

Project Development Process Manual



Revised July 2019

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Manual Notice 2019-1

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Manual: *Project Development Process Manual*

Effective Date: July 15, 2019

Purpose

The *Project Development Process Manual* has been revised to update Chapter 1 Planning and Programming, specifically Section 5 Design and Construction Funding Identification to include comprehensive new content and reorganization on preparing and executing project funding agreements. In addition, Appendix B was added to the manual which includes the Participation Chart and definitions specific to the chart.

Contents

Chapter 1

- ◆ 10100: Added "Project Development Process" and made other minor edits to the Description.
- ◆ Section 2/Overview: Added Statewide Transportation Improvement Plan (STIP)
- ◆ 10200: Deleted reference to obsolete Estimator Converter Program.
- ◆ 10200: Listed "Separately list Federal "Non-Participating" items in the estimate", under Helpful Suggestions.
- ◆ 10460: Changed "Toll Operations" to Project Finance Division (PFD) and the Strategic Contracts Management (SCM) section.
- ◆ 10470: Under Resource Material, added "Strategic Contracts Section of Project Finance Division for assistance in evaluating major project feasibility".
- ◆ Section 5: Changed title.
- ◆ Overview: Minor text edits.
- ◆ 10510: Added comprehensive new content and reorganization to preparing and executing project funding agreements.
- ◆ 10510: Added "Available Agreement Types for Third-Party Improvements on State Right of Way" chart.
- ◆ 10510: Added "Recommended Funding Type Chart".
- ◆ 10510: Added "...or Division Director depending upon project type", under Responsible Party.

- ◆ 10510: Added "Prepare local government Risk Assessment and set oversight level (if required)", under Subtasks.
- ◆ 10510: Added content on submitting Funding Special Approval form and Oversight Level Special Approval form to Contract Services under Subtasks.
- ◆ 10510: Added content upon obtaining CSD approval and local government signature under Subtasks.
- ◆ 10510: Added miscellaneous text edits to Subtasks.
- ◆ 10510: Added "...or division (depending upon project type)", under Helpful Suggestions.
- ◆ 10510: Added "...and the funding responsibilities of each party" and "Execute LOSA..." under Critical Sequencing.
- ◆ 10530: Deleted duplicate text "TxDOT Unified Transportation Program".

Appendix B

Added a new Appendix B to the manual which includes the Participation Chart and definitions specific to the chart.

Contact

Contact the Project Development Section Director of the Design Division at (512) 416-2673 with any questions or comments.

Archives

Past manual notices are available in a [pdf archive](#).

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Preface

Purpose

This manual release updates references to outdated department structure, policies, technology, and processes. The *Project Development Process Manual* provides task information for the transportation engineering practitioner to begin with a project concept and move forward to a complete PS&E project approved for work authorization.

The chapters and tasks in this manual are arranged by project [building blocks](#). There are over 300 tasks that provide guidance, references, and regulation authority.

Recent department business and planning changes have incorporated vocabulary and phrases that may confuse the user of this manual. The title of this manual and definitions used within are intended for the purpose of the engineering design project development process. For example, references to *stage gate* or *portfolio* in this manual should only be interpreted as they apply to the engineering design process: Stage Gate is an Environmental Affairs Division form that assists the designer with the project's environmental development; and Portfolio is a PDF formatted e-construction package of highway construction documents for our paperless environment.

This manual is not intended as a financial business or forecasting how-to manual for programming, planning, and business portfolio management. Business, finance, and planning processes are distinct with unique terminology and definitions; more information is available through those division offices, websites, and manuals.

Audience

The manual was written for districts; divisions; employees new to project development; and consultant personnel assigned to plan, develop, and design a project.

Chapter 1 — Planning and Programming

Contents:

[Section 1 — Needs Identification](#)

[Section 2 — Project Authorization](#)

[Section 3 — Compliance with Planning Requirements](#)

[Section 4 — Study Requirements Determination](#)

[Section 5 — Design and Construction Funding Identification](#)

Section 1 — Needs Identification

Overview

This section discusses the tasks of identifying and documenting the need for a project. The need for a project may be identified in many ways, including suggestions from maintenance supervisors, area engineers, district staff, planning organizations, local elected officials, developers, and the society served by transportation planning and programming. Once a project is suggested, research should be conducted to prioritize the need for one project relative to others competing for limited funds.

This section includes the following tasks listed in chronological order.

10100. [Identify project need and scope](#)

10110. [Perform site visit](#)

10120. [Public safety planning](#)

10100: Identify project need and scope

Description. Many factors are considered in determining project need including crash frequency and severity, pavement condition, bridge condition, conformance with current geometric standards, security, trends, issues associated with demand for moving people and goods, resiliency, and the Texas Transportation Plan (TTP) goals and objectives. The need for a project may be identified in the following ways:

- ◆ Projects may be suggested by maintenance supervisors, area office staff, district staff, local transportation partners, developers, or the society served.
- ◆ For urban projects, particularly capacity improvements, the need for a project may be determined from traffic modeling of future growth and travel demands. This data may be requested from the Transportation Planning and Programming (TPP) Division Traffic Analysis office or, in some cases, from local government Transportation planners. The project should be evaluated for compliance with planning documents. See 10300: [Evaluate compliance with planning documents](#).
- ◆ For some specific urban projects, the development process may encompass a need for a sustainable street and transit network associated with the potential project in the context of desired land uses and urban design established in regional plans, comprehensive plans, neighborhood plans, other local plans, special district plans, relevant public-private partnerships or economic development plans. While not shown directly in the [Project](#)

[Development Process](#), these plans may indicate that the Needs Identification step should be revisited.

- ◆ Rural multimodal mobility, safety, and added capacity projects may be identified through local decision makers and stakeholders. Trend analysis and forecasted growth data may be obtained from TPP Traffic Analysis office.
- ◆ Area Engineers generally determine rehabilitation needs for their areas in consultation with maintenance supervisors and local officials.
- ◆ Off system projects are generally identified through statewide ranking formulas and through consultation with local officials.
- ◆ Public meetings may generate comments on area wide transportation needs.
- ◆ A review of traffic crash information may alert the department to needed improvements.
- ◆ Needs may be identified through the Pavement Management Information System (PMIS) or the Wet Weather Accident Reduction Program (WWARP).
- ◆ Studies from adjacent projects may indicate needs in other areas. See Task 10310: [Identify and review related studies](#).

Pertinent Project Types. All projects.

Responsible Party. District staff.

Subtasks.

- ◆ Gather information on pavement conditions from the district pavement engineer.
- ◆ Document, in the Purpose and Need Statement, problem information listing deficiencies and opportunities within project influence area.
- ◆ For bridges, coordinate with bridge planning engineers in the Project Development Section of the Bridge Division.
- ◆ Review four-year metropolitan Transportation Improvement Program (TIP) meeting minutes.
- ◆ Identify community concerns and critical issues. In urban areas, this includes coordinating with the MPO. In some areas, coordination with municipal urban planning organizations, neighborhood land use planning groups, etc. may be appropriate.
- ◆ In urban areas, evaluate compatibility of the project with the Metropolitan Transportation Plan (MTP).
- ◆ Consider all transportation modes, the need for multimodal alternatives, and intermodal freight transport. See 10440: [Identify multimodal alternatives and intermodal connections](#). Coordinate with other disciplines (e.g. planner, landscape architect).
- ◆ Consider the economic impacts and goals for freight transportation and freight movement patterns of the Freight Mobility Plan (FMP).

- ◆ Review existing geometrics and compare to current rehabilitation and reconstruction design criteria.
- ◆ Consider the need for control of access.
- ◆ Evaluate conversion of two-way frontage roads to one-way operation. Refer to the *Roadway Design Manual*, Chapter 3, Section 6: “[Conversion of Frontage Roads from Two-way to One-way Operation](#).”
- ◆ Review traffic crash information to identify locations having a high incidence of traffic crashes (relative statewide incidence) for potential projects. Refer to the *Highway Safety Improvement Program Manual*, “[Obtaining Crash Data](#)” for information on how to obtain and analyze traffic crash information. Assistance in obtaining or reviewing traffic crash information is available from the Traffic Operations Division (TRF).
- ◆ Include curb ramp construction on any project that includes curb construction.
- ◆ Review available transportation technology solutions appropriate to project goals.
- ◆ 10300: [Evaluate compliance with planning documents](#).
- ◆ Prepare a draft Purpose and Need statement. See 30310: [Prepare “Purpose and Need” statement](#). It may be required, later on, as part of an environmental document.

Critical Sequencing. Needs identification should be done as the first step in the project development process.

Resource Material.

- ◆ Form 2440, [Design Summary Report](#) (DSR)
- ◆ TxDOT [Bridge Project Development Manual](#)
- ◆ TxDOT *Highway Safety Improvement Program Manual*, “[Obtaining Crash Data](#)”
- ◆ Online: Inside TxDOT, Divisions, Environmental Affairs, [AASHTO Practitioner’s Guide: Defining the Purpose and Need and Determining the Range of Alternatives for Transportation Projects](#)

10110: Perform site visit

Description. Site visits should be performed to properly assess project needs to adequately design a project. Although maps, satellite imagery, or aerial photography may give an overview of a project area, a site visit is essential to obtain a complete understanding of the project area. The purpose of the visit should be to identify needed improvements and physical or environmental constraints. Planning stage site analysis of land, location, and possible environmental impacts can improve scope development and reduce key feature(s) oversight. Documents and media files gathered during a site visit by subject matter experts can aid preliminary design and project estimate development.

Pertinent Project Types. All projects.

Responsible Party. Project manager.

Subtasks.

- ◆ Gather pertinent plans, maps, and reference material to use as guides in locating existing features.
- ◆ Gather information on governmental jurisdiction boundaries such as cities, counties, utility districts, and water reservoir areas.
- ◆ Visit project site with others having relevant knowledge, such as: drainage engineer, structural engineer, traffic engineer, biologist, botanist, and other environmental staff.
- ◆ Data collection: field notes, key project issues, photographs and video of the project area. Note presence type and location of any utilities, development adjacent to the right of way, overall terrain, etc.

Helpful Suggestions. The following suggestions are offered to make the visit to the site more productive:

- ◆ Input from an environmental specialist, while at the site, can be useful in determining environmental constraints.
- ◆ For visiting remote, off-road sites, use Global Positioning System (GPS) devices to determine locations.
- ◆ Consider using an Esri Collector to access ArcGIS online data collecting on GPS enabled smartphone or tablet devices.
- ◆ Trimble GIS mapping equipment can link images collected with external cameras.
- ◆ Use manual tools such as level, measuring wheel and tape to collect as-built dimensions.
- ◆ During a site visit, create media files of the project area. Capture still and video images of the proposed project between the planned limits with a GPS enabled device. Use notes or commentary to supplement the collected information.
- ◆ Photos and video of stream areas can be useful, later, in determining roughness coefficients used in hydraulic calculations and in determining high-water marks.

In collecting data for preliminary design, look for the following features:

- ◆ Potential project constraints (e.g., major utilities, wetlands, parks, historic structures, potential hazardous materials, floodplains, cemeteries, cultural facilities),
- ◆ Utility markers,
- ◆ Flood-prone areas,
- ◆ Right of way encroachments,

- ◆ Significant trees to preserve,
- ◆ Possible contamination,
- ◆ Intersection geometry.

Critical Sequencing.

- ◆ A right of entry or other written evidence of permission must always be obtained before entering private property. See 20230: [Obtain right of entry](#).

Resource Material.

- ◆ TPP Mapping Branch, mapping and GIS assistance
- ◆ TxDOTNow, Esri Collector, ArcGIS Online, GIS/GPS, Trimble GIS mapping equipment support
- ◆ Online Inside TxDOT - Environmental Affairs Division “Resources for Environmental Professionals - [Environmental Compliance Toolkits](#)”
- ◆ TxDOT [Hydraulic Design Manual](#)
- ◆ TxDOT [Statewide Planning Map](#)

10120: Public safety planning

Description. Given Texas' geographic location and impact on state and national economies, it is essential to consider security for the Texas transportation network which serves public mobility, economic development, and productivity.

Texas has an international border, a long coastline attracting visitors and accommodating a megaregion bound by several Interstates, as well as more than two dozen ports and ferry services. NAFTA has increased the amount of regional and national freight traffic passing through the Texas Triangle. Texas ports serve military and multinational commercial business, and will serve deepwater post-Panamax ships carrying freight distributed by truck, air, and rail.

Having a long coastline places megapolitan areas at risk to natural disasters.

Texas is also a significant national and international supplier of energy products with refineries and distribution infrastructure in close proximity to the Texas transportation network. TxDOT corridor planning should consider emergency evacuation planning.

Pertinent Project Types. Priority corridor and strategic projects

Responsible Party. Executive Director through District Engineer

Resource Material.

- ◆ TPP Systems Planning Office
- ◆ FHWA ["Using Highways for No-Notice Evacuations"](#)
- ◆ FHWA [Emergency Transportation Operations](#) (ETO)

Section 2 — Project Authorization

Overview

All projects must be approved by the Texas Transportation Commission, either by inclusion in the Unified Transportation Program (UTP), Statewide Transportation Improvement Plan (STIP) or through a project specific minute order, before beginning project development.

Projects are authorized as one of three levels of authority - PLAN, DEVELOP or CONSTRUCT. To obtain PLAN authority for a project, submit a request to the director of the Transportation Planning and Programming Division (TPP).

This section includes the following tasks listed in chronological order.

10200. [Prepare cost estimate.](#)

10210. [Obtain approval of PLAN authority.](#)

10215. [Project File of Record.](#)

10220. [Obtain project specific minute order, if required.](#)

10200: Prepare cost estimate

Description. To obtain adequate funding for a project, prepare construction cost estimate and separate right of way (ROW) cost estimate, and enter the estimates into the Design and Construction Information System (DCIS). It is important for this information to be correct in DCIS so that the project and funding data will be correct in the Financial Management Division (FIN) PeopleSoft project information.

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 purpose and need and is also needed to develop a high-quality preliminary cost estimate. Some issues that should be considered when developing the scope are:

- ◆ Type of work proposed (2R, 3R, 4R, or 5R),
- ◆ Proposed typical section,
- ◆ For existing geometry - meets appropriate design criteria or consider realignment,
- ◆ Specify safety improvements indicated by crash analysis,
- ◆ Multimodal design considerations - accessible pedestrian routes, bicycle facilities,
- ◆ Existing and proposed pavement,

- ◆ Bridges (size and complexity),
- ◆ Earthwork and retaining walls or sloped embankments,
- ◆ Drainage issues and possible solutions,
- ◆ Potential human and nature environmental issues and mitigation,
- ◆ Traffic control plans, including detours,
- ◆ Specialized designs and technology incentives.

Reasonable and accurate cost estimating, and intermittent updating 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 and requires that the department have a record to explain the reason for rising estimated costs.

The Advance Planning Risk Analysis (APRA) [tool](#) developed under TxDOT Research Project 0-5478 offers a method to measure project scope definition for completeness and identify potential risks early in the project. With this tool, users identify the critical elements of the project scope across all disciplines. This tool is suggested for use throughout the project's life cycle and is referenced at several key stages in this manual.

For more information on AASHTO Estimator[®], refer to the *PS&E Preparation Manual*, Chapter 4, Section 2, "[Preparation of Project Estimate](#)" or contact the Design Division.

Pertinent Project Types. All projects.

Responsible Party. District Director of Transportation Planning and Development

Subtasks.

- ◆ Obtain design information about the project, such as: project length, proposed bridges and major drainage structures, proposed typical sections, expected pavement structure, and required ROW widths.
- ◆ Include significant traffic control and detour costs.
- ◆ Research possible major costs for environmental protection and mitigation measures.
- ◆ Although not included in the construction estimate, research major costs associated with utility adjustments and relocations because they are ultimately paid by the public.
- ◆ For programming estimates, note project items to be paid by others (e.g., sidewalk to be paid by *city*), write down assumptions for future reference (e.g., project does not include illumination).
- ◆ Obtain average low bid unit prices from TxDOT website under Business - [Letting and Bids](#). Unit bid prices are updated every month by the Construction Division. Using accurate bid prices is very important for calculating a reasonable estimate.

- ◆ Prepare the construction cost estimate in a chart with column headings in order of: Bid Item Number, Item Description, Unit (of measure), Quantity, and Price. In a programming estimate, bid item numbers are optional, but helpful.
- ◆ Add additional costs in the range of 10% to 20% for miscellaneous items such as erosion control measures, striping, pavement markings, and signs.
- ◆ Include approximately 6% to 11% for engineering and contingencies to arrive at an estimated total cost.
- ◆ Add estimate special accounts for Force Accounts: law enforcement; safety contingency, and environmental maintenance.
- ◆ Prepare a separate right of way cost estimate, including eligible utility adjustment costs. ROW project limits should be the same as construction project limits for the corresponding project.
- ◆ Review cost estimates with project manager or other staff knowledgeable about the project.
- ◆ Enter the construction and ROW cost estimates into DCIS. Refer to the TxDOT [DCIS User Manual](#).

Helpful Suggestions.

- ◆ Detailed descriptions of bid item work and materials are available online in TxDOT's specification book, [Standard Specifications For Construction and Maintenance of Highways, Streets, and Bridges](#).
- ◆ A list of 8-character bid codes, brief item descriptions, and units of measure are available online at TxDOT - Business>Resources>Standard Specifications>Bid Codes.
- ◆ Bid item numbers correspond to standard specification item numbers and special specification item numbers.
- ◆ Relocating major utilities (e.g., fiber optic lines) or providing environmental mitigation measures (e.g., filtration basins) can be major project costs that usually can be identified early with minimal effort and making a field visit.
- ◆ As a rough check, compare the estimate to cost per mile for similar projects in the area.
- ◆ It is better to slightly overestimate than underestimate. Generally, a preliminary estimate is considered reasonable if, later, it is found to be within +/- ten percent of the final cost estimate.
- ◆ Do not prepare overly high estimates that tie up funds that could be allocated to other projects.
- ◆ Separately list federal "Non-Participating" items in the estimate.

Resource Material.

- ◆ For bridge cost estimating information, refer to the TxDOT [Bridge Project Development Manual](#).

- ◆ For information on entering cost estimate data into DCIS, refer to the TxDOT [DCIS User Manual](#).
- ◆ *PS&E Preparation Manual*, Chapter 4, [Section 2](#).
- ◆ [University of Texas Center for Transportation Research \(CTR\) Library](#) - search archives by research project number.
- ◆ [Finance \(FIN\) Intranet site](#) for information on scoping and estimating projects.
- ◆ *AASHTO Practical Guide to Cost Estimating*, Bid Based Estimates.

10210: Obtain approval of PLAN authority

Description. The Statewide Planning & Programming Management Section of the Transportation Planning & Programming Division (TPP) approves projects for the PLAN Authority Phase. PLAN authority is reserved for mobility or high capital cost projects. Planning, route studies, preliminary design, environmental impact studies, right of way determination, and public involvement activities are performed.

- ◆ To obtain PLAN authority, send request to the director of the Transportation Planning and Programming Division.
- ◆ With PLAN authority, work should proceed to complete right of way maps and identify necessary environmental permits, clearances and coordination.

Pertinent Project Types. Projects in the following UTP categories:

General Funding Categories

Category Number	Title
1.	Preventive Maintenance and Rehabilitation
2.	Metro 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
7.	Metropolitan Mobility and Rehabilitation
8.	Safety
9.	Transportation Alternative Program
10.	Supplemental Transportation Projects
11.	District Discretionary
12.	Strategic Priority

Responsible party. District Director of Transportation Planning and Development.

Helpful suggestions.

- ◆ PLAN authority is controlled by TPP because these projects are not officially part of the UTP.
- ◆ Set up a Control Section Job (900 Series) then request TPP approval to convert the 900 number to an assigned job number. FIN will convert the 900 number and submit to PeopleSoft.
- ◆ When approved for PLAN authority, the district should verify that the project fund authorization has been properly set up in PeopleSoft. Contact the district accounting office for assistance.
- ◆ The project should be set up in PeopleSoft before proceeding with any work.

Resource Material.

- ◆ TxDOT Transportation Planning and Programming Division (TPP)
- ◆ TxDOT Financial Management Division (FIN)
- ◆ Texas Department of Transportation UTP

10215: Project File of Record

Description. An audit trail should be maintained in the event of a legal challenge or audits by state or federal auditors. TxDOT refers to the official location as the “File of Record”. Securely store the File of Record. For department projects, districts must maintain a complete and orderly project File of Record that is not cluttered with unnecessary information. Documents should support decision making for the plans, methods, and procedures used to meet the mission, goals, and objectives of the project.

The file should provide guidance to where electronic files are maintained. Project email, voicemail, desktop or portable device files should be retained according to department policy. Files should be complete, accurate, consistent, and held for the life of the project then archived for retention period according to department policy.

A file can be storage equipment such as a filing cabinet, electronic media, or electronic recordkeeping arranged into logical records stored together and treated as a unit.

Design Exception files. Permanently retained for legal reference. Design Exception files are stored in designated filing location used exclusively for these files.

Preliminary engineering files. Retain primary records, which typically support the financial record of a project and as applicable to a state or a federal project.

- ◆ Design Summary Report (DSR)
- ◆ FMIS project agreement/modifications

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- ◆ Consultant services contract
 - ◆ Project agreements between department and local or federal agencies
 - ◆ Revisions/change orders
 - ◆ Invoices and billing support documents (travel, timesheets, etc.)
 - ◆ Final plans/specifications/work products
 - ◆ Interstate access approval
 - ◆ Utility agreements
 - ◆ Value Engineering study(ies)
 - ◆ Design decision documentation
 - ◆ NEPA documentation
 - ◆ Final ROD/FEIS/FONSI
 - ◆ Documentation of litigation or claims

Construction files. Preliminary engineering files can be transferred to a construction file at close of project preliminary engineering phase. Records of further project development and construction, in addition to those listed as “preliminary engineering”, are documents to close the project as listed below. List is not all inclusive and as applicable to state or federal projects.

- ◆ Plans, Specifications, and Estimate (PS&E)
- ◆ Bid/award documentation
- ◆ Revisions/change orders
- ◆ Invoices and billing support documentation
- ◆ As-built plans
- ◆ Materials records
- ◆ Field book/diaries
- ◆ Documentation for construction engineering costs
- ◆ Force account documentation
- ◆ Utility/railroad agreements
- ◆ Environmental permits
- ◆ Alternative contracting method approval/public interest finding
- ◆ Right of Way clearance
- ◆ Final acceptance checklist/supporting documentation/contractor release
- ◆ Final estimate voucher/invoice

- ◆ Final acceptance of ITS/technology related elements of the project should be based on the test plans initially developed during the design phase of the project where hardware specifications and software requirements have been defined
- ◆ Materials certification (23 CFR §637)
- ◆ Verify completion/status of environmental commitments
- ◆ Environmental Stage Gate Lists
- ◆ Warranty documentation
- ◆ Final inspection and acceptance report
- ◆ Documentation from earlier phases that supports construction cost eligibility/PS&E approval
- ◆ Audits (may occur after project close)

10220: Obtain project specific Minute Order, if required

Description. A Minute Order (MO) for project authorization is requested by district staff through the Transportation Planning and Programming Division (TPP). A Minute Order is needed in the following situations:

- ◆ **Project authorization.** An MO is needed if a project is not authorized in the current Unified Transportation Program (UTP) or in a Bank Balance Allocation Program.
- ◆ **Control of access.** All projects are assumed to be non-controlled access, unless the district sends a request to TPP for an MO to be passed designating the facility, or a portion of the facility, as controlled access under Transportation Code, §203.031 (HB 179, 55th Legislature, 1957.) The control of access line on schematics, ROW maps and plans should be coincident with the back of curb or property right of way line and clearly depicts the locations where access to the highway is denied.
- ◆ **Route designation.** If the project is on new location, the district may want to request route designation in the same MO or separate MO. New locations must be designated by an MO and will need to be removed from the state system by a subsequent MO.
- ◆ **Donations.** An MO is needed for accepting donations, such as right of way.
- ◆ **Authority to contract.** For TxDOT, the authority to contract for the project is in the form of an MO. The MO may be a specific MO authorizing a project.

Pertinent Project Types. All projects.

Responsible Party. District Director of Transportation Planning and Development

Helpful Suggestions.

- ◆ Assistance with minute orders is available from TPP.

- ◆ Copies of minute orders are available from the Texas Transportation Commission Minute Clerk.

Critical Sequencing.

- ◆ Obtain project authorization before starting project development or executing an agreement with outside entities.

Section 3 — Compliance with Planning Requirements

Overview

This section involves integrating project planning with various local, regional and statewide plans. As part of that integrated planning, applicable requirements are determined and complied with.

This section includes the following tasks. The tasks are listed in approximate chronological order but may be performed concurrently in some cases.

10300. [Evaluate compliance with planning documents](#)

10310. [Identify and review related studies](#)

10320. [Identify area/regional goals and plans](#)

10330. [Identify corridor plan development needs](#)

10340. [Partnership plan review/coordination](#)

10350. [Identify funding alternative/feasibility economics, value capture, sustainability](#)

10360. [Institutionalization of coordination/partnerships in project development](#)

10300: Evaluate compliance with planning documents

Description. After preparing a Purpose and Need Statement (see 30310: [Prepare “Purpose and Need”](#) statement), the project manager assesses the following situations:

- ◆ Whether the proposed project follows the policy and mandates of the Unified Transportation Plan (UTP),
- ◆ Whether the project is consistent with regional and local transportation plans,
- ◆ Whether the proposed project is consistent with ongoing Texas freight, rail, and airport planning efforts.

Pertinent Project Types. New construction, reconstruction, and rehabilitation projects.

Responsible Party. Director of Transportation Planning and Development

Subtasks.

- ◆ Review long-range planning documents, which have planning periods of 20 to 24 years:

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- Statewide Long-Range Transportation Plan, which is a comprehensive statewide multimodal plan with a vision for the state's transportation and services. (24 year period)
 - Metropolitan Transportation Plan (MTP)
 - Rural Transportation Plan (RTP) (20 year period).
 - ◆ Review ten year mid-range Unified Transportation Program (UTP) planning document, developed annually.
 - ◆ Review short-range programming documents:
 - Transportation Improvement Program (TIP) developed by an MPO in cooperation with the department containing a prioritized list of proposed projects and funding (4 year period),
 - Rural Transportation Improvement Program (RTIP) is developed in cooperation with rural planning organizations and is a prioritized list of projects for proposed funding (4 year period),
 - Statewide Transportation Improvement Program (STIP) is a compilation list of projects to be implemented with reasonable anticipated funding over the four-year period.
 - ◆ Review local master street plans and networks.
 - ◆ Consult with district coordinators and local planning staffs for other modes, and assess need to incorporate design features to accommodate other modes (e.g., transit, pedestrian, bike, port, railroad, aviation).
 - ◆ Consult the State's coastal zone management plan for project development considerations along the Gulf Coast.
 - ◆ Work with the district planning staff to coordinate with the MPO and other planning entities.

Critical Sequencing.

- ◆ Delays may occur without proper coordination with the MPO and other stakeholders.
- ◆ The project must be listed in the [Statewide Transportation Improvement Program \(STIP\)](#) before any federal transportation funds can be used.

Resource Material.

- ◆ Transportation Planning and Programming Division
- ◆ Texas Coastal Management Program - General Land Office (for projects along the Gulf Coast)
- ◆ Unified Transportation Program (UTP)
- ◆ City plans including: comprehensive plan, regional transit plans, transit oriented Transportation Opportunity Development (TOD) plans, other land use plans, economic/commercial development plans, street or transportation plans; neighborhood plans, and bicyclist/pedestrian plans, greenway/trails plans, and Tax Increment Reinvestment Zone (TIRZ) project plans or other similar plans for other value capture districts.

- ◆ TxDOT statewide freight, aviation, and/or public transportation plans.

10310: Identify and review related studies

Description. Related studies may provide information for planning a project and assessing the relationship between a specific project and neighboring projects. Obtaining and reviewing these studies gives a broader perspective of regional needs.

Types of related studies include:

- ◆ Feasibility study,
- ◆ Route study,
- ◆ Toll road study,
- ◆ Corridor study,
- ◆ Subarea study,
- ◆ Value engineering study,
- ◆ Similar studies that propose transportation capital investments.

Pertinent Project Types. New construction and reconstruction projects

Responsible Party. District Director of Transportation Planning and Development

Critical Sequencing. This task should occur before preliminary design.

- ◆ Coordinate and consult with the Transportation Planning and Programming Division. Check with city, county, MPO, transit or special authority, and recognized neighborhood planning organizations for plans or studies in the affected area.

Resource Material.

- ◆ Transportation Planning and Programming Division

10320: Identify area/regional goals and plans

Description. Coordination with other entities and other areas of expertise is important to ensure that projects compliment the surrounding community or local area. This early coordination is important since the transportation corridor may be only one component of the long-term local objectives.

One method is a collaborative, interdisciplinary approach using Context Sensitive Solutions (CSS) strategic planning process. While not applicable to all project types (e.g., restoration, preventive maintenance), CSS principles exercise flexibility and creativity, preserve resources, enhance the

community, as well as, improve mobility, safety, and infrastructure conditions. Transportation and development projects may be better accomplished in a joint development or well-coordinated process that will meet the objectives of multiple stakeholders.

For example, local entities may wish to encourage certain development, preserve, change or sustain the character of a specific area of the community or set future sustainable development for an entire transportation corridor or area network.

CSS principles promote the establishment of public and private partnerships that can support the project by (1) bringing together the future revenue streams with costs in order to provide funding for operation and maintenance, (2) creating funding for future projects, and (3) optimize return on public resources such as local tax bases. The establishment of these long-term relationships that consider transportation projects in the context of regional or local overall objectives can be a significant future benefit.

The Institute of Transportation Engineers (ITE) and the Congress for the New Urbanism (CNU) have developed recommended practices for context sensitive design process principles for streets, intersections, and networks, providing design flexibility in project development.

Possible outcomes in considering the CSS principles and partnerships include:

- ◆ Long-range vision for the community and project,
- ◆ Community values and issues,
- ◆ Supporting data,
- ◆ Community and agency priorities,
- ◆ Development of interdisciplinary teams,
- ◆ Education of stakeholders regarding issues, process, and constraints,
- ◆ Establishing planning process, which identifies decision points and stakeholder roles and responsibilities,
- ◆ Identification of design flexibility within the project development process.

Consult the following possible partners/stakeholders:

- ◆ Municipal departments,
- ◆ Chambers of commerce and regional economic development organizations,
- ◆ Professional and nonprofit local organization chapters,
- ◆ Councils of Government (COGs),
- ◆ Community leaders,
- ◆ Adjacent property and business owners,

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- ◆ Developers,
 - ◆ Redevelopment and community development agencies,
 - ◆ Economic development agencies,
 - ◆ Transit authorities,
 - ◆ Special authorities and improvement districts,
 - ◆ School districts,
 - ◆ Public utilities,
 - ◆ Public housing,
 - ◆ Railroads, ports/harbors, bus companies,
 - ◆ Regional transit authorities and rail districts.

Usually, the following district staff have established contacts with local entities:

- ◆ Director of Transportation Planning and Development,
- ◆ Community development and planning directors,
- ◆ Advanced project development engineer,
- ◆ Area engineer,
- ◆ Public transportation coordinator,
- ◆ Bicycle coordinator,
- ◆ Pedestrian coordinator,
- ◆ Planner,
- ◆ Public information officer.

The following divisions may be contacted:

- ◆ Aviation Division (AVN), project development within airport property and interface issues,
- ◆ Maritime Division (MRD), corridor, transport nodes, maritime highways, water, and ports,
- ◆ Rail Division (RRD), passenger and freight rail,
- ◆ Public Transportation Division (PTN), metropolitan and statewide planning.

Pertinent Project Types. All projects except preventive maintenance and restoration projects

Responsible Party. District Director of Transportation Planning and Development

Subtasks.

- ◆ Identify stakeholders in project area.

- ◆ Coordinate Context Sensitive Solutions (CSS) workshop for partners and stakeholders to establish project visions, goals, objectives, issues, and opportunities.
- ◆ Establish contacts or teams for ongoing feedback and to move project issues forward.
- ◆ Participate in related workshops sponsored by project stakeholders.

Resource Material.

- ◆ FHWA and AASHTO, *Flexibility in Highway Design* - <http://www.fhwa.dot.gov/environment/publications/flexibility/>
- ◆ Federal Highway Administration - <http://contextsensitivesolutions.org/>
- ◆ Center for Environmental Excellence by AASHTO, "Environmental Topics," Context Sensitive Solutions - http://environment.transportation.org/environmental_issues/context_sens_sol/
- ◆ Institute of Transportation Engineers, Context Sensitive Solutions in *Designing Walkable Urban Thoroughfares: A Context Sensitive Approach, An ITE Recommended Practice, 2010*
- ◆ Transportation Research Board, *Context-Sensitive Design Around the Country*, Circular EC067, July 2004.

10330: Identify corridor plan development needs

Description. A transportation corridor is a broad geographic band along an interstate or major principal arterial that follows a linear flow integrating operational surface transportation networks of origin-destination trip generators. Urban and rural corridors have unique design characteristics.

For planning purposes, rural corridors are outside a metropolitan planning area 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.

Corridor and network planning is an early opportunity to establish a framework for integrating specific thoroughfare projects into local area overall objectives. This represents an early opportunity to bring public and private stakeholders together to discuss the transportation project. 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.

Integrated network and corridor planning process can:

- ◆ Determine the relationships and needs for both mobility and land uses 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 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.
- ◆ Expose additional related studies that may provide information for planning a project and assessing the relationship between a specific transportation project and neighboring community projects. Obtaining and reviewing these studies can give a broader perspective of network and corridor needs. Types of related studies include: feasibility study, route study, toll road study, corridor study, market study, value capture study, environmental documentation, and value engineering study.

Pertinent Project Types. New construction, reconstruction, and some rehabilitation projects

Responsible Party. District Director of Transportation Planning and Development, Project Managers

Subtasks.

- ◆ Coordinate this work with district staff and divisions.
- ◆ Review local planning documents.
- ◆ Review any special municipal plans for study area (e.g., economic development, Transportation Opportunity District (TOD) area near major terminals).
- ◆ TxDOT Public Transportation Division - coordinating public transportation.
- ◆ TxDOT Environmental Affairs, public involvement as part of the NEPA process.
- ◆ Review other specialty plans, as appropriate (e.g., water/wastewater, other utility, transit, aviation, railroads, ports).
- ◆ While obtaining plans, inquire from the agency whether they can advise of other relevant plans or agencies to contact.
- ◆ Meet with regional and local agency staff and discuss area objectives together with the need to bring stakeholders into the process.
- ◆ Assess corridor mobility and land use opportunities, needs, issues, objectives, and existing plans and, with stakeholders, determine which ones should be considered or developed further.

Helpful Suggestions.

- ◆ Coordinate and consult with the Transportation Planning and Programming Division. Meet with city, county, COG department managers, and other public or private stakeholders to obtain input and published plans or information.

Critical Sequencing.

- ◆ Obtain local plans early because project planning by public and private local entities may affect transportation project planning.
- ◆ This task should occur before preliminary design.

Resource Material.

- ◆ TxDOT TPP Division
- ◆ Municipal plans (comprehensive land use, transportation, housing, redevelopment, water/wastewater)
- ◆ City, county and MPO transportation plans and projections: street, transit, pedestrian and bicycle, aviation, freight or transportation plan
- ◆ Local economic development plans or value capture scenarios
- ◆ Chamber of Commerce, regional economic development organization, or regional visioning publication
- ◆ Texas Metropolitan Planning Organizations (TEMPO) - <http://www.texasmpo.org/texas-mpo/>
- ◆ Texas Councils of Government - http://txregionalcouncil.org/display.php?page=regions_map.php.

10340: Partnership Plan Review/Coordination

Description. As the planning process begins to move the project from the planning process toward the initial stages of design development, coordination of the partnerships that have been established become critical. Stakeholders have to make solid and supported commitments to the project effort at this point. The expected outcomes of this step include commitments for:

- ◆ Joint/coordinated progress toward transportation improvement concepts and plans for land use enhancements and development,
- ◆ Innovative solutions that meet project needs, reflect community values, and enhance resources,
- ◆ Compatibility and support of the transportation improvement within its context of the surrounding area and activities,
- ◆ Expedited approval of the project through early and consistent stakeholder involvement,
- ◆ Agreement on the relationship between sustainable land uses, urban design, and the transportation system,
- ◆ Agreement on multimodal planning including vehicular, transit, pedestrian, bicycle and green infrastructure potential such as trails,
- ◆ Agreement on the travel demand forecasts and network functionality for various modes of travel that will guide the project development process,

- ◆ Identification of any performance measures, sustainability goals or milestones that will be used in project development,
- ◆ Application of CSS, design flexibility and documentation of design decisions. See: 20100: [Conduct a Preliminary Design Concept Conference](#), Form 2440 [Design Summary Report \(DSR\)](#).
- ◆ Commitment for continuation of stakeholder input throughout the design of the project,
- ◆ Assurance that commitments made in the planning process are honored through construction.

Pertinent Project Types. All projects except preventative maintenance and restoration projects

Responsible Party. District Director of Transportation Planning and Development, Project Managers

10350. Identify funding alternative or feasibility - economics, value capture, sustainability

Description. As part of the partnership coordination, the transportation project development process considers the effects of financial availability and decisions on costs, liability risks, and operations and maintenance. Application of CSS partnerships, principles, and design flexibility can affect these funding considerations in specific project applications.

Depending on the type and timing of the project, the stakeholders may need to consider a range of alternatives to traditional transportation funding. These alternative funding sources can provide a broader approach to project development and offer opportunities within corridors beyond just the transportation facility itself.

