.gov Statewide Resiliency Plan webpage

TxDOT.gov Stormwater Pollution Prevention Plan (SWP3) guidance document webpage

TxDOT.gov Strategic Plans webpage

TxDOT.gov Strategic Public Engagement Guidance

TxDOT.gov Surveyors' Toolkit webpage

TxDOT.gov Texas Freight Network Technology and Operations Plan webpage

TxDOT.gov Texas Freight Network Technology and Operations Plan webpage

TxDOT.gov Texas Railroad Information Management System (TRIMS)

TxDOT.gov Texas-Mexico Border Transportation Master Plan

TxDOT.gov Traffic Count Maps webpage

TxDOT.gov Traffic Design Standards for Signs, Signals and Markings webpage

TxDOT.gov Traffic Noise Analysis toolkit webpage

TxDOT.gov Transportation Planning SLRTP webpage

TxDOT.gov Transportation Planning STIP webpage

TxDOT.gov Transportation Planning UTP webpage

TxDOT.gov Transportation Planning webpage

TxDOT.gov Transportation Systems Management and Operations webpage

TxDOT.gov TxDOT Financial Management – Funding Needs and Potential Sources webpage

TxDOT.gov TxDOT's Stormwater Pollution Prevention Plan (SWP3) Guidance Document webpage

TxDOT.gov Unmanned Aircraft System (UAS) Services webpage

TxDOT.gov Utility Accommodations Toolkit webpage

TxDOT.gov Utility Forms and Publications webpage

TxDOT's Guidance – Preparing a Purpose and Need Statement

TxDOT's Public Involvement Policy

TxDOT's Strategic Public Engagement Guidance

TxDOT's Training Catalog

TxDOTCONNECT Reference Guide - Project Information

TxDOTCONNECT Reference Manual – Engineer's Estimate

Uniform Relocation Assistance

U.S. Army Corp of Engineers (USACE)

United States Coast Guard (USCG)

USDOT Bicycle and Pedestrian Planning, Program, and Project Development Guidance memo

Use of Right of Way by Others Manual

UTP programming guidance

Appendix C Tools Links

ADA/TAS Design Variance Form (TxDOT Intranet only)

Atlas 14 rainfall intensity tools

CCEG spreadsheet tool

Certifications for Utilities, ROW, and Railroads

Construction Cost Estimate Assistance Tool

Corridor Planning Tools (TxDOT intranet only)

DES-FPP 100% PS&E Submittal checklist

DES-FPP Final PS&E Processing checklist

Design Deviation form (TxDOT intranet only)

Design Exceptions form (TxDOT Intranet only)

District and DES specific H&H spreadsheets to document calculations (TxDOT intranet only)

Drainage Report template (TxDOT intranet only)

Form 1002 – PS&E Transmittal Data

Form 1204 – Request for Regulatory Construction Speed Zone

Form 2044 - Multiple Use Agreement

Form 2044-FED - Multiple Use Agreement

Form 2229 - Significant Project Procedures (TxDOT intranet only)

Form 2440 – DSR

Form 2442 – APD Stage Gate Checklist

Form 2443 – PSE Stage Gate Checklist

Form 2448 – CSGC Stage Gate Checklist

Form 2502 – Value Engineering Study Executive Decision Summary (TxDOT intranet only)

Form 2699 - Determination of Additional Project-Specific Liquidated Damages

Form TEA30A - Agreement for the Temporary Closure of State Right of Way (TxDOT intranet only)

Interstate and Non-interstate Design Exception templates (TxDOT intranet only)

Local Government Project Development & Delivery Checklist – Environmental Compliance

Major project document templates (TxDOT intranet only)

PS&E QC Milestone Checklist

Right-of-Entry Agreement Form

Risk Register Spreadsheet

ROW-N-PUAIC Possession and Use Agreement with Additional Payment of Independent Consideration form