Some non-traditional funding and resource considerations include:

- ◆ Economic development potential,
- ◆ Value capture through public improvement districts, tax increment reinvestments zones, and other special district or public-private agreements,
- ◆ Transportation reinvestment zones,
- ◆ Public improvement districts,
- ◆ Private funding or donation,
- ◆ Bonding capacity,
- ◆ Comprehensive development agreements,
- ◆ Pass-through financing and other cost recapture approaches,
- ◆ Consideration of savings from long-term project and resource sustainability.

Pertinent Project Types. All projects except preventative maintenance and restoration projects.

Responsible Party. District Director of Transportation Planning and Development, Project Managers

Subtasks.

- ◆ Identify potential funding sources and partners as appropriate (local government entities, other public agencies, adjacent property owners, other private sources, etc.).
- ◆ Consider advantages, disadvantages, and necessary actions to make the best options viable.
- ◆ Identify appropriate agreements to facilitate long-term sustainability of the project and its context by supporting and tracking future capital investment, debt service, credit enhancements as well as operation and maintenance.

10360. Institutionalization of Coordination and Partnerships in Project Development

Description. The institutionalization of coordination and partnerships developed early in the project development process is necessary if it is to be sustained through the project planning phase, the development phase, and the construction phase. Even at the individual project level, unless these partnerships are actively involved, the likelihood of a successful project that meets as many objectives as possible within the local context can be significantly reduced. Further, and perhaps more importantly, the partnerships created should be maintained for future development beyond simply the immediate project, corridor, or area transportation network.

There are several ways to assist in maintaining these partnerships and coordinating these efforts. For example, a Metropolitan Planning Organization (MPO) is required for each urbanized area with a census population of 50,000 or more. The MPO may also function as the designated contact for rural plan development. A Metropolitan Transportation Plan (MTP) or Rural Transportation Plan (RTP) are long-range 20-year plans of ways a region plans to invest in and transportation facilities functioning as an integrated transportation system. Early project planning and development must consider the applicable MTP or RTP.

- ◆ Urbanized Areas (UZAs) greater than census 50,000 population are required to have a Metropolitan Planning Organization (MPO). The MPO is the local decision making body responsible for planning and coordinating a multimodal transportation system that facilitates better 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.
- ◆ Urbanized Areas (UZAs) greater than census 200,000 population are designated as a Transportation Management Area (TMA). The TMA is required to have a Congestion Management Process (CMP) to address congestion.

The public involvement process is an additional activity requiring coordination with the MPO. An MPO may have its own specific public involvement requirements. See 30100: [Public involvement](#).

Different vehicles for sustaining these partnerships may function better in different circumstances. These partnerships and project coordination can result in:

- ◆ Better identification of community transportation, land use, development, activity centers, and other context issues that provide future direction,
- ◆ Identification of public and private stakeholders' priorities,
- ◆ Development and coordination of interagency multidisciplinary teams,
- ◆ Regular communication among stakeholders,
- ◆ Better educational outreach and transparency for agencies involved in project development,
- ◆ A pattern for future coordination of transportation issues within established community contexts.
- ◆ Identification of design issues, area planning goals, environmental process coordination, and construction phasing,
- ◆ Feedback on individual projects through construction as well as future coordination efforts.

Pertinent Project Types. Projects or facilities contained in the MTP or RTP.

Responsible Party. District Director of Transportation Planning and Development and Regional and Local Agency Planning Directors

Helpful Suggestions. Coordinate with the district and local agency planning staff.

Resource Material. TxDOT Transportation Planning and Programming Division

Subtasks.

- ◆ For individual corridors or projects, review each task in [Section 3](#) to ensure that any later task revisions are still appropriate. This review process may necessitate revision of conclusions about the project Need and Scope. This feedback loop will insure that issues are not overlooked so that the project will (1) support community sustainability and economic development goals, and (2) allow for project development to stay on schedule.
- ◆ Maintain regular involvement and communication among stakeholders.

Section 4 — Study Requirements Determination

Overview

This section includes information on determining the project's scope and addressing regional, state and federal requirements. Federal and State requirements, along with Texas Transportation Commission policies, affect project development.

This section includes the following tasks that may be performed concurrently.

- 10400. [Review scope, cost, and staff requirements of project development](#)
- 10410. [Determine need for feasibility \(route/corridor\) study](#)
- 10420. [Determine if Statewide Implementation Plan requirements apply](#)
- 10430. [Obtain traffic data](#)
- 10440. [Identify multimodal and intermodal connections](#)
- 10450. [Determine conformity with Congestion Management Process requirements](#)
- 10460. [Evaluate inclusion of High Occupancy Vehicle/High Occupancy Toll lanes](#)
- 10470. [Evaluate major project feasibility](#)
- 10480. [Evaluate railroad corridor preservation](#)

10400: Review scope, cost, and staff requirements of project development

Description. The scope of the project should be reviewed to determine specific work tasks that will be needed. Refer to the scope discussion contained in Task 10200: [Prepare Cost Estimate](#).

The Advance Planning Risk Analysis (APRA) tool developed under TxDOT research project 0-5478 offers a method to measure project scope definition for completeness and identify potential risks early in the project. With this tool, users identify the critical elements of the project scope across all disciplines. A high level assessment of the project is recommended at this stage of project development. The APRA tool and the User Guide [Zip File](#) is available.

A project work schedule should be developed manually or with the aid of various software programs to identify the critical path. The schedule describes work tasks, estimated task durations, and responsible parties. The schedule helps approximate the project completion date and determine time requirements of staff. It may be revised as necessary.

Potential project risks should be monitored to minimize the risk early and reduce the impact. Risks can drive up costs and have the potential to result in lawsuits. Cost overruns, claims, and delays are usually attributed to five difficult to control issues:

1. Inability to get required permits on time.
2. Political or acceptance issues including agreements with other political sub-divisions.
3. Inability to get right of way.
4. Inability to get utilities relocated on time.
5. Unforeseen site conditions.

A Major Project, by UTP definition, may also involve FHWA according to the Oversight Agreement. FHWA will have cradle-to-grave involvement with Major Projects having federal funding and total cost greater than \$500 Million or TIFIA loan projects. Involvement is due to the inherent high risk of these projects. FHWA NEPA oversight is excluded, since the NEPA responsibility has been assumed by the department. Department projects considered a Major Project are automatically an FHWA Project of Division Interest (PODI).

Staff requirements should be assessed several months before beginning each of the following work phases:

- ◆ Preliminary engineering,
- ◆ Environmental studies and documentation,
- ◆ Right of way acquisition,
- ◆ PS&E preparation.

Professional Engineering Procurement Services Division (PEPS) should be contacted for contracting information when TxDOT does not have the necessary resources. Consultant selection should be done according to the consultant selection process adopted by the Texas Transportation Commission.

Pertinent Project Types. All projects except preventive maintenance.

Responsible Party. Project manager

Subtasks.

- ◆ When using in-house staff, select the project development team. This requires careful coordination of work assignments with various supervisors for multi-disciplined projects.
- ◆ When using consultant services, select a TxDOT project manager to manage the consultant contract.

When using consultant services for right of way (ROW) acquisition:

- ◆ Prepare a work authorization to a statewide ROW acquisition provider contract. Contact the Right of Way division for more information.
- ◆ The district right of way administrator manages the consultant contract.

Critical Sequencing.

- ◆ The need to outsource work should be identified early because the consultant selection process can take several months.

Resource Material.

- ◆ [FHWA Major Project Delivery Process](#)
- ◆ TxDOT [UTP, Part II. Major Transportation Projects](#)
- ◆ PEPS Division, [PEPS Contracting: Selection Process](#) manual
- ◆ Contract Services, internal online manual: [Negotiated Contracts Procedures Manual](#)
- ◆ TxDOT Right of Way Division, Online Manual collection
- ◆ NCHRP Web-only Document 137, Project 20-69, *Guidance for Transportation Management*, March 2009
- ◆ Procurement, Management, and Administration of Engineering and Design Related Services for federally funded contracts, [23 CFR 172](#)
- ◆ Contracting for Architectural, Engineering, and Surveying Services, [43 TAC §9.30 et seq.](#)

10410: Determine need for feasibility (route/corridor) study

Description. A feasibility study addresses possible alternatives when the solution is unknown. The study may show that the project is not economically justifiable - or that it has 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 potential transportation corridors or routes within a corridor.

Pertinent Project Types. A feasibility study may be done at the district's discretion. A district may want to perform a feasibility study in the following situations:

- ◆ Project is outside the MPO jurisdiction,
- ◆ Project may involve a major fund investment,
- ◆ Solution is unknown,
- ◆ Major environmental concerns,
- ◆ Consensus of general public and property owners along the route has not been developed, or
- ◆ as directed by the Texas Transportation Commission.

Responsible Party. District Director of Transportation Planning and Development

Subtasks.

- ◆ Consult with the district environmental coordinator.
- ◆ Determine if the project is in a “rural” or “urban” area.

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

- ◆ Determine feasibility,
- ◆ Examine potential environmental problems,
- ◆ Study alternatives,
- ◆ Analyze present and future traffic,
- ◆ Prepare a preliminary plan drawing/map,
- ◆ Develop cost estimate,
- ◆ Conduct public involvement for study, if required.

Helpful Suggestions. When preparing a feasibility study, cover the following areas:

- ◆ The purpose of, and need for, a project,
- ◆ Conformance with the Texas Transportation Plan. See 10300: [Evaluate compliance with planning documents](#).
- ◆ Description of the limits of the study area. If corridors are being considered as part of the study, the corridor should be large enough to accommodate route alternatives, design alternatives, detours, utility relocations, and possible construction staging areas (e.g., equipment site, borrow/waste areas).
- ◆ Social (e.g., a demographic profile), economic, and environmental features. Existing land use and environmental features have impacts on a feasibility study and may include: historical buildings, trees, endangered species, noise, wetlands, lakes, buried fuel tanks, and hazardous waste sites.
- ◆ Level of community support,
- ◆ Cost effectiveness,
- ◆ Infrastructure safety issues,
- ◆ Level of service analysis See 20410: [Perform preliminary Level of Service analysis](#).
- ◆ Comparison of different routes, or corridors, and design alternatives. The “no-build” alternative must always be considered.
- ◆ Existing transportation systems in the study area should be analyzed and described.
- ◆ Recommendations.

Critical Sequencing.

- ◆ This task should be done after identifying the need for a transportation improvement and before spending funds on preliminary design.

Resource Material.

- ◆ Online - Inside TxDOT, [Environmental Affairs Division](#), programs and resources
- ◆ TxDOT Transportation Planning and Programming Division - Corridor Planning Branch

10420: Determine if State Implementation Plan requirements apply

Description. Texas' State Implementation Plan (SIP) is an enforceable plan, which requires the department to produce and regularly update a SIP. The Federal Clean Air Act (FCAA) revisions have been prepared for specific areas in the state (e.g., Dallas-Fort Worth, Houston Galveston, etc.).

The FCAA requires each state to develop an SIP that outlines a series of steps, over time, to improve air quality. These include mobile source plans affecting transportation planning and programming. 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 areas for "criteria pollutants". These pollutants include particulates, carbon monoxide, ozone, volatile organic compounds (VOC), and nitrous oxides (NO_x).

In nonattainment or maintenance areas, the Metropolitan Planning Organization (MPO) must have a Metropolitan Transportation Plan (MTP) and Transportation Improvement Program (TIP) in conformance with the SIP. Proposed projects must be in a conforming MTP to be eligible for funding. The project manager should verify that the proposed project is included in the current, conforming TIP. See Task [10300](#).

Pertinent Project Types. Added capacity projects in MPO nonattainment or maintenance areas.

Responsible Party. Project manager

Helpful Suggestions.

- ◆ Contact the district planning office to determine the MPO compliance for MTP, TIP, and federal conformity.
- ◆ Consult the State Implementation Plan (SIP) to determine whether it includes the project. If required, work early with the MPO to amend the local TIP and allow time for the redetermination of air quality conformity.
- ◆ If the project is not in the SIP, the process to amend the SIP and determine air quality conformity is time consuming.

- ◆ Traffic Analysis Section of the Transportation Planning and Programming Division is available for assistance.

Authority.

- ◆ [30 TAC Chapter 114 §114.260-§114.270](#)

Resource Material.

- ◆ Texas Commission on Environmental Quality (TCEQ), [State Implementation Plan \(SIP\)](#)
- ◆ Environmental Affairs Division
- ◆ Metropolitan Transportation Plan
- ◆ Transportation Improvement Program (TIP)

10430: Obtain traffic data

Description. The design of a new transportation facility is based on future traffic projections. Planning level traffic data (based on either historical trend analysis or a travel demand model) is used to quantify estimated facility demand and level of service. Design traffic, which is a refinement of planning level traffic data, provides:

- ◆ Existing and projected [Annual Average Daily Traffic \(AADT\)](#),
- ◆ [Directional Design Hour Volumes \(DDHV\)](#),
- ◆ [Directional distribution factors](#),
- ◆ Percent truck volumes.

Traffic data is collected and published in various forms such as maps, reports, and electronic files by the Traffic Analysis Section of the Transportation Planning and Programming (TPP) Division. The online interactive TPP Statewide Planning Map is updated regularly and can be used for informational purposes; however, consult TPP Traffic Analysis Section for latest data or reports.

Data gathered locally, or at district level, for use in project development must be reviewed by the TPP Traffic Analysis Section.

The following information is available from TPP Traffic Analysis:

- ◆ Annual statewide system traffic counts,
- ◆ Urban area saturation counts on a five-year cycle for urban areas,
- ◆ Air quality and noise analyses,
- ◆ Transportation Analysis and Forecasting can provide 18 kip loadings, peak hour factors, K factors, air and noise analyses, and travel demand models for urban areas.

Pertinent Project Types. All projects except preventive maintenance.

Responsible Party. Project manager

Subtasks.

- ◆ Acquire, assemble, and review available traffic data.
- ◆ In urban areas, review travel demand model assignments.
- ◆ Identify new connecting roads or special traffic generators such as major shopping centers or new residential subdivisions.
- ◆ Determine if traffic data, such as traffic counts for signal warrants, exist at the city, county, Metropolitan Planning Organization, and district level.
- ◆ Request TPP review and approval of this data, if it will be used in project development.
- ◆ Request traffic data from TPP.

Helpful Suggestions.

- ◆ Contact the district planning office for assistance with obtaining traffic data.
- ◆ Contact the TPP Traffic Analysis Section for additional assistance.
- ◆ Electronic copies of saturation count and district maps are available through TPP.

Critical Sequencing.

- ◆ Traffic data will be needed before beginning preliminary design.

Resource Material.

- ◆ Online interactive [Statewide Planning Map](#)
- ◆ District traffic maps
- ◆ *NCHRP [Report 765](#): Analytical Travel Forecasting Approaches for Project-Level Planning and Design (update to NCHRP Report 255: Highway Traffic Data for Urbanized Area Project Planning and Design)*
- ◆ *Traffic Load Forecasting for Pavement Design - [TTI Research Report 1235-1](#)*
- ◆ *The State-of-the-Practice in Forecasting Turning Flows - [TTI Research Report 1235-11](#).*

10440: Identify multimodal and intermodal connections

Description. To address mobility needs, 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). Consider provisions for pedestrians and bicyclists on all projects.

Pertinent Project Types. New location, reconstruction and rehabilitation projects

Responsible Party. Project manager

Subtasks.

- ◆ Review Metropolitan Transportation Plan (MTP).
- ◆ Review any municipal plans, including existing neighborhood plans affected in study area, and document any reviews made.
- ◆ Review special purpose studies (e.g., studies on making an area into an intermodal hub or expanding a port).
- ◆ Assess the need to accommodate multiple modes in developing alternatives by coordinating with district experts on those topics. These modes may include transit, pedestrian, bike, high occupancy vehicles, single occupant vehicles, port, railroad, aviation, and freight.
- ◆ In urban areas provide accessible routes for pedestrians and bicycle facilities.
- ◆ Provide bicycle connectivity for suburban and rural mobility.
- ◆ Evaluate transit corridors for needed pedestrian and accessibility improvements.
- ◆ Implement public involvement.
- ◆ Develop evaluation framework for comparing modes.
- ◆ Analyze and compare alternatives.
- ◆ Identify preferred alternative.
- ◆ Amend the Metropolitan Planning Organization (MPO) MTP and Transportation Improvement Program (TIP), if warranted.
- ◆ If the area is nonattainment for air quality, the MPO and TxDOT will submit the project to the Texas Commission on Environmental Quality (TCEQ) to determine compliance with the Statewide Implementation Plan. See 10420: [Determine if State Implementation Plan requirements apply](#).
- ◆ Determine whether the area has a conforming plan and TIP.

Helpful Suggestions. The following table depicts contacts for multimodal and intermodal issues:

Meeting Multimodal and Intermodal Needs

Subject	Contact
Bicycle facilities	District bicycle coordinator
Pedestrian facilities	District pedestrian coordinator
Transit facilities	Public Transportation Division
Air/surface mobility	Aviation Division

Meeting Multimodal and Intermodal Needs

Subject	Contact
Rail	Rail Division
Port and waterway	Maritime Division

Resource Material.

- ◆ Transportation Programming and Programming Division - Systems Planning Office
- ◆ Metropolitan Transportation Plan and its components (available from the MPO in urban areas) street, transit, pedestrian, and bicycle
- ◆ Aviation, port, rail, freight or transportation plans
- ◆ United States Access Board, [PROWAG](#) pedestrian facilities
- ◆ AASHTO *Guide for the Planning, Design, and Operation of Pedestrian Facilities*
- ◆ Texas Accessibility Standards, [TAS](#)
- ◆ AASHTO *Guide for the Development of Bicycle Facilities*
- ◆ TxDOT State Aviation Plan
- ◆ TxDOT State Transportation Plan

10450: Determine conformity with Congestion Management Process requirements

Description. The congestion management process (CMP) provides information on multimodal transportation system performance and alternative strategies for easing congestion and enhancing mobility. For Transportation Management Areas (TMA) with census population greater than 200,000, the CMP is required in the Metropolitan Transportation Plan (MTP) and the Transportation Improvement Program (TIP). The CMP is beneficial for smaller MPOs.

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.

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.

Developed strategies include Transportation Control Measures (TCM), which include 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 1990 Clean Air Act Amendments require the Texas Commission on Environmental Quality (TCEQ) and MPOs that are in nonattainment areas to include TCMs in the State Implementation Plan (SIP).

TCM

- ◆ Traffic flow improvements
- ◆ Trip-reduction ordinances
- ◆ Involve public transit

TSM

- ◆ Traffic signal optimization
- ◆ Intersection improvements
- ◆ Roundabouts
- ◆ Capacity expansion
- ◆ Intelligent vehicle/highway system elements
- ◆ Speed reduction and enforcement
- ◆ Bicycle and walking facilities
- ◆ Incident management

TDM

- ◆ 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)

Pertinent Project Types. Projects in Transportation Management Areas (TMAs) that meet criteria in the published MPO congestion management process plan. Examples include added capacity projects, traffic signalization, arterial bottleneck elimination, and ITS projects.

Responsible Party. District Director of Transportation Planning and Development

Subtasks.

- ◆ Review MPO congestion management process plan.
- ◆ Review Metropolitan Transportation Plan (MTP).
- ◆ Review the Transportation Improvement Program (TIP).
- ◆ Review TCM in SIP.
- ◆ Verify that the MPO has received its federal certification for the metropolitan planning process.
- ◆ Evaluate congestion management/pricing.

Helpful Suggestions.

- ◆ In TMA nonattainment areas, coordinate with the district planning staff and MPO.
- ◆ Locally, consult the MTP and TIP to determine whether the project is on both. If it is not, work early with the MPO to amend the MTP and TIP, and allow time for the determination of air quality conformity, if required.

Critical Sequencing.

- ◆ In TMA, the MPO coordination and CMP considerations may become critical because developing typical highway projects becomes subject to numerous conditions (air quality conformity, transportation demand and operational management strategies) which affect project development and design.

Authority.

- ◆ Development of programmatic mitigation plans [23 CFR §450.320](#)
- ◆ CMS [23 CFR Section 500.109](#)

Resource Material.

- ◆ FHWA, Environment, Publications, [Climate Change Mitigation](#)
- ◆ MTP and TIP
- ◆ *Online: Inside TxDOT - [Environmental Affairs Division](#)*

10460: Evaluate inclusion of High Occupancy Vehicle/High Occupancy Toll lanes

Description. Managed lanes are single or multiple lanes separated from general purpose lanes by physical structure, barriers, or by pavement striping. Most often Texas uses two categories of managed lanes: high occupancy vehicle (HOV) lanes, which are vehicle eligible (i.e. trucks, buses, 2+ or 3+ occupants) and qualified price high occupancy toll (HOT) lanes where pricing is

dynamically changed one or more times per day in response to changing traffic conditions. If HOV lanes are underutilized, conversion to HOT lanes allows single occupant vehicles to use the managed lane under congestion priced tolls. HOV lanes should be monitored for vehicle and occupancy level eligibilities and operating hours. Managed lanes should be evaluated for their ability to reduce congestion and increase throughput in urban and suburban routes. For information on determining whether HOV or HOT lanes are practicable, contact Project Finance Division (PFD) and the Strategic Contracts Management (SCM) section.

By statute, Texas has four tolling authorities:

- ◆ Statewide highway tolling projects (TxDOT projects),
- ◆ Regional Toll Authority,
- ◆ County Toll Authority,
- ◆ Regional Mobility Authority.

Pertinent Project Types. HOV and HOT facilities are appropriate only in urban and suburban freeway corridors where significant traffic congestion is observed, or forecast, and where the feasibility of meeting demand by adding lanes is limited.

Responsible Party. District planner

Helpful Suggestions.

- ◆ Determining feasibility usually includes collaborative involvement from agencies and stakeholders such as metropolitan planning organizations, transit service providers, city and county traffic departments, FHWA, FTA, and representatives from law enforcement agencies.

Resource Material.

- ◆ Establishing operational policy is typically performed at the corridor level and may not be consistent between corridors in a region. All affected agency stakeholders should provide input in setting this policy.
- ◆ An operator or administrator may be solicited from outside TxDOT to manage the HOV or HOT lane.
- ◆ Once built, a new HOV facility may take more than a year to reach its potential for use.
- ◆ Assistance with HOV and HOT lane studies is available from the Project Finance Division (PFD) and the Strategic Contracts Management (SCM) section.
- ◆ TxDOT *Roadway Design Manual*, Chapter 3, Section 7, [Freeways with High Occupancy Vehicle Treatments](#)

- ◆ Federal-aid Highway Program Guidance on High Occupancy Vehicles ([HOV](#)) lanes, November 2012

10470: Evaluate major project feasibility

Description. The design, construction, and operation of major transportation infrastructure requires a significant commitment of federal, state, and public funding. In some instances, private funding is required. Because of limited available funding to develop transportation facilities, major projects can sometimes be developed through comprehensive development agreements (CDA). Innovative project delivery methods can accelerate project delivery. Planning of major projects should investigate the tollway alternative.

A Major Project, by UTP definition, may also involve FHWA according to the Oversight Agreement. FHWA will have cradle-to-grave involvement with Major Projects having federal funding and total cost greater than \$500 Million or TIFIA loan projects. Involvement is due to the inherent high risk of these projects. FHWA NEPA oversight is excluded, since the NEPA responsibility has been assumed by the department. Department projects considered a Major Project are automatically an FHWA Project of Division Interest (PODI).

Pertinent Project Types. Significant statewide or regional transportation projects requiring large capital expenditure to construct or rehabilitate a facility.

Responsible Party. District Director of Project Planning and Development through the District Engineer

Helpful Suggestions.

- ◆ Partnering with regional mobility authorities, and metropolitan planning organizations to assist in determining the viability of a major project with or without tolls.

Critical Sequencing.

- ◆ Early environmental review process.

Resource Material.

- ◆ [FHWA Major Project Delivery Process](#)
- ◆ TxDOT [UTP, Part II. Major Transportation Projects](#)
- ◆ TxDOT [Design-Build Quality Assurance Program Implementation Guide](#)
- ◆ Refer to the Strategic Contracts Section of Project Finance Division for assistance in evaluating major project feasibility.

10480: Evaluate railroad corridor preservation

Description. Railroad corridors constitute a source of right of way 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. If a transportation project can be foreseen within all or a portion of the railroad property, the affected districts should prepare a railroad corridor evaluation report recommending for or against corridor acquisition.

Pertinent Project Types. Projects with potential to utilize railroad corridors.

Responsible Party. District Director of Transportation Planning and Development.

Subtasks.

- ◆ Inquire about corridor status.
- ◆ If rail line is in a metropolitan area, coordinate with the MPO.
- ◆ Coordinate with any type of rail district that has jurisdiction in the area.
- ◆ Prepare railroad corridor evaluation report. Consult TPP for further information.
- ◆ Obtain minute order through TPP.

Helpful Suggestions.

- ◆ Authorization of a minute order is conditional pending a satisfactory survey, appraisal, and environmental investigation.
- ◆ A title insurance policy should be obtained for corridor acquisition.

Resource Material.

- ◆ TxDOT Traffic Operations - Rail Safety, [Rail-Highway Operations Manual](#)
- ◆ TxDOT Right of Way Manuals Collection.

Section 5 — Design and Construction Funding Identification

Overview

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.

This section includes the following tasks. The tasks are listed in approximate chronological order, but may be performed concurrently in some cases.

10500. [Identify potential design and construction funding](#)

10510. [Prepare and execute project funding agreements](#)

10520. [DEVELOP Authority](#)

10530. [CONSTRUCT Authority](#)

10540. [Place project in Transportation Improvement Program \(TIP\)](#)

10550. [Develop Statewide Transportation Improvement Program \(STIP\)](#)

10560. [Place project in one-year letting schedule](#)

10500: Identify potential design and construction funding

Description. The Unified Transportation Program (UTP) is a 10-year, mid-range planning document, approved annually. The UTP authorizes planning, development and construction activities for highways, public transportation, aviation, state and coastal waterway, and rail. Twelve specific purpose categories of funds have been established by federal and state legislation and commission policy for highway transportation programs. Categories have target LET dates and are either allocation programs or project specific.

Authority.

- ◆ Federal, State and Local Participation, [43 TAC §15.50 et seq.](#)
- ◆ Transportation Programs, [43 TAC §16.101 et seq.](#)

Resource Material.

- ◆ Unified Transportation Program ([UTP](#)) - Apportionment formulas

10510: Prepare and execute project funding agreements

Description. Project funding agreements are used when entities participate in funding project development along with TxDOT or make improvements within the State Highway System (SHS) right of way. When local government funding is involved, it may be directed toward preliminary engineering, construction, right of way, utility relocation costs, maintenance or any other project expense. Driveway permits and Multiple Use Agreements (MUAs) allow local governments to perform work within the SHS right of way but do not include funding. The funding agreements, driveway permits, and MUAs state the entity responsible for performance of the various project activities. The available project funding agreements, permits and MUAs and the applicability of each in varied situations are indicated in the following chart:

Available Agreement/Permit Types for Third-Party Improvements on State Right of Way

Agreement/Permit Type								
Type of Entity	Donation agreement	Driveway Permit	Municipal Maintenance Agreement	Landscape Maintenance Agreement	Multiple Use Agreement	Local On-System Agreement	Voluntary Advance Funding Agreement	Advance Funding Agreement
Brief description of allowable improvements types by agreement type	Private entity funded additions to an improvement project being performed by TxDOT or privately funded and performed improvements on TxDOT ROW	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.	An improvement project within TxDOT ROW which will be maintained by TxDOT that is performed by and entirely funded by a local government	Local government funded improvement project being performed by TxDOT	An improvement project being jointly performed, funded, or maintained by TxDOT and/or a local government
Division "Owner" of Agreement								
	Contract Services	Maintenance	Maintenance	Maintenance	Maintenance	Contract Services	Contract Services	Contract Services
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			NA	NA				X
Private	X	X	NA	NA				
City		X	NA	NA	X	X	X	X
Other local government		X	NA	NA	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

The remainder of this section focuses on three of the project funding agreements (Local On-system Agreements, Voluntary Advance Funding Agreements, and Advance Funding Agreements). Generally, these three types of project funding agreements should only be executed with governmental entities except for certain work with utilities and railroads. The district or division is responsible for preparing a draft agreement of these types and submitting it to Contract Services Division for review and approval.

Voluntary AFAs and Advance Funding Agreement (AFA) may also be applicable to off-system projects which include FHWA funding. The executed AFA (either type) will state the party responsible to perform each project development activity and the funding obligations of each party to the agreement. Standard templates for Voluntary AFAs and AFAs are available from the standard contracts webpage on

the Contract Services Division Crossroads website ([Standard Contracts](#)).

For entities which sign Voluntary AFAs or AFAs with TxDOT on a regular basis, Contract Services Division has developed a contracting system that allows the local government to execute Master Advance Funding Agreement (MAFA) with the department. This MAFA contains all the standard contract clauses contained in a Voluntary AFA or AFA. Once a local government signs a MAFA, future Voluntary AFAs and AFAs only require the inclusion of project specific contract terms and conditions. For these cases, Contract Services Division has developed Local Project Advance Funding Agreement (LPAFA) templates for Voluntary AFAs and AFAs to use along with the MAFA. This eliminates the need to review the standard terms and conditions for individual project agreements. For local government who choose not to use the MAFA/LPAFA system, Contract Services Division has long-form Voluntary AFAs and AFAs.

When any element of project work is proposed to be performed by the local government entity for which they will be reimbursed with state or federal funds, the department is required to determine if the local government is qualified and has adequate resources and controls to perform the desired project work elements prior to the department's authorizing the entity to perform the project work. This is accomplished through the Local Government Risk Assessment process. This process is defined in the "LG Risk Assessment and Participation/Responsibilities in AFAs" guidance document ([Local Government Projects](#)).

The Local On-system Agreement (LOSA) is to be used only for a construction project within State right of way when the local government proposes to perform and fund all elements of the project. The template for the Local On-system Agreement is available from the Standard Contracts webpage on the Contract Services Division Crossroads website ([Standard Contracts](#)).

In accordance with 43 TAC 15.52, two payment methods are available for use on the Voluntary AFAs and AFAs:

Fixed Price. The fixed price amount to be paid by the local government will be based on the estimated cost of the work to be performed. The fixed price funding amount is only subject to adjustment, as provided by 43 TAC 15.52 (4)(A)(ii).

Specified Percentage. The local government is responsible for a specified percentage of the actual project costs. In addition to the designated specified percentage, the local government is responsible for the direct cost of any work ineligible for federal or state participation and all project costs that are greater than the maximum federal or state participation amounts specified in the AFA. Upon completion of the project, the department prepares a Statement of Cost to document actual project costs incurred by the department. If any additional funds are owed by the local government, Financial Management Division sends an invoice to the local government. Any overpayment by the local government, after all cost and claims are paid, is returned.

The use of fixed price or specified percentage shall be based upon the recommended funding type specified in the following chart:

Recommended Funding Type Chart

December 18, 2018

Who is Managing the Work Item?	Category of the Work Item?	Recommended Funding type for Local Gov. Participation	Who is Managing the Work Item?	Category of the Work Item?	Recommended Funding type for Local Gov. Participation	Who is Managing the Work Item?	Category of the Work Item?	Recommended Funding type for Local Gov. Participation			
On-System			Off-System			Non-Construction					
TxDOT Managed	R/W Acq.	Fixed	TxDOT Managed	R/W Acq.*	NA	TxDOT Managed	Plng. Study	Fixed			
	Util. Relo.*	Fixed		Util. Relo.**	Spec. %		Traf. Mgmt.	Fixed			
	Env.	Fixed		Env.	Spec. %		Air Quality	Fixed			
	Des.	Fixed		Des.	Spec. %	Local Gov. Managed	Plng. Study	Spec. %			
	Constr.	Fixed		Constr.	Spec. %		Traf. Mgmt.	Spec. %			
Service Proj.	Spec. %	O/S Bridge	Fixed	Air Quality	Spec. %						
Local Gov. Managed	R/W Acq.	Spec. %	Local Gov. Managed	R/W Acq.	Spec. %	Examples of Non-Construction project types: Traffic Mgmt: freeway incident management ITS Air Quality: transit, van pool, ride share clean vehicles					
	Util. Relo.	Spec. %		Util. Relo.	Spec. %						
	Env.	Spec. %		Env.	Spec. %						
	Des.	Spec. %		Des.	Spec. %						
Constr.	Spec. %	Constr.	Spec. %								
* TxDOT is not authorized to purchase right of way 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) please see the Utility Manual.											

The use of any funding type other than the recommended type in the above chart for any element of the project development and delivery process requires special approval by the Executive Director (which has been delegated to Deputy Executive Director).

The minimum local government funding participation percentages for various state and federally funded programs are specified in [Appendix B](#). Local governments may choose to overmatch (contribute a higher percentage of funding than the minimum included in the attached chart).

TxDOT rules allow for a local government to make periodic payments if the local government is unable to pay its total funding share prior to the department's scheduled date for contract letting. The use of periodic payments requires special approval by the TxDOT Executive Director. (which has been delegated to Deputy Executive Director)

Accurate estimates are essential for preparing Voluntary AFAs and AFAs. Local governments may not be able to afford the project at letting if an inaccurate, low estimate was used to determine participation amounts. If the scope of work involving the local government changes after the execution of the original AFA, the AFA must be amended.

The AFA must be executed and the funds provided to TxDOT before the required services are performed unless periodic payments are approved.

Pertinent Project Types. Projects containing local funding participation. Other projects legally required to match participation (i.e. required to match state or federal funds).

Responsible Party. District Director of Transportation Planning and Development or Division Director depending upon project type.

Subtasks.

- ◆ Contact [Contract Services Division](#) (CSD) for help preparing and executing AFA or LOSA (TxDOT internal link, only).
- ◆ Prepare a draft AFA or LOSA.
- ◆ Prepare local government risk assessment and set oversight level (if required, AFA only).
- ◆ Originating district/division obtain review by appropriate divisions (when applicable).
- ◆ Originating district/division ensure that all internal stakeholders concur with business terms in the agreement prior to submittal to CSD (for AFA only).
- ◆ Send the draft LOSA or draft AFA with AFA Checklist, SPA(s), division review(s), resolution or ordinance and other required documents, to CSD for review and revision as needed.
- ◆ Submit Funding Structure Special Approval form (if required, AFA only) and Oversight Level Special Approval form (if required, AFA only) to Contract Services. CSD will review and forward appropriate documents to Deputy Executive Director for approval.

- ◆ Upon CSD approval of AFA or LOSA, obtain local government signature (preferably using DocuSign), and send the partially executed AFA or LOSA to CSD or proper signatory (i.e. off system bridge AFA to BRG).
- ◆ Proper signatory executes the AFA or LOSA for TxDOT.
- ◆ Proper signatory sends an original of the fully executed AFA or LOSA to the district or division (based upon project type) for return to the local government.
- ◆ Complete DCIS and PeopleSoft or other electronic tracking reports relating to AFA or LOSA.
- ◆ District or division managing the AFA or LOSA is responsible for collecting the funds in accordance with the terms of the AFA or LOSA (when applicable).

Helpful Suggestions.

- ◆ Start the AFA process as early as possible. The district should contact the local government as soon as it appears an AFA is required.
- ◆ The estimate should be accurate to allow the local government opportunity to budget for the project. This will help ensure that funds will be available when they are required.
- ◆ Entities may need additional time to schedule meetings (i.e. city council) necessary to accept AFA provisions and to transfer funds.
- ◆ CSD and the administering divisions are available to assist districts.
- ◆ The district or division (depending upon project type) is responsible for ensuring that all provisions of any agreement comply with all applicable laws, policies, and procedures.

Critical Sequencing.

- ◆ Execute AFA at the beginning of project development to ensure that the responsibilities of each party and the funding responsibilities of each party are agreed to before incurring preliminary design costs.
- ◆ Execute LOSA prior to district approving project plans and specifications and prior to authorizing local government construction activities within the State right of way.

Authority.

- ◆ Federal, State, and Local Participation, [43 TAC §15.50 et seq.](#)

Resource Material.

- ◆ Transportation Programs Division - Local Government Projects Section (LGP)

10520: DEVELOP Authority

Description. DEVELOP Authority phase is for projects in the years 5 to 10 of the UTP. The districts perform advanced planning, engineering, environmental studies, surveying, initial utility and right of way planning, and preliminary design.

Pertinent Project Types. Projects authorized for project development, but not for CONSTRUCT Authority

Responsible Party. District Director of Transportation Planning and Development.

- ◆ The district programming and scheduling manager should update DCIS to show current cost estimates.
- ◆ Projects are ranked relative to the following criteria:
 - TxDOT's strategic goals for safety, congestion, connectivity, and strategic priorities,
 - Project development phasing and readiness, and
 - Funding availability is a function of funding secured for a project.
- ◆ Ranking is important for advancing a project to CONSTRUCT authority. See 10530: [CONSTRUCT Authority](#).
- ◆ As right of way is acquired, a project's cost effectiveness ranking improves.

Resource Material.

- ◆ Unified Transportation Program ([UTP](#))
- ◆ TxDOT [DCIS User Manual](#)

10530: CONSTRUCT Authority

Description. All phases of work are permitted for projects with CONSTRUCT Authority. Generally, projects with CONSTRUCT Authority are 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.

Pertinent Project Types. Projects with environmental and right of way clearance and secured funding.

Responsible Party. District Director of Transportation Planning and Development

Resource Material.

- ◆ TxDOT [Unified Transportation Program](#)
- ◆ Transportation Programming and Programming Division - Systems Planning Office

10540: Place project in Transportation Improvement Program (TIP)

Description. The Transportation Improvement Program (TIP) is a central component of the multimodal transportation planning process developed by the MPO in cooperation with the department and local public transportation operators. The TIP is a four-year list of transportation projects approved for development and prioritized by project within each UTP funding category. The TIP for rural areas and urban areas outside an MPO is developed by the responsible TxDOT district in cooperation with local government entities. The TIP is a list of priority projects to be funded and likely implemented within a four year period.

A new TIP shall be updated and approved at least every two years and in a format consistent with the STIP. Modifications to a currently approved TIP can be made as defined in 43 TAC §16.101(k).

The TIP is approved by the MPO and the Governor's designee (TTC or TxDOT Executive Director). After approval, the TIP shall be included without modification, directly or by reference, in the STIP program except that in nonattainment and maintenance areas, a conformity finding 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 Statewide Transportation Improvement Program. See Task 10550: [Develop Statewide Transportation Improvement Program \(STIP\)](#). Generally, a project's letting year is established as part of placing it in the TIP.

Pertinent Project Types.

- ◆ Federal regulations require that projects proposing to use FHWA or FTA funds are shown in the TIP before project approval.
- ◆ Projects that will not use FHWA or FTA funds, but that will require approval by these agencies (such as new access to an interstate) should also be in the TIP.
- ◆ In non-attainment areas or maintenance areas, all regionally significant projects, regardless of funding (federal, state or local), must be in the TIP.
- ◆ In all areas, locally funded, regionally significant projects let in the previous fiscal year, should 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.

Responsible Party. District Director of Transportation Planning and Development

Helpful Suggestions.

- ◆ The TIP must be consistent with expected funding levels (i.e., it must be fiscally constrained).
- ◆ Before approval, there must be an opportunity for public comment.
- ◆ In non-attainment and maintenance areas, the TIP and Metropolitan Transportation Plan (MTP) must be found to conform with the Statewide Implementation Plan (see Task 10420:

[Determine if Statewide Implementation Plan requirements apply](#)) by the MPO and US DOT (FHWA and FTA). The projects in the TIP must contribute to a reduction in emissions.

Critical Sequencing.

- ◆ All projects listed in the STIP must be included in a TIP and MTP (MTP only where applicable).
- ◆ Projects must be in the STIP before federal reimbursement of work will be authorized.

Resource Material.

- ◆ Transportation Planning and Programming Division - Systems Planning Office

10550: Develop Statewide Transportation Improvement Program (STIP)

Description. The Department must develop a comprehensive intermodal statewide transportation plan for all areas of the state including metropolitan planning bound by federal requirements. The STIP is a compilation of Transportation Improvement Programs and projects selected by districts. See Task 10540: [Place project in Transportation Improvement Program \(TIP\)](#).

For non attainment areas, the MPO must prove conformity with the Statewide Implementation Plan (SIP) before the TIP can be included in the STIP. See Task 10420: [Determine if Texas Statewide Implementation Plan requirements apply](#). As with each TIP, the STIP is financially constrained.

TPP compiles the STIP, which is then approved by the Texas Transportation Commission acting for the governor. The Commission forwards the STIP to the Federal Highway Administration (FHWA) and the Federal Transit Administration (FTA) for review and approval. All federal-aid projects must be included in the STIP before federal funds may be authorized for the phase of project development.

Pertinent Project Types.

- ◆ Federal aid projects using federal funds in any portion of project development.
- ◆ Projects that will not use FHWA or FTA funds, but that will require approval by these agencies (such as new access to an interstate) should be shown in the STIP.
- ◆ State-funded projects inclusion required by TxDOT to show financial constraint.
- ◆ Regionally significant projects.
- ◆ Transit projects.
- ◆ Multimodal projects.
- ◆ Aviation projects (optional).

Responsible Party. Transportation Planning and Programming Division

Helpful Suggestions.

- ◆ The STIP must be consistent with expected funding levels.
- ◆ Before STIP approval, there must be reasonable opportunity for public comment.

Critical Sequencing.

- ◆ Federally funded projects must be included in the STIP before issuance of an FPAA.
- ◆ FPAA to obligate federal funds must be obtained before incurring reimbursable project costs.

Resource Material.

- ◆ Transportation Planning and Programming Division - Systems Planning Office

10560: Place project in one-year letting schedule

Description. On an annual basis, the Letting Management Section of the Financial Management Division (FIN) requests that districts formulate a three-year letting schedule to meet specific letting volumes provided for each District. This involves updating PeopleSoft and various fields in DCIS in accordance with specific instructions provided by the Letting Management Section. The “LET SCH FY” field on the DCIS Project Identification Screen (P01) are opened, or ‘unlocked’, for changes during a six-week period for districts to enter let years for their projects. Other fields requested to be updated, including the “PRES DIST EST LET DATE” are open for changes throughout the year.

From DCIS data in the LET SCHEDULE YEAR and the PRES DIST EST LET DATE fields, the Letting Management Section forms a one-year letting schedule. Letting Management reviews the schedule on a statewide basis to ensure funding goals are met. The schedule is also reviewed for completeness, funding eligibility, federal oversight, etc. and any necessary changes are coordinated with the district. The schedule is then submitted to the administration for their approval. The one-year letting schedule is a planning document and is subject to change. Letting schedules are posted on the Internet.

Financial Management Division tracks letting volumes by district and by funding category. This information is sent to the Texas Transportation Commission monthly and summarized in a quarterly report (with cumulative results) to districts.

Pertinent Project Types. All projects.

Responsible Party. Financial Management Division (FIN) - Letting Management Section

Chapter 2 — Preliminary Design

Contents:

[Section 1 — Preliminary Design Concept Conference](#)

[Section 2 — Data Collection/Preliminary Design Preparation](#)

[Section 3 — Public Meeting\(s\)](#)

[Section 4 — Preliminary Schematic](#)

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[Section 6 — Value Engineering](#)

[Section 7 — Geometric Schematic Approval](#)

Section 1 — Preliminary Design Concept Conference

Overview

This section describes preliminary activities to define the general project location, design concepts, and activities to establish parameters for the final design.

The Preliminary Design Concept Conference is a meeting of key individuals for establishing fundamental aspects of a project. The conference facilitates agreement to basic project features by concerned parties and enhances relationships among those parties. Preliminary design activities undertaken prior to the NEPA clearance should not materially undermine consideration of project alternatives.

This section includes the following tasks:

20100. [Conduct a Preliminary Design Concept Conference](#)

20110. [Analysis of environmental impacts and mitigation](#)

20120. [Right of way determination](#)

20100: Conduct a Preliminary Design Concept Conference

Description.

A Preliminary Design Concept Conference (DCC) is a meeting to establish and agree on fundamental aspects, concepts, and preliminary design criteria of a project. Supporting documents constitute an understanding of basic features of the project by FHWA, TxDOT divisions, TxDOT district office, and local government agencies.

The Design Summary Report (DSR) is a dynamic document. It contains the record of project development and design. Used as a preliminary DCC guide, the DSR will help ensure that the project team does not overlook potentially critical issues. While all items will not be applicable to all projects, overlooking any item may significantly delay the project. Although the project is in a preliminary phase and fundamental aspects have not reached detailed development, the DSR should be updated with known data; information detail can be added as the project progresses to the detailed Plans, Specifications, and Estimate (PS&E) level of development. The DSR remains with the project records from creation to eventual archival or destruction. See 50110: [Conduct Design Conference](#).

Pertinent Project Types.

- ◆ New construction, reconstruction, and special transportation projects

- ◆ Other projects that the Director of Transportation Planning and Development determines would benefit

Responsible Party. Project manager

Subtasks.

- ◆ Identify and invite participants with sufficient lead time.
- ◆ Extend an invitation to the Federal Highway Administration (FHWA), if the project will involve Interstate access or is a Federal Aid Highway Program (FAHP) project, which will exceed one million dollars.
- ◆ Schedule field visit to review existing conditions with a team of experienced staff from traffic operations, design, construction, and maintenance prior to the Preliminary Design Concept Conference. Document the site visit dates and participants on the DSR.
- ◆ Complete parts of DSR and circulate to all parties invited to the conference for review.
- ◆ Obtain concurrence or disagreement by approval entities listed in the DSR.
- ◆ Update DSR as project progresses, and make updated DSRs available to approval entities and other parties with a need-to-know.
- ◆ Retain the DSR in the Project File of Record.

Helpful Suggestions.

- ◆ The primary purpose of the Preliminary Design Concept Conference is to establish and agree on fundamental aspects, concepts, and design criteria for a project.
- ◆ Appoint an individual to take conference notes.

Critical Sequencing.

- ◆ Conduct the conference before preparing schematics or performing other preliminary design.

Resource Material.

- ◆ Design Summary Report ([TxDOT Form 2440](#))
- ◆ TxDOT [Roadway Design Manual](#)
- ◆ TxDOT *Landscape and Aesthetics Design Manual*, Chapter 3, Section 2, [Conduct Preliminary Design Conference](#)
- ◆ Online: Inside TxDOT, Divisions, [Environmental Affairs](#)
- ◆ TxDOT [Hydraulic Design Manual](#) (hydrology)
- ◆ Online: Inside TxDOT, [Bridge Division](#)
- ◆ [Facility Type Guide to Design Criteria](#)

- ◆ Online: Inside TxDOT, Traffic Operations Division - [Rail Safety](#)

20110: Analysis of environmental impacts and mitigation

Description. The department has review responsibilities for the National Environmental Policy Act (NEPA) Assignment for projects funded by the Federal Aid Highway Program (FAHP) and any other Federal environmental law with respect to transportation projects.

Environmental review responsibilities should be started at the earliest possible stage to eliminate delays. This comprehensive assessment of potential and existing human and natural environmental risks for a proposed federal action starts with a defined needs and objectives of the project and alternatives. The completed NEPA document is a detailed single source of information for project decision makers.

The NEPA decision occurs when a Categorical Exclusion (CE), finding of no significant impacts (FONSI), or record of decision (ROD) is issued. Final design activities may not be advanced until a NEPA decision has been issued.

The following Classes of Projects briefly explain NEPA documents:

- ◆ Class I - environmental impact statement (EIS) is very detailed. It begins with a Notice of Intent (NOI) and is complete when a ROD has been signed; this is a very lengthy process.
 - New access control freeway
 - Highway of four or more lanes on new location
 - New construction or extension of a separate roadway for buses or high occupancy vehicles not located within an existing highway facility
- ◆ Class II – Categorically Excluded (CE). Projects which do not have a cumulative or significant effect on the human environment normally do not require further NEPA approvals. Applies to projects on or off the state highway system and funded by FHWA or projects that require FHWA approval.
- ◆ Class III – Environmental Assessment (EA). Projects funded by FHWA or require FHWA approval. Projects in this category are not Class I or Class II and can be on or off the state highway system. The EA provides a written report of the project need and alternatives, environmental impact of the proposed project and alternatives, and agencies consulted in the assessment. The EA is complete when a FONSI is issued; however, if an impact appears to be significant and mitigation will not reduce an adverse impact, a NOI should be prepared and a draft EIS should begin.

Contact district or division environmental coordinator to determine the appropriate required environmental documentation or if there are any problems with a cooperating agency. Create and maintain an Environmental Affairs Division - Advanced Project Development Stage Gate Checklist, [Form 2442](#).

Environmental Stage Gate documentation is required throughout the plan development, PS&E, and construction processes. Evaluate and document the transportation project analysis for other Federal environmental review responsibilities. Provide project environmental information on the Environmental Permits, Issues and Commitments (EPIC) standard for Federal environmental laws other than NEPA. Ensure early coordination for permits and timely environmental document approval.

For State funded projects, review the “FHWA and State EA Comparison Chart” under Resource Material below. Contact the district environmental office for assistance.

Use of available advanced modeling technology, including 3-dimensional digital modeling, may accelerate and improve the environmental review process.

Pertinent Project Types. All projects.

Responsible Party. Project manager

Resource Material.

- ◆ Environmental Affairs Division, [Project Initiation and Scope Development](#) tools
- ◆ Advance Planning and Development Stage Gate Checklist, [Form 2442](#)
- ◆ [Memorandum of Understanding](#) Between Federal Highway Administration and Texas Department of Transportation Concerning the State of Texas’ Participation in the Project Delivery Program Pursuant to 23 USC 327.
- ◆ Environmental Impact and Related Procedures, [23 CFR Part 771](#)
- ◆ Environmental Affairs Division, FHWA and State EA Comparison [Chart](#)
- ◆ [Red Book](#) - Synchronizing Environmental Reviews for Transportation and Other Infrastructure Projects (FHWA Publication)
- ◆ FHWA - [Summary of Environmental Legislation Affecting Transportation](#)

20120: Right of way determination

Description. Right of way is a function of project development. The project team needs a method to incorporate and control factors affecting right of way determination. During a Preliminary Design Concept Conference, proposed project limits, impacts, and physical and financial constraints should be studied.

The advance planning risk analysis (APRA) tool was developed under TxDOT Research Project 0-5478 to meet this need. It offers a method to measure project scope definition for completeness and identify potential risks early in the project. With this tool, users identify the critical elements of the project scope across all disciplines. A high level assessment of the project is recommended at this stage of project development. Results should be recorded for benchmarking purposes.

Pertinent Project Types.

- ◆ New construction, reconstruction, and special transportation projects
- ◆ Other projects which may benefit from this analysis

Responsible Party. Director of Transportation Planning and Development

Subtasks.

- ◆ Utilize the APRA tool to align project objectives and stakeholders' needs, identify high priority project deliverables, and facilitate communication
- ◆ Work with the district survey coordinator on a plan to evaluate properties to be surveyed and acquired to establish project right of way. See Task 20230: [Obtain right of entry](#).

Critical Sequencing. Determine planned right of way before preparing preliminary schematics or other preliminary design.

Resource Material.

- ◆ Identifying Right-of-Way Requirements during the Project Development Process, 2007. [Report No. FHWA/TX-08/0-5478-1](#)
- ◆ APRA tool [Report No. 0-5478-Pla](#) (zip file contains: Tool - XLS file, and User Guide)

Section 2 — Data Collection/Preliminary Design Preparation

Overview

This section includes obtaining data necessary for making engineering and environmental decisions related to project design. Data collection efforts should be as complete as possible so project solutions providing the most benefit are selected.

This section includes the following tasks. The tasks are listed in approximate chronological order but may be performed concurrently in some areas.

20200. [Conduct early coordination with stakeholders](#)

20210. [Prepare and execute additional agreements](#)

20220. [Review traffic data](#)

20230. [Obtain right of entry](#)

20240. [Obtain related data, plans, studies, and reports](#)

20250. [Obtain information on existing utilities](#)

20260. [Obtain traffic crash data](#)

20270. [Obtain hydraulic studies](#)

20280. [Obtain geospatial data](#)

20290. [Perform other surveys](#)

20200: Conduct early coordination with stakeholders

Description. Early coordination with resource and regulatory agencies and other stakeholders is vital in obtaining concerns and opportunities for a proposed project. Sometimes opportunities may be identified to perform joint activities with a project planned by an agency. Project managers can streamline the overall project development process by proactively seeking out potential stakeholders such as neighborhood associations, schools, fire and police departments, etc.

Permits from regulatory agencies may be required for construction activities affecting the respective resources. Resource agencies may require implementing mitigation measures where environmental effects cannot be avoided. Types of mitigation may include restoration or enhance-

ment, creation, and preservation of natural resources. Mitigation can be a requirement in obtaining permits from regulatory agencies.

Pertinent Project Types. New construction, reconstruction and rehabilitation projects. Minor projects (2R, seal coat, overlay) may require coordination if a resource is known to exist within department right of way.

Responsible Party. Project manager

Subtasks.

- ◆ Coordinate with district environmental coordinator and roadway design engineer.
- ◆ Identify resource and regulatory agencies and stakeholders.
- ◆ Identify environmental and design constraints.
- ◆ Identify possible construction methods.
- ◆ Explore project design modifications to avoid, minimize, or mitigate effects to natural resources.

Helpful Suggestions.

- ◆ Refer to Chapter 3, Section 2 [Interagency Coordination/Permits](#).
- ◆ Early coordination is essential to meet project planning and development milestones. Coordination continues throughout the process including construction and maintenance, based on the project's environmental commitments.

Authority.

- ◆ [National Environmental Policy Act](#) (NEPA) 1969

Resource Material.

- ◆ Online: Inside TxDOT, Divisions, [Environmental Affairs](#)

20210: Prepare and execute additional agreements

Description. 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. Identification of existing agreements also helps determine the possible need for additional agreements. Some agreements may need to be amended and the appropriate division can assist. The advance funding agreement should have been previously executed. See Task 10510: [Prepare and execute advance funding agreements](#).

The following table lists the coordinating division of each type of additional agreement:

Additional Agreements

Type of Agreement	Coordinating Division
Bridge projects between Texas and other states or between Texas and Mexico	Bridge
Drainage agreements	Right of Way or Maintenance
Joint-use agreements, see Task 40340: Prepare and execute joint-use, multiple-use agreements	Right of Way
Multiple-use agreements, see Task 40340: Prepare and execute joint-use, multiple-use agreements	Maintenance
Municipal maintenance	Maintenance
Natural Resource Conservation Service (NRCS)	Environmental Affairs
Railroad	Rail
Right of entry	Right of Way
Right of way (agreement to contribute funds)	Right of Way
U.S. Coast Guard (USCG)	Environmental Affairs
U.S. Army Corps of Engineers (USACE)	Environmental Affairs
U.S. Fish and Wildlife Service	Environmental Affairs
U.S. Geological Survey (USGS) - gaging stations	Bridge
Utility (pipelines, telephone, etc.)	Right of Way

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

- ◆ Work is performed within jurisdiction of another entity (e.g., railroads).
- ◆ Other entities construct facilities (e.g., driveways, utilities) on department right of way.
- ◆ Funds are provided by another entity.
- ◆ Other entities agree to maintain the facility.

Pertinent Project Types. All projects

Responsible Party. Project manager

Subtasks.

- ◆ Identify existing agreements.
- ◆ Determine need for additional agreements and amendments to existing agreements.
- ◆ Coordinate with district and division staff to develop and execute agreements.

Critical Sequencing.

- ◆ Develop agreements as early as possible to allow approval time.

Authority Requirements.

- ◆ Funding: [43 TAC § 15.50 et seq.](#)
- ◆ International Bridges: [43 TAC §15.70 et seq.](#)
- ◆ Utility Accommodation: [43 TAC § 21.21 et seq.](#)
- ◆ Federal projects, Accommodation of Utilities, [23 CFR 645 Subpart B](#)

Resource Material.

- ◆ TxDOT [Rail-Highway Operations Manual](#)
- ◆ Online: Inside TxDOT, Divisions, [Bridge](#)
- ◆ TxDOT [Right of Way](#) Manual Collection

20220: Review traffic data

Description. Traffic data is a key element in highway design. Traffic data requested earlier should be reviewed, and additional data should be obtained. See Task 10430: [Obtain Traffic Data](#).

Pertinent Project Types. New construction, reconstruction, and rehabilitation projects

Responsible Party. Project manager

Resource Material.

- ◆ TxDOT Transportation Planning and Programming Division - Traffic Analysis Office
- ◆ TxDOT *Roadway Design Manual*, [Traffic Volume](#)

20230: Obtain right of entry

Description. Right of entry (ROE) is permission, granted by a landowner, for others to enter the landowner's property for a specific purpose. ROE should be obtained in writing on a form that is legally binding.

ROE requests to access railroad property should be processed through the district railroad coordinator or through the Traffic Operations Division - Rail Safety Section. Conditions may exist for entry on railroad property.

Consult with Design Division, Photogrammetry Section for their services which may not require entering private property. See Task 20280: [Obtain geospatial data](#).

Pertinent Project Types. Projects requiring land surveying, environmental surveying, core drilling, rail construction and maintenance agreements, or other work activities outside public right of way.

Responsible Party. Survey, rail, and environmental personnel through the Project Manager

Subtasks.

- ◆ Identify properties requiring entry. This includes properties where work activities will be performed and properties that will be traveled upon to reach work activity sites.
- ◆ Research property ownership information - typically at county tax appraiser's office. District Right of Way personnel might be able to assist.
- ◆ If possible, meet the property owner to discuss the conditions for the ROE.
- ◆ Prepare letters to property owner(s) requesting permission to enter property. The letters may be sent by U.S. mail or courier delivery service.

Helpful Suggestions.

- ◆ Work with district survey coordinator, rail, and right of way personnel to develop appropriate wording for ROE letters. They may have a standard form letter.
- ◆ Keep the ROE permission request for engineering survey separate from environmental survey. Some property owners can become cautious about too much activity on their property.
- ◆ As a courtesy, send an extra copy of the ROE request letter for the landowner's records. Include a cover letter containing a description of the overall project and a description of the public involvement process, if applicable, and include a self-addressed, stamped envelope. This should reduce the number of follow-up inquiries and efficiently direct inquiries received.
- ◆ Be prompt and mindful of time allowed by the ROE. Remember to leave landowner's premises as they were found and relock gates.

If consultants are performing survey work and obtaining ROE, assist with the following:

- ◆ The project manager should supply the consultant with copies of a TxDOT cover letter for attachment to the consultant's ROE request letter. This can assist the consultant in securing ROE.
- ◆ The consultant should forward copies of ROE request letters signed by landowners to the TxDOT project manager. These letters should be kept with project records.

Critical Sequencing.

- ◆ This task must be done before entering private property.
- ◆ Because it might take months to obtain permission from property owners living out of town or out of state, begin this task soon after identifying its need.

- ◆ For time-sensitive ROE requests, landowners may send a signed PDF letter by email or FAX.

Resource Material.

- ◆ Online: TxDOT Right of Way [manuals collection](#)
- ◆ District environmental coordinator
- ◆ District surveyor or survey coordinator
- ◆ Design Division – Photogrammetry Section

20240: Obtain related data, plans, studies and reports

Description. Studies and reports can provide information that will assist in decision making and help avoid “re-inventing the wheel.”

Consider the following sources:

- ◆ Project history files
- ◆ Previously studied but suspended projects
- ◆ Formal or informal studies addressing a specific issue
- ◆ Relevant project information for adjoining or parallel routes
- ◆ Studies conducted by other agencies or special districts (e.g. MPO, flood control district) related to the proposed project concept or having possible impact on project design.

Pertinent Project Types. All projects

Responsible Party. Project manager

Subtasks.

- ◆ Identify and contact individuals having knowledge of relevant information.
- ◆ Research names of property owners along the project for use in future public involvement.
- ◆ Maintain an inventory of information received.

Helpful Suggestions.

- ◆ Identifying and locating information may depend on memories of individuals who worked on related projects.
- ◆ When requesting information, be as specific as possible about information being sought.
- ◆ Information may be obtained through informal interviews.
- ◆ Search for related research at the Center for Transportation Research Library catalog, [CTR](#).

- ◆ City and county offices have information on local circulation plans or planned residential or commercial development.
- ◆ In urban areas, it may be helpful to contact the local transit operator for information.
- ◆ Private companies may have reports or studies (e.g., a traffic study developed for a commercial property owner).

Related information typically available within TxDOT includes the following sources:

- ◆ “As-built” construction plans
- ◆ Right of way maps
- ◆ Bridge inventory data
- ◆ Traffic signal studies
- ◆ Pedestrian and bicycle plans
- ◆ Environmental studies and schematics for previous or adjacent projects
- ◆ Texas Reference Markers, GIS data for railroads, city limits, and public roads, contact the Transportation Planning and Programming Division, Data Management office
- ◆ Traffic data, see Task 10430: [Obtain Traffic Data](#)
- ◆ Traffic accident data, see Task 20260: [Obtain Traffic Crash Data](#)
- ◆ Archived project history files
- ◆ Pavement Management Information System (PMIS) data
- ◆ Existing hydrologic/hydraulic reports
- ◆ Existing geotechnical reports
- ◆ Local agency comprehensive plans

Critical Sequencing.

- ◆ Perform data collection as soon as work is authorized to begin on preliminary design.

20250: Obtain information on existing utilities

Description. Utility locations must be identified early in project development. Coordination with utility owners is required when existing utilities are present.

Pertinent Project Types. All projects except preventive maintenance and restoration projects

Responsible Party. Project manager

Subtasks.

- ◆ Coordinate with district utility coordinator as needed.
- ◆ Review “as-built” construction plans and permit records to identify existing utility owners.
- ◆ Observe utility locator markers and signs in the field and note owner's name.
- ◆ Contact municipalities adjacent to the project and request help in identifying utility owners to contact.
- ◆ Provide utility owners with the project “footprint” and request information on their utility locations.
- ◆ Conduct utility field surveys. See Task 40110: [Locate existing utilities](#).

Helpful Suggestions.

- ◆ If the project is proposed on new location, review recent area wide aerial photography for evidence of underground transmission lines. Contact Design Division Photogrammetry Section for possible assistance.
- ◆ Establish the locations of existing right of way near utilities. See Task 40100: [Perform preliminary right of way research](#).
- ◆ Consider using subsurface utility engineering (SUE). See Task 40110: [Locate existing utilities](#).
- ◆ Utility owner representatives may need reminders about information requests; mark your calendar for follow-up contacts. Expect four to six weeks for a response.
- ◆ Citizens ultimately pay for utility relocations, so avoid or minimize relocations when possible.
- ◆ Surveys should be used to locate above-ground utilities and signs for underground utilities.

Critical Sequencing.

- ◆ Identify utility locations early so there is time to design around them or determine utility adjustment costs.

Resource Material.

- ◆ TxDOT [ROW Utility Manual](#)

20260: Obtain traffic crash data

Description. A crash analysis is essential in the design process for a project involving an existing transportation facility. The Traffic Operations Division is responsible for collecting State crash reports.

Traffic crashes, which result in injury to, or death of, a person, or that result in damage to the property of any one person to the apparent extent of \$1,000 or more are required to be reported to the department, in writing, within 10 days. The vehicle operator shall submit a written report, if there was no investigating law enforcement officer. In the case of a crash investigating law enforcement

officer, the officer shall provide the written report within the same 10 day time requirement. See Transportation Code Chapter 550 - Accidents and Accident Reports.

Pertinent Project Types. All projects except preventive maintenance.

Responsible Party. Project manager

Subtasks.

- ◆ If possible, obtain crash data for at least a three-year period.
- ◆ Obtain information about pertinent, physical features of the facility such as geometrics and traffic (i.e., average annual daily traffic).
- ◆ Observe traffic movements at the location during pertinent times (e.g., rush hour).
- ◆ Analyze the data. Identify factors contributing to crashes, look for similarities, patterns, or abrupt changes over time in the way crashes are happening.
- ◆ Consider design features that might reduce potential for crashes, reduce crash severity, or improve operations.

Helpful Suggestions.

- ◆ Through the district traffic operations section, contact Traffic Operation Division (TRF) to obtain access and training for the Crash Records Information System (CRIS).
- ◆ The Traffic Operations Division (TRF) can also assist in research, analyzing, and evaluating crash data.
- ◆ The district maintenance supervisor is a good source for traffic crash information.
- ◆ Local authorities may also assist in identifying or tracking problems as they develop.
- ◆ AASHTO *Highway Safety Manual* analysis can provide quantitative analysis and countermeasures to address safety.
- ◆ AASHTO Safety Analyst software can proactively predict safety improvements and optimize crash reduction as opposed to costly waiting for crashes to warrant an action.
- ◆ When data alone is insufficient, copies of a law enforcement officer's report may be obtained from CRIS.

Resource Material.

- ◆ AASHTO *Highway Safety Manual*, (HSM)
- ◆ Traffic Operations Division, Crash Data and Analysis Section
- ◆ Interactive Highway Safety Design Module ([IHSDM](#)), Six evaluation modules (Crash Prediction, Design Consistency, Intersection Review, Policy Review, Traffic Analysis, and Driver/Vehicle)

- ◆ AASHTO [Safety Analyst](#)
- ◆ TxDOT *Highway Safety Improvement Program Manual*
- ◆ [Texas Transportation Code Chapter 550](#)

20270: Obtain hydraulic studies

Description. To determine preliminary drainage structure requirements (i.e., “floodplain screening”), obtain and review existing studies. Floodplain studies and other hydraulic data may be prepared by or for the Federal Emergency Management Agency (FEMA), drainage districts, river authorities, cities, and counties.

Numerous communities throughout Texas participate in the National Flood Insurance Program (NFIP). FEMA requires an appointed State Coordinating Agency for the NFIP communities, which is the Texas Water Development Board (TWDB). For streams within jurisdiction of a participating community, FEMA rules and regulations apply.

In instances where TxDOT facilities are located within bounds of a Flood Insurance Study (FIS), TxDOT needs to investigate effects that proposed construction will have on the published Flood Insurance Study. The studies have been compiled by organizations such as the U.S. Army Corps of Engineers (USACE), the U.S. Geological Survey (USGS), the U.S. Natural Resources Conservation Service (NRCS), various local governmental entities, and private consultants.

To analyze existing hydraulics, obtain the FEMA study, or other relevant floodplain study; see the [Hydraulic Design Manual](#). Use this information to analyze the existing location and develop design alternatives that follow FEMA guidelines, when applicable.

Pertinent Project Types. Projects that might change the water surface elevation in a FEMA controlled floodplain. Some examples of these projects are as follows:

- ◆ New structure (new profile) over a stream
- ◆ Project generates an increase in impermeable cover in a watershed (not ultimate development)
- ◆ Riprap added to a stream bank or bed
- ◆ Addition of concrete median barrier to an existing facility.

Responsible Party. Project manager

Subtasks.

- ◆ Comply with minimum FEMA rules and regulations. Determine whether the project has the potential to affect a stream within jurisdiction of a city or community participating in the National Flood Insurance Program.

- ◆ Contact the Design Division Hydraulics Branch to obtain the relevant hydraulic study (i.e., computer model).
- ◆ Perform modeling and coordination as discussed in the TxDOT [Hydraulic Design Manual](#). Ask for assistance from the DES Hydraulics Branch as needed.

Helpful Suggestions.

- ◆ The backwater profile program used in originally developing a study may have been one of several types and from one of several sources. In Texas, the model most commonly used is the HEC-2 Water Surface Profile model from the U.S. Army Corps of Engineers. Typically, FEMA encourages that the 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.
- ◆ Floodway and floodplain encroachments must be explained in the environmental document.
- ◆ Obtaining FEMA studies can take several months.

Resource Material.

- ◆ TxDOT [Hydraulic Design Manual](#)
- ◆ Federal Emergency Management Agency, [FEMA](#)

20280: Obtain geospatial data

Description. Geospatial data includes digital maps, terrain models, and orthophotography. The data may already exist (e.g., Google Maps) or, depending on project requirements, may need to be created. Geospatial data can be created using various technologies.

Small areas, less than 10 acres:

- ◆ Land surveying using conventional optical or GPS surveying equipment
- ◆ Static (terrestrial) LiDAR

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 similar to land surveying in that a surveying instrument is setup 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.

The following are more cost-effective for areas greater than 10 acres:

- ◆ Aerial photogrammetry

- ◆ Airborne LiDAR
- ◆ Close-range photogrammetry: terrestrial, mobile, or unmanned aerial vehicle (UAV)
- ◆ Mobile LiDAR

Aerial photogrammetry typically uses piloted aircraft equipped with a large-format metric mapping camera; however, UAS (unmanned aerial systems) 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.

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 should not be used for precise mapping.

Pertinent Project Types. All Projects

Responsible Party. Project manager

Subtasks.

- ◆ Determine if existing data exists. If it does, determine suitability for use.
- ◆ Discuss data needs with the area engineer, district land surveyor, or geospatial data subject matter experts in the Design Division - Photogrammetry Section (DES-PS).

- ◆ Determine the technology to be used based on data needs assessment. Note that DES-PS provides complete in-house photogrammetric services. LiDAR services are currently contracted to outside firms.
- ◆ If a photogrammetric solution is selected, contact DES-PS for flight and control planning. The section will provide a ground control plan showing the location of targets to be placed on the ground. The targets will be placed and surveyed using either in-house survey staff or by outside contractors. DES-PS will schedule the aerial flight mission once the targets are in place.
- ◆ If a LiDAR solution is selected, consult with DES-PS.

Additional subtasks for controlled aerial photography.

- ◆ Conduct or contract out field surveys to obtain ground control coordinates and to lay out ground panels. A registered professional land surveyor (RPLS) should perform the surveying work.
- ◆ Provide ground control coordinates to DES-PS.

Helpful Suggestions.

- ◆ Knowing which technology or combination of technologies to use can be a complicated matter. In general, project size determines which technology will be most effective. Contact DES-PS.
- ◆ Plan for a long lead-time before the finished product becomes available.
- ◆ Check with the DES-PS for scheduling.
- ◆ Digital orthophotography is available through the DES-PS. Lower resolution digital ortho is available from the Texas Natural Resource Information System (TNRIS) at www.tnris.org. TNRIS also has some LiDAR data available.
- ◆ When identifying the photography coverage area, consider including intersecting side roads, stream crossings, or complex drainage areas.
- ◆ Producing mapping in urban areas requires more effort than in rural areas due to the complexity of the urban areas.
- ◆ Be sure to follow up on delivering survey control data to DES-PS because lack of the control data can delay production of DTMs or planimetrics.
- ◆ For projects passing through areas of heavy vegetation, control surveying and the photography flight should occur during winter months when foliage is minimal.
- ◆ For large projects, consider performing control surveying in phases so panels can be more easily set up and maintained.

20290: Perform other surveys

Description. Given the type and extent of existing data available for a project, additional data is sometimes needed to support decisions during preliminary design. A survey is a data collection effort. It is the type of data, level of detail, and collection process that defines a survey. The survey could involve reconnaissance trips to the project site or a review of maps and plans. Level of detail could range from a general listing of items to controlled surveys tying features to a coordinate system. New ways of combining data will improve capability to coordinate activities.

As a large or complex project develops, it is common to determine that existing data is insufficient or needs updating. See Task 20505: [Perform preliminary geotechnical surveys](#) and Task 20280: [Obtain geospatial data](#). In addition to preliminary geotechnical surveys and topographic surveys, other surveys may include the following:

- ◆ ROW or property surveys: Task 40100: [Perform preliminary right of way research](#)
- ◆ Utility surveys: collect information on location and type of existing utilities. See Task 40110: [Locate existing utilities](#).
- ◆ Cultural and historic: buildings, cemeteries, and other cultural resources
- ◆ Intersections: turning movements and through traffic
- ◆ Traffic generators: classification by Origin Destination
- ◆ Origin and destination
- ◆ Traffic: ADT
- ◆ Vehicle classification: percent truck traffic
- ◆ Environmental: type and location of environmental features

Pertinent Project Types. All projects

Responsible Party. Project manager

Subtasks.

- ◆ Identify data needs.
- ◆ Define the survey in terms of needed type and limits of information, level of detail, process of collection, and data format.
- ◆ Coordinate with appropriate staff to schedule the survey.
- ◆ Depending on survey type, it may be necessary to obtain right of entry. See Task 20230: [Obtain right of entry](#). A right of entry or other written evidence of permission must always be obtained before entering private property.
- ◆ Information on subsurface utility engineering (SUE) is available under Task 41100: [Locate existing utilities](#).

Helpful Suggestions.

- ◆ Data collection is time consuming, so get only as much detail as necessary.

Section 3 — Public Meeting(s)

Overview

This section discusses obtaining public input on a project and incorporating that input into the project's design. Input from a public meeting can reveal concerns and issues that are not readily apparent, and give the designer an opportunity to address them during project development. Early coordination with the public aids in the type of environmental review documents that may be needed. At least one public meeting must be held during the drafting of an environmental impact statement (EIS).

Public meetings are less formal than public hearings. See Chapter 3, Section 4 – [Conduct public hearing](#).

This section includes the following tasks listed in chronological order.

20300. [Conduct public meeting](#)

20310. [Revise design based on public input](#)

20300: Conduct public meeting

Description. Public meetings provide an opportunity for the public to engage in a free exchange of views and ideas and to raise individual concerns. Public meetings, also called scoping meetings, encourage public involvement in the decision making process. Public meetings may be conducted early in planning and numerous times throughout the project development process.

Public involvement is an essential and required part of the development process for proposed actions. Taking public interest into account provides a balanced approach to the decision making.

Preparation for a public meeting should include advance notification to ensure that the public is made aware of the project planning and development process and to ensure full public involvement.

Use of available advanced modeling technology, including 3-dimensional digital modeling, may increase effective public participation.

Pertinent Project Types.

- ◆ Substantial public interest or controversy
- ◆ New construction or reconstruction
- ◆ Access changes
- ◆ Large amounts of right of way

- ◆ Impacts to historic or cultural properties

Responsible Party. Project manager

Subtasks.

- ◆ If the project is within a Metropolitan Planning Organization's (MPO's) area, include the MPO public involvement requirements. MPO requirements may be different from TxDOT's in areas such as required notification procedures, mailing lists, or number of meetings.
- ◆ Identify meeting date and location. When selecting a meeting location, ensure the meeting facilities are accessible to persons with disabilities.
- ◆ Prepare exhibits for the meeting, appropriate to the meeting format, providing information:
 - Project's purpose, needs, goals, and any local urban planning
 - Project alternatives and major design features
 - Relocation assistance program and the right of way acquisition process
 - The department's procedures for receiving written and oral statements
- ◆ Use public involvement techniques that target different groups and individuals.
- ◆ Use one or more outreach methods to inform the public of a public meeting to maximize attendance.
- ◆ Determine staff requirements.
- ◆ Prepare presentation speeches, if part of the public meeting.
- ◆ Conduct meeting.
- ◆ Prepare responses to public input. Obtain response approval from Advanced Project Development engineer.
- ◆ Review responses with stakeholders, as needed. Stakeholders may include property owners, resource agencies, local government officials, homeowner's associations, and local business organizations.
- ◆ Document a summary of the public meeting, comments received, responses to comments, and any modifications to the project as a result of the public comments.
- ◆ Provide copy of the meeting summary analysis, comments, and response report to the District Engineer and the district environmental coordinator. Maintain original documents in the Project File of Record.

Helpful Suggestions.

- ◆ Coordinate the planning and conduct of the public meeting with the district public information officer.