ROW-RM-CSJTPC Right of Way Total Project Costs form

Schematic QC Checklist

Sole Source Request Form - template

Statewide Planning Map

Texas Access Management Enterprise System (TAMES) – request access through TxDOT Service Now portal

THFN Design Deviation template (TxDOT intranet only)

Traffic Forecasting Analysis tool (TxDOT intranet only)

TxDOT Utility Conflict Analysis Template

TxDOT.gov Certifications – all template

TxDOT.gov Unclear ROW for CMP template

Unclear Railroad Agreement/Maintenance Notification template

Appendix D Acronyms

- **AAA** – Airport Airspace Analysis
- **AADT** – annual average daily traffic
- **AASHTO** – American Association of State Highway and Transportation Officials
- **ACP** – asphalt concrete pavement
- **ACT** – Antiquities Code of Texas
- **ADA** – Americans with Disabilities Act
- **ADT** – Average Daily Traffic
- **AEP** – annual exceedance probability
- **AFA** – advance funding agreement
- **AGL** – above ground level
- **ALD** – Alternative Delivery Division
- **AMM** – Access Management Manual
- **AOTS** – advanced outfall tracking system
- **APD** – advance planning and development
- **ATC** – Alternative Technical Concepts
- **BMP** – best management practices
- **BRG –** Bridge Division
- **C&M** – construction & maintenance
- **CAD** – computer-aided design
- **CANDPA** – Candidate PLAN Authority
- **CCAM** – Construction Contract Administration Manual
- **CCEG** – Construction Cost Estimating Guidance
- **CCSJ** – Controlling Control Section Job
- **CCTV** – closed circuit television
- **CE** – Categorial Exclusion
- **CFR** – Code of Federal Regulations
- **CIA** – community impacts assessment
- **CMP** – Congestion Management Process
- **CMV** – Commercial Motor Vehicle
- **CO** – carbon monoxide
- **CoC** – Chambers of Commerce
- **COE** – Corps of Engineers
- **COG** – Councils of Government
- **CRIS** – Crash Records Information System

- **CSD** – Contract Services Division
- **CSGC** – Construction State Gate Checklist
- **CSJ** – Control Section Job
- **CSRA** – Cost and Schedule Risk Analysis
- **CST**– Construction Division
- **CTB** – concrete traffic barrier
- **CTD** – contract time determination
- **CVS** – Certified Value Specialist
- **CWA –** Clean Water Act
- **DB** – design-build (alternative delivery)
- **DBB** – design-bid-build delivery
- **DCC** – design concept conference
- **DEIS** – draft environmental impact statement
- **DES** – Design Division
- **DMS** – dynamic message signs
- **DPS** – Department of Public Safety
- **DSR** – Design Summary Report
- **DSRT** – District safety review team
- **DTM** – Digital Terrain Model
- **EA** – Environmental Assessment
- **ECOS** – Environmental Compliance Oversight System
- **EDC** – Economic Development Councils
- **EIS** – Environmental Impact Statement
- **EJ** – environmental justice
- **EMLL** – electromagnetic line location
- **ENV** – Environmental Affairs Division
- **EPA** – Environmental Protection Agency
- **EPI** – Effective Public Involvement
- **EPIC** – environmental permits, issues, and commitments
- **ESA** – environmental site assessment
- **ESBD** – Electronic State Business Daily
- **FAA** – Federal Aviation Administration
- **FAHP** – Federal Aid Highway Program
- **FAQ** - Frequently Asked Questions
- **FCAA** – Federal Clean Air Act
- **FEAS** – feasibility studies