- ◆ Public meetings are an effective method of obtaining public support for a project and may help avoid controversial public hearings later in project development.
- ◆ On complex projects, holding an “open house” for several hours before the meeting allows the public a better opportunity to understand the proposed improvements and make more meaningful comments.
- ◆ Use of communication technology over the life of the project (planning to completion) can keep the public informed and notified about planning, construction work progress, upcoming road detours, or closures.
- ◆ If the project is in an area with a population of limited English proficiency (LEP), develop a language access plan for the population being served.
- ◆ Although Design Division review and approval of a preliminary schematic is not required before showing a schematic at a public meeting or open house, coordination with the Design Division is suggested for more complex or high profile projects.

Critical Sequencing.

- ◆ Public meeting(s) shall be conducted during the drafting of the draft environmental impact statement (DEIS).

Authority.

- ◆ Transportation Code, Public Involvement Policy, [§201.811](#)
- ◆ Public Meeting, 43 TAC, [§2.105](#)

Resources.

- ◆ Memorandum of Understanding Between Federal Highway Administration and Texas Department of Transportation Concerning the State of Texas' Participation in the Project Delivery Program Pursuant to 23 USC 327.
- ◆ Online: Inside TxDOT, Divisions, Environmental Affairs, Environmental Compliance Toolkits - Environmental Handbook [Public Involvement](#)

20310: Revise design based on public input

Description. Preliminary designs may need to be revised after public meetings are held and input is gathered.

Pertinent Project Types. All projects where public involvement is sought.

Responsible Party. Project manager

Section 4 — Preliminary Schematic

Overview

Once data collection is substantially complete, the preliminary schematic activity phase begins. This section describes developing engineering solutions to satisfy the project need. Geometric alignments and typical sections are the major engineering variables set forth. An operational analysis is performed on alternatives to determine the Level of Service (LOS) of each.

Parameters needed for final design may proceed as long as the activities don't affect objective consideration of alternatives in the NEPA review process or cause adverse environmental impacts.

Schematics are valuable to communicate design concepts to the parties involved in project development. A geometric schematic is required for new location, added capacity project, interstate ramp relocation, control of access, or an environmental impact statement. A list of schematic requirements can be found in the TxDOT [Roadway Design Manual](#).

Districts establish Green Ribbon Master Plans for urban corridors with populations greater than 100,000. Conceptual guidance for landscape and aesthetic enhancements are considered, as well as bicycle and pedestrian accommodation.

Preliminary geotechnical surveys are conducted, if important to the decision making process. Preliminary pavement designs are developed so that project cost estimates can be updated.

For projects requiring environmental impact statement (EIS), control of access, new location, or added capacity requires Design Division approval of the geometric schematic. If the schematic requires an Interstate Access Justification Request (IAJR), FHWA will review and approve the schematic and IAJR. All schematic approvals are considered as “pending” until NEPA is clear.

This section includes the following subsections and tasks, many of which may be performed concurrently:

Alternative Selection

- 20400. [Evaluate corridor alternatives](#)
- 20410. [Perform preliminary Level of Service analysis](#)
- 20420. [Evaluate route alternatives](#)
- 20430. [Initiate railroad coordination](#)
- 20440. [Identify requirements for crossing navigable waters](#)

Geometrics

- 20450. [Evaluate geometric alternatives](#)
- 20460. [Develop typical sections](#)
- 20470. [Prepare Landscape and Aesthetics Assessment](#)
- 20480. [Develop bicycle and pedestrian accommodation](#)
- 20490. [Update cost estimates](#)

Update cost estimates

- 20490. [Update cost estimates](#)

20400: Evaluate corridor alternatives

Description. A transportation corridor is essentially a linear broad band that follows a general travel flow. Influenced by logical, existing, and forecast travel patterns, it includes interconnected networks of adjacent travel modes all affected by transportation and mobility needs. Preparing corridor alternatives during preliminary design involves developing many conceptual alternatives that are feasible and reasonable in terms of construction, operation, and satisfying project goals. Corridors may be managed and serve a transportation network that carries freight, transit, cars, and alternate transportation modes by bicyclist and pedestrian. The corridor may be urban or may be a longer intercity corridor serving a variety of trip purposes. The corridor alternatives evaluation end product is a single, preferred corridor and conceptual typical sections. This preferred corridor will be carried forward to the next stage, 20420: [Evaluate route alternatives](#).

Conceptual typical sections define basic elements including number and type of lanes (e.g., single versus high occupancy vehicle lanes), shoulders, type and range of median width, possible frontage roads, and range of offset to right of way limits. Details such as cross slopes, side slopes, pavement structure, and station limits are typically not needed to define a particular concept. The number of lanes should be based on the design year capacity needed to operate at a desired Level of Service (LOS).

Although a more formal evaluation process will follow for selecting the preferred alternative, interim screening levels may be necessary to reduce the list of alternatives to a manageable number. Screening criteria should be based on characteristic elements that differentiate alternatives.

Pertinent Project Types. New location, added capacity, or controlled access projects or projects requiring an environmental impact statement.

Responsible Party. Project manager

Subtasks.

- ◆ Review projected design year traffic volumes. See Task 10430: [Obtain Traffic Data](#).
- ◆ Verify that the facility type continues to remain appropriate.
- ◆ Determine if this corridor is part of a freight network.
- ◆ Determine number of lanes.
- ◆ Prepare conceptual typical sections.
- ◆ Schedule public involvement activities such as public meetings. See Task 20300: [Conduct public meeting](#).
- ◆ Select the preferred corridor.

Helpful Suggestions.

- ◆ Obtain traffic data early. It may take three to four months to obtain design traffic data.
- ◆ Early on, determine the availability and preference for base mapping such as aerial photos, USGS maps, topographic maps, or TxDOT county maps.
- ◆ Public involvement is a major factor in determining corridor alternatives. Plan public meeting(s) to obtain input.
- ◆ Establish a clear labeling or naming convention for alternatives.
- ◆ Anticipate the need for creating options to an alternative or possible combinations of alternatives.
- ◆ 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.
- ◆ Doing a planning safety analysis makes safety an integrated component of the design.
- ◆ Keep alternatives basic in definition and avoid dwelling on details that are not significant at a conceptual level.
- ◆ Prepare study area map to evaluate environmental challenges.
- ◆ Review topography and floodplain maps to estimate whether adverse hydraulic impacts can occur.

Critical Sequencing.

- ◆ Request traffic data (e.g., traffic volumes) for use in defining typical sections early.
- ◆ Through site visits or reviewing existing data, develop a clear understanding of the study area limits as well as corridor network function before developing alternatives.

Resource Material.

- ◆ Green Ribbon Projects, [43 TAC §11.100 et seq.](#)
- ◆ Development of Guidelines for Triple Left and Dual Right Turn Lanes [Report 0-6112](#)
- ◆ Online: Inside TxDOT, Divisions, [Environmental Affairs](#)
- ◆ TxDOT [Roadway Design Manual](#)
- ◆ TxDOT [Bridge Project Development Manual](#) for identifying bridge constraints
- ◆ TxDOT Transportation Planning and Programming Division, Traffic Analysis office
- ◆ TxDOT Transportation Planning and Programming Division, Freight and International Trade office
- ◆ Design Division Photogrammetry Section, geospatial services
- ◆ AASHTO Guide for the Development of Bicycle Facilities
- ◆ TRB Highway Capacity Manual (HCM) and software
- ◆ Public Rights of Way Guidelines (PROWAG) - US Access Board - pedestrian access [Chapter R3: Technical Requirements](#)
- ◆ Texas Accessibility Standards, [TAS](#)
- ◆ AASHTO *Highway Safety Manual* (HSM)
- ◆ Interactive Highway Safety Design Module ([IHSDM](#)). Six evaluation modules (Crash Prediction, Design Consistency, Intersection Review, Policy Review, Traffic Analysis, and Driver/Vehicle)
- ◆ AASHTO [Safety Analyst](#)

20410: Perform preliminary Level of Service analysis

Description. A planning [Level of Service \(LOS\) analysis](#) uses preliminary traffic volume data for the design year. Analyze the existing facility and current volumes for a baseline to compare alternate designs. After project alternatives are fully defined, including the “no-build” alternative, a planning LOS analysis can be conducted. Given a desired LOS for the design year, the typical number of lanes proposed is usually based on projected design year traffic volumes. The results combined with cost estimates may also determine cost effectiveness.

Pertinent Project Types. New construction, multilane highway reconstruction, and interstate projects.

Responsible Party. Roadway design engineer or traffic engineer

Subtasks.

- ◆ Review existing and projected traffic data obtained. See Task 10430: [Obtain traffic data](#).
- ◆ Identify desired LOS for the design year.

Resource Material.

- ◆ Transportation Research Board, *Highway Capacity Manual*
- ◆ TxDOT [Roadway Design Manual](#)

20420: Evaluate route alternatives

Description. A route alternative comparison is performed within the preferred corridor to identify the most feasible and reasonable route alternatives. The evaluation process developed for selecting alternatives is typically based on criteria addressing project objectives, commitments, environmental impact, and stakeholder input. Quality, organization, documentation, and presentation of data are critical to the success and credibility of the evaluation and selection process. Thorough analyses of alternatives supports a well-defined scope, minimizes scope creep, and incremental cost effects later.

Doing a planning safety analysis makes safety an integrated component of the final design. AASHTO Highway Safety Manual (HSM) and software can provide a quantitative safety analysis of the route to identify alternate forms of intersecting traffic control and capacity improvement.

If funding authorization involves federal funds and the preliminary estimates indicate the total project cost may approach the threshold for a Value Engineering Study, contact the Design Division Value Engineering representative to discuss options. See Task 20600: [Conduct Value Engineering \(VE\) study](#).

Pertinent Project Types. New location, added capacity, or controlled access projects or projects requiring an environmental impact statement.

Responsible Party. Project manager

Subtasks.

- ◆ Review traffic data obtained earlier. See Task 10430: [Obtain traffic data](#) and Task 20220: [Review traffic data](#).
- ◆ Evaluate crash data for existing problems. See Task 20260: [Obtain traffic crash data](#).
- ◆ Select evaluation criteria and measures for comparing alternatives.
- ◆ Evaluate each alternative.
- ◆ Schedule public involvement activities and ongoing stakeholder meetings. See Task: 20200: [Conduct early coordination with stakeholders](#), and Task 20300: [Conduct public meeting](#).
- ◆ Identify the most feasible and reasonable alternatives.

Helpful Suggestions.

- ◆ Obtain traffic data. It may take three to four months to obtain design traffic data.
- ◆ Early on, determine the availability and preference for base mapping such as aerial photos, USGS maps, topographic maps, floodplain maps, or TxDOT county maps.
- ◆ Public input is required. Ensure comments and concerns are addressed in route analyses. Public patronage encourages community support and goodwill.
- ◆ In describing alternatives, use intersecting roads or landmarks instead of stationing.
- ◆ Establish a clear labeling or naming convention for alternatives.
- ◆ Anticipate the need for creating options to an alternative and possible combinations of alternatives.
- ◆ 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.
- ◆ Keep alternatives basic in definition and avoid dwelling on details that are not significant at a concept level.

Critical Sequencing. The most feasible and reasonable route alternatives must be selected before evaluating geometric alternatives.

Resource Material.

- ◆ Online: Inside TxDOT, Divisions, [Environmental Affairs](#)
- ◆ Transportation Planning and Programming Division, Traffic Analysis Office
- ◆ TxDOT [Hydraulic Design Manual](#)
- ◆ TxDOT [Bridge Project Development Manual](#)
- ◆ TxDOT [Landscape and Aesthetics Design Manual](#)
- ◆ AASHTO *Highway Safety Manual* (HSM)

20430: Initiate railroad coordination

Description. All work within railroad right of way (ROW) must be coordinated with the railroad owners. TxDOT may not perform work within railroad ROW without the proper agreement, liability insurance, and special provisions.

Approval for new, at grade railroad crossings is difficult to obtain. Generally, an existing at grade crossing in the general project area must 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.

Early coordination reduces construction time extension claims and project delivery delays, which increase project cost. Depending on the impact to the railroad, the negotiations, plans, and final agreement can take about four to 24 months. Federal Aid Highway Program projects are subject to compliance audit for railroad agreements completed prior to the project construction authorization date.

Pertinent Project Types. Projects involving rail-highway crossings, either at grade or grade separated, and all projects involving joint usage with the railroad (e.g., shared ditches).

Responsible Party. Project manager or roadway design engineer

Subtasks.

- ◆ District railroad coordinator should begin work early with Traffic Operations Division - Rail Safety Section (TRF-RSS), the office of primary negotiation with the rail companies.
- ◆ Locate all potential railroad crossings within project limits.
- ◆ Determine existing crossing conditions and traffic control. Investigate the need for interconnection between various signals.
- ◆ Identify opportunities to close or consolidate at grade crossings.
- ◆ Obtain a train crossing schedule from railroad owners. Inquire into major railroad line improvement plans. Obtain approval of clearances for grade separated structures.
- ◆ Develop recommendations for proposed rail highway crossings.
- ◆ Document all correspondence regarding the design of the railroad features.
- ◆ Task 50480: [Develop Exhibit A for railroad agreements](#). The Traffic Operations Division - Rail Safety Section prepares and negotiates construction and maintenance agreements with railroad company.
- ◆ Provide railroad agreement completion date on Form 1002, page 2.

Helpful Suggestions.

- ◆ Consider installing new, and upgrading existing, railroad warning devices at railroad crossings within and near the project limits. Coordinate this with the railroad owner through TRF-RSS. Railroad owners are responsible for maintaining railroad active warning devices and signs.
- ◆ Consider interconnecting closely spaced, active railroad warning devices and highway traffic signals.
- ◆ Consider replacing the crossing surface and subgrade. District rail coordinators should inspect the crossing surfaces to evaluate if crossing is a candidate for the Replanking Program.

Critical Sequencing.

- ◆ Initial railroad coordination should be conducted before selecting a preferred alternative because railroad issues may affect final alternative selection.

Authority.

- ◆ TxDOT [Bridge Project Development Manual](#)
- ◆ TxDOT [Rail-Highway Operations Manual](#)
- ◆ 43 TAC Part 1, Chapter 7, [Rail Facilities](#)

20440: Identify requirements for crossing navigable waters

Description. The requirements for crossing navigable waters must be determined to ensure that projects are in compliance with federal regulations. All projects affecting a navigable waterway require coordination with the U.S. Coast Guard (USCG) and the U.S. Army Corps of Engineers (USACE).

Pertinent Project Types. Projects affecting a navigable waterway

Subtasks.

- ◆ Determine if waterways are navigable.
- ◆ Identify required permits.
- ◆ Identify design criteria necessary to secure permits.

Responsible Party. District environmental coordinator

Helpful Suggestions.

- ◆ For a proposed bridge crossing navigable waterways, lights and/or signals will be required, which warn of bridge piers, caps, and beams
- ◆ Assistance related to bridge requirements is available from the Bridge Division Project Development Section.

Critical Sequencing.

- ◆ When design criteria must be met to secure a permit, coordinate this early in schematic development.

Authority.

- ◆ Protection of Navigable Waters and of Harbor and River Improvements Generally, [Title 33 USC, Chapter 9, §401 et seq.](#)

Resource Material.

- ◆ TxDOT Environmental Affairs Division
- ◆ TxDOT [Hydraulic Design Manual](#)
- ◆ USCG Office of Bridge Programs
- ◆ TxDOT Bridge Division, Project Development Section

20450: Evaluate geometric alternatives

Description. Controlling design criteria are shown on preliminary schematics. This requires developing alignments for mainlanes, ramps, crossroads, and interchanges to ensure that design controls are satisfied. The end product is a preferred alternative selection.

Design the alignments to fit constraints that were identified earlier. The preliminary hydraulic design should be reviewed so the vertical “profile” alignment will accommodate drainage structures. See Task 20560: [Perform preliminary hydraulic analysis/design](#).

At this stage, geometric alignments should be defined enough to determine basic requirements such as required drainage structures, right of way (ROW), business or home relocations, and major utility conflicts. This information can be used in comparing alternatives, along with safety, environmental, travel efficiency and other considerations. Later, a preferred geometric alignment will be selected, and a more detailed schematic may be prepared on survey controlled base mapping.

The preferred alignment and associated geometrics, including typical section(s), will be formally labeled as “preferred” and presented to the public. Reasons for establishing an alignment as preferred must be clear and should be recorded in project files for future reference.

A list of items to show on a schematic is available in the TxDOT [Roadway Design Manual](#).

A preliminary schematic will accomplish the following goals:

- ◆ Formulate design concepts for the project.
- ◆ Show interrelating design elements such as typical sections, bridge and drainage structures, traffic and turning data, project constraints, etc.
- ◆ 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 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 physical scale model, three-dimension graphics demonstration, or computer animation. These may be needed for costly, controversial or complex projects.

- ◆ Serve as the guide for detailed design and plan preparation.

Pertinent Project Types. New location, added capacity, controlled access projects, or projects requiring an environmental impact statement.

Responsible Party. Roadway design engineer

Subtasks.

- ◆ Review design traffic data obtained earlier. Traffic data such as current and design year ADT volumes may be shown on the schematic. See Task 10430: [Obtain traffic data](#).
- ◆ Prepare a base map for the schematic's plan view showing existing topographic features. Base map is not necessarily from detailed field survey data or aerial photogrammetry; it may be from U.S. Topo maps or digital orthophotography.
- ◆ Add existing ROW limits, locations of major utilities, etc. See Task 40100: [Perform preliminary right of way research](#).
- ◆ Add constraints such as proximity to historic structure, hazardous and petroleum materials, threatened and endangered species, wetlands, or noise attenuation; add labels or dimensions, if appropriate. Show how constraints will be handled.
- ◆ Add typical sections to schematic. See Task 20460: [Develop typical sections](#).
- ◆ Add controlling design criteria information to schematic.
- ◆ Evaluate need to realign heavily skewed intersections or replace with better functional and operational design.
- ◆ Establish sizes of drainage structures, and add location and size data to schematic. Only major cost structures are needed for preliminary schematics.
- ◆ Generate preliminary cross sections to aid in determining right of way (ROW) needs and earth-work volumes.
- ◆ Determine ROW needs and control of access restrictions, add to schematic. Examine ROW needs for special drainage or run-off pollution control measures (e.g., detention or filtration basins). See Task 20565: [Determine right of way and access needs](#).
- ◆ Obtain project specific minute order for controlled access facilities. See Task 10220: [Obtain project specific minute order, if required](#).
- ◆ Consider significant utility conflicts. Add labels to schematic and identify potential conflicts.
- ◆ Traffic handling during construction should be a major consideration.
- ◆ Evaluate pavement design type for compatibility with proposed construction sequence. See Task 20510: [Prepare pavement design report](#).
- ◆ Coordinate landscape and aesthetic considerations with landscape architect.
- ◆ Consider hydraulic issues such as backwater flooding and scour/erosion potential.

- ◆ Identify needed design exceptions or waivers. Alignment and other geometric features must meet TxDOT's minimum design standards; otherwise a design exception or waiver is required. See Task 20720: [Design exceptions or waivers](#).
- ◆ If any improvements are planned involving railroad ROW, the district railroad coordinator should contact the Traffic Operations Division - Rail Safety Section for early coordination with the appropriate railroad company. See Task 20430: [Initiate railroad coordination](#).
- ◆ Schedule public involvement activities such as ongoing stakeholder meetings and public meetings. See Task 20200: [Conduct early coordination with stakeholders](#) and Task 20300: [Conduct public meeting](#).
- ◆ Select preferred alternative.

Helpful Suggestions.

- ◆ Display schematic for public view. Make the schematic as uncluttered as possible.
- ◆ Use enlarged drawings to show areas of a project having large amounts of detail.

Resource Material. The following table indicates where more information related to the evaluation of geometric alternatives may be found:

Topic	Reference
Roadway design criteria	TxDOT Roadway Design Manual
Schematic checklist	TxDOT <i>Roadway Design Manual</i> , Chapter 1
Bridge planning	TxDOT Bridge Project Development Manual
Bridge design	TxDOT Bridge Design Manual - LRFD
Landscape and aesthetics	TxDOT <i>Landscape and Aesthetics Design Manual</i> , Chapter 3
Hydraulics	TxDOT Hydraulic Design Manual
Bike lane/bike trail design criteria	AASHTO <i>Guide for the Development of Bicycle Facilities</i>
Pedestrian Accommodation	U.S. Access Board – PROWAG AASHTO <i>Guide for the Planning, Design, and Operation of Pedestrian Facilities</i>
Quantitative safety evaluation	AASHTO <i>Highway Safety Manual</i> and software

20460: Develop typical sections

Description. Typical sections are developed as part of selecting design alternatives. The typical section geometry should include the following information:

- ◆ Existing and proposed right of way width,
- ◆ Pavement cross slopes,
- ◆ Lane, shoulder, and median widths,
- ◆ Side slope rates for both cuts and fills for all proposed highway mainlanes, ramps, frontage roads, and cross roads,
- ◆ Clear zone widths,
- ◆ Provisions for landscaping and aesthetics,
- ◆ Noise attenuation devices, and
- ◆ Roadway elevations relative to local floodplain.

Design criteria for features shown on typical sections can be found in TxDOT's *Roadway Design Manual*, [Chapter 2](#). If pavement design information is available at this time, it may be shown on the typical section. See Task 20510: [Prepare pavement design report](#).

Authority.

- ◆ Federal-aid highway projects, Pavement Policy, [23 CFR PART 626](#)

Pertinent Project Types. All projects

Responsible Party. Roadway design engineer

Resource Material.

- ◆ TxDOT *Roadway Design Manual*, [Chapter 2](#)
- ◆ TxDOT *Landscape and Aesthetics Design Manual*, [Chapter 3](#)
- ◆ TxDOT [Pavement Design Guide](#)

20470: Prepare Landscape and Aesthetics Assessment

Description. The landscape and aesthetics assessment (LAA) identifies the issues that will affect the physical design form and detail of the project. A landscape architect should be consulted to prepare an LAA. See the *Landscape and Aesthetics Design Manual*, Chapter 3, Section 2, [Landscape and Aesthetics Assessment](#).

Issues and procedures involve field observation and participation in or review of public participation venues. The goal is to maximize design flexibility. Verify if the project is in a Green Ribbon

Master Plan that includes city populations greater than 100,000. A Green Ribbon Master Plan provides conceptual guidance to planning and design.

- ◆ Project scope
- ◆ Corridor inventory such as, physical properties of the project site, grades, horizontal curves and sight distance obstructions, median widths, right of way widths available, and neighborhood context
- ◆ Public issues from public participation process
- ◆ Identify assets and liabilities
- ◆ Sensitivity of the corridor such as established schools, neighborhoods, shopping centers, medical facilities, historical areas
- ◆ Identify issues relating to visual perception of the transportation corridor such as materials, colors, appropriate design themes
- ◆ Cost sharing opportunities
- ◆ Gather information which assists in estimating development costs

The district or Design Division landscape architect can assist in providing guidance upon request.

Pertinent Project Types. New construction and reconstruction projects

Responsible Party. Roadway design engineer

Subtasks.

- ◆ If the project area is in a Green Ribbon Master Plan, observe plan policy.
- ◆ Coordinate landscape/aesthetics plan with district or Design Division landscape architect.
- ◆ Obtain data on existing conditions from soil surveys and topographic surveys.
- ◆ Prepare concept proposal including data such as construction and maintenance costs.
- ◆ Consider environmental justice issues, if unusual or high-cost amenities are proposed that vary from usual TxDOT practice.

Authority.

- ◆ Landscape and Roadside Development, [23 CFR Part 752](#)
- ◆ Transportation Enhancement Program [43 TAC, §11.200 et seq.](#)
- ◆ Green Ribbon Projects [43 TAC §11.100 et seq.](#)

Resource Material.

- ◆ TxDOT *Landscape and Aesthetics Design Manual*, [Prepare Assessment of Landscape and Aesthetic Issues](#)

20480: Develop bicycle and pedestrian accommodation

Description. Accommodations for bicycle and pedestrian travel should be given full consideration on all highway projects and during construction, specifically on Federal-aid projects. Where these non-motorized transportation modes are reasonable to expect, preliminary plans should be developed to include safe bicycle and pedestrian transportation accommodation.

Public rights of way and facilities are required to be accessible for all pedestrians.

Pertinent Project Types. All projects

Responsible Party. Roadway design engineer

Subtasks.

- ◆ Decide what accommodation type can be reasonably provided.
- ◆ Provide a reasonable alternative route, if an existing bicycle and pedestrian facility is being affected by proposed construction.
- ◆ If a bridge deck is being rehabilitated or replaced on a highway, which permits bicycles and pedestrians to operate at each end of the bridge, provide safe accommodation on the replaced or rehabilitated bridge.
- ◆ Coordinate with public transportation providers to facilitate provision of intermodal connections.

Helpful Suggestions.

- ◆ Refer to local bicycle and pedestrian plans, if applicable.
- ◆ Coordinate with the State Bicycle and Pedestrian Coordinator during the planning stage.
- ◆ Where new bicycle and pedestrian facilities are proposed, include sufficient information to explain the reasons for facility selection in the environmental effects statement.

Critical Sequencing.

- ◆ Include provisions for bicycle and pedestrian accommodations in the preliminary schematic.

Authority

- ◆ Pedestrian and Bicycle Accommodations and Projects [23 CFR Part 652](#)

Resource Material.

- ◆ Public Rights of Way, Streets and Sidewalks: - U.S. Access Board - [PROWAG](#), Technical Requirements, R302 Pedestrian Access Routes
- ◆ Building, sites, facilities, and elements used by individuals with disabilities: Architectural Barriers, Texas Accessibility Standards, [TAS](#)

- ◆ Buildings and sites: ADA Accessibility Guidelines ([ADAAG](#))
- ◆ TxDOT *Roadway Design Manual*, [Sidewalks and Pedestrian Elements](#)
- ◆ TxDOT *Roadway Design Manual*, [Bicycle Facilities](#)
- ◆ TxDOT [Bridge Project Development Manual](#)
- ◆ TxDOT *Landscape and Aesthetics Design Manual*, [Develop Bicyclist/Pedestrian Accommodation Concept](#)
- ◆ *AASHTO Guide for the Development of Bicycle Facilities*
- ◆ *AASHTO Guide for the Planning, Design, and Operation of Pedestrian Facilities*
- ◆ TxDOT [PED Pedestrian Facilities standards](#) for accessible sidewalks and curb ramp design

20490: Update cost estimates

Description. Construction and right of way cost estimates, and corresponding DCIS and People-Soft data, should be updated periodically to reflect project changes. Any cost overruns will affect district programming of projects and should be identified as early as possible. For more information, see Task 10200: [Prepare cost estimate](#). The cost estimates should accurately identify approved funding sources (federal, state, and local participation.) Eligible utility adjustment costs must be included in the right of way cost estimate.

If updated estimate total cost meets or approaches the value engineering (VE) threshold, consider conducting a VE Study. See [Section 6 — Value Engineering](#) of this chapter.

Pertinent Project Types. All projects

Responsible Party. Roadway design engineer

Helpful Suggestions.

When recalculating the cost estimate, be sure to use current unit bid prices. Consider factors such as the following:

- ◆ Changes in project scope or design development
- ◆ Unique, new materials or technology items
- ◆ Geographic location (i.e., remoteness) and proximity to material sources
- ◆ Construction season
- ◆ Time value of money due to inflation and timing of expenditures
- ◆ Construction complexity
- ◆ Presence of restricted work areas, work hours, or schedules - expected construction staging

- ◆ Project size relative to previous project sizes

Resources.

- ◆ AASHTO *Practical Guide to Cost Estimating*
- ◆ Online: TxDOT, Business, Resources, Bridge Publications, [Bridge Unit Costs](#)
- ◆ [NCHRP Report 574](#) *Guidance for Cost Estimation and Management for Highway Projects During Planning, Programming, and Construction*
- ◆ Online: Inside TxDOT, Divisions, Design, [Estimator Converter Program](#)

Section 5 — Geometric Schematic

Overview

This section discusses the process of refining alignments and geometrics, performing analyses on geometrics, and preparing preliminary plans and layouts. Most of the data collected and calculated is shown on a “geometric” schematic - a schematic having computed alignments. Work related to schematic development includes performing hydraulic studies, determining right of way needs, and identifying utility conflicts.

After developing preliminary schematics and performing associated preliminary design, the project cost estimate and, sometimes the project scope are updated to reflect changes.

Requirements for presentation of information in schematics are included in the [Roadway Design Manual](#).

Developing the Geometric Schematic includes the following tasks. All tasks should be performed concurrently as much as possible. However, the following sequence of work tasks will likely be necessary:

- 20500. [Develop preferred geometric alignment](#)
- 20505. [Perform preliminary geotechnical surveys](#)
- 20510. [Prepare pavement design report](#)
- 20515. [Refine typical sections](#)
- 20520. [Consider impacts on historic structures](#)
- 20525. [Perform detailed Level of Service analysis](#)
- 20530. [Determine guide signing and operational controls](#)
- 20535. [Submit requests for new or revised access points to interstate highways](#)
- 20540. [Perform preliminary planning for commercial motor vehicle inspection stations](#)
- 20545. [Perform preliminary planning for bridges](#)
- 20550. [Establish preliminary retaining or noise wall locations](#)
- 20555. [Perform hydrologic study](#)

- 20560. [Perform preliminary hydraulic analysis/design](#)
- 20565. [Determine right of way and access needs](#)
- 20570. [Identify existing utilities on geometric schematic](#)
- 20575. [Identify potential utility conflicts](#)
- 20580. [Establish preliminary illumination locations](#)
- 20585. [Evaluate Intelligent Transportation System \(ITS\) needs](#)
- 20590. [Conduct constructability review](#)
- 20490. [Update cost estimates](#)
- 20595. [Update project scope](#)
- 10400. [Review scope, cost, and staff requirements of project development](#)

20500: Develop preferred geometric alignment

Description. A preferred geometric alignment is developed after preliminary schematics are developed and a preferred alternative selected. Related disciplines should be consulted in reviewing alternatives and establishing the preferred alignment. See Task 20450: [Evaluate geometric alternatives](#).

Changes to the preferred alignment after a public meeting or hearing may require TxDOT to repeat the review and approval process for the environmental document and hold an additional hearing. However, 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 schematic will require submission of the revised schematic to the Design Division. If FHWA is the agency responsible for oversight, contact Design Division for required submittal documents.

Items to show on a schematic are available in the TxDOT [Roadway Design Manual](#).

Pertinent Project Types. New location, added capacity, or controlled access projects or projects requiring an environmental impact statement.

Helpful Suggestions.

- ◆ Avoid changes to ROW limits and locations of ramp gores shown on the schematic after Design Division or FHWA approval.
- ◆ Consider underground features, such as utilities and septic tank systems, when making alignment adjustments.

- ◆ Begin identifying and securing approval of design exceptions/waivers. See Task 20720: [Design exceptions or waivers](#).
- ◆ Consider if a value engineering study will be required. See Task 20600: [Conduct a Value Engineering \(VE\) study](#).

Responsible Party. Project manager

Resource Material.

- ◆ TxDOT [Roadway Design Manual](#)

20505: Perform preliminary geotechnical surveys

Description. Preliminary geotechnical surveys are performed to help guide early project layout and design, and to determine feasibility of the preliminary design and limitations on construction staging.

Preliminary geotechnical testing serves as a preview to determine the following factors:

- ◆ Determine whether an additional final geotechnical survey is needed. See Task 50600: [Perform final geotechnical surveys](#).
- ◆ Preliminary geotechnical surveys can vary from simple, visual inspections to various forms of subsurface exploration, depending on information needed.

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

Geotechnical surveys for pavement design should be done at this time and may include roadway pavement testing such as Falling Weight Deflectometer (FWD) testing.

Pertinent Project Types. All projects except preventive maintenance and restoration projects.

Responsible Party. Project manager

Subtasks.

- ◆ Determine needs for more data and field testing after evaluating existing geotechnical information.
- ◆ Forward the information to the district pavement engineer, structural engineer, and landscape architect for their use.

Helpful Suggestions.

- ◆ Bridge Division Geotechnical Branch is available for geotechnical engineering support in areas of foundations, retaining walls, embankment stability including slope stability and settlement, and stabilization of soft soils under roadway and embankment.
- ◆ Construction Division Materials & Pavement Section (CST-M&P) is responsible for technical support for pavement design such as falling weight deflectometer, ground penetrating radar, dynamic cone penetrometer, and seismic pavement testing.
- ◆ Construction Division Geotechnical, Soils, & Aggregates Branch is responsible for assisting with soil and aggregate exploration and testing.
- ◆ A right of entry or other written evidence of permission must be obtained before entering private property. See Task 20230: [Obtain right of entry](#).
- ◆ Survey results may influence project design (e.g., high water table, hazardous materials).

Critical Sequencing.

- ◆ Perform hazardous materials investigations before performing this task to avoid spreading contamination. See Task 30335: [Perform hazardous materials survey assessment and investigation](#).
- ◆ Preliminary geotechnical surveys should be performed before developing a pavement design or establishing preliminary retaining and/or noise wall locations. See Task [20510](#): Prepare pavement design report and Task 20550: [Establish preliminary retaining or noise wall locations](#).
- ◆ Locate existing utilities before conducting subsurface exploration. See Task 40110: [Locate existing utilities](#).

Resource Material.

- ◆ Online: TxDOT, Business, Resources, Bridge [Publications](#)
- ◆ Online: Inside TxDOT, Divisions, [Bridge](#)
- ◆ TxDOT Pavement Design Guide, Chapter 3, Section 2, [Geotechnical Investigation for Pavement Structures](#)
- ◆ [Natural Resources Conservation Service](#) (NRCS) Published Soil Surveys for Texas
- ◆ Online: [SoilWeb apps](#), soil survey for most of the United States.

20510: Prepare pavement design report

Description. The pavement structure represents one of the single most costly items in a typical highway project budget. The objective for doing a preliminary pavement design is to select a pavement structure capable of carrying traffic loads safely, comfortably, and with minimum

physical deterioration. Pavement design should be done early in project development to ensure a balance between risk management and adequate funding. Early pavement selection improves estimate accuracy.

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

- ◆ New location (flexible and rigid)
- ◆ Reconstruction (flexible and rigid)
- ◆ Rehabilitation (3R) (flexible and rigid)
- ◆ Hydraulic cement concrete unbonded overlays of existing pavements (rigid)

A preliminary pavement design conference is used to refine initial concepts, guide the district pavement engineer, and permit development of an approved design and a pavement design report. The pavement design engineer evaluates various data to determine a proper pavement structure, including materials properties, environmental conditions, availability, and cost. Traffic data and geotechnical data should be reviewed. There are benefits and costs to be considered in selecting rigid pavement or flexible pavement types. The designer's job is to assess all facts and factors and maximize the benefits including life-cycle costs and user delay costs. A new design is not necessary if analysis of traffic, environmental conditions, and subgrade yield similar results to a previously approved design. See Task 10430: [Obtain Traffic Data](#) and Task 20505: [Perform preliminary geotechnical surveys](#).

The designer must determine the purpose of the new pavement structure, such as improving structural capacity or improving functional characteristics such as ride quality or skid resistance. For overlays and rehabilitation projects, it is essential to perform pavement evaluations to identify the types of distress (such as base failures, asphalt stripping, pumping, etc.), determine the causes for distresses, and suggest a rehabilitation strategy that will address the problem. For new pavements it is important to perform a full geotechnical investigation to determine whether there is a need for stabilization of the subgrade material in accordance with the stabilization guidelines developed by CST-M&P.

If significant changes occur during project development in project scope, pavement type, traffic data, etc., the report may need to be revised and resubmitted.

Pertinent Project Types.

Documentation is required for the project types below; however, HMA 2 inches or less and considered preventative maintenance does not require documentation.

- ◆ All projects on the interstate highway system
- ◆ Detours
- ◆ Approaches on a bridge replacement

- ◆ Pavement widening including shoulders
- ◆ HMA overlay of rigid pavement
- ◆ Bonded rigid overlay on rigid pavement
- ◆ Thin whitetopping of flexible pavements

For project types not listed above, contact the district pavement engineer.

Responsible Party. Roadway design engineer or district pavement engineer

Subtasks.

- ◆ Collect necessary data, such as the following:
 - “As-built” construction plans; field evaluation data
 - Request existing and projected traffic data early in project development. See Task 10430: [Obtain Traffic Data](#).
 - Geotechnical investigation
 - Current pavement construction cost information
 - Drainage data
 - Historical performance information
 - Pavement evaluation
 - Available funding.
 - Contact district maintenance personnel for additional information on roadway pavement history.
 - Check the TxDOT mainframe program, Pavement Management Information System (PMIS), for historical data on pavement conditions.
 - Perform a condition survey site visit to assess pavement surface distress.
 - Determine new pavement requirements - what loads must it carry and how long before the first overlay will be required.
 - Determine the type of pavement to be built.
 - Determine the different materials to be used for the different layers of the pavement structure.
 - Determine the Performance Grade (PG) to be used for hot mix asphalt (HMA) layers.
 - Determine the pay schedule to be used for evaluating the ride quality.
 - Perform a life-cycle cost analysis as part of using automated design software (e.g., Flexible Pavement System FPS19).
 - Prepare the pavement design and develop a Pavement Design Report.

- Send the design to the district pavement engineer for review and approval. The district pavement engineer is responsible for ensuring compliance with FHWA and TxDOT design policies and procedures. If a district does not have a certified pavement engineer, then pavement design approval reverts to the Materials and Pavement Section of the Construction Division (CST-M&P).
- The district pavement engineer sends the approved copy of the pavement design report to the Pavement Section of the Construction Division for review and analysis. Revise the project cost estimate since pavement is a major portion of the project cost. See Task 20490: [Update Cost Estimates](#).

Helpful Suggestions.

- ◆ Contact Transportation Planning and Programming Division for both existing and projected traffic data. See Task 10430: [Obtain Traffic Data](#).
- ◆ CST-M&P is available for assistance as needed.
- ◆ Contact the CST-M&P, through the district pavement engineer, for information on the FWD testing, the dynamic cone penetrometer test, the use of ground penetrating radar, and for a pavement design report format.
- ◆ The district laboratory can run the triaxial test, Atterberg Limits, and calculate potential vertical rise as part of the geotechnical investigation.
- ◆ For large, complex projects that take years to design, the pavement design may need to be re-evaluated during detailed design. It is possible for traffic counts and patterns to change enough to require pavement design change.
- ◆ Soil types, weather conditions, and material availability vary widely among districts. Consult with the district pavement engineer and construction engineers before starting a design.
- ◆ Pavement design must consider potential effects of groundwater on pavement performance along with other factors such as proposed roadway grades.

Critical Sequencing.

- ◆ Purpose of pavement design is to estimate the cost of pavement related items; pavement design should be performed before updating the cost estimate.
- ◆ Pavement design task should occur after collecting traffic and geotechnical data, roadway pavement testing and after setting preliminary grades. See Task 20505: [Perform preliminary geotechnical surveys](#).

Authority.

- ◆ Federal-aid highway projects, Pavement Policy, [23 CFR PART 626](#)

Resource Material.

- ◆ *Pavement Design Guide*, [Pavement Design Reports](#)
- ◆ Online: TxDOT, Business, Resources, [Test Procedures](#)
- ◆ Contact CST–M&P for available training

20515: Refine typical sections

Description. As the project progresses, a preferred design alternative is selected, and revisions are made to the design. Typical sections need to be updated to show those changes. Information on their requirements is available in this manual. Design criteria for features to be shown on the typical sections can be found in TxDOT's [Roadway Design Manual](#). If preliminary pavement design information is available at this time, it may be added to the typical section. See Task 20510: [Prepare pavement design report](#) and Task 20460: [Develop typical sections](#).

Review proposed typical sections with local public agencies responsible for cost participation in the project.

Pertinent Project Types. All projects

Responsible Party. Roadway design engineer

Critical Sequencing.

- ◆ Revisions to the schematic are determined as the schematic is refined, hydraulic studies are performed, and a detailed Level of Service analysis is done.

Resource Material.

- ◆ TxDOT *Roadway Design Manual*, Chapter 2, [Cross Sectional Elements](#).

20520: Consider impacts on historic structures

Description. A mitigation plan may be needed for projects affecting buildings, structures (including bridges), sites, etc., which are included, or eligible for inclusion in the National Register. If a plan is needed, the project manager should begin considering how mitigation plans will be incorporated into the project.

Pertinent Project Types. All projects except preventive maintenance and restoration projects

Responsible Party. Project manager

Helpful Suggestions.

- ◆ Coordinate all development with the district environmental coordinator.

- ◆ Request that the landscape architect review the mitigation plan so that landscape and aesthetics are considered.
- ◆ The Environmental Affairs Division will coordinate with the State Historic Preservation Office, which will review the PS&E package for all projects involving historic buildings, structures, or landscapes.

Authority.

- ◆ Memorandum of Understanding with the Texas Historical Commission [43 TAC §2.251 et seq.](#)
- ◆ Environmental Affairs Division: *Environmental Handbook* - [Historic Properties](#)
- ◆ National Historic Preservation Act of 1966
- ◆ Department of Transportation Act of 1966
- ◆ National Environmental Policy Act of 1969
- ◆ Historical and Archeological Data Preservation Act of 1974
- ◆ Intermodal Surface Transportation Efficiency Act of 1991.

Resource Material.

- ◆ TxDOT [Bridge Project Development Manual](#) and [Historic Bridge Manual](#) for information on historic bridges
- ◆ TxDOT *Landscape and Aesthetics Design Manual*, Chapter 3, Section 2, [Prepare Mitigation Plan for Historic Structures](#)

20525: Perform detailed Level of Service analysis

Description. Earlier in the process, a preliminary Level of Services (LOS) analysis of project alternatives should have been performed to aid in selecting a preferred alternative. See Task 20410: [Perform preliminary Level of Service \(LOS\) analysis](#).

At this stage, a detailed LOS analysis may be needed to compare different geometrics to refine the design proposal. For example, the analysis can be used to refine geometrics such as shoulder and lane widths, profile grades, and frequency of access points.

Results of the detailed LOS analysis are incorporated into establishing preferred alignments. See Task 20500: [Develop preferred geometric alignment](#) and Task 20515: [Refine typical sections](#).

A LOS analysis is usually performed for the current year using current traffic and geometric conditions, and for the future “design” year using traffic projections and proposed geometric designs. The LOS analysis may show whether a proposed design will meet future transportation needs.

Pertinent Project Types. New construction and reconstruction projects on multi-lane highways and freeways, and projects with ramp modifications

Responsible Party. Roadway design engineer

Subtasks.

- ◆ Review traffic data obtained on present and projected traffic volumes and other data such as percent trucks, design hourly volume, and the directional distribution. See Task 10430: [Obtain Traffic Data](#).
- ◆ Obtain data on current and proposed roadway features (e.g., number of lanes, offset to obstructions, lane widths).

Helpful Suggestions.

- ◆ Computer software programs are available to run the analyses.

Critical Sequencing.

- ◆ Perform as part of refining the preferred alignment and geometrics.

Resource Material.

- ◆ TxDOT [Roadway Design Manual](#)
- ◆ *Highway Capacity Manual* and software

20530: Determine guide signing and operational controls

Description. Traffic control guide signs guide vehicle operators along streets and highways. Guide signs show route designations, destinations, directions, distances, services, points of interest, and other geographical, recreational, or cultural information.

There are different types of guide signs used on freeways or expressways. These include advance signs for interchange exits, supplemental signs, exit direction signs, diagrammatic signs, and miscellaneous signs.

The department has the authority to install, maintain, and operate traffic signals on the state highway system and may install operational controls in incorporated and unincorporated areas provided they meet specified agreement conditions.

Pertinent Project Types. Mainly freeway/expressway and arterial highway projects; however, there are some rural applications.

Responsible Party. Roadway design engineer or traffic engineer

Authorization.

- ◆ Traffic Control Devices on Federal-Aid and Other Streets and Highways, [23 CFR §655.601 et seq.](#)

Subtasks.

- ◆ Obtain traffic data. See Task 10430: [Obtain Traffic Data](#).
- ◆ Obtain traffic crash data. See Task 20260: [Obtain traffic crash data](#).
- ◆ Determine guide signs needed to increase roadway efficiency and safety.
- ◆ Consider including ITS strategies in the project.

Helpful Suggestions.

- ◆ Design guide signs to be legible to drivers approaching them and to allow adequate time for the driver to respond.

Critical Sequencing.

- ◆ Obtain traffic information before performing this task. See Task 10430: [Obtain Traffic Data](#).

Resource Material.

- ◆ TxDOT *Negotiated Contracts Procedures Manual*, [Traffic Engineering Agreements](#)
- ◆ [Texas Manual on Uniform Traffic Control Devices](#).

20535: Submit requests for new or revised access points to interstate highways

Description. Regardless of funding or oversight, new or revised access points on interstate highways must be approved by the Federal Highway Administration (FHWA). Revised access is considered to be a change in configuration even though the number of actual points of access may not change. Each entrance, exit, “locked gate”, new or modified freeway-to-crossroad interchanges inside a transportation management area, ramp, or access to a collector-distributor is considered an access point. Locked gate access in remote areas may be allowed in special circumstances for emergency management, border patrol, utility, or maintenance forces. FHWA must ensure there is either no or only minimal adverse effect on the operation of the interstate facility.

The Request is an agreement between a state department of transportation (TxDOT) and the controlling federal agency (FHWA). The report front cover should only show the TxDOT logo, project information, and location. Preparer information (TxDOT District, local agencies, or Consultant) and all associated logos may be placed on an acknowledgment page in the Appendix. Any information in the body of the report shall be presented as a TxDOT request. Reports will be rejected by FHWA, if the request and recommendations are attributed to a TxDOT District, local agencies, or Consultant.

A request for access modifications must be documented in an “Interstate Access Justification Report (IAJR)” which is considered a stand-alone document; reference to decision making information in other documents is discouraged.

The IAJR should provide information to support a request for the approval of new or revised points of access on completed sections of the interstate system. Establish areas of influence for the proposed change in access. At minimum, interstate area of influence should be done between the nearest upstream and downstream interchanges and crossroad or local roadway area of influence should be between the first traffic signal each side of a major intersection to ensure the ability to collect and distribute traffic. Provide Level of Service analyses. See Task 20525: [Perform detailed Level of Service analysis](#).

Submit one schematic layout, DSR [Form 2440](#), [Form 1002](#), and one IAJR to Design Division Field Section for preliminary submittal review and comments. The project has to be acceptable in terms of safety, environment, design, and operation. Any revisions or corrections will be addressed before the department can submit an IAJR recommendation for approval to FHWA.

FHWA must preapprove concurrent reviews with the department. Concurrent reviews are allowed, if there are emergency circumstances.

See FHWA Delegation of Authority link, under Resources below. Contact DES Field Section for actions indicated in the “N/A” column. Provide the following for the final IAJR submittal:

- ◆ FHWA Headquarters, Washington D.C.
 - 3 schematics (hard copy)
 - 3 IAJR (hard copy)
 - 4 electronic schematic and IAJR files on flash media or disk.
- ◆ FHWA Division, Austin
 - 1 schematic (hard copy)
 - 1 IAJR (hard copy)
 - 2 electronic schematic and IAJR files on flash media or disk.

Pertinent Project Types. Projects involving new mainlane access points, revisions to existing access points, or abandonment of ramps or interchanges on the interstate system.

Responsible Party. Project manager

Helpful Suggestions.

- ◆ Consider including a line diagram showing LOS results and traffic volumes.
- ◆ Informal coordination with FHWA during schematic preparation may streamline the FHWA review process later.

- ◆ Concurrent reviews with the department and FHWA require prior approval from FHWA.
- ◆ Anticipate about 60 days for coordination and approval of the IAJR by FHWA Headquarters staff in Washington, DC.
- ◆ Report may be evaluated by persons unfamiliar with the project location. Do not use multiple names or local name references for individual roadways.

Critical Sequencing.

- ◆ FHWA approval is considered a federal action which requires NEPA procedures are followed. Final approval of access cannot precede NEPA completion.
- ◆ This task should be done after preparing a schematic.

Authority.

- ◆ Federal Aid Highways, Access to rights-of-way-Interstate System [23 USC §111](#)
- ◆ FHWA, Directives and Memorandum, Notice - [Interstate Access](#)

Resource Material.

- ◆ TxDOT [Publications Style Guide](#), provides style references
- ◆ TxDOT [Roadway Design Manual](#)
- ◆ FHWA Interstate System Access Informational [Guide](#)
- ◆ FHWA Delegation of Authority for Access [Approval](#)

20540: Perform preliminary planning for commercial motor vehicle inspection stations

Description. The need for infrastructure improvements for Commercial Motor Vehicle (CMV) inspection stations and the determination of their location must be coordinated between the TxDOT administration and the Department of Public Safety (DPS). The DPS provides permanent scales, if needed, and also provides manpower to operate inspection stations. Construction of new inspection stations must be authorized by Texas Transportation Commission minute order. Projects that serve existing inspection stations should consult DPS for needed infrastructure improvements as part of the project.

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.

Pertinent Project Types. Individual inspection station projects or highway improvement projects including inspection stations.

Responsible Party. Project manager

Subtasks.

- ◆ Obtain Commission authorization for any new inspection station construction.
- ◆ Contact the DPS to obtain details on inspection station design needs, consistent with Commission direction.
- ◆ Develop preliminary plans for the inspection station.

Authority.

- ◆ Government Code, Department of Public Safety and the State of Texas, [§411.0099](#)

Helpful Suggestions.

- ◆ Clarify funding issues in question before beginning planning or design.

Critical Sequencing.

- ◆ If part of a larger project, perform this task when developing other preliminary plans.

20545: Perform preliminary planning for bridges

Description. The location of proposed bridges must be determined early in project development. Preliminary planning includes estimating bridge limits, span lengths, and bent locations. Bridge layouts are created from this information and forwarded to the Bridge Division for approval. Accommodations for future bridge widening should be considered at this time.

If a railroad crossing is involved, the Traffic Operations Division - Railroad Safety Section (TRF-RSS) will coordinate with the railroad. Project Development Section of the Bridge Division will review Exhibit A.

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.

Pertinent Project Types. Bridge projects or other projects that include bridge class structures.

Responsible Party. Roadway design engineer

Subtasks.

- ◆ Identify applicable Federal Emergency Management Agency (FEMA), U.S. Corps of Engineers and U.S. Coast Guard constraints. See Task 20440: [Identify requirements for crossing navigable waters](#).
- ◆ Identify type, size, and locations of existing bridges.
- ◆ Determine vertical and horizontal clearance requirements.

- ◆ Determine load rating for bridge widening and obtain condition survey. See [Bridge Project Development Manual](#).
- ◆ Consider widening the existing structure versus replacement.
- ◆ Determine type, size, and location of proposed bridges.
- ◆ Review proposed bridge cross sections with local public agency when grade separation structures involve facilities not owned or maintained by TxDOT.
- ◆ Initiate geotechnical surveys for foundation design. See Task 20505: [Perform preliminary geotechnical surveys](#).

Helpful Suggestions.

- ◆ Seek input and guidance from Project Development Section of the Bridge Division or the district bridge section concerning bridge types, application limits for bridge types, and possible innovative solutions.

Critical Sequencing.

- ◆ Bridge planning must be addressed early in project development. Characteristics such as limits of bridge, bent locations, 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.

Resource Material.

- ◆ TxDOT [Rail-Highway Operations Manual](#)
- ◆ TxDOT [Bridge Project Development Manual](#)
- ◆ TxDOT [Bridge Design Manual - LRFD](#)
- ◆ TxDOT [Hydraulic Design Manual](#)
- ◆ TxDOT [Landscape and Aesthetics Design Manual](#)

20550: Establish preliminary retaining or noise wall locations

Description. Preliminary retaining wall or noise wall locations are established as part of developing geometric schematics. Wall locations may be revised as the project progresses. Locating walls will assist in determining locations of needed soil core borings. See Task 20505: [Perform preliminary geotechnical surveys](#).

The noise study will include recommendations for mitigating noise. A noise wall is the primary method. Later, during detailed design, retaining and/or noise wall layouts will be prepared. See Task 30355: [Conduct noise analysis](#) and Task 50800: [Prepare retaining and/or noise wall layouts](#).

Pertinent Project Types. Projects having retaining and/or noise walls

Responsible Party. Roadway design engineer

Subtasks. The following subtasks are common to both retaining and noise walls:

- ◆ Determine if aesthetics is an important consideration because this will affect the type of design.
- ◆ If walls are adjacent to residential or school properties, consider the structural design or barriers for crash safety.
- ◆ Consider traffic control plan, soil considerations, and right of way limitations because these factors may dictate type of wall to be used.
- ◆ Determine limitations on access to construct and maintain the wall. This will affect type of wall design (i.e., precast, cast-in-place, drilled shafts, etc.).
- ◆ Determine right of way boundaries, and any additional site constraints.
- ◆ Coordinate with utility companies to determine any potential conflicts.
- ◆ Determine if street lights, overhead bridge signs, concrete traffic barriers, or traffic signs will be attached to the wall.

Subtasks.

Retaining walls:

- ◆ Determine where walls are needed, and their limits. Compare retaining wall cost to bridge cost to determine height at which bridge is more cost effective.
- ◆ On retaining wall layouts, include horizontal and vertical curvature information with stations and elevations along the top and bottom of the wall.
- ◆ Determine if the retaining wall also needs to act as a noise barrier wall.
- ◆ Determine if concrete barrier is needed at the base of a retaining wall for maintenance reasons (e.g., to protect fragile wall facings) or safety reasons (e.g., to shield vehicles from rough wall facings).
- ◆ 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.
- ◆ Submit retaining wall layout to Bridge Division if height will be greater than 25 feet.

Noise walls:

- ◆ Coordinate with the environmental specialist to determine if a noise analysis and mitigation study is required. If so, determine if one was completed.

- ◆ Determine if a noise wall is the recommended mitigation measure for noise abatement. Refer to the project noise analysis and mitigation study report.
- ◆ Determine the material type for the noise wall. Material weighing four pounds per square foot is dense enough to prevent noise from passing through it. TxDOT typically uses concrete. Wood is not an acceptable material due to maintenance reasons.

Helpful Suggestions.

For retaining walls or noise walls:

- ◆ When creating a wall alignment, begin the alignment start point before the wall begins. This will make it easier to revise if, due to roadway or bridge changes, the wall beginning or end is moved.
- ◆ Provide adequate clear zone between travel lanes and the wall.
- ◆ The wall should not be located in gore areas and should be designed to avoid interfering with sight distance - including sight distance at intersecting streets and driveways.
- ◆ Create a smooth profile on the top of the wall for a pleasing appearance.

For noise walls:

- ◆ Refer to the noise analysis for the location and dimensions of the proposed noise wall.
- ◆ For noise walls adjacent to residential areas and parklands, aesthetics will play an important role in developing the wall. Coordinate with planners, landscape architects and community groups early in project development.
- ◆ Often, the placement of the noise wall depends on existing or proposed utility lines. Coordinate early with utility owners to determine locations of existing and proposed new lines.
- ◆ Determine if a berm may be effectively used to mitigate noise. It may be used with a noise wall and allow a shorter, more aesthetically pleasing wall.
- ◆ Use caution about building noise walls because they might limit future access to adjacent property.

Critical Sequencing.

- ◆ The noise study must be completed before performing this task.
- ◆ Preliminary retaining wall layouts should be submitted, when required, as soon as practical and before detailed design.

Authority.

- ◆ Procedures for Abatement of Highway Traffic Noise and Construction Noise, [23 CFR Part 772](#)

Resource Material.

- ◆ TxDOT [Roadway Design Manual](#) for clear zone, sight distances, and other geometric considerations for wall placement
- ◆ Online: Inside TxDOT, Divisions, Bridge, [Retaining Walls](#)
- ◆ TxDOT *Landscape and Aesthetics Design Manual*, [Establish Preliminary Retaining and/or Noise Wall Locations](#)
- ◆ TxDOT [Bridge Project Development Manual](#) for information on submission requirements
- ◆ Online: Inside TxDOT, Divisions, Environmental Affairs, Environmental Compliance Toolkits, [Traffic Noise Toolkit](#)

20555: Perform hydrologic study

Description. A hydrologic study is performed to estimate flood magnitudes caused by precipitation. An analysis will provide the designer with fundamental data necessary to perform preliminary sizing of drainage facilities and bridges. Data compiled includes peak runoff (discharge) and discharge hydrographs.

Pertinent Project Types. All projects except preventive maintenance and restoration projects.

Responsible Party. Roadway design or hydraulic engineer

Subtasks.

- ◆ Conduct a site investigation. See the [Hydraulic Design Manual](#).
- ◆ Identify potential outfall and stream crossing locations.
- ◆ Estimate the runoff from the watershed. See the [Hydraulic Design Manual](#).
- ◆ Review previous hydrologic study, reports, as-built construction plans, bridge inspection reports, and available stream gage data. Obtain and evaluate additional data including hydrologic studies, existing structure and channel surveys, existing structure inspection reports, tidal surveys, soil reports, and wetland reports.
- ◆ Review U.S. Natural Resources Conservation Service (NRCS) reports as well as USGS and FEMA flood maps.
- ◆ Verify past coordination with local governments having jurisdiction over the project area.

Helpful Suggestions.

- ◆ Consider the possibilities for future development in the area. Additional buildings and parking lots can change the rate and direction of runoff.
- ◆ Many cities maintain zoning and land use maps; these should be referenced when estimating watershed runoff.

Critical Sequencing.

- ◆ This task should be done after the preliminary roadway layout is determined.

Resource Material.

- ◆ [Natural Resources Conservation Service](#) (NRCS) Published Soil Surveys for Texas
- ◆ USACE Hydrologic Engineering Center ([HEC](#))
- ◆ USGS [Current Water Data for Texas](#), daily streamflow conditions
- ◆ FEMA [Flood Map Service Center](#)
- ◆ TxDOT [Hydraulic Design Manual](#)

20560: Perform preliminary hydraulic analysis/design

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

The basic hydraulic design process begins with data collection. Ultimately, the type of drainage facilities provided in the hydraulic design will be determined by the highway classification, right of way, 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. Usually, there are not enough funds available to design a facility to handle the biggest flood that would ever occur. Thus, a compromise must be achieved between expense and potential effect.

Other major considerations should be determined, such as the need for large storm drain structures, and detention ponds, pump stations, and other hydraulic facilities; these should be assessed for cost and ROW requirements.

Pertinent Project Types. Projects affecting existing drainage, including those that add a concrete median barrier to an existing facility.

Responsible Party. Roadway design or hydraulic engineer

Helpful Suggestion.

- ◆ The calculation process may be significantly easier with use of TxDOT-approved hydrologic and hydraulic computer software. This hydraulic design software is a package of several programs, which provide computational capability for the majority of procedures contained in the TxDOT [Hydraulic Design Manual](#).

Critical Sequencing.

- ◆ Preliminary hydraulic design can be performed after runoff is calculated.

Resource Material.

- ◆ TxDOT [Hydraulic Design Manual](#)
- ◆ USACE Hydrologic Engineering Center ([HEC](#))

20565: Determine right of way and access needs

Description. ROW requirements must be determined as part of developing preliminary and geometric schematics. With the geometric schematic, an accurate estimate of the area of ROW to be acquired is used in estimating the project's cost and refining the alignment to optimize use of the ROW. Earlier while developing preliminary schematics for route alternative selection, ROW needs for each route were approximated to compare alternative effects. Known utility facilities within the needed ROW should be located on the schematics.

The roadway design engineer determines the right of way (ROW) needed based on the proposed alignment, typical sections, access control, and any other information available. In determining proposed ROW limits, the engineer should consider accommodation for construction, drainage, clear zone, access to and maintenance of the highway, accessible pedestrian design, if applicable, and environmental mitigation.

Pertinent Project Types. Projects requiring additional ROW or a change to control of access.

Responsible Party. Roadway design engineer

Subtasks.

- ◆ Gather information on existing ROW, property lines, control of access, etc. See Task 40100: [Perform preliminary right of way research](#).
- ◆ Obtain project-specific minute order for controlled access facilities. See Task 10220: [Obtain project specific minute order, if required](#).
- ◆ Develop plan to address identified encroachments.

Helpful Suggestions.

- ◆ Consider reducing ROW acquisition costs by developing an alignment so that additional ROW is required only from one side of an existing facility.
- ◆ Proposed ROW should be sufficient for parallel drainage channels and cross-drainage structures.
- ◆ Identify needed drainage easements.

- ◆ Strive to minimize displacements of homes or businesses while still meeting other design requirements.
- ◆ Intelligent Transportation System (ITS) infrastructure may affect ROW needs.
- ◆ If any airport ROW is needed, contact the Aviation Division Planning Section for coordination.
- ◆ If existing features are determined to be an encroachment on department ROW, they will need to be removed.
- ◆ Reconfiguration of existing ramps may necessitate acquisition of additional control of access.
- ◆ Disposal of access rights must be handled according to [43 TAC Part 1 Chapter 21](#).

Critical Sequencing.

- ◆ A ROW needs determination plays a key role in determining a preferred alignment, because there may be existing ROW and access constraints, especially in urban areas. This task should be performed alongside preferred alignment determination and the related geometrics.

Authority.

- ◆ Construction, [43 TAC §15.54](#)
- ◆ Right of Way, [TAC Part 1 Chapter 21](#)

Resource Material.

- ◆ TxDOT [Hydraulic Design Manual](#) for information on drainage easements
- ◆ TxDOT Online Manuals, [Right of Way Collection](#)
- ◆ TxDOT [Access Management Manual](#)

20570: Identify existing utilities on geometric schematic

Description. The design engineer should obtain information on existing utilities from utility owners and create a layout of the existing utilities. See Task 20250: [Obtain information on existing utilities](#).

Pertinent Project Types. All projects except preventive maintenance and restoration projects.

Responsible Party. Roadway design engineer

Subtasks.

- ◆ Coordinate with district utility coordinator.
- ◆ Collect utility information from utility owners.
- ◆ Develop a utility layout.

Helpful Suggestions.

- ◆ A utility layout may be prepared more easily by performing the following steps:
 - Sending 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
- ◆ Consider using subsurface utility engineering (SUE). Information is available under Task 40110: [Locate existing utilities](#).

Critical Sequencing.

- ◆ A utility layout should be created soon after developing the preliminary schematic.

20575: Identify potential utility conflicts

Description. Utility conflicts refer to physical conflicts between existing utilities and proposed transportation facility construction. Utility conflicts also refer to utilities not complying with TxDOT's Utility Accommodation Rules, such as utilities not complying with location, cover, or clearance requirements. After developing a utility layout, the roadway design engineer can determine potential utility conflicts. If geospatial data is available, do a three dimension model review. Knowledge of these conflicts assists the utility owners in budgeting for anticipated adjustment costs.

Early coordination cuts construction time extension claims and delays, which increase project cost.

Pertinent Project Types. All projects except preventive maintenance and restoration projects.

Responsible Party. Roadway design engineer

Subtasks.

- ◆ Review preliminary schematic with district utility coordinator.
- ◆ At minimum, locate utility conflicts in linear plan and profile.
- ◆ Contact the affected utility owners to discuss plans to address utility conflicts.

Helpful Suggestions.

- ◆ Try to revise alignments and project features to avoid utilities before requesting that the utilities be moved. It can be expensive and time-consuming to adjust the utilities, so it should be done only when it is unavoidable.
- ◆ Utility owners should be advised of potential conflicts as soon as possible. One to two years may be needed to budget, design, and complete required adjustments.
- ◆ If geospatial data is available, do a three dimension model review of utility conflicts.

Resource Material.

- ◆ TxDOT [ROW Utility Manual](#)

20580: Establish preliminary illumination locations

Description. Illumination infrastructure must meet the requirements of AASHTO's *Roadway Lighting Design Guide*, and must use TxDOT standard equipment and spacing. Electrical systems must be designed in accordance with the National Electrical Code. A preliminary illumination layout should 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. Evaluate illumination poles and locations near airport facilities. Submit information to FAA. See Resource Material list below.

The department uses two basic types of illumination systems:

- ◆ Continuous illumination systems - Mainlanes, direct connectors, ramp entrances and exits, merge and diverge locations
- ◆ Safety lighting systems - Location doesn't meet warrant for continuous lighting. Engineer judges a need for safety lighting due to geometric hazard, high crash rates, etc.

Pertinent Project Types. Projects requiring illumination.

Responsible Parties. Roadway design engineer

Subtasks.

- ◆ Discuss with area office and district maintenance and construction staff the need for agreements with local entities.
- ◆ Determine if the lighting system meets warranting conditions and requirements contained in the TxDOT [Highway Illumination Manual](#).
- ◆ Determine the locations, mounting heights and offsets, and types of luminaires.
- ◆ Power company can help locate power sources.
- ◆ Develop plan sheets, pertinent notes, understructure lighting, and details.

Helpful Suggestions.

- ◆ Install lighting systems on eligible roadways where conditions warrant such installation.
- ◆ Illumination in residential areas provides safety and security for road and sidewalk users, but should be reviewed to minimize undesirable impacts on residences.

- ◆ Traffic Operations Division, Illumination Branch is available to provide design assistance, upon request.

Critical Sequencing.

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

Authority.

- ◆ FAA "Form and time of notice", [14 CFR §77.7](#)
- ◆ FAA "Construction or alteration requiring notice", [14 CFR §77.9](#)
- ◆ Highway Improvements in the Vicinity of Airports, [23 CFR Part 620](#)

Resource Material.

- ◆ FAA Obstruction Evaluation/Airport Airspace Analysis ([OE/AAA](#)), information and latest Forms
- ◆ TxDOT Traffic Operations Division, Illumination branch
- ◆ Roadway Lighting ANSI/IES RP-8-14
- ◆ TxDOT [Highway Illumination Manual](#)
- ◆ [NFPA 70: National Electric Code](#)
- ◆ FHWA Roadway Lighting resources
- ◆ Online: Inside TxDOT, Divisions, Design, Computer-aided drawings ([CAD](#)) Traffic Engineering Standard Plans

20585: Evaluate Intelligent Transportation System (ITS) needs

Description. Intelligent Transportation System (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), ubiquitous mobile devices, and infrastructure improves operating performance of the surface transportation system. Dynamic mobility applications make the system safer, smarter, and greener.

Traffic management centers (TMC) – TMC manages department ITS equipment. Large metropolitan areas have dedicated facilities, operators, and support staff. Smaller offices are managed by operators with other job 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 congestion management.

Motorists appreciate seeing travel times; it gives motorists the choice to continue on the route or divert to a less congested highway or street.

Pertinent Project Types. Major corridors (urban or rural), toll facilities, and other roadways which would benefit.

Responsible Party. Project Manager

Subtasks.

- ◆ Consider need to add equipment or upgrades to existing system.
- ◆ Evaluate coverage for specific data collection.

Resource Material.

- ◆ Traffic Operations Division, ITS Branch
- ◆ USDOT [ITS Joint Program Office](#)

20590: Conduct constructability review

Description. Requirements for construction, including construction phasing, should be considered throughout development of the geometric schematic and preliminary layouts. If needed, seek construction and traffic expertise for assistance.

Use of available advanced modeling technology, including three dimension digital modeling, may help provide a view of construction conflicts and may be required for FHWA FAHP projects greater than one million dollars. Identifying constructability issues reduces change orders and delay costs, which means less inconvenience to the traveling public. Future maintenance problems may be eliminated.

Pertinent Project Types. All projects, except preventive maintenance and restoration projects

Responsible Party. Roadway design engineer

Subtasks.

- ◆ Develop conceptual construction phasing plan.
- ◆ Involve multi-disciplinary geometric schematic review relating to functional areas of maintenance, traffic, design, and construction.
- ◆ Review requirements for access and operation of construction equipment to ensure that schematic design can be built. Enlist the help of an experienced construction inspector for this review.

Helpful Suggestions.

- ◆ Sequence of construction often affects selection of retaining or noise walls and bridge construction method.

Resource Material.

- ◆ [Texas Manual on Uniform Traffic Control Devices](#)
- ◆ AASHTO "[Constructibility Review Best Practices Guide](#)", 2000, based on NCHRP Report 391: "Constructibility Review Process for Transportation Facilities Workbook", 1997
- ◆ Title 23 USC – Highways

20595: Update project scope

Description. As project development progresses, the project scope may change due to design refinements, route or design alternative selection, utility conflicts, environmental mitigation measures, input from public involvement, or value engineering analysis findings.

Changes to project scope or other significant changes should be recorded in the Design Summary Report ([DSRform](#)) that was prepared during the Preliminary Design Concept Conference. Updating this Form helps serve as a type of project development "journal." Recording changes and reasons for them assists in project development, especially if project team members change. See Task 20100: [Conduct a Preliminary Design Concept Conference](#).

Pertinent Project Types. Projects for which a DSR was prepared.

Responsible Party. Project manager

Subtasks.

- ◆ Update DSR form completed during the Preliminary Design Concept Conference.
- ◆ Revise project cost estimate. See Task 20490: [Update Cost Estimates](#).
- ◆ Assess staffing needs for the next phase of work, detailed design work. See Chapter 5, Section 2 - [Begin Detailed Design](#).
- ◆ Reassess for VE requirements. See Task 20600, [Conduct Value Engineering \(VE\) Study](#).

Resource Material.

- ◆ Design Summary Report

Section 6 — Value Engineering

Overview

A Value Engineering (VE) study is a systematic process to evaluate a project concept and design by a multidiscipline team of individuals not directly involved in the project. The outcome of the study is to provide 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 lowest cost. For maximum benefit, the VE analysis should be conducted as early as possible during the planning or preliminary design phase.

This section discusses the following, listed in approximate chronological order.

20600. [Conduct Value Engineering \(VE\) study](#)

20610. [Revise design based on Value Engineering Study findings](#)

20600: Conduct Value Engineering (VE) study

Description. A Value Engineering (VE) study has the potential to optimize value and quality of a project.

A VE study by a multidisciplinary team evaluates the constructability, safety, rights of way, economic, environmental, and operational benefits of alternative designs.

VE studies 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.

Upon completion of the VE study:

- ◆ Final Report is prepared by the facilitator and sent to TxDOT.

- ◆ Recommendation approval/rejection process: Executive Decision Summary, [Form 2502](#), should be completed by the district and sent to Design Division Value Engineering State Coordinator along with the final report for coordination with FHWA.

Pertinent Project Types.

- ◆ A VE study is required for all projects on the National Highway System (NHS) that utilize Federal-Aid Highway Program (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.
- ◆ A VE study is required for all bridge projects on the NHS utilizing FAHP funding with an estimated total project cost of \$40 million or more.
- ◆ Any major project located on or off of the NHS that utilizes FAHP funding in any contract or phase comprising the major project.
- ◆ FHWA encourages conducting an additional VE analysis if a major project is split into individual contracts and their costs meet or exceed the threshold values.
- ◆ Any project FHWA considers appropriate and uses FAHP funding.
- ◆ A VE Study is not required on design/build projects. If the Project Manager chooses to conduct a study, this should be performed prior to the release of the Request for Proposal (RFP).
- ◆ No exceptions to federal VE requirement will be granted by FHWA.

Responsible Parties. Project manager

Subtasks.

- ◆ Contact the Design Division VE State Coordinator for current VE requirements and processes.
- ◆ Conduct pre-study conference call with VE facilitator and Design Division.
- ◆ Identify team members and the team leader.
- ◆ Extend invitation to FHWA to participate in VE study.
- ◆ Schedule study and collect resources.
- ◆ Conduct the VE study, coordinate report preparation, and make recommendations to the district.
- ◆ District Engineer or District Executive Decision Team determines which recommendations to implement.

Helpful Suggestions.

- ◆ Consider a VE study when total cost is approximately \$10 million less than required threshold to account for project scope creep in the estimate. Total cost threshold considers all project related costs, not just construction cost.

- ◆ A VE study should be performed on high cost and complex projects (regardless of threshold cost).
- ◆ If the team leader is a TxDOT employee, provide sufficient uninterrupted time for the leader to prepare for the VE study and to coordinate production of the final report.
- ◆ Consider inviting representatives from local public agencies, utilities, commercial interests, and special event facilities to participate in VE studies on projects in highly urbanized areas that will impact these stakeholders.
- ◆ Consider any environmental commitments that will be required to obtain environmental clearance of the project.

Critical Sequencing.

- ◆ Perform the study after a schematic is available so the study can focus on practical design alternatives and so enough resource information has been generated during preliminary design.
- ◆ Reevaluate project scope and cost as it nears construction letting to determine if a VE study would be required or beneficial.

Authority.

- ◆ Value Engineering, [23 CFR Part 627](#)
- ◆ Project approval and oversight, [23 USC §106\(e-g\)](#)
- ◆ FHWA Value Engineering (VE) Policy, August 28, 2013, [FHWA Order 1311.1B](#)

Resource Material.

- ◆ *AASHTO Guidelines for Value Engineering*
- ◆ TxDOT Design Division e-Form (ID browser), [Form 2502](#)
- ◆ [FHWA VE Principal Documents](#)

20610: Revise design based on Value Engineering Study findings

Description. Depending on results of the Value Engineering Study, the project's design may need to be modified. Corresponding schematic revisions may be needed as well. See Task 20600: [Conduct Value Engineering \(VE\) study](#).

Pertinent Project Types. Projects for which VE studies lead to design changes

Responsible Party. Project manager

Subtasks. Make necessary design changes to implement VE recommendations selected by the District Engineer or the Executive Decision Committee for implementation.

Document design changes resulting from VE recommendations on Executive Summary Form.

Helpful Suggestions.

- ◆ Sometimes recommendations seem viable at first, but result in offsetting disadvantages when studied in detail and should be re-examined before implementation.

Section 7 — Geometric Schematic Approval

Overview

Before providing the opportunity for a public hearing, schematics are reviewed by district staff and stakeholders to ensure that design criteria, project needs, and commitments are met. Schematics may be changed based on public input. The same stakeholders involved in earlier review should review the changes made.

Geometric schematic approval should be requested of the Design Division for new location, controlled access, added capacity projects, or projects requiring an environmental impact statement before beginning detailed design.

The following tasks are part of schematic approval:

20700. [Circulate geometric schematic for district review](#)

20710. [Review geometric schematic with stakeholders](#)

20720. [Design exceptions or waivers](#)

20730. [Revise geometric schematic based on public input](#)

20740. [Obtain approval of final geometric schematic](#)

20700: Circulate geometric schematic for district review

Description. The project schematic should be distributed to the district for review and approval.

Pertinent Project Types. New location, added capacity, or controlled access projects or projects requiring an environmental impact statement.

Responsible Party. Project manager

Critical Sequencing.

- ◆ District staff must review and approve the schematic before showing the schematic to stakeholders and the public.

20710: Review geometric schematic with stakeholders

Description. When local entities, Metropolitan Planning Organizations, and local government officials are stakeholders in a project, it is advisable to obtain their review and approval of the

project schematic and changes to the schematic. The review will allow for discussion and consensus building on final decisions. The review can be useful if project changes involve significant funding changes.

Stakeholders should be kept involved throughout project development. The project manager may coordinate this task with the advanced project development engineer and roadway design engineer.

Pertinent Project Types. New location, added capacity, controlled access projects or projects requiring an environmental impact statement.

Responsible Party. Project manager

Critical Sequencing.

- ◆ This task should be completed after district schematic review and approval.

20720: Design exceptions or waivers

Description. Prior to final design, the need for a design exception or design waiver may be identified.