- **FEIS** – final environmental impact statement
- **FEMA** – Federal Emergency Management Agency
- **FHWA** – Federal Highway Administration
- **FIN** –Financial Management Division
- **FIO** – for information only
- **FMIS** – Financial Management Information System
- **FONSI** – finding of no significant impact
- **FPA** – floodplain administrator
- **FPAA** – Federal Project Authorization and Agreement
- **FPUA** – Financial Plan Annual Update
- **FRA** – Federal Railroad Administration
- **FTA** – Federal Transit Administration
- **FWD** – Falling Weight Deflectometer
- **GIS** – geographic information system
- **GPR** – ground penetrating radar
- **GPS** – Global Positioning System
- **H&H** – hydrology and hydraulics
- **HARS** – high advisory radio stations
- **HECRAS** – hydrologic engineering center's river analysis system
- **HOT** – High Occupancy Toll
- **HOV** – High Occupancy Vehicle
- **HSIP** – Highway Safety Improvement Program
- **IAJR** – Interstate Access Justification Report
- **ICE** – Intersection Control Evaluation
- **iCx** – Integrated Contractor Exchange (electronic bidding system)
- **IFP** – Initial Financial Plan
- **IHSDM –** Interactive Highway Safety Design Model
- **ILF** – In lieu fee
- **IMD** – Information Management Division
- **ISA** – initial site assessment
- **ITS** – Intelligent Transportation Systems
- **LAA** – landscape and aesthetics assessment
- **LCS** – lane control signals
- **LEP** – limited English proficiency
- **LG** – Local Government
- **LGP** – Local Government Projects

- **LiDAR –** Light Detention and Ranging
- **LOA** – letter of authority
- **LOS** – level of service
- **LOSA** – Local On-System Agreement
- **LPA** – local public agency
- **LRFD** – load and resistance factor design
- **LSM** – letting schedule modification
- **LWCF** – Land and Water Conservation Fund Act
- **MALD** – Model as the Legal Document
- **MBTA** – Migratory Bird Treaty Act
- **MOU** – memorandum of understanding
- **MPO** – Metropolitan Planning Organization
- **MRD** – Maritime Division
- **MS4** – municipal separate storm sewer system
- **MSAT** – mobile source air toxics
- **MSU** – map survey utility
- **MTN** – Maintenance Division
- **MTP** – metropolitan transportation plan
- **MUA** – Multiple Use Agreement
- **NAAQS** – National Ambient Air Quality Standards
- **NAOPH** – notice affording an opportunity for a public hearing
- **NEPA** – National Environmental Policy Act
- **NFIP** – National Flood Insurance Program
- **NHPA** – National Historic Preservation Act
- **NHS** – National High System
- **NOC** – notice and opportunity to comment
- **NOI** – notice of intent
- **NPS** – National Park Service
- **NRCS** – Natural Resources Conservation Service
- **NRHP** – National Register of Historic Places
- **OCB** – One-Call Board of Texas
- **OE** – Obstruction Evaluation
- **OPC** – Oracle Primavera Cloud
- **OPI** – Office of Public Involvement (TPP)
- **OSB** – overhead sign bridge
- **P&P** – plan and profile

- **PA** – programmatic agreement
- **PALM** – potential archeological liability maps
- **PBLR** – Preliminary Bridge Layout Review
- **PBPD** – Performance Based Practical Design
- **PDCC** – Preliminary Design Concept Conference
- **PDP** – Project Development Process Manual
- **PEL** – Planning and Environmental Linkage
- **PFD** – Project Finance, Debt and Strategic Contracts Division
- **PI** – public involvement
- **PM** – Project Manager
- **PMI** – Project Management Institute
- **PMIS** – Pavement Management Information Systems
- **PMP** – Project Management Plan
- **PPM** – project and portfolio management
- **PR** – Park Road
- **PRM** – permittee responsible mitigation
- **PROWAG** – Public Rights-of-Way Accessibility Guidelines
- **PS&E** – Plans, Specifications and Estimate
- **PUA** – possession and use agreement
- **PW** – Wildlife Road
- **PWC** – Parks and Wildlife Code
- **QA/QC** – quality assurance/quality control
- **QC** – quality control
- **RADAR** – radio detecting and ranging
- **RAID** – Roundabout and Alternative Intersection Design
- **RAS** – Registered Accessibility Specialist
- **RCSJ** – ROW control-section-job
- **RDM** – Roadway Design Manual
- **RFP** – Request for Proposal
- **RHA** – Rivers and Harbors Act
- **RIA** – rich internet application
- **ROD** – record of decision
- **ROE** – Right of Entry
- **ROW** – Right of Way Division
- **RPLS** – Registered Professional Land Surveyor
- **RPM** – raised pavement marker