Design exceptions or waivers are required any time designs do not meet the minimum or limiting TxDOT or AASHTO design criteria. Form 1002, PS&E Submission Data, page 3, is the official place where project design criteria are documented. Design exceptions locations and issues are noted on this page with an approval date and authorized district signature.

An explanation of why design exception(s) are needed should be sent to the district design exception committee for approval. Documentation of the Design Exception Record of Decision should be retained in district design exception files. Furnish a copy of all documents to Design Division.

All design exception documentation should contain the following to demonstrate compliance with accepted engineering principles and the reasons for the decision:

- ◆ Specific criteria that will not be met (nominal safety)
- ◆ Existing roadway characteristics
- ◆ Alternatives considered
- ◆ Analysis of standard and proposed design criteria
- ◆ Quantitative analysis of expected operational and safety performance (substantive safety)
- ◆ Impacts to:
 - Right of way
 - Human and natural environment
 - Community

- Needs of all facility users
- Project cost
 - Compatibility with adjacent roadway sections
 - Future possibility of bringing this section into compliance with applicable standards
 - Mitigation measures

Design speed and Structural capacity are fundamental criteria of project design. Design exceptions should be extremely rare. Documentation for this design speed design exception should address:

- ◆ Length of section with reduced speed compared to overall length of project
- ◆ Measures used in transitions to adjacent sections with higher or lower design speeds

Design exception for design loading structural capacity must be handled according to procedures in the TxDOT *Bridge Project Development Manual*. Exceptions to design loading structural capacity criteria can have an impact on freight, emergency, and military transport, as well as the traveling public. If the structure is on the NHS, additional coordination with FHWA will be required. The design exception must address:

- ◆ Verification of safe load-carrying capacity (load rating) for all State unrestricted legal loads or routine permit loads, and in the case of bridges on the Interstate, all Federal legal loads.

TxDOT district design exception committee provides decisions on requests for design exceptions for all categories, except interstate. FHWA acts on requests for interstate design exceptions.

For interstate design exceptions, the Design Division will coordinate with the Federal Highway Administration (FHWA). A federal submittal request must include a completed Form 1002, page 3, plan sheets to illustrate the request, and a completed Request for Design Exception form covering the information listed above.

Controlling criteria requiring design exceptions and waivers are shown in the TxDOT *Roadway Design Manual*, Chapter 1 for the following projects:

- ◆ New construction and reconstruction projects (4R)
- ◆ Non-freeway resurfacing, restoration, or rehabilitation projects (3R)
- ◆ Non-freeway resurfacing or restoration projects(2R)
- ◆ Special facilities and off-system historically significant bridge projects
- ◆ Park road
- ◆ Bicycle facilities.

For park road projects off the state highway system, deviations from the “Texas Parks and Wildlife Department Design Standards for Roads and Parking” must be coordinated with TPW for approval.

Documentation of this approval should be retained in district design exception files. Furnish a copy of all documentation to the Design Division.

Requests for variances to the Texas Accessibility Standards (TAS) must be coordinated with the contracted Registered Accessibility Specialist.

Documentation related to the approval or denial of design exceptions, variances, and/or waivers are permanently retained for legal reference. Design Exception files are stored in a designated filing location used exclusively for these files.

Pertinent Project Types. All projects

Responsible Party. Roadway design engineer

Subtasks.

- ◆ Identify design exceptions and waivers.
- ◆ Thoroughly document why design exceptions and waivers are needed.
- ◆ Evaluate the safety, operational and other impacts of the proposed and alternative designs.
- ◆ Prepare design exception and waiver requests.
- ◆ Process design exceptions and waivers at district level.
- ◆ During schematic development, the Design Division will submit district design exception requests to the FHWA for projects on the interstate.
- ◆ Design waiver documentation approved by districts should be permanently maintained and documented on Form 1002, Page 3.
- ◆ Obtain district or FHWA approval of design exception requests or revise schematic or plans.
- ◆ Identify and submit additional design exceptions or waivers as the project progresses.

Critical Sequencing.

- ◆ Prior to final design and soon after identifying their need, complete design exceptions or waivers. Denial of a design exception request will affect final design.

Resource Material.

- ◆ AASHTO *Highway Safety Manual* and software
- ◆ TxDOT [Roadway Design Manual](#)
- ◆ TxDOT [PS&E Preparation Manual](#)
- ◆ TxDOT [Bridge Project Development Manual](#)
- ◆ [Texas Accessibility Standards](#)

- ◆ [Texas Parks and Wildlife Department, Design Standards for Roads and Parking](#)

20730: Revise geometric schematic based on public input

Description. Schematics are finalized after incorporating appropriate comments received at the public meetings or a hearing.

Pertinent Project Types. Projects requiring control of access, added capacity, ramp revisions, new location, reconstruction, ROW acquisition, or an environmental impact statement.

Authorization.

- ◆ Transportation Code Title 6 - Roadways, Public Involvement Policy [§201.811](#)

Responsible Parties. Project manager

Subtasks.

- ◆ Review written public comments received within the allotted comment period after a meeting or hearing.
- ◆ Determine, based on engineering judgment and cost effectiveness, if any suggestions can be incorporated into the project.
- ◆ Provide clear information to the public about outcomes of public input.
- ◆ Make an effort to clearly tie public involvement to decisions made by the department.
- ◆ Task 20700: [Circulate geometric schematic for district review](#).
- ◆ Task 20710: [Review geometric schematic with stakeholders](#).

20740: Obtain approval of final geometric schematic

Description. FHWA approves schematics associated with an IAJR or a design exception. If a project exceeds one million dollars it could become a federal Project of Division Interest (PoDI). PoDIs usually have elevated risks associated with them and FHWA would have responsibility for oversight and approvals.

Design Division approves schematics for added capacity, ROW acquisition, new location, and EIS projects. This includes projects on the interstate and NHS that do not have access changes.

All approvals are considered “pending” prior to NEPA completion.

Pertinent Project Types. New location, added capacity, or controlled access projects or projects requiring an environmental impact statement.

Responsible Parties. Roadway design engineer

Chapter 3 — Environmental

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Section 1 — Preliminary Environmental Issues

Overview

A sustainable highway approach 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 to identify the environmental, economic, and social concerns regarding a project.

This section describes identifying a project's environmental variables and planning public involvement. These activities should be conducted concurrently with developing the preliminary schematics and determining utility and right of way ownership. Public involvement process applies equally to state and federal projects.

By the Memorandum of Understanding (Assignment MOU) between the US Department of Transportation through the Federal Highway Administration (FHWA) and the State of Texas through the Texas Department of Transportation (TxDOT), the department has accepted jurisdiction of the federal courts for the compliance, discharge, and enforcement of any responsibility assumed under the Assignment MOU. The department will be deemed to be a federal agency with respect to the environmental review, consultation, and other actions required under the assumed responsibilities. The Assignment MOU is a five-year agreement.

This section includes discussion of the following tasks. These tasks should be performed concurrently as much as possible.

- 30100. [Public involvement](#)
- 30110. [Develop and implement scoping process](#)
- 30120. [Conduct meeting with affected property owners](#)
- 30130. [Collect environmental data](#)
- 30140. [Identify potential Section 4\(f\) property](#)
- 30150. [Evaluate impacts on waterways and floodplains](#)

30100: Public involvement

Description. Public involvement is an integral continuous part of project development. The public should have accurate timely access to information and decision making processes. The level of involvement should reflect department policy for public involvement best practices. Focusing on interests rather than positions, successful involvement addresses the public need to communicate

community interests and transportation needs while gathering useful information. Using interest based problem solving can expand dialog with constituents and gain support of the public.

Required public involvement involves the following opportunities:

- ◆ Scoping meetings. See Task 30110: [Develop and implement scoping process](#).
- ◆ Public meetings. See Task 20300: [Conduct public meetings](#).
- ◆ Public hearings. See Task 30400: [Opportunity for public hearings](#).

The Transportation Planning and Programming (TPP) Division - Office of Public Involvement (OPI) can provide latest best practice techniques and strategies for public involvement activities throughout the life-cycle of the project.

Pertinent Project Types. Regardless of state or federal oversight, any project can include public involvement elements. The extent of participation depends on project type, level of public concern, and complexity. Some projects have specific public involvement requirements to obtain environmental clearance.

Responsible Party. Project manager

Subtasks.

- ◆ Contact Office of Public Involvement (OPI), for guidance.
- ◆ District and OPI should schedule a joint meeting to discuss the project and public involvement strategy.
- ◆ Gain approval of the plan from OPI.
- ◆ Conduct project public involvement according to the plan.

Critical Sequencing.

- ◆ Plan public involvement for the beginning of the planning phase.

Authority.

- ◆ Texas Transportation Commission Policy, [Minute Order 112555](#), January 27, 2011
- ◆ Federal Projects: [23 CFR §771.111](#)
- ◆ State Projects: [Texas Transportation Code §203.021](#), [43 TAC §2.101 et seq.](#), and [43 TAC §1.5](#)

Resource Material.

- ◆ Online: Inside TxDOT, Environmental Affairs Division, [Public Involvement Toolkit](#)

30110: Develop and implement scoping process

Description. Scoping is an early and open process involving the public and other federal, state, preservation and interest groups, and local agencies, conducted to identify the issues to be addressed and for identifying the significant issues related to the proposed project. Scoping meeting is required for the environmental impact statement (EIS) process.

The environmental review process is a useful tool in preparing environmental assessments (EAs) for controversial projects. Scoping may involve preparing a “coordination” or “overview” EA. See Task 10410: [Determine need for feasibility \(route or corridor\) study](#) to analyze modal alternatives.

During scoping or through scope amendments, the core team determines required technical studies for the environmental documents. Coordinate with core team and subject matter experts on appropriate approaches and methodologies. A technical report QC review can be done by peer review or other subject matter expert not directly involved in the report generation.

Project Scope must be approved by the department delegate.

Pertinent Project Types. Projects requiring an EIS. Projects requiring large amounts of ROW, access changes, or substantial public controversy. Seal coats and overlays are exempted.

Responsible Party. Core team – The core team is comprised of a district environmental project manager and ENV project manager. Either may expand the team to include planners, local agency sponsor representatives, consultants, engineers, and subject matter experts.

Critical Sequencing.

- ◆ As soon as the decision is made to prepare an EIS, initiate the scoping process.
- ◆ Define the study area and logical termini for the scope of work.
- ◆ Contact TPP - Office of Public Involvement (OPI) for guidance and meeting planning.

Authority.

- ◆ NEPA, [Environmental Quality Improvement Act of 1970](#), as amended
 - Efficient environmental reviews for project decisionmaking, [23 USC §139](#)
 - Environmental impact and related procedures, [23 CFR §771 et seq.](#)
 - Public Participation – Public Meeting, [43 TAC §2.105\(b\)\(2\)](#)

Resources.

- ◆ Best Practice [Working as a Core Team](#)
- ◆ ENV Guidance: [Scope Development Tool](#)
- ◆ Comment Response Matrix and Peer Review Request for Environmental Documents ([WORD files](#))

- ◆ ENV Handbook: [Quality Assurance/Quality Control Procedures for Environmental Documents](#) (QA/QC)
- ◆ FHWA NEPA and Transportation Decision making:
 - [The Development of Logical Project Termini, 1993](#)
 - [Development and Evaluation of Alternatives](#)

30120: Conduct meeting with affected property owners

Description. Informal meetings with affected property owners (MAPO) is not a limit to public involvement efforts; additional public involvement may be needed. One or more MAPOs may be held prior to the environmental decision if the project requires detours, temporary construction easements, or minimal right of way acquisition.

The department will hold a MAPO in addition to previous public participation, if a location or design revision results in substantial changes or impacts to affected property owner(s) and occurs after public requirements have been completed.

Property owner(s) are owners of property adjacent to the project as well as other residential or commercial property owners and government agencies impacted by the project.

Pertinent Project Types. Projects involving any of the following factors:

- ◆ Limited right of way acquisition
- ◆ Temporary construction easements
- ◆ Detours

Authority.

- ◆ Meeting with Affected Property Owners, [43 TAC §2.104](#)

Responsible Party. Project manager

Subtasks.

- ◆ Contact Office of Public Involvement (OPI), for guidance.
- ◆ Make arrangements to conduct the MAPO.
- ◆ Ask members of the project team to attend the MAPO to answer questions in their areas of expertise.
- ◆ Project specifics are presented to the public at the MAPO.
- ◆ Retain a record of the MAPO in the project file. Include summary of meeting, date(s), who conducted the meeting, attendees, and correspondence. Records will be forwarded to the department delegate when requested.

Helpful Suggestions.

- ◆ If the number of affected property owners does not appear manageable for a MAPO, a standard public meeting may be more appropriate.

Critical Sequencing.

- ◆ MAPOs may occur at any stage of the project development process, but must be completed prior to the final environmental decision.

Resource Material.

- ◆ TPP - Office of Public Involvement, [MAPO templates](#)
- ◆ Online: Inside TxDOT, Environmental Affairs Division, [Public Involvement Toolkit](#)

30130: Collect environmental data

Description. Environmental document research includes obtaining information from federal, state, and local agency databases, as well as on-the-ground surveys. This data should be used to assess the existing baseline environmental conditions, identify “red flag” resources and areas requiring avoidance considerations, current transportation system, land use trends, local agency planning, and type of environmental document to be prepared.

Maintain an accurate project file. The file allows the project team quick access to important documents and reduces inefficiency and duplication. If a lawsuit is filed challenging the environmental decisions, the project file provides a starting point for the administrative record preparation.

Pertinent Project Types. All projects except preventive maintenance or restoration projects.

Responsible Party. Core team

Subtasks.

- ◆ Perform a site visit to identify and assess environmental constraints, potentially sensitive areas, historic structures, habitats, and landscapes.
- ◆ Gather information in addition to that gathered during detailed site visits performed earlier. See Task 10110: [Perform site visit](#).
- ◆ Prepare a baseline environmental constraints map showing the location of sensitive environmental features. The roadway design engineer and environmental coordinator use this map to determine potential environmental effects of proposed alignments.

Helpful Suggestions.

- ◆ For complex projects or projects with more than one potential corridor, Geographic Information System (GIS) mapping data can be used to automatically calculate impacts.

Critical Sequencing.

- ◆ Preliminary environmental surveys, data collection, and coordination with local impacted agency goals/objectives should be started early during preliminary design.
- ◆ Develop the baseline environmental constraints map as soon as practical. It will be used for project decision making. It will serve as an important tool in communicating environmental constraints, and it is the first step in preparing the project's environmental document.

Resource Material.

- ◆ Inside TxDOT: Environmental Affairs Division, [Best Practices for the Environmental Document Process](#)
- ◆ AASHTO Practitioner's Handbook - [Maintaining a Project File and Administrative Record for a NEPA Study](#), 2006
- ◆ [TxDOT Resource for Linking Planning with Project Planning in support of NEPA](#), 0-6701-P1
- ◆ CDOT [Planning and Environmental Linkages \(PEL\) Handbook](#), 2012
- ◆ Environmental Affairs Division: [NEPA and Project Development Toolkit](#)

30140: Identify potential Section 4(f) property

Description. Survey the project corridor to locate Section 4(f) property as early as possible in the development when alternatives are under study. 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.

Public land properties of national, state, or local significance include the following:

- ◆ Parks
- ◆ Recreation areas
- ◆ Wildlife and waterfowl refuges
- ◆ Historic sites

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 to use of land from the property.
- ◆ Project includes all possible planning to minimize harm to the property resulting from such use.

Recreational lands purchased or improved with Land and Water Conservation Fund (L&WCF) assistance may also be subject to Section 6(f)(3) L&WCF Act of 1965, administered by the

National Park Service (e.g. Wimberley Blue Hole Regional Park or Matagorda Bay Park & Preserve).

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, 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, historical 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.

Pertinent Project Types. Projects involving right of way acquisition or impacts to Section 4(f) property.

Responsible Party. Department delegate

Helpful Suggestions.

- ◆ 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.
- ◆ 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) properties should be avoided to the maximum extent feasible.

Critical Sequencing.

- ◆ Identify Section 4(f) and Section 6(f) property while developing roadway alignment alternatives.
- ◆ The FHWA Area Engineer should be the first point of contact for Section (6f) project specific questions.

Authority.

- ◆ Parks, Recreation Areas, Wildlife and Waterfowl Refuges, and Historic Sites (Section 4(f)) [23 CFR Part 774](#)
- ◆ Parks and Wildlife Code, [Chapter 26. Protection of Parks and Recreational Lands](#)

Resource Material.

- ◆ FHWA Environmental Review [Section 4\(f\)](#)
- ◆ Online: Inside TxDOT, Environmental Affairs Division, Environmental Compliance Toolkits, [USDOT Section 4\(f\) Toolkit](#) and [Section 6\(f\) LWCF Act](#)

30150: Evaluate impacts on waterways and floodplains

Description. Preliminary structure and hydraulic studies are needed to evaluate environmental impacts of highway encroachments on waterways and floodplains. Changes in water surface elevation, construction in channels, bridge construction methods, etc. commonly impact environmental resources. In addition, an Army Corps of Engineers Section 404 permit may be required for wetland area disturbance, work in channels, channel/stream modifications, and dewatering/construction methods necessary to construct the water crossing structure.

No improvement shall be passed over, under, or through flood protection facilities such as improved channels, floodways, and levees. Excavation, construction, or alteration may adversely impact the function of the protective facilities. USACE should be consulted, if the project will impact protective facilities.

Pertinent Project Types. Projects encroaching on waterways and floodplains

Responsible Party. Core team

Authority.

- ◆ Bridges, Structures, and Hydraulics: [23 CFR 650](#)
- ◆ Local flood protection works: [33 CFR §208.10](#)
- ◆ Flood damage reduction measures in urban areas: [33 CFR 238](#)
- ◆ Permits for discharges of dredged or fill material into waters of the United States: [33 CFR §323.3 and 323.4](#)
- ◆ Floodplain Management, [Executive Order 11988](#), May 1977

Subtasks.

- ◆ Review the waterways in the field and provide input to the drainage engineer regarding environmental aspects of the project. This information can help the drainage engineer develop recommendations.
- ◆ Review previously conducted hydraulic studies, FEMA maps, local flood control policies, and Corps of Engineers requirements for specific floodplains.
- ◆ Obtain structures/hydraulics studies when completed and recommend project modifications that reduce environmental impacts.

Resource Material.

- ◆ TxDOT [Hydraulic Design Manual](#)

Section 2 — Interagency Coordination/Permits

Overview

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.

This section includes the following tasks:

30200. [Perform early coordination with review/resource agencies](#)

30210. [Determine environmental permit requirements](#)

30200: Perform early coordination with review/resource agencies

Description. During early project planning, regulatory/resource agencies should be contacted and notified to obtain input, concerns, or opportunities regarding the project.

For projects impacting navigation and construction activities in waters of the United States, four agencies have regulatory authority.

- ◆ US Coast Guard (USGC)
- ◆ US Army Corps of Engineers (USACE)
- ◆ Federal Highway Administration (FHWA)
- ◆ Environmental Protection Agency (EPA)

Pertinent Project Types. Projects requiring environmental documentation

Responsible Party. Core team

Subtasks.

- ◆ Coordinate task work with Environmental Affairs Division.
- ◆ Several agencies provide permit requirements, FAQs, and accept electronic permit applications.
- ◆ Begin discussions regarding environmental mitigation. See Task 30390: [Prepare environmental mitigation plans](#).

Helpful Suggestions.

- ◆ Include a project location map and any information that helps produce a project specific response versus a generalized information response.
- ◆ Consider conducting field investigations with resource agencies and discuss issues in the field.

Critical Sequencing.

- ◆ This coordination should be initiated after field investigations are conducted.

Authority.

- ◆ Memorandum of Understanding with TCEQ - [43 TAC §2.301 et seq.](#)
- ◆ Memorandum of Understanding with TPWD - [43 TAC §2.201 et seq.](#)
- ◆ Memorandum of Understanding with THC - [43 TAC §2.251 et seq.](#)

Resource Material.

- ◆ Environmental Affairs Division, [Environmental Compliance Toolkits](#)

30210: Determine environmental permit requirements

Description. Required permits are determined by project location, affected resources, and specific activities. Regulatory agencies have permitting requirements for proposed construction activities. The scope of work may require permits to comply with federal and state regulations governing activities within, or close to, the project area.

Processing time for permits can be three weeks to three months depending on the completeness of the application for the regulated activity covered by the permit. In emergencies, permits can be obtained in a matter of days or hours.

Pertinent Project Types. All projects, except preventive maintenance or restoration projects

Responsible Party. Core team

Critical Sequencing.

- ◆ Determine permit requirements through early coordination with review agencies so design/construction requirements may be considered during schematic design.

Authority.

- ◆ Construction in the vicinity of airports - FAA, [14 CFR §77.9](#)
- ◆ [National Environmental Policy Act of 1969](#) (NEPA), as amended
- ◆ [Endangered Species Act of 1973](#), (ESA)

- ◆ [Texas Historical Commission](#) (THC)
- ◆ [National Historic Preservation Act of 1966](#) (NHPA), as amended
- ◆ Clean Water Act, (CWA), regulated by USACE
 - [Section 401 Water Quality Certification](#)
 - [Section 402 National Pollutant Discharge Elimination System](#)
 - [Section 404 Regulatory Program](#)
- ◆ TCEQ: Texas Pollutant Discharge Elimination System (TPDES)
- ◆ [River and Harbors Appropriation Act of 1899](#) (RHAA)
- ◆ Farmland Protection Policy Act (FPPA)
- ◆ Clean Air Act (CAA), as amended
- ◆ [Coastal Zone Management Act of 1972](#) (CZMA), as amended
- ◆ Marine Protection, Research, and Sanctuaries Act of 1972 (MPRSA), as amended

Resource Material.

- ◆ FAA Construction near airports, [Part 77 Notice Criteria Tool](#)
- ◆ Bridge Division, *Bridge Project Development Manual* – [Agreements and Permits](#)
- ◆ TxDOT [Hydraulic Design Manual](#)
- ◆ TCEQ Notice of Intent for Stormwater Discharges Associated with Construction Activity under TPDES General Permit (TXR150000), [Form](#)

Section 3 — Environmental Documentation

Overview

This section describes the activities involved in providing decision makers with information relating to a project’s social, economic, and environmental impacts. Documents are prepared that identify and support analyses and evaluations performed during the environmental process of project development.

This section includes discussion of the following tasks. The tasks are listed in approximate chronological order, but may be performed concurrently, or may not be required in some cases.

- 30300. [Determine type of environmental document to prepare](#)
- 30310. [Prepare “Purpose and Need” statement](#)
- 30315. [Direct and Indirect Effects and Cumulative Impacts](#)
- 30320. [Conduct natural resources study](#)
- 30325. [Conduct cultural resources study](#)
- 30330. [Prepare Section 4\(f\) Evaluation](#)
- 30335. [Perform hazardous materials assessment and investigation](#)
- 30340. [Prepare socioeconomic/environmental justice analysis](#)
- 30345. [Determine right of way relocation impacts](#)
- 30350. [Analyze existing environment](#)
- 30355. [Conduct noise analysis](#)
- 30360. [Conduct air quality analysis](#)
- 30365. [Determine project’s environmental consequences](#)
- 30370. [Prepare landscape recommendations](#)
- 30375. [Prepare description of project alternatives](#)
- 30380. [Prepare exhibits for environmental documentation](#)
- 30385. [Stake areas of potential impact](#)

30390. [Prepare environmental mitigation plans](#)

30395. [Notice of Availability](#)

30300: Determine type of environmental document to prepare

Description. Environmental documentation is required throughout the plan development, PS&E, and construction processes. Environmental review responsibilities should be started at the earliest possible stage to eliminate delays. Listed by descending process time length and level of documentation, are the three Classes of project environmental review. For more information, see Task 20110: [Analysis of environmental impacts and mitigation](#).

Environmental Impact Statement (EIS). An EIS is the Class I action prepared for a project that may have significant social, economic, or environmental impacts. The EIS is very detailed.

Environmental Assessment (EA). An EA is the Class III action required for a project not meeting CE requirements and significance of impacts is not known. Occasionally, an EA is prepared for a project that results in a finding of significant social, economic, and environmental impacts, which then requires preparing an EIS. The EA is useful as an early coordination document, but this process usually requires additional time for documentation.

Categorical Exclusion (CE). A CE is the Class II action required for projects which, based on past experience, do not involve significant environmental impacts. CEs are excluded from the requirement to prepare an EIS or EA. Under the Memorandum of Understanding, between FHWA and TxDOT, concerning the surface transportation program environmental review responsibilities executed December 16, 2014, the previous “programmatic” CE (PCE) agreement is suspended for the duration of the Assignment MOU.

Projects meeting categorical exclusion requirements will be cleared as a CE. The use of BCE and PCE codes in the Environmental Compliance Oversight System (ECOS) is to sort projects for federal reporting purposes, only. ECOS is the File of Record for environmental aspects of department sponsored projects.

Reevaluations. If a project remains idle for three years following approval of a final EIS (FEIS) or an FEIS is not submitted within three years of the draft EIS (DEIS) circulation, a reevaluation is required to establish whether approved environmental decision remains valid. See Task 51000: [Conduct environmental reevaluation](#).

Pertinent Project Types. Environmental review document or documentation of a categorical exclusion for a highway project, if:

- ◆ Project is on a financially constrained portion of the approved STIP or UTP
- ◆ Project is eligible by a Texas Transportation Commission order

- ◆ State or federal transportation funds are used
- ◆ Transportation project by a public or private entity that requires department or commission approval
- ◆ Transportation project is on the state highway system or on department-owned property
- ◆ Exceptions may apply for safety projects, emergency relief, or others, which will not alter the functional capacity or capability of the facility being improved.

Responsible Party. Core team

Subtasks.

- ◆ Planning product type is presumed, based on project conditions and experience, during planning and programming. This presumption is either confirmed or revised after conducting preliminary environmental surveys and resource agency coordination.

Critical Sequencing.

- ◆ Begin environmental coordination and public involvement early in project development.

Authority.

- ◆ FHWA Environmental Review: [23 CFR §771.101 et seq.](#)
- ◆ Texas Environmental Review: [43 TAC §2.81 et seq.](#)
- ◆ Texas Transportation Code [§201.752](#)

Resource Material.

- ◆ FHWA - [Summary of Environmental Legislation Affecting Transportation](#)
- ◆ Online: Inside TxDOT, [Environmental Affairs Division](#) handbooks
 - [NEPA and Project Development Toolkit](#)
 - [Environmental Impact Statements](#)
 - [Environmental Assessments](#)
 - [Categorical Exclusion](#)
- ◆ [Research Report 0-6701-P1](#): TxDOT Resource for Linking Planning with Project Planning in Support of NEPA, December 2012

30310: Prepare “Purpose and Need” statement

Description. The “Purpose and Need” statement is the foundation for NEPA alternatives analyses and evaluations done under other laws. It should include a clear statement of the objectives that the proposed action is intended to achieve. Explain 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 are still valid. Provide facts and/or data to support problems or unsatisfactory conditions identified in the need sentence.

As early as possible provide an opportunity for involvement by participating agencies and the public in determining the range of alternatives to be considered for the project. The need should be defined in terms understandable to a general audience.

The discussion should clearly describe problems that the project will correct. It will form the basis for identifying reasonable alternatives, comparing alternatives, and selecting the preferred alternative after considering public comments.

Pertinent Project Types. Projects requiring an environmental assessment (EA) or an environmental impact statement (EIS)

Responsible Party. Core team

Helpful Suggestions. The following list identifies items to consider when developing the purpose and need statement:

- ◆ 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 Level of Service of the existing and proposed facility? 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?
- ◆ Nonattainment or maintenance areas - Be sure the project is part of the transportation conformity plan in the Transportation Improvement Program (TIP).
- ◆ Include results of preliminary planning studies.

Critical Sequencing.

- ◆ Prepare the initial purpose and need statement. See Task 10100: [Identify project need and scope](#), and Task 20100: [Conduct a Preliminary Design Concept Conference](#).
- ◆ During environmental document development stage, the purpose and need statement should be reviewed and updated as needed.

Authority.

- ◆ Transportation Code, §201.615. [Design Considerations](#).

Resource Material.

- ◆ TxDOT Environmental Affairs Division, [Preparing a Purpose and Need Statement](#)
- ◆ [AASHTO Practitioner's Handbook](#) - Defining the Purpose and Need and Determining the Range of Alternatives for Transportation Projects, 2007

30315: Direct and Indirect Effects and Cumulative Impacts

Description. Satisfying the requirements of the NEPA process requires that direct and indirect effects and cumulative impacts of the proposed project be analyzed and documented. Early consideration of cumulative impacts can improve project alternate designs to minimize or avoid impacts. It is important to maintain a connected sequence of defensible decisions regarding impacts associated with the project.

Direct Effects are caused by the action and occur at the same time and place. Highway construction that occurs within a wetland could completely remove the wetland or alter the structure and function of the wetland. This would be a direct effect.

Indirect Effects are caused by an action and are later in time or further in distance, but are reasonably foreseeable. Highway construction, which increases or decreases overland water flow to nearby wetlands and streams, causes an indirect effect on the plant and animal species that inhabit the impacted areas.

Cumulative Impacts are incremental effects of an action, which add to or interact with past, present, and predictable future effects of other actions by all entities in a particular time and place. These impacts can be viewed as the total effects on a resource, ecosystem, or human environment. Analyzing cumulative effects on resources under NEPA provides guidance to address sustainable development.

Effects and impacts considered in the regulations are synonymous. Effects result from those actions that may have both detrimental and beneficial effects on ecological (natural resources and on components, structures, and functioning of ecosystems), historic, aesthetic, cultural, economic, social, or health elements whether direct, indirect, or cumulative.

Pertinent Project Types. New locations, reconstruction, and activities that impact resources

Responsible Party. Core team

Authority.

- ◆ Council on Environmental Quality - NEPA, [40 CFR §1500 et seq.](#)

References.

- ◆ Environmental Affairs Division, [Indirect and Cumulative Impacts](#)
- ◆ Planning and Environmental Linkages (PEL): PEL Handbook developed by Colorado DOT and FHWA, [PDF](#) download available at CDOT.

30320: Conduct natural resources study

Description. Review all project alternatives to the same level of detail for potential impacts to natural resources and perform studies to evaluate the impact to these resources. Natural resources are the finite and exhaustible environmental quantities of land, wind, water, minerals, forests, and wildlife. Environmental clearance processes can be lengthy and impact the schedule when working with regulatory agencies. The project budget may be impacted by costly mitigation. Potentially, the project location and design may be limited by avoidance.

Natural resource issues, such as:

- ◆ Woodlands
- ◆ Wetlands
- ◆ Fish, wildlife, and endangered species
- ◆ Waterfowl
- ◆ Historic Resources
- ◆ Biological or botanical resources
- ◆ Farmland soils
- ◆ Waters of the United States
- ◆ Minerals
- ◆ Hazardous Substances
- ◆ Floodways/100-year Floodplains
- ◆ Parkland and recreational resources
- ◆ Water and land resources at the international border.

Pertinent Project Types. New locations, reconstruction, and activities which adversely impact natural resources.

Responsible Party. Core team

Helpful Suggestions.

- ◆ Coordinate this work with project manager.
- ◆ Environmental Affairs Division can provide technical assistance and will provide reviews of environmental documentation.
- ◆ Geographic Information System (GIS) is a helpful tool in conducting natural resource studies and mapping, especially for alternatives on new alignment. Contact Design Division, Photogrammetry Section.

Critical Sequencing.

- ◆ Conduct natural resource studies as soon as there is reasonable assurance that all project alternatives have been identified. More detailed study and the report can be generated as soon as the preferred alternative has been identified.
- ◆ Timely requests and responsive coordination with resource and regulatory agencies will help ensure required permits and approvals are received prior to final project document completion.
- ◆ A right of entry permission must always be obtained before entering private property, if necessary. See Task 20230: [Obtain right of entry](#).

Authority.

- ◆ TCEQ: Texas Pollutant Discharge Elimination System (TPDES)
- ◆ Farmland Protection Policy Act of 1981 (FPPA)
- ◆ [Endangered Species Act of 1973](#) (ESA), as amended
- ◆ [Migratory Bird Treaty Act of 1918](#) (MBTA), as amended
- ◆ [Clean Water Act of 1972](#) (CWA), as amended
- ◆ [Clean Air Act of 1970](#) (CAA), as amended
- ◆ Edwards Aquifer Act of 1993 (EAA), [30 TAC Chapter 213](#)
- ◆ [Coastal Zone Management Act](#) of 1972 (CZMA)
- ◆ Coastal Barrier Resources Act of 1982 (CBRA)
- ◆ Policy on lands, wildlife and waterfowl refuges, and historic sites (Section 4(f)), [49 USC §303](#) and [23 CFR §774.1 et seq.](#)
- ◆ [Executive Order 11988](#) of 1977: Floodplain Management

Resource Material.

- ◆ Environmental Affairs Division handbooks, such as
 - [Ecological Resources Toolkit](#)
 - Farmland Protection Policy Act of 1981 ([FPPA](#))
 - [Endangered Species Act of 1973 \(ESA\)](#)

30325: Conduct cultural resources study

Description. The cultural resources study is project-specific. Document archeological or historical resources within the project area that may be affected by project alternatives. The study should indicate whether resources within the project area are identified and assessed in accordance with Section 106 of the Historic Preservation Act of 1966 (NHPA), as amended. Historical properties are assessed for their existence on, or eligibility to be on, the National Register of Historic Places (NRHP).

Cultural uses of the natural environment, built environment, and social institutions generally include historic properties, valued pieces of real property, social institutions, religious and other cultural institutions. Many impacts on these resources fall between cultural resource and social impact categories. See Task 30340: [Prepare socioeconomic and environmental justice analyses](#).

Conduct the study on all alternatives to the same level of detail. The cultural resources study presents and discusses findings of archeological and historical resources. Adverse effects on archeological or historical resources and possible mitigation are resolved in consultation with appropriate parties.

If a project area includes a cemetery, area of human burials, or discovery of burials at any point in project development or construction will require compliance with the Health and Safety Code provisions.

Pertinent Project Types.

- ◆ Projects requiring additional right of way
- ◆ Ground-disturbing project on non-federal public lands

Responsible Party. Core team

Helpful Suggestions.

- ◆ A thorough review of findings with the roadway design engineer is recommended for efficiently developing project alternatives.
- ◆ Coordinate the study and document development with THC.

Critical Sequencing.

- ◆ If a draft environmental document is being prepared (other than DEIS) complete the study in sufficient time to incorporate into document.
- ◆ Conduct the study as soon as there is reasonable assurance that all project alternatives are identified. More detailed study and reports can be generated as soon as the preferred alternative is identified.
- ◆ A right of entry or other written evidence of permission must always be obtained before entering private property. See Task 20230: [Obtain right of entry](#).

Authority.

- ◆ National Historic Preservation Act of 1966 (NHPA), as amended, [Section 106](#)
- ◆ Health and Safety Code - project includes a cemetery, [Chapter 694](#)
- ◆ Natural Resources Code, [Title 9 - Chapter 191 Antiquities Code](#)
- ◆ Texas Historical Commission (THC)
- ◆ US DOT Act of 1966, as amended, [Section 4\(f\)](#)
- ◆ Protection of Historic Properties (Section 106), [36 CFR Part 800](#)

Resource Material.

- ◆ Environmental Affairs Division toolkits
 - [Archeological Sites and Cemeteries Toolkit](#)
 - [Historic Resources Toolkit](#)
- ◆ TxDOT [Historic Bridge Manual](#)

30330: Prepare Section 4(f) Evaluation

Description. A Section 4(f) Evaluation describes the project impacts to a Section 4(f) property, alternatives, and mitigation measures. There are two types of Section 4(f) Evaluations, individual and programmatic; each is subdivided into draft and final phases.

Perform an evaluation in accordance with Section 4(f) of the US Department of Transportation Act of 1966 if the project may affect an area identified as a Section 4(f) property. For a draft Environmental Impact Statement (DEIS), prepare the Evaluation for all alternatives. For a final EIS (FEIS), only prepare the Evaluation for the preferred alternative. See Task 30140: [Identify potential Section 4\(f\) property](#).

Pertinent Project Types. Projects affecting a Section 4(f) property.

Responsible Party. Core team

Subtasks.

- ◆ Coordinate with project manager.
- ◆ Obtain alignment map.
- ◆ Determine with jurisdictional authority whether Section 4(f) site is significant.
- ◆ Identify and develop alternatives to eliminate or minimize impact to Section 4(f) properties.
- ◆ Prepare draft Section 4(f) report.
- ◆ Obtain approval of draft report from the Environmental Affairs Division.

Helpful Suggestions.

- ◆ All reasonable alternatives to eliminate or minimize impacts to Section 4(f) properties must be exhausted before selecting a preferred alternative that affects a Section 4(f) property.
- ◆ Work with the project manager and the roadway design engineer to minimize impacts.
- ◆ A Section 4(f) Evaluation may be included in the environmental document, or it may be a stand-alone document.

Critical Sequencing.

- ◆ Section 4(f) Evaluations should be conducted as soon as there is reasonable assurance that all project alternatives are identified.

Authority.

- ◆ Section (4f): 23 USC §138 and 49 USC §303 implemented by [23 CFR Part 774](#)
- ◆ Texas Statute: Parks and Wildlife Code, [Chapter 26. Protection of Public Parks and Recreational Lands](#)
- ◆ Parks, Forests, and Public Property, Section 6(f): [36 CFR Part 59](#)

Resource Material.

- ◆ Environmental Affairs Division, [U.S. DOT Section 4\(f\) Toolkit](#)
- ◆ US DOT Act Section 4(f) [Programmatic table](#)
- ◆ FHWA Technical Advisory T 6640.8A; 10/30/87; [Guidance for Preparing and Processing Environmental and Section 4\(F\) Documents](#)

30335: Perform hazardous materials assessment and investigation

Description. Soil and groundwater contamination from hazardous substances and petroleum products is often encountered on transportation projects. Also, some projects may generate hazardous materials. For example, projects with structures (enhancement or bridge projects) may involve

asbestos containing materials and/or lead-based paint requiring testing and analysis during project development.

The department uses three types of hazardous materials site assessment standards:

- ◆ Initial Site Assessment (ISA) – Primary tool used for investigating department projects; used during advanced planning phase. Information gathered by examining existing and previous land use history and available databases to identify material and waste sites, which could impact roadway project.
- ◆ Phase I Environmental Site Assessment (ESA) – Generally a site-specific assessment. Phase I ESA is done according to ASTM E1527 standards.
- ◆ Phase II Environmental Site Assessment (ESA Ph II) – Intrusive assessment to confirm soil or groundwater contamination by means of site sample collection and analysis.

Research land use by owner, tenant, or illegal third party disposal practices. The department can be exposed to substantial liability if a contaminated land parcel is purchased.

Pertinent Project Types. All projects

Responsible Party. Core team

Subtasks.

- ◆ Determine considerations for right of way (ROW) acquisition and design.
- ◆ Coordinate with project manager and right of way staff.
- ◆ Task 10110: [Perform site visit](#).
- ◆ Interview property owners or current occupants.
- ◆ Review regulatory database and files.
- ◆ Determine need, scope, and schedule for further investigation.
- ◆ Conduct or manage consultants to perform environmental site investigation(s) for contamination that will be encountered by the preferred alignment – both horizontal and vertical.
- ◆ Coordinate findings with property owners, potentially responsible parties, regulatory agencies, and local government authorities.
- ◆ Determine regulatory requirements for handling and disposing material.
- ◆ Monitor progress and make arrangements for handling contamination, if required.

Helpful Suggestions.

- ◆ The project-specific requirements for each component of an initial site assessment can be based on the preliminary design and right of way requirements.

- ◆ Coordination with regulatory agencies or negotiation with potentially responsible parties to determine responsibilities for additional investigation, corrective action, and closure should be conducted before right of way acquisition.
- ◆ Environmental site investigations should be considered for the preferred alignment, if results of the ISA show significant contamination likely exists within the existing and proposed project ROW or easement areas outside ROW that may be disturbed during construction.
- ◆ Generally, TxDOT is not required to perform environmental site investigations for areas within the existing ROW that will not be disturbed during construction or maintenance activities.

Critical Sequencing.

- ◆ Conduct ISA in the advanced planning stage so that hazardous material issues can be considered in the NEPA process.
- ◆ Initial site assessments should be conducted as soon as there is reasonable assurance that all project alternatives are identified.
- ◆ Environmental site investigations may be conducted, if determined necessary, as soon as the preferred alternative is identified.
- ◆ A right of entry or other written evidence of permission must always be obtained before entering private property. Exhaust every reasonable way to work with property owners and regulatory agencies to obtain access. See Task 20230: [Obtain right of entry](#).

Resource Material.

- ◆ Right of Way Division – Right of entry assistance for investigations
- ◆ Environmental Affairs Division, [Hazardous Material Toolkit](#)

30340: Prepare socioeconomic and environmental justice analyses

Description. Perform socioeconomic and environmental justice (EJ) analyses on each project alternative. Assess the extent that alternatives may adversely affect the human environment, disadvantaged communities, or minority populations. In the analyses, consider the degree that each environmental resource may be impacted by each alternative.

Identify socioeconomic and environmental justice issues when evaluating project alternatives. Issues may include concerns such as:

- ◆ Land use
- ◆ Social impacts
- ◆ Relocation impacts
- ◆ Urban growth patterns
- ◆ Community and neighborhood cohesion

- ◆ Business impacts
- ◆ Property values
- ◆ Access to public facilities
- ◆ Low-income populations
- ◆ Elderly/Minority populations
- ◆ Disproportionately high and adverse human health or environmental effects on low-income and elderly/minority populations.

Ensure full and fair participation by all potentially affected communities in the transportation decision making process.

Pertinent Project Types. New construction and reconstruction projects

Responsible Party. Core team

Helpful Suggestions. Environmental Affairs Division can assist in developing studies.

Authority.

- ◆ [Executive Order 12898 of February 11, 1994](#): “Address Environmental Justice in Minority Populations and Low-Income Populations”

Resource Material.

- ◆ EPA, [Environmental Justice: Guidance Under the National Environmental Policy Act](#)
- ◆ Environmental Affairs Division, [Community Impacts Assessment Toolkit](#)

30345: Determine right of way relocation impacts

Description. The Uniform Relocation Assistance and Real Properties Acquisition Policies Act of 1970 (Uniform Act) requires relocation advisory services and payments to eligible displaced individuals, families, businesses, farms, and nonprofit organizations. Identify potential displaced persons and the relevant circumstances surrounding displacement in environmental documentation as right of way relocation impacts for all alternatives. Determine relocation impacts while developing the schematic.

Pertinent Project Types. Projects involving displacement of individuals, families, businesses, farms, and nonprofit organizations.

Responsible Party. Core team

Authority.

- ◆ Uniform Relocation Assistance and Real Properties Acquisitions Policies Act of 1970, as amended (Uniform Act), [42 USC Ch. 61 §4601 et seq.](#)

Resource Material.

- ◆ TxDOT *Right of Way Manual*, [Vol. 3 - Relocation Assistance](#)

30350: Analyze existing environment

Description. This discussion in the environmental document provides a concise description of the environment of area(s) affected by alternatives under consideration and the environmental consequences for each reasonable alternative.

All socio-economic or sensitive environment locations and features in the project impact area should be identified on exhibits and briefly described in the text (e.g., neighborhoods, elderly/minority/ethnic groups, parks, hazardous material sites, historic resources, wetlands, critical habitat, etc.). Also, a discussion should briefly describe the land use policy, trends, and status of the planning processes of local jurisdictions impacted by the proposed project.

The Environmental Impact Statement (EIS) considers many environmental concerns such as the Affected Environment, Environmental Consequences, and Land Use. In an Environmental Assessment (EA)/Finding of No Significant Impact (FONSI) or Categorical Exclusion (CE), this is included as part of the impacts section.

Pertinent Project Types. Projects requiring either an Environmental Impact Statement (EIS) or Environmental Assessment (EA). A Categorical Exclusion (CE) project having no individual or cumulatively significant environmental impacts.

Responsible Party. Core team

Helpful Suggestions.

- ◆ To save space and communicate effectively, this section of the document should be a single description for the general project area rather than a separate one for each alternative.

Critical Sequencing.

- ◆ This section should be completed as soon as all social, economic, and environmental data is collected and evaluations are made.

Resource Material.

- ◆ Online: Inside TxDOT, Environmental Affairs Division, [Environmental Compliance Toolkits](#)

30355: Conduct noise analysis

Description. Undesirable effects of highway noise are evaluated and controlled by source control, highway noise mitigation, and noise compatible planning. When projected noise levels at noise-sensitive receptor sites exceed federal, state, or local guidelines, noise abatement measures must be evaluated.

Noise abatement measures protect the public's health, welfare, and livability. Noise abatement measures may incorporate one or more methods by use of quieter pavement materials, traffic management, alignment modifications, buffer zones, insulation of public buildings, or construction of noise barriers.

Elements of a noise analysis include traffic information (existing and future), design information, noise-sensitive receptors, results of field measurements, and computer modeling. The analysis is designed to provide comprehensive information to the public and local government officials.

Pertinent Project Types. New construction, reconstruction (with substantial horizontal or vertical realignment) and all added capacity projects

Responsible Party. Core team

Subtasks.

- ◆ Provide procedures for noise study and abatement measures.
- ◆ Prepare noise abatement proposal for preferred alternative.

Helpful Suggestions.

- ◆ Noise workshops may be appropriate to inform the public about a noise abatement proposal and obtain input regarding a noise abatement proposal.
- ◆ A noise contour analysis may be useful to compare noise impacts of alternatives.

Authority.

- ◆ EPA
- ◆ Source control: [Noise Control Act of 1972](#)
- ◆ Mitigation: Federal-Aid Highway Act of 1970
- ◆ Procedures for Abatement of Highway Traffic Noise and Construction Noise [23 CFR Part 772](#)

Resource Material.

- ◆ Environmental Affairs Division, [Traffic Noise](#) manual

30360: Conduct air quality analysis

Description. An air quality analysis needs to be performed for projects in attainment, maintenance, and nonattainment areas according to EPA air quality guidelines. At the state level, Texas Commission for Environmental Quality (TCEQ) has chosen to mirror the EPA’s National Ambient Air Quality Standard (NAAQS). NAAQS is the EPA official standard for criteria pollutants that impact human health and environment.

TCEQ is responsible for developing the State Implementation Plan (SIP) required by the Clean Air Act. The SIP is the state’s comprehensive plan to clean the air and meet federal quality standards. TxDOT is the state agency responsible for helping project sponsors of transportation projects in the state with ensuring compliance with federal, state, and local laws and regulations. Transportation projects must conform to the SIP.

Environmental Affairs Division recommends a Climate Change and Greenhouse (GHG) Emission Impact Statement as a best practice for projects with potential public concern or inquiry. Include the statement as part of the EIS, EA, or CE documentation. Future federal policy may mandate a GHG statement.

The air quality analysis is not conducted for various alternatives. Rather, the analysis is performed for the general project airshed. Capture any mitigation listed in the air quality statement in the environmental permit, issue, and commitment (EPIC) report.

Pertinent Project Types. All projects

Responsible Party. Core team

Critical Sequencing.

- ◆ Review of potential project effects must be complete prior to final project decision or approval.
- ◆ Projects for which conformity applies must be found in compliance before final project decision or approval.
- ◆ If a public hearing is planned, the air quality analyses should be completed and reviewed and presented at the hearing.

Authority.

- ◆ EPA: Federal regulation and enforcement
- ◆ TCEQ: Texas regulation and enforcement
- ◆ Clean Air Act (CAA), as amended
- ◆ Texas Health and Safety Code, [Clean Air Act](#) (TCAA)
- ◆ National Environmental Policy Act (NEPA)

- ◆ Federal-Aid Highways Code, 23 USC §101 to 190
- ◆ Texas Administrative Code, [30 TAC §114.260](#)

Helpful Suggestions.

- ◆ Use same traffic data throughout project development.

Resource Material.

- ◆ Environmental Affairs Division, [Indirect and Cumulative Impacts](#)
- ◆ [TxDOT Best Practice](#): Climate Change and Greenhouse Gas Emission Impact Statements
- ◆ TxDOT [Environmental Handbook for Air Quality](#)
- ◆ TCEQ: [Air-related topics](#)
- ◆ US EPA: [Green Book](#) Nonattainment Areas for Criteria Pollutants

30365: Determine project’s environmental consequences

Description. In this section of the environmental document include the expected beneficial and adverse social, economic, and environmental consequences of project alternatives. Provide a sufficiently scientific comparative basis for evaluating alternatives. Describe measures proposed to mitigate adverse effects. See Task 30390: [Prepare environmental mitigation plans](#).

Do not use the term “significantly” unless it is in the context of the definition stated in [40 CFR 1508.27 Significantly](#).

Pertinent Project Types. Projects requiring an environmental document

Responsible Party. Core team

Critical Sequencing.

- ◆ Complete this section as soon as all social, economic, and environmental data is collected.

Resource Material.

- ◆ Environmental Affairs Division
 - [Storm Water Management Program](#)
 - [Environmental Compliance Toolkits](#)

30370: Prepare landscape recommendations

Description. In the federal-aid highway program, highway aesthetics is a most important consideration. Highways must blend with our natural, cultural, and social environment and also provide

pleasure and satisfaction in their use. Landscape development within the right of way shall be in conformity with accepted concepts and principles of highway landscaping and environmental design. Highway landscape design does not consist of seeding for erosion control or planting vegetation for screening purposes.

Federal cooperation with state and local agencies can provide opportunities for display of original works of art in the right of way. Designers should encourage the development of pollinator habitat, forage, and migratory way stations for monarch butterflies, honey bees, and other native pollinators by planting native forbs and grasses. Plant establishment durations should be sufficient for an expected survival in a highway environment.

Consider a revegetation plan as an integral part of road construction and not an afterthought.

Pertinent Project Types. New construction, and major reconstruction, or rehabilitation projects

Responsible Party. Project manager

Authority.

- ◆ Landscape and Roadside Development: [23 CFR §752.1 et seq.](#)
- ◆ Landscape and Scenic Enhancement: [23 USC §319](#)
- ◆ Eligibility for Control of Noxious Weeds and Aquatic Noxious Weeds and Establishment of Native Species: [23 USC §329](#)
- ◆ Green Ribbon Projects: [43 TAC §11.100 et seq.](#)
- ◆ Transportation Enhancement Program: [43 TAC §11.200 et seq.](#)

Subtasks.

- ◆ Planning and development of the project roadside should be concurrent with or closely follow the highway project.
- ◆ On new or major reconstructed highways, develop *urban* landscape appropriate to existing or planned environment.
- ◆ On new or major reconstructed highways, develop *rural* landscape appropriate to adjacent environment. Include an opportunity for regeneration and maintenance of native growth.
- ◆ Landscape planning shall incorporate planting native wildflower seeds or seedlings, unless a waiver is provided in accordance with 23 CFR 752.11(b).
- ◆ Request the landscape architect perform a visual inspection of the project area and identify visual and aesthetic resources that might be affected.

Helpful Suggestions.

- ◆ Integrate aesthetic elements in the design phase.

- ◆ Use native plants or xeriscaping.
- ◆ Enlist the support and advice of the landscape architect early in project development.
- ◆ Consider sight distance and maintenance requirements when developing the landscape plan.
- ◆ Coordinate planning with local officials to ensure compatibility with local aesthetic planning efforts.

Critical Sequencing.

- ◆ Aesthetic and landscape recommendations are usually developed only for the preferred alternative.
- ◆ Assemble a team that includes a revegetation specialist before soil and vegetation disturbances are planned.
- ◆ Understand that revegetation tasks begin 1 to 3 years before construction and continue after construction is complete.

Resource Material.

- ◆ TxDOT [Landscape and Aesthetics Design Manual](#)
- ◆ AASHTO A Guide for Highway Landscape and Environmental Design
- ◆ FHWA/USDOT, [A Manager's Guide to Roadside Vegetation Using Native Plants](#), 2007

30375: Prepare description of project alternatives

Description. Alternatives screening may involve reviewing a broad range of reasonable alternatives, which are feasible and practical. Reasonable alternatives should include the ‘no-build’ alternative. Selecting an alternative appropriate for the project can be facilitated, if the purpose and need statement has a clear statement of essential elements. All reasonable alternatives under consideration in the draft environmental document should be developed to a similar level of detail so that comparisons are fair.

Pertinent Project Types. Projects requiring an environmental document

Responsible Party. Core team

Critical Sequencing. The environmental document’s section containing a description of project alternatives should be developed throughout the environmental documentation phase.

Resource Material.

- ◆ [AASHTO Practitioner's Handbook](#) - Defining the Purpose and Need and Determining the Range of Alternatives for Transportation Projects, 2007
- ◆ Task 30310: [Prepare "Purpose and Need" statement](#)

30380: Prepare exhibits for environmental documentation

Description. Environmental document exhibits are prepared to show existing social, economic, and environmental resources, and potential impacts to these resources. The environmental specialist, drainage engineer, and project manager typically contribute to developing certain exhibits.

Pertinent Project Types. Projects requiring an environmental document

Responsible Party. Core team

Critical Sequencing.

- ◆ Exhibit preparation for the environmental document should be accomplished throughout the environmental documentation phase.

30385: Stake areas of potential impact

Description. Once a preferred alignment is selected, limits of potential impact areas should be staked or flagged on the ground or obtain GPS coordinates of the impact areas. These limits are established to gain permitting agency approval of the extent of affected natural resources. Once permitting authority is gained, the limits are surveyed to establish quantifiable impacts.

This includes the limits of environmentally sensitive areas such as:

- ◆ Wetlands
- ◆ Ordinary high water line - non-tidal waters
- ◆ High tide line - tidal waters
- ◆ Water resources
- ◆ Waters of the United States
- ◆ Archeological/historical properties
- ◆ Critical biological habitat
- ◆ Endangered species.

Pertinent Project Types. Projects having potential environmental impacts to areas such as those listed above

Responsible Party. Core team

Subtasks.

- ◆ Obtain the alignment map showing the preferred alternative.

- ◆ A right of entry or other written evidence of permission must always be obtained before entering private property. See Task 20230: [Obtain right of entry](#).
- ◆ Stake impact areas in the field or obtain GPS coordinates of impact areas.
- ◆ Permitting agencies review and approve the staked or GPS impact area limits by review of a report and map or by field visit.
- ◆ After permitting agency approval of limits, surveyors perform a controlled survey of staked areas. Provide surveyors with impact area map.
- ◆ Refine constraints map previously prepared and provide impact area limits to the project manager for inclusion on project drawings. See Task 30130: [Collect environmental data](#).

30390: Prepare environmental mitigation plans

Description. A functional assessment is completed on the resource to be impacted. Preliminary or conceptual plans for mitigating adverse environmental impacts are developed at this stage. Actions are taken to avoid, minimize, or compensate for impacts. If mitigation work must be completed before highway construction begins, detailed plans and specifications may be prepared at this point.

When all reasonable and feasible methods to avoid damage at a project site are not possible, compensatory mitigation will be used. Compensatory mitigation is done through one of three methods and approved by the regulating agency: Mitigation Banks, In-Lieu Fee Mitigation, or Permittee-Responsible Mitigation.

Mitigation Banks. The Anderson Tract, the Coastal Bottomlands Mitigation Bank, and the Blue Elbow Swamp are three wetland banks used by the department. The bank value is determined by quantifying the resource functions restored or preserved in terms of “credits”. The regulatory agency may approve the permittee the use of these credits. A mitigation bank is a set-aside aquatic resource for future preservation of wetlands, streams, vegetation, wildlife, hardwoods, and recreation. Wetland and Stream Mitigation Banks are regulated by the USACE and Species Conservation Banks are regulated by the US Fish and Wildlife Service (USFWS).

In-lieu fee (ILF). A permit applicant may make a payment to an ILF program to conduct a resource audit, restoration, creation, or preservation activity.

Permittee-Responsible. Resource restoration may be done on the project site or adjacent to it. The permittee is responsible for implementation and success of the mitigation project.

Pertinent Project Types. Projects requiring environmental mitigation

Responsible Party. Core team

Subtasks.

- ◆ Obtain environmental mitigation commitments made to the public and resource agencies.

- ◆ Obtain input from the project manager, drainage engineer, landscape architect, biologist, and archaeologist.
- ◆ Prepare mitigation plan and specifications, as necessary.
- ◆ Prepare cost estimates for environmental mitigation measures.

Helpful Suggestions.

- ◆ Regional mitigation for wetland and wildlife impacts has advantages over isolated, smaller-scale environmental enhancements.

Critical Sequencing.

- ◆ The mitigation plan development schedule is usually driven by the permitting process.

Authority.

- ◆ Memorandum of Understanding with Texas Parks and Wildlife, 43 TAC [Subchapter G](#)
- ◆ Mitigation of Adverse Environmental Impacts, [Transportation Code §201.617](#)
- ◆ USACE and EPA, 2008: Joint rule-making expanded the CWA §404(b)(1) Guidelines for more comprehensive standards for compensatory mitigation

Resource Material.

- ◆ Environmental Affairs Division
- ◆ Design Division – Landscape Section

30395: Notice of Availability

Description. A Notice of Availability (NOA) is published to inform the public and interested parties that documents are available for review and where to obtain them. The project sponsor shall maintain a list of elected officials, individuals, and affected interest groups and inform them of any public participation opportunities related to the project.

The NOA process is specified by document type. Notice of Availability is published in the Federal Register for federal assigned projects, Texas Register, online at Inside TxDOT “Get Involved”, and local newspapers.

A NOA is published for various document types.

- ◆ Environmental Assessment (EA)
- ◆ Finding of No Significant Impact (FONSI)
- ◆ Draft Environmental Impact Statement (DEIS)
- ◆ Final Environmental Impact Statement (FEIS)

- ◆ Record of Decision (ROD)

Pertinent Project Types. Projects requiring an EA or EIS

Responsible Party. Core team

Subtasks.

- ◆ Submit draft document to Environmental Affairs Division for approval.
- ◆ Coordinate with Environmental Division to publish NOA.

Helpful Suggestions.

- ◆ Obtain assistance from district environmental coordinator.

Critical Sequencing.

- ◆ Review and approval is needed before advertising a NOA.

Resource Material.

- ◆ Online: Inside TxDOT, Environmental Affairs Division, [Public Involvement Toolkit](#)

Section 4 — Public Hearing

Overview

Public involvement is an ongoing phase of the project planning 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. A public hearing is a specific format that gives the public access to the decision making process. This section discusses a formal avenue of public involvement and is required with specific project proposals.

This section includes the following tasks, listed in chronological order:

30400. [Opportunity for public hearing](#)

30410. [Public hearing](#)

30420. [Respond to public hearing comments](#)

30400: Opportunity for public hearing

Description. A Notice Affording an Opportunity for a Public Hearing (NAOPH) is required for certain projects listed below, to determine if the public wants a formal public hearing.

NAOPH is advertised after the draft environmental document is approved by the department delegate who is the person with authority to approve an environmental review document on behalf of TxDOT.

Since a public hearing is required for an EIS project, an NAOPH is not offered.

Offer an opportunity for public hearing if:

- ◆ Acquisition of significant amounts of right of way is proposed.
- ◆ Project substantially changes the layout or function of connecting roadways or the facility being improved.
- ◆ Project adds mainlane capacity, not including auxiliary or other lanes less than one mile in length.
- ◆ Adverse impact on abutting real property.
- ◆ Project is subject of an environmental assessment.

Responsible Party. Advanced project development engineer

Helpful Suggestions.

- ◆ Consult with Environmental Affairs division for decision to afford an opportunity for public hearing.
- ◆ Contact TPP - OPI for latest notification techniques and assistance with public outreach event.

Critical Sequencing.

- ◆ Obtain draft environmental document approval for circulation.

Authorization.

- ◆ 43 TAC §2.106, [Opportunity for Public Hearing](#)
- ◆ Public Hearing, 43 TAC §2.107

Resource Material.

- ◆ Online: Environmental Affairs Division, [Public Involvement Toolkit](#)

30410: Public hearing

Description. A public hearing is held to present project alternatives and seek public comment on the proposed project location, design, cultural, economic, historical, and environmental impacts. A hearing includes portions for procedures, introductory remarks, a technical presentation, and receiving public comments.

The public hearing is conducted by a department public hearing official. If the department is not the project sponsor, the public hearing officer will be selected by the sponsor. Arrange for a professional court reporter who will certify the transcript as verbatim; audio recording equipment is not acceptable. Provide an effective public address system.

Location must comply with Americans with Disabilities Act. Provide district public information officer contact and telephone number for persons needing special communication or accommodation needs. Requests should be made at least two days in advance of the meeting.

Invite comments from federal agencies or cooperative agencies with jurisdiction by law or special expertise with respect to environmental impact involved. These agencies shall comment on statements in their jurisdiction, expertise, or authority within the time period allowed.

Invite public comments and document the number of positive, negative, or neutral public comments received at a public hearing concerning an environmental impact statement (EIS). Information is presented to the Texas Transportation Commission in open meeting and published on the TxDOT website.

Pertinent Project Types.

- ◆ Request for hearing is received under "Public Hearing", [43 TAC §2.107](#)
- ◆ Ten or more individuals submit a written request for a public hearing
- ◆ Project with substantial interest or controversy
- ◆ Substantial interest in a hearing
- ◆ Project is an EIS project

Responsible Party. TPP - Office of Public Involvement (OPI)

Helpful Suggestions.

- ◆ Explain in procedures where the public can get information or status reports on environmental impact statements and other elements of NEPA process.
- ◆ Hiring security for a hearing is recommended especially in urban areas or for controversial projects.

Authorization.

- ◆ Public Hearing, [43 TAC §2.107](#)
- ◆ [Public Participation, 43 TAC §2.101 et seq.](#)
- ◆ [Council on Environmental Quality, 40 CFR Chapter V](#)
- ◆ Parks and Wildlife Code, [Chapter 26](#)
- ◆ Natural Resources Code, [Chapter 183](#)
- ◆ Public Involvement Recommendations, Texas Transportation Commission, [Minute Order #112555](#)
- ◆ [Executive Order 13166](#), Improving Access to Services for Persons with Limited English Proficiency of August 11, 2000

Resource Material.

- ◆ Online: Inside TxDOT, Environmental Affairs Division, [Public Involvement Toolkit](#)
- ◆ Online: Inside TxDOT, Environmental Affairs Division, [Chapter 26 Parks and Wildlife Code Toolkit](#)

30420: Respond to public hearing comments

Description. The public has the opportunity during a public hearing and a minimum of ten days post-public hearing to comment on any aspect of an EA or CE project; an EIS project has 15 calendar days for post-hearing comments. The final date for comments must be announced at the public

hearing. During the hearing, these comments can be made in writing or orally. Post-public hearing, the comments must be received in writing.

The project sponsor shall submit to the department delegate the public hearing documentation consisting as described in TxDOT Public Involvement Manual, §11.4 “Public Hearing Documentation”. This document must be retained in the official project file.

Pertinent Project Types. Projects having a public hearing

Responsible Party. Core team and public involvement coordinator

Subtasks.

- ◆ Obtain all comments from the hearing and any additional comments received after the hearing.
- ◆ In cooperation with the project manager and public information office prepare responses to the comments.
- ◆ When preparing an FEIS, consider comments collectively or individually and respond by one or more methods:
 - Modify alternatives including the proposed action.
 - Develop and evaluate alternatives not previously given serious consideration.
 - Supplement, improve, or modify analyses.
 - Make factual corrections.
 - Explain why comments do not warrant further department response, citing sources, authorities, and reasons which support a department position.
- ◆ All comments made on the DEIS should be attached to the FEIS.
- ◆ Submit required documentation on the hearing to the department delegate.
- ◆ Coordinate external review of schematic revisions with project manager. See Task 20710: [Review geometric schematic with stakeholders](#).
- ◆ Use hearing information to select or modify a preferred alternative.

Resource Material.

- ◆ Online: Inside TxDOT, Environmental Affairs Division, [Public Involvement](#)
- ◆ TPP - Public Involvement Office Coordinator

Section 5 — Environmental Clearance

Overview

This section describes finalizing required environmental documentation and public involvement to obtain approval by the Environmental Affairs Division.

This section includes the following task:

30500. [Obtain environmental clearance](#)

30500: Obtain environmental clearance

Description. As outlined in the Assignment MOU regarding project delivery, TxDOT Environmental Affairs Division (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. ENV has provided extensive guidance documents, flowcharts, and forms to assist the project core team meet the environmental requirements.

A preliminary FEIS and/or an individual Section 4(f) evaluation is submitted for a legal sufficiency review before it is eligible for final document certification. The Office of General Counsel must provide a written statement that the legal sufficiency review is complete.

The Environmental Review Document is approved by the ENV Division Director.

Pertinent Project Types. Projects requiring an EA, EIS or CE

Responsible Party. Core team

Authority.

- ◆ Environmental Impact and Related Procedures, [23 CFR Part 771](#)
- ◆ Environmental Review Process for Highway Projects, [43 TAC §§ 2.40 et seq.](#)

Resource Material.

- ◆ Environmental Affairs Division, [Quality Assurance/Quality Control Procedures for Environmental Documents](#)
- ◆ FHWA [Section 4\(f\) Documents](#)
- ◆ Environmental Affairs Division, [NEPA and Project Development Toolkit](#)

Chapter 4 — Right of Way and Utilities

Contents:

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[Section 2 — Right of Way Map and Property Descriptions](#)

[Section 3 — Right of Way Appraisals and Acquisition](#)

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Section 1 — Right of Way and Utility Data Collection

Overview

This section describes determining existing right of way (ROW) limits, restrictions to State ROW ownership, ownership of the properties that abut State ROW, and ownership of any properties to be acquired. It also includes identification of owners of any utilities that are in the existing ROW or on the proposed ROW. The Project Manager, Regional ROW Project Delivery Workforce, District ROW Utility Coordinator, District Mapping Coordinator, and District Survey Coordinator manage the work described in this section.

Above ground utility information may be obtained by standard land surveying methods.

Underground utility locations may be determined by conventional survey methods, newer technologies, or by Subsurface Utility Engineering (SUE). The SUE process combines surveying, civil engineering, and geophysics to accurately identify, characterize, and map underground utilities.

To avoid design issues and delays that create cost overruns, the designer should AVOID, MITIGATE, or ADJUST for project utility conflicts. Early design and planning phases should include subsurface site characterization of various geologic, environmental, and utility features.

This section includes the following tasks:

40100. [Perform preliminary right of way research](#)

40110. [Locate existing utilities](#)

40100: Perform preliminary right of way research

Description. Determining existing right of way (ROW) limits, restrictions to State ownership (e.g. easements), and actual property owners is a necessary first step in the identification of property interests. Property records and other records maintained by local public entities should be researched for this information. This preliminary ROW data can be used in refining a preferred alignment to minimize ROW impacts to properties. Schematics for public view can also show data collected, such as names of property owners and approximate locations of existing ROW limits.

A utility owner may occupy compensable property that may be affected by the proposed project ROW. The utility may own an easement or fee title to the property they occupy, which may determine who would pay for any necessary utility adjustments. As another example, a local governmental entity may own an easement, which would otherwise appear to be privately held (e.g., a drainage canal).

ROW maps may be obtained from TxDOT records. Tax assessor maps may be obtained from city, county, and appraisal district offices. Deed and easement records may be obtained from the County Clerk's office.

Pertinent Project Types. All projects except preventive maintenance and restoration

Responsible Party. Project manager and Regional ROW Project Delivery Workforce

Subtasks.

- ◆ Coordinate with District ROW Mapping, Survey, and Utility Coordinators to manage specialized tasks and identify information needed.
- ◆ Establish existing ROW.
- ◆ Research abutting property ownership.
- ◆ Perform site reconnaissance to confirm maps of utilities that may be associated with adjacent facilities.
- ◆ Determine method for subsurface location survey, if required.

Helpful Suggestions.

- ◆ Identify property owners as soon as possible in the preliminary design phase of project development.
- ◆ Identify property interests owned by members of the Texas Legislature. These interests must be acquired by condemnation.
- ◆ As the project develops, identification of the rights that individuals, or entities, have in property ownership becomes important.
- ◆ Perform a field survey of existing ROW limits. This is useful in developing schematics for projects in urban areas with limited ROW. See Task 20290: [Perform other surveys](#).

Critical Sequencing.

- ◆ This work should be done before developing a schematic for the preferred alignment.
- ◆ Permission for right of entry or other written evidence of permission must always be obtained before entering private property. See Task 20230: [Obtain right of entry](#).

Authority.

- ◆ Acquisition of Property, Transportation Code [§203.51 et seq.](#)
- ◆ Ineligibility for Other Offices; Interest in Contracts, Texas Constitution, [Article 3 §18](#)

Resource Material.

- ◆ Online Manuals: [Right of Way Manual Volume 1 - Preliminary Procedures for the Authority to Proceed](#).

40110: Locate existing utilities

Description. This task involves physically locating, marking, and surveying the physical features of utilities. If utility maps are not available, knowledge and survey of the aboveground structure types can indicate the complexity.

This task identifies utilities specifically and determines elevations as well as horizontal positions. Examples might include manhole covers, gas pipes, overhead lines, and fiber-optic cables. There are standard location methods and newer technologies used for underground utility locating survey, such as subsurface utility engineering (SUE), metal detection (MD), ground-penetrating radar (GPR), and electromagnetic line location (EMLL). Topographic surveys may be adequate for project locations with few underground utilities (i.e., in rural areas).

Undocumented utilities may have been installed without a record of their location. EMLL or GPR should be used to mark locations on the ground followed by invasive potholing or excavation to determine the utility type. GPR can detect non-metallic targets without tracer wire.

Within the public right of way, a department employee or a contractor working under contract with the Texas Department of Transportation are not required to place a “locate request” through One-Call Board of Texas (OCB) prior to excavation work. Outside of right of way, a 48-hour notice to the One-Call system is required.

SUE is an established method with large cost benefits on individual projects. SUE may be needed in urban areas, critical locations along a rural project, or locations near a Class A underground facility that is used to store, produce, transmit, or distribute electrical energy, gases, petroleum products, steam, or any telecommunications transmission.

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. They can provide comprehensive and reliable information in the format of the client’s choosing. SUE is a professional service resulting in signed and sealed deliverables.

See Subsurface Utility Engineering (SUE) at the end of Section 1 for the five major SUE activities: scope of work, designating, locating, data management, and conflict analysis. Four SUE Quality Levels (QL-A, QL-B, QL-C, and QL-D) are summarized.

Pertinent Project Types. Projects with potential utility conflicts

Responsible Party. Project manager and Regional ROW Project Delivery Workforce

Subtasks.

For topographic surveying:

- ◆ Coordinate with District ROW Survey and Utility Coordinators.
- ◆ Locate, log, and survey visible features of utilities.
- ◆ To confirm and survey locations of strategic subsurface features, it may be necessary to “pot-hole” or excavate down to the utility after using MD, GPR, or EMLL.
- ◆ Mark and label locations of subsurface utilities on the ground with stakes, laths, or other means.
- ◆ Survey utility locations.
- ◆ Consult with the District ROW Utility Coordinator to determine the need for SUE.
- ◆ Contact the Contract Services Office to prepare a work authorization for the SUE engineering services.

Helpful Suggestions.

- ◆ Prepare utility and survey data in appropriate format (i.e., electronic, MicroStation, ArcGIS, EOPAK, etc.).
- ◆ Develop a list of all utilities to monitor their status.
- ◆ Obtain department engineering and survey services information from Contracts and Purchasing Division - Contract Services office.
- ◆ Carefully assess the costs for SUE versus its benefits. For some projects, costs for SUE can be relatively small compared to overall savings.
- ◆ Work closely with utility owners. They will often supply copies of maps and as-built construction plans, and also do the potholing. It is in their interest to avoid relocating the utility and avoid damage by construction activities.
- ◆ Typically, utility owners are responsible for relocating their own facilities at their own expense; 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. See Task 40400: [Coordinate utility adjustment plans](#).
- ◆ Manhole covers and other obstructions may need to be adjusted for resurfacing projects.

Critical Sequencing.

- ◆ While developing preliminary or 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 detailed design.

- ◆ Utility data is needed before establishing final alignments of the roadway and related features (e.g., storm drains, other excavation work) so that the roadway design engineer may avoid or design around some conflicts.

Authority.

- ◆ Utilities Code [Chapter 251](#) - Underground Facility Damage Prevention and Safety
- ◆ Utility Adjustment, Relocation, or Removal [43 TAC §21.21 et seq.](#)
- ◆ Utility Accommodation: [43 TAC §21.31 et seq.](#)
- ◆ Federal projects, Accommodation of Utilities, [23 CFR 645 Subpart B](#)
- ◆ Utility Relocation Prepayment Funding Agreements [43 TAC §21.921 et seq.](#)

Resource Material.

- ◆ One-Call Board of Texas ([OCB](#))
- ◆ TxDOT [ROW Utility Manual](#)
- ◆ FHWA Office of Infrastructure, Design - [Utility Program SUE](#)
- ◆ American Society of Civil Engineers (ASCE), “Standard Guideline for the Collection and Depiction of Existing Subsurface Utility Data”, 2003
- ◆ TxDOT *Negotiated Contracts Policy Manual*, Chapter 6, [Engineering, Surveying, and Architectural Negotiated Contracts](#)

Subsurface Utility Engineering (SUE)

SUE providers should be competent and knowledgeable, experienced, insured, timely, and have the equipment and financial capacity to provide the service. Software systems should be compatible with those of the department. Major activities involved in SUE are:

- ◆ **Scope of Work:** A project-specific work plan for scope of work, level of service vs. risk allocation, schedule, and delivery method. SUE provider and project sponsor agree on work plan describing the SUE work to be performed.
- ◆ **Designating:** 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 location.
- ◆ **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.

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- ◆ **Conflict Analysis:** Using a conflict matrix to do an engineering evaluation and compare designating information with proposed plans to inform all stakeholders of potential conflicts, possible resolutions, and costs to resolve.
 - ◆ **Quality Level D (QL-D).** The most basic level of information. It comes from existing utility records or oral recollections. Its usefulness should be confined to project planning and route selection activities.
 - ◆ **Quality Level C (QL-C).** It involves surveying visible aboveground utility facilities, such as manholes, valve boxes, posts, etc., and correlating this information to Quality Level D. Its usefulness should be confined to rural projects where utilities are not prevalent, or are not too expensive to repair or relocate.
 - ◆ **Quality Level B (QL-B).** Using 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 in order 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.

Section 2 — Right of Way Map and Property Descriptions

Overview

This section describes preparing and submitting right of way maps, and property descriptions before acquiring property for a project. To ensure accuracy, the project manager must maintain strong coordination with the project engineers and surveyors.

40200. [Prepare right of way map and property descriptions](#)

40210. [Controlled access highway adjoining public/private real property](#)

40200: Prepare right of way map and property descriptions

Description. Right of way (ROW) maps and property descriptions are prepared to describe each parcel of land to be acquired. These documents are prepared after project location and design acceptance is obtained. Since they will form a vital part of future legal instruments (e.g., property deeds, eminent domain documents), these documents must be accurate and must be prepared by a Registered Public Land Surveyor. Preparation of these items is a ROW expense; therefore, funding approval and a right of way control-section-job (RCSJ) should be obtained from the ROW Division after the Commission has given project DEVELOP approval.

Pertinent Project Types. Projects requiring additional ROW whether fee title, easement, or other real property interests (e.g., access)

Responsible Party. Project manager and Regional ROW Project Delivery Workforce assigned to the district

Subtasks.