- **RPO** – Rural Planning Organization
- **RRD** –Railroad Division
- **RTIP** – Rural Transportation Improvement Program
- **RTL** – ready to let
- **S&O** – Stewardship & Oversight Agreement
- **SH** – state highway
- **SHPO** – state historic preservation office
- **SHSP** – Strategic Highway Safety Plan
- **SIP** – Statewide Implementation Plan
- **SLOA** – State Letter of Authority
- **SLRTP** – Statewide Long-Range Transportation Plan
- **SME** – Subject Matter Expert
- **SOP** – standard operating procedure
- **SSD** – stopping sight distance
- **STIP** – Statewide Transportation Improvement Program
- **SUE** – subsurface utility engineering
- **SWMP** – stormwater management plan
- **SWP3** – stormwater pollution prevention plan
- **TAC** – technical advisory committee
- **TAC** – Texas Administrative Code
- **TAMES** – Texas Accessibility Management Enterprise System
- **TAQA** – traffic air quality analysis
- **TAS** – Texas Accessibility Standards
- **TCAA** – Texas clean air act
- **TCAP** – Texas Comprehensive Accessibility Program
- **TCEQ** – Texas Commission on Environmental Quality
- **TCM –** Transportation Control Measure
- **TCP** – traffic control plan
- **TDLR** – Texas Department of Licensing and Regulation
- **TDM** – Transportation Demand Management
- **THC** – Texas Historical Commission
- **THFN** – Texas Highway Freight Network
- **THPO** – Tribal Historic Preservation Office
- **TIA** – Traffic Impact Assessment
- **TIP** – Transportation Improvement Program
- **TIRZ** – Tax Increment Reinvestment Zone

- **TMA** – Transportation Management Areas
- **TMC** – Traffic Management Centers
- **TMUTCD** – Texas Manual on Uniform Traffic Control Devices
- **TNRIS** – Texas Natural Resources Information System
- **TOD** – Transit Oriented Development
- **TP&D** – Transportation Planning and Programming Division
- **TPAR** – temporary pedestrian access route
- **TPC** – total project costs
- **TPD** – Transportation Programs Division
- **TPP** – Transportation Planning and Programming Division
- **TPWD** – Texas Parks and Wildlife Department
- **TRB** – Transportation Research Board
- **TRF**– Traffic Safety Division
- **TRIMS** – Texas railroad information management system
- **TSAP** – Traffic and Safety Analysis Procedures Manual
- **TSM** – Transportation System Management
- **TSMO** – Transportation System Management and Operations
- **TTC** – Texas Transportation Commission
- **TWLTL** – Two-way-left-turn-lanes
- **TxC** – TxDOTCONNECT
- **TxDIP** – Texas Division Involved Projects
- **TxDOT** – Texas Department of Transportation
- **TxGIO** – Texas Geographic Information Office
- **UAS** – Unmanned Aircraft System
- **UCM** – utility conflict matrix
- **USACE** – United States Army Corps of Engineers
- **USC** – United States Code
- **USCG** – United States Coast Guard
- **USDOT**– United States Department of Transportation
- **USGS** – United States Geological Survey
- **UTL** – Utility
- **UTP –** Unified Transportation Plan
- **UZA** – Urbanized Areas
- **VAFA –** Voluntary Advance Funding Agreement
- **VE** – Value Engineering
- **WIM** – weigh-in-motion