- ◆ Coordinate with the roadway design engineer to determine proposed ROW limits including temporary and drainage easements, and access denial areas.
- ◆ Obtain and/or verify project specific ROW control-section-job (RCSJ) numbers and check the project setup to be sure the project data is correct in the department portfolio and project management program.
- ◆ Deliver the approved project schematic to the land surveyor, and discuss ROW issues in detail. Obtain an expected delivery date for ROW documents.
- ◆ The surveyor verifies property ownership and performs field survey of existing ROW and property lines.
- ◆ Coordinate any required use of railroad ROW with Rail Division (RRD).

- ◆ The land surveyor identifies and verifies real property improvements to be acquired.
- ◆ The roadway design engineer performs a quality control check on the completed ROW maps, and property descriptions, comparing them to the project schematic design, or construction plans if available.
- ◆ Submit ROW map and property descriptions to the Right of Way Division to obtain ROW project release.

Helpful Suggestions.

- ◆ Stay in communication with the surveyor preparing the map to answer questions, provide updated ROW requirements for minor modifications, additions, or deletions of ROW.
- ◆ If the project is in PS&E development and ROW planning concurrently, the project manager should encourage clear communication between all engineers and the land surveyor. In this situation, 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 the ROW phase.
- ◆ Seemingly minor errors can have major effects on the acquisition of ROW, especially in the area of eminent domain proceedings. A single discrepancy between a ROW map, parcel plat, or legal description has the potential for disrupting the eminent domain process. Consequently, accuracy is extremely important.
- ◆ Locate and generally describe existing improvements, such as buildings, fences, gates, billboards, signs, driveways, major landscape features (e.g., large trees), on ROW maps and parcel plats. This information will be used later by the appraiser to determine the value of the property – including land and/or improvements.

Critical Sequencing.

- ◆ Other than for advance acquisition, ROW acquisition cannot begin until authority for ROW project release is obtained. See Task 40310: [Perform advance acquisition for qualified parcels](#) and Task 40320: [Obtain authority for ROW project release](#).
- ◆ All ROW documents must be completed before ROW acquisition can begin.

Resource Material.

- ◆ [TxDOT Survey Manual](#)
- ◆ TxDOT Submission Standards for Right of Way (ROW) Mapping Data in ArcGIS Format, [memo](#)
- ◆ TxDOT Right of Way Manual Collection
- ◆ TxDOT Online: Right of Way [Forms](#)

40210: Controlled access highway adjoining public/private real property

Description. Access management is a process of sound principles and policies to administer the connections between public highways and adjoining land. The department must balance the need for business and community with the need for safe and efficient travel. Well-planned access helps maintain property values and promotes safe and efficient transportation for the public.

The commission may designate a state highway system as a controlled access facility. Consequently, it is necessary to limit or completely deny an abutting owner of property access rights.

Direct access will be controlled and determined prior to right of way acquisition. Direct access to frontage roads in vicinity of a ramp is prohibited.

When public or private property owners are denied access, the right of way deeds will describe the access. Damages cannot be claimed for denial of access to a new facility, since the owner cannot be damaged by something that he never had.

Temporary access is permitted where a property would be landlocked. The access permit will clearly state terms and conditions of the temporary connection and conditions of the permanent access connection.

Authority.

- ◆ Access Connections to State Highways, [43 TAC §11.50 et seq.](#)
- ◆ Land Acquisition Procedures, Controlled Access Highways, [43 TAC §21.2](#)
- ◆ Transportation Code, Control of Access [§203.031](#)

Resources.

- ◆ Online TxDOT Processes and Procedures, [Right of Way Forms](#)
- ◆ *Right of Way Manual Volume 2 - Right of Way Acquisition*, [Chapter 5 §15](#)
- ◆ TxDOT [Access Management Manual](#)
- ◆ Transportation Research Board (TRB) *Access Management Manual*, 2nd ed.

Section 3 — Right of Way Appraisals and Acquisition

Overview

Appraisals and right of way (ROW) acquisitions must be done according to state and federal guidelines. ROW cost is a significant factor in the department's project development process. The district right of way administrator assigns a pre-approved, certified appraiser.

Appraisal reviews should be conducted after appraisals are completed and before beginning parcel acquisition. The ROW acquisition process involves making offers based on appraisal price, negotiating, and using eminent domain when required.

Relocation assistance involves helping with the relocation of residents and business owners being displaced due to ROW acquisition. This activity may take significant time and should be incorporated into the project completion schedule.

Improvements on ROW should be removed, sold, or demolished before construction. ROW clearance and encroachment certifications must be prepared and submitted before a project can be advertised for construction bids. The District Engineer signs project certifications which will be part of the project File of Record. A copy of the signed certifications are submitted, with other supporting documents, to the Design Division for PS&E letting document review and processing.

This section includes information on the following tasks listed in approximate chronological order:

- 40300. [Obtain contractual agreements with local public agencies](#)
- 40310. [Perform advance acquisition for qualified parcels](#)
- 40320. [Obtain authority for right of way project release](#)
- 10400. [Review scope, cost, and staff requirements of project development](#)
- 40330. [Identify impediments to parcel acquisition](#)
- 40340. [Prepare and execute joint-use/multiple-use agreements](#)
- 40350. [Appraise parcels](#)
- 40360. [Implement right of way acquisition process](#)
- 40370. [Implement relocation assistance program](#)
- 40380. [Dispose of improvements](#)

40390. [Prepare right of way and encroachment certifications](#)

40300: Obtain contractual agreements with local public agencies

Description. Local public agencies are often required to participate in transportation project development by performing or contracting directly for the acquisition of rights of way (ROW) and required adjustments of utility facilities. When this occurs, TxDOT and the local public agency should have already entered into a Right of Way Agreement to contribute funds, which identifies each party's responsibilities. Appraisals and ROW negotiations and acquisitions must be done according to federal and state guidelines.

Pertinent Project Types. Projects involving ROW acquisition

Responsible Party. Project manager

Subtasks.

- ◆ Review previously executed advance funding agreements.
- ◆ District right of way administrator and director of transportation planning and development decide how, and by whom, ROW is to be acquired.
- ◆ Give local entity approved ROW maps, plats, parcel descriptions, and notify them to begin acquisition, if applicable.

Helpful Suggestions.

- ◆ Standard agreement forms are available in the TxDOT ROW Manual for ROW acquisition by cities or counties.

Critical Sequencing.

- ◆ Environmental clearance and ROW documents (e.g., maps, plats, and legal descriptions) must be completed before authorizing a local public agency to begin ROW appraisal and acquisition.

Authority.

- ◆ Federal, State, and Local Participation, [43 TAC §15.50 et seq.](#)
- ◆ Uniform Relocation Assistance and Real Property Acquisition Policies for Federal and Federal Assisted Programs, [42 USC §4601 et seq.](#)

Resource Material.

- ◆ Local public agency (LPA) acquisitions, TxDOT *ROW Appraisal and Review Manual*, [Chapter 8](#)
- ◆ TxDOT [Right of Way Manual Collection](#)

- ◆ [Local Government Projects Policy Manual](#)

40310: Perform advance acquisition for qualified parcels

Description. Under qualifying circumstances, a very limited number of right of way (ROW) parcels may be acquired early, prior to the proper time for acquisition of all parcels.

Early Acquisition. Parcels may be acquired before obtaining the authority for right of way project release and before environmental clearance; however, it must be stated that transportation route alternatives are still being studied and that results of the study may show the acquired property might not be needed for the ultimate facility.

Requirements of early acquisition are described in the TxDOT *Right of Way Manual*. See Task 40320: [Obtain authority for ROW project release](#). Parcels that may qualify for early acquisitions involve one of the following:

- ◆ Land donations
- ◆ Hardship cases where the landowner has a unique hardship circumstance that is not common to all property owners. The hardship may be for health, safety, or financial reasons. The department has to do an objective evaluation to determine whether to accept the hardship acquisition request.
- ◆ Protective acquisition - where imminent parcel changes in land use are planned, which would substantially increase the cost or effort to construct a transportation facility within the subject ROW.

Notices to property owners or occupants shall be personally served or sent by certified or registered first-class mail, return receipt requested, and documented in the department files.

Advance Acquisition. The commission may “purchase an option” to acquire property for possible use in connection with a transportation facility before a final decision has been made to use the property for a transportation facility. The option to acquire the property may not expire later than five years from the date the option was purchased and may be renewed by agreement.

Advance acquisitions may not be made by condemnation.

Pertinent Project Types. Projects requiring additional ROW and involving parcel donations, hardship cases, or protective acquisition

Responsible Party. District Right of Way Administrator

Subtasks.

- ◆ Determine, through communication with property owners and local officials, which parcels may be considered for early acquisition due to land donations or protective acquisition. The project manager may do this work.
- ◆ Determine the need for early acquisition after receiving a request for hardship acquisition.
- ◆ Obtain approval from ROW Division for early acquisition.
- ◆ Obtain title reports and prepare parcel plat and property description.

Authority.

- ◆ Transportation Code §202.112 [Advance Acquisitions](#)
- ◆ Transportation Code Chapter 203 - [Subchapter. D](#) Acquisition of Property
- ◆ Uniform Relocation Assistance and Real Property Acquisition Policies for Federal and Federally Assisted Programs [42 USC Chapter 61](#)
- ◆ Protective Buying and Hardship Acquisition, [23 CFR §710.503](#)
- ◆ Real Property Donations, [23 CFR §710.505](#)
- ◆ Uniform Relocation Assistance and Real Property Acquisition for Federal and Federally-Assisted Programs, [49 CFR Part 24](#)
- ◆ Land Acquisition Procedures, [43 TAC §21.7](#) Donation of Real Properties
- ◆ Land Acquisition Procedures, [43 TAC §21.16](#) Use of Options to Purchase for Advance Acquisition of Real Property

Resource Material.

- ◆ TxDOT [ROW Appraisal and Review Manual](#)
- ◆ TxDOT Right of Way Manual Collection

40320: Obtain authority for right of way project release

Description. The Right of Way Division authorizes a right of way (ROW) project once all of the following conditions are complete:

- ◆ Environmental clearance of construction project
- ◆ Receipt of district approved ROW map
- ◆ Execution of agreement with local public agency to contribute funds. See Task 40300: [Obtain contractual agreements with local public agencies.](#)
- ◆ Project has funding

ROW project authorization is communicated to the districts by letter notifying them of ROW project release.

A ROW CSJ (RCSJ) may be obtained after the commission authorizes the project for DEVELOP phase.

Pertinent Project Types. All projects requiring ROW acquisition or utility adjustments

Responsible Party. District Right of Way Administrator

Critical Sequencing.

- ◆ With the exception of early acquisition, no ROW costs (including utility adjustments) may be incurred before ROW project release.

Resource Material.

- ◆ TxDOT [Right of Way Manual Vol. 1 – Preliminary Procedures for the Authority to Proceed](#)
- ◆ TxDOT [Right of Way Manual Vol. 2 – Right of Way Acquisition](#)
- ◆ TxDOT Right of Way Manual Collection

40330: Identify impediments to parcel acquisition

Description. Impediments to parcel acquisition are things that could adversely affect the ability to acquire right of way. These impacts may have high 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 project manager, project engineers, and acquisition specialists should meet to discuss 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.

Pertinent Project Types. Projects requiring additional right of way whether fee title or easement

Responsible Party. Project manager

Critical Sequencing.

- ◆ This task should be done immediately before starting parcel acquisition. It will aid the acquisition team in prioritizing the parcel acquisition sequence.

40340: Prepare and execute joint-use/multiple-use agreements

Description. Joint-use agreements are executed to permit TxDOT to use right of way (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 right of way, 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, 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. Right of Way Division is the coordinating division for preparing multiple-use agreements. See Task 20210: [Prepare and execute additional agreements](#).

Pertinent Project Types. Projects requiring interests in property owned by public and quasi-public entities

Authority.

- ◆ Joint Use Agreement Forms, [43 TAC §21.53](#)
- ◆ Multiple Use of Highway Right of Way, [43 TAC §11.21](#)
- ◆ Online: TxDOT, Transportation Commission, Search Commission Documents, [Minute Order No. 65169](#), August 5, 1971, pp.44-47

Responsible Party. District Right of Way Administrator or Director of Maintenance

Subtasks.

- ◆ Identify the need for an agreement versus outright ownership of property. Coordinate with project manager.
- ◆ Prepare property description for ROW map.
- ◆ District submits joint-use agreements to the Right of Way Division for review and execution.

- ◆ District submits multiple-use agreements for highway projects that are in the design or construction phase to the Design Division for review.

Critical Sequencing.

- ◆ All property interests, including agreements, must be obtained before TxDOT activity may begin on a property.

References.

- ◆ TxDOT [Use of Right of Way by Others Manual](#)
- ◆ Multiple Use Agreement [Form 2044](#) or [Form 2044-FED](#)
- ◆ Utility Joint Use Acknowledgment Reimbursable Utility Adjustment, [Form ROW-U-JUAA](#). Use with Form UJUACheck.

40350: Appraise parcels

Description. After obtaining authority for right of way project release from the Right of Way Division, the district selects an approved, certified appraiser from the TxDOT statewide list to determine the market value of property to be acquired. See Task 40320: [Obtain authority for ROW project release](#).

The appraiser conducts a site analysis, prepares an appraisal report stating the market value of the property, and determines the total compensation that should be paid to the property owner for real property interests (e.g., land, easements, and improvements).

District review and approval of all parcel appraisals is required. The district may request that the Right of Way Division assist in the review and approval of appraisals. The Right of Way Division has review and approval authority for values of acquisition by condemnation.

Pertinent Project Types. Projects requiring additional ROW whether fee title or easement

Responsible Party. District Right of Way Administrator

Subtasks.

- ◆ Obtain authority for ROW project release from the Right of Way Division.
- ◆ Charge all ROW Division-approved right of way acquisition costs to the ROW CSJ.
- ◆ Arrange for a Registered Professional Land Surveyor (RPLS) to survey and monument the corners of properties to be appraised.
- ◆ Conduct preappraisal contact with the property owner.
- ◆ Select appraisers from the list of approved appraisers.
- ◆ Issue appraisal work authorization for each parcel.

- ◆ Provide property description and parcel plat to appraiser.
- ◆ Appraiser prepares appraisals of required property interests.
- ◆ Review appraisals. Request assistance from the Right of Way Division, if needed.
- ◆ If acquisition is by condemnation, forward appraisals to the Right of Way Division.

Critical Sequencing.

- ◆ The appraisals should be started immediately after obtaining the authority for ROW project release from the Right of Way Division.

Authority.

- ◆ Uniform Standards of Professional Appraisal Practice (USPAP) as promulgated by the Appraisal Standards Board (ASB) of the Congressionally authorized nonprofit Appraisal Foundation.

Resource Material.

- ◆ TxDOT [Right of Way Appraisal and Review Manual](#)
- ◆ TxDOT [Right of Way Manual Collection](#).

40360: Implement right of way acquisition process

Description. The right of way (ROW) acquisition process involves negotiating terms and conditions of acquisition, making offers based upon appraised value, and using eminent domain when required. The acquisition process must be accomplished according to the TxDOT Right of Way Manual. Sometimes, property interests other than fee title may be required (e.g., easements, temporary easements, joint-use and multiple-use agreements). See Task 40340: [Prepare and execute joint-use/multiple-use agreements](#).

Pertinent Project Types. Projects involving ROW acquisition

Responsible Party. District Right of Way Administrator

Helpful Suggestions.

- ◆ Prioritize the sequence of parcel acquisition before beginning the acquisition process.
- ◆ Utility adjustments cannot be made until impacted parcels are obtained. A single holdout parcel located in a string of adjacent parcels can prevent utilities from being adjusted within a whole segment of roadway. Parcels involving such utilities need to be prioritized.

Critical Sequencing.

- ◆ Right of way acquisition is accomplished after ROW appraisals are performed and before TxDOT work activity can begin on the property.

Authority.

- ◆ Property Code, Chapter 21 - [Eminent Domain](#)
- ◆ Transportation Code Chapter 203, Subchapter D, [Acquisition of Property](#)
- ◆ Federal-aid Program or Projects: 49 CFR Subpart B - [Real Property Acquisition](#)

Resource Material.

- ◆ TxDOT [Right of Way Manual Vol. 2 - Right of Way Acquisition](#)
- ◆ TxDOT [Right of Way Manual Collection](#)
- ◆ TxDOT, [Right of Way Forms](#)

40370: Implement relocation assistance program

Description. Residents and business owners who will be displaced as a direct result of the acquisition of the real property, in whole or in part, for a construction project are eligible for relocation assistance. Engineering and environmental staff members identify these individuals during preliminary design. Later, district staff provide relocation assistance information to these individuals as part of the project's public involvement efforts.

Pertinent Project Types. Projects requiring right of way acquisition

Responsible Party. District Right of Way Administrator

Subtasks.

- ◆ Identify and follow through with any commitments made in the project's environmental documents with respect to relocation assistance.
- ◆ Identify eligible owners and tenants.
- ◆ Send a notice to vacate to all displacees still occupying the project ROW at least 90 days before the intended date to vacate. An additional 30-day notice may be required after the State takes possession of the property.
- ◆ Provide assistance, as required and allowed by law, in the relocation of displaced individuals.

Helpful Suggestions.

- ◆ Only trained relocation experts should discuss this issue with property owners.
- ◆ Implementing the relocation assistance program and delivering notices to vacate must be done within the overall project schedule. Relocating individuals can take much time to complete.

Authority.

- ◆ Relocation Assistance Program, [Property Code § 21.046](#)

- ◆ Relocation Assistance and Benefits, [43 TAC §21.111 et seq.](#)
- ◆ Federal aid Programs and Projects: [49 CFR Part 24](#) Uniform Relocation Assistance and Real Property Acquisition for Federal and Federally assisted Programs

Resource Material.

- ◆ TxDOT [Right of Way Manuals Collection](#)
- ◆ TxDOT [ROW Vol. 3 - Relocation Assistance](#)

40380: Dispose of improvements

Description. Improvements on right of way acquired by the department are considered either salable or nonsalable. The Texas Facilities Commission (TFC) has given the department delegated authority to handle all right of way improvement sales. Nonsalable improvements are items that have little or no value, as determined in the appraisal process. Disposal can be included in the construction contract or performed by maintenance forces.

Pertinent Project Types. Projects requiring ROW acquisition

Responsible Party. District Right of Way Administrator

Subtasks.

- ◆ Identify improvements to be removed from the ROW.
- ◆ If field surveying of improvements to be removed is needed before ROW acquisition, obtain permission for right of entry. Permission for right of entry or other written evidence of permission must always be obtained before entering private property. See Task 20230: [Obtain right of entry](#).
- ◆ Develop a plan for removing improvements, if needed. For example, a house containing asbestos would need a containment plan.
- ◆ Verify that the State has title to the right of way parcel and is in possession of the improvements to be removed.
- ◆ For salable improvements, submit request for approval to TxDOT General Services Division, Property Management Section.
- ◆ Identify the most economical way to dispose of nonsalable improvements.

Critical Sequencing.

- ◆ Disposal of improvements cannot begin until the State owns the improvements.
- ◆ This task should be completed before construction begins unless disposal is in the construction contract.

Helpful Suggestions.

- ◆ Dispose of improvements, particularly buildings, as soon as possible to prevent reoccupation and additional relocation expense.

Authority.

- ◆ Right of Way - Disposal of Real Estate Interests: [43 TAC §21.101 et seq.](#)

Resource Material.

- ◆ *Property Management Manual*, [Chapter 4](#)
- ◆ TxDOT [Right of Way Manual Collection](#)

40390: Prepare right of way and encroachment certifications

Description. In general, encroachment certifications are statements signed by the district engineer and included in the PS&E transmittal letter. A right of way (ROW) certification certifies that required ROW acquisition is complete, or will be complete, by a certain date. An encroachment certification generally certifies that the ROW is free of encroachments, or if they remain temporarily, they will not pose a safety or constructability conflict during construction. ROW encroachments, when identified, must be removed from the ROW by the owner of the encroaching property.

Federal policy requires bid proposals to identify the status of required ROW acquisition. If ROW acquisition is incomplete before bid advertisement, the district must give anticipated acquisition completion dates to the Design Division that must include the status of acquisition and the effect on construction. A map showing uncleared parcels may be required. These dates must be as accurate as possible since delays in ROW acquisition may result in contractor delays and claims.

Pertinent Project Types. All projects

Responsible Party. Project manager

Subtasks.

- ◆ Research status of ROW acquisition and removal of identified encroachments.
- ◆ Prepare ROW encroachment certifications. See the *PS & E Manual*, [Chapter 5](#).
- ◆ The District Engineer is responsible for the accuracy and execution of all ROW and encroachment certifications.
- ◆ Submit certifications with the PS&E Transmittal Data (Form 1002) to the Design Division along with PS&E documents.

Critical Sequencing.

- ◆ ROW and encroachment certifications are required before a project can be advertised for construction bids.

Resource Material.

- ◆ TxDOT *PS & E Manual*, [Chapter 5](#)

Section 4 — Utility Adjustments

Overview

Public utility owners (companies) legally share State right of way, so when major changes are made to roadways, they 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 adjustments 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, TxDOT may fund utility adjustments. Furthermore, utility adjustment plans may be made part of the TxDOT project construction plans. This is known as Combined Transportation Utility Construction (CTUC).

Signed utility agreements and clearance certifications are part of the project File of Record. Copies of the signed certifications are supporting documents sent to the Design Division with the PS&E submittal.

This section includes the following tasks. The tasks are listed in approximate chronological order.

- 40400. [Coordinate utility adjustment plans](#)
- 40410. [Prepare and execute utility adjustment agreements](#)
- 40420. [Utility owners adjust facilities](#)
- 40430. [Prepare utility clearance certifications](#)
- 40440. [Reimburse utility owners for eligible adjustment costs](#)
- 40450. [Non-reimbursable utility cost](#)

40400: Coordinate utility adjustment plans

Description. After receiving TxDOT's plans or schematics, the utility owner should prepare their utility adjustment plans, which may include relocation. As a best practice recommendation 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 engineering may ensure good coordination in regard to designing, funding, and scheduling issues.

Continuous coordination and involvement of the utility owners throughout project development is essential to maintain the project schedule and avoid costly delays. Utility owners should 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 should:

- ◆ 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.
- ◆ Be incorporated into TxDOT PS&E, if the utility adjustment is included in the TxDOT construction contract (CTUC).

TxDOT may participate in the cost of eligible utility adjustments. This is called a reimbursable adjustment.

When TxDOT acquires new right of way (ROW) containing utilities, TxDOT typically participates in the cost of adjusting the utilities.

The department and the utility shall 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 located in existing ROW, and need adjusting.

Pertinent Project Types. Projects involving potential conflict between utilities and construction activities

Responsible Party. Roadway design engineer

Subtasks.

- ◆ When design of proposed underground features is substantially complete (approximately 60% complete), send project construction plans to all utility owners so they may begin designing required adjustments. This should be documented to show good faith coordination.
- ◆ Determine if additional work is needed to precisely locate existing utilities. This may be needed if adjusting the utility would be very expensive or a roadway feature needs to be built very close to the utility. See Task 40110: [Locate existing utilities](#).

Helpful Suggestions.

- ◆ 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, high-pressure pipelines).
- ◆ If the department will participate in adjustment cost, the department's share must be included in the ROW project cost estimate.
- ◆ 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.

Critical Sequencing.

- ◆ Utility adjustments should be completed before the project is let to contract.

Authority.

- ◆ Right of Way Utility Adjustment, Relocation, or Removal, [43 TAC §21.21 et seq.](#)
- ◆ Right of Way Utility Accommodation: [43 TAC §21.31 et seq.](#)
- ◆ Utilities, [23 CFR Part 645](#)
- ◆ Relocation of Utility Facilities, [23 USC §123](#).

Resource Material.

- ◆ TxDOT [ROW Utility Manual](#)
- ◆ TxDOT [Hydraulic Design Manual](#) for avoiding, adjusting, and accommodating utilities (storm drains)
- ◆ TxDOT [Bridge Project Development Manual](#) for attaching utilities to bridges and relocating gage stations.

40410: Prepare and execute utility adjustment agreements

Description. 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 with regard to the highway/utility interface. Assignment of agreement approval authority, by the district or Right of Way Division, depends on the agreement type and other conditions. An agreement is required, even if the utility adjustment is incorporated in a TxDOT construction contract.

The Utility Agreement includes:

- ◆ Standard utility agreement form
- ◆ Plans, specifications, and detailed cost estimates. See Task 40400: [Coordinate utility adjustment plans](#).

- ◆ Evidence of reimbursable interest
- ◆ The utility joint-use agreement.

The Map, Survey, Utility (MSU) Section of the Right of Way Division is available for consultation and review of nontypical agreements.

Pertinent Project Types. Projects requiring utility adjustments

Responsible Party. District Right of Way Utility Coordinator

Subtasks.

- ◆ Coordinate work with the project manager and district utility coordinator.
- ◆ With input from the Right of Way Division, as needed, prepare and submit the draft agreement assembly to utility owners.
- ◆ Any requested modifications to the agreement are negotiated and the agreement is revised as necessary.
- ◆ Ensure that both parties execute the agreement.

Helpful Suggestions.

- ◆ The TxDOT Utility Manual contains typical agreements that have been used successfully between TxDOT and utility owners. If a utility is uncooperative, contact the ROW Division for assistance.

Critical Sequencing.

- ◆ After coordination with the Right of Way Division, submit the agreement to the utility owners for execution.

Authority.

- ◆ Right of Way - Agreements: [43 TAC §21.22](#)
- ◆ Utilities: [23 CFR Part 645](#)

Resource Material.

- ◆ Right of Way Division, Resource Management Section
- ◆ Right of Way: [Utilities Forms](#)
- ◆ TxDOT [ROW Utility Manual](#)
- ◆ TxDOT Right of Way Manuals Collection

40420: Utility owners adjust facilities

Description. Once utility adjustment agreements are executed, utility owners can begin adjusting their utilities. Throughout the adjustment period, continuous coordination should 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
- ◆ Traffic control in accordance with the [TMUTCD](#).

Utility owners are responsible for utility adjustments. The Project Manager, through the District Right of Way Utility Coordinator, is responsible for notifying utility owners that agreements are executed and utility adjustments can begin.

Pertinent Project Types. Projects requiring utility adjustments by the utility owner

Responsible Party. Project manager

Subtasks.

- ◆ Notify utility owners, through the District Right of Way Utility Coordinator, that the agreements are executed and utility adjustments may begin.
- ◆ District inspector maintains utility adjustment construction records to relate billing with work accomplished and to ensure proper location.

Helpful Suggestions.

- ◆ Ensure good communication among utility owners to prevent delays. The project manager should follow up with utility owners on coordinating adjustments. One owner's facilities may not be able to be adjusted until another owner's facilities are adjusted.
- ◆ Utility owners have legal rights to use highway rights of way in accordance with TxDOT policy, and they should be regarded as partners in the transportation business.
- ◆ Utility adjustments often require specialized equipment, trained crews, and expertise (e.g., fiber optic cables, 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, drainage pipes) may be incorporated into the highway construction plans to be executed by the contractor.

Critical Sequencing.

- ◆ To avoid affecting proposed construction, start utility adjustments as soon as environmental clearance is obtained, necessary right of way is available, agreements are executed, and CONSTRUCT authority for the project is received.

Authority.

- ◆ Utility Accommodation: [43 TAC §21.21 et seq.](#)

Resource Material.

- ◆ TxDOT [Right of Way Collection](#)

40430: Prepare utility clearance certifications

Description. The district shall prepare a statement certifying 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. The utility certification shall be signed by the District Engineer. The original will be filed in the project File of Record and a copy shall be submitted with the PS&E to the Design Division.

Where clearance of the utilities in advance of construction is not feasible, a triple-zero special provision notification to the contractor shall be provided in the bid proposal identifying the utility adjustments which remain to be completed.

Pertinent Project Types. All projects

Responsible Party. Project manager

Subtasks.

- ◆ Review status of required utility adjustments.
- ◆ If adjustments will not be complete before letting, a utility adjustment status list should provide estimated adjustment completion dates. Attach the list of unclear utilities to the utility certification.
- ◆ Use the list of unclear utilities to create a triple-zero special provision to be included in the bid proposal.
- ◆ Coordinate with utility owners on adjustment completion date commitments.
- ◆ It is recommended to obtain letters from utility providers stating dates when adjustments will begin and be complete.

Helpful Suggestions.

- ◆ Full clearance of utility conflicts prior to letting is strongly encouraged.

- ◆ When determining completion dates for adjustments after letting, be as accurate as possible.
- ◆ Check clearance dates with respect to letting. Inaccurate utility adjustment dates can cause contractor change orders and contractor claims.
- ◆ Coordination with utility owners should be current. Dates should be realistic and attainable. This information will go into the bid proposal and construction agreement with the highway contractor.
- ◆ Completion of the utility certification and an adjustment status list for unclear utilities is required for all Federal-aid projects and suggested for State-funded projects.

Critical Sequencing.

- ◆ Prepare the utility clearance certification after TxDOT has inspected the adjustments.

Authority.

- ◆ Physical Construction Authorization, [23 CFR §635.309](#) - Authorization
- ◆ Construction and Maintenance, [23 CFR Part 635](#)

Resource Material.

- ◆ Online: TxDOT, Government, Processes and Procedures, [ROW Utilities Forms](#)
- ◆ TxDOT [ROW Utility Manual](#)
- ◆ TxDOT *PS&E Preparation Manual*, [Chapter 5](#), Utility Clearance Certification

40440: Reimburse utility owners for eligible adjustment costs

Description. Where utility relocations are required for the project and costs are at the expense of the state. Costs of betterments that are necessitated by the requirements of the highway project are reimbursable (forced betterment).

The district will review, approve, and forward the statement to the Right of Way Division along with its recommendation on reimbursement. By statute, eligible utility adjustment costs are a cost of right of way 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:

1. Improved segments on a state highway facility will occupy compensable property of a utility. This includes extension of a highway in an urban area;
2. 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 shall share equal cost of the relocation of a utility facility that is required by:

1. Improvement to a nontolled highway that will add one or more tolled lanes;
2. Improvement to a nontolled highway that will be converted to a turnpike or toll project;
3. 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 should submit a final billing statement to the district. Utility relocation costs are the entire amount paid by the utility attributable to the relocation less:

1. Increase in the value of the new facility;
2. Salvage value of the old facility;
3. Other deductions established by regulations for federal cost participation.

Authority.

- ◆ Transportation Code - Utility Relocation Costs [§224.008](#)
- ◆ Transportation Code - Reimbursement for Relocation of Utility Facilities, [§203.092](#)
- ◆ State Participation in Relocation, Adjustment, and/or Removal [43 TAC §21.21](#)
- ◆ Utility Accommodation, [43 TAC §21.31 et seq.](#)
- ◆ Federal projects, Accommodation of Utilities, [23 CFR 645 Subpart B](#)

Resource Material.

- ◆ District Right of Way Utility Coordinator for documentation and special cases
- ◆ TxDOT [ROW Utility Manual](#)

40450: Non-reimbursable utility cost

Description. The department may cause or make a relocation of utility facilities, which are not reimbursable. The utility shall reimburse the department for any amount expended by the department for relocation. The following apply to a project, if:

1. Relocation is essential to timely completion of a state highway improvement
2. Continuous service to utility customers is essential to the local economy or public well-being
3. 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

4. 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 ensure disruptions of utility service will be minimized.

The utility shall 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 TxDOT Plans, Specifications, and Estimate (PS&E).

Pertinent Project Types. Projects requiring utility adjustments

Responsible Party. District Right of Way Utility Coordinator

Critical Sequencing.

- ◆ This task can be started after utility adjustment is complete.

Authority.

- ◆ Utility Accommodation: [43 TAC §21.31 et seq.](#)
- ◆ Federal projects, Accommodation of Utilities, [23 CFR 645 Subpart B](#)
- ◆ Transportation Code Department Relocation of Utility Facilities for Essential Highway Improvement [§203.0921](#)

Resource Material.

- ◆ TxDOT Right of Way Division
- ◆ TxDOT [ROW Utility Manual](#)

Chapter 5 — PS&E Development

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Section 1 — Design Conference

Overview

This section includes information on assessing background information for completeness, updating the information as needed, and conducting the design conference. If the project is inactive for some time, it is possible that traffic data, right of way maps, and other information will need updating. It is also a good idea for the design team, which includes a landscape architect and biologist, to perform a site visit.

The design conference provides the opportunity for key people to review basic design criteria 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, specifications, and estimate (PS&E) production.

During the Preliminary Design Concept Conference, a Design Summary Report (DSR) was created. This is a dynamic document, which should be updated as the project progresses and activities are performed. The DSR is an auditable record of project development, which should be stored in the project File of Record. See Task 10215: [Project File of Record](#).

This section includes the following two tasks listed in chronological order.

50100. [Obtain additional or updated data](#)

50110. [Conduct Design Conference](#)

50100: Obtain additional or updated data

Description. The Transportation Planning and Programming Division (TPP) provides a multifunction desktop statewide planning map using Esri software, which allows planners to view and query roadway data, build custom data files, and export maps and layers.

The following data may have changed or need updating throughout project development.

- ◆ **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.
- ◆ **As built construction plans.** As built construction plans need to be obtained as part of data collection. 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 freight highway network, design vehicle type will influence pavement design, width, and curvature of turning roadways and intersections. See Task 10430: [Obtain traffic data](#).

- ◆ **Site information.** A site visit should be conducted by the design team. For complex projects, appropriate division staff should be invited to the site visit. The design team should use the site visit to identify issues requiring additional study 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 design. See Task 10110: [Perform site visit](#).
- ◆ **Preliminary cost estimates.** Preliminary cost estimates are prepared during advance planning. Cost estimates may change substantially due to the amount of time since the schematic design was completed or due to changes in project scope. Update the project cost estimate as necessary and transfer data to DCIS. See Task 20490: [Update cost estimates](#).

Pertinent Project Types. All projects

Responsible Party. Project manager

Helpful Suggestions.

- ◆ 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.
- ◆ Check with the area maintenance supervisor to learn about any issues that the project can resolve.
- ◆ Cost estimates should be updated throughout final design whenever a significant scope change occurs, as many relatively minor changes can cumulatively affect the cost estimate.
- ◆ Conduct site visits. Take photos or video of major project issues.

References.

- ◆ Contact Transportation Planning and Programming Division (TPP) for statewide planning map software assistance.

50110: Conduct Design Concept Conference

Description. This task marks the beginning of PS&E preparation and occurs after most of the background data has been gathered. The purpose of the conference is to:

- ◆ Review basic design parameters, concepts, and criteria that were established during the Preliminary Design Concept Conference or by the project manager. See Task 20100: [Conduct a Preliminary Design Concept Conference](#).
- ◆ Confirm or change design criteria necessary to commence detailed design work.

- ◆ Obtain concurrence with decisions.

Update the DSR form that was initiated at the Preliminary Design Concept Conference. 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. Maintain the logs of meeting and site visit attendees.

Pertinent Project Types. All projects except simple projects and seal coats or overlays

Responsible Party. Project manager

Subtasks.

- ◆ Gather and organize exhibits: existing data including maps, aerial photographs, schematics, and environmental documents that might be referred to during the conference.
- ◆ Obtain and review the DSR initiated during the Preliminary Design Concept Conference.
- ◆ Review design commitments and decisions made during schematic development.
- ◆ Utilize the Advance Planning Risk Analysis (APRA) tool to evaluate risk issues and mitigation plans underway. For more information regarding this tool, refer to Task 10400: [Review scope, cost, and staff requirements of project development](#).
- ◆ Discuss staffing and scheduling requirements for detailed design work.
- ◆ Review update of related work progress for right of way acquisition and utility adjustments.
- ◆ Finalize design criteria.
- ◆ Update the DSR and circulate to all parties invited to the conference for their review.
- ◆ Obtain concurrence or comments by approval entities listed in the DSR.
- ◆ Update the DSR as the project progresses.
- ◆ The DSR is an element of the File of Record.

Helpful Suggestions.

- ◆ The project manager should consult with the district director of advanced planning and development and the area engineer to determine appropriate individuals to invite to the conference.
- ◆ Extend additional invitations to offices, areas of expertise, or governmental entities that have become involved since the Preliminary Design Concept Conference.
- ◆ If the PS&E team and schematic design team are different, invite schematic design team members to brief the new team on commitments, decisions, special problems, or constraints.
- ◆ Appoint an individual to take conference minutes or notes.
- ◆ At least two weeks before the conference, invite participants, and distribute meeting materials including the Preliminary DSR.

Critical Sequencing. The following information should be available before holding the Design Concept Conference:

- ◆ Schematic approval
- ◆ Value engineering study
- ◆ Public involvement
- ◆ Approved environmental document and commitments
- ◆ Preliminary pavement design
- ◆ Layouts for interchanges
- ◆ Level of service analyses
- ◆ Hydraulic studies and analyses
- ◆ Safety analyses
- ◆ Traffic and crash data
- ◆ Aerial photographs and topographic surveys
- ◆ Preliminary geotechnical surveys
- ◆ Utility coordination.

Resource Material.

- ◆ Design Summary Report (DSR), [Form 2440](#)
- ◆ TxDOT [Roadway Design Manual](#)
- ◆ TxDOT [PS&E Preparation Manual](#)
- ◆ TxDOT [Landscape and Aesthetics Design Manual](#), [PS&E Development](#)
- ◆ TxDOT [Hydraulic Design Manual](#)
- ◆ TxDOT [Bridge Project Development Manual](#)
- ◆ TxDOT [Rail-Highway Operations Manual](#)

Section 2 — Begin Detailed Design

Overview

The design field survey, stream crossing hydraulics, and pavement design should be completed before detailed plan development. Traffic control and permits/agreements may delay the project, if not handled properly at the beginning of detailed design.

This period of project development requires a substantial amount of the project manager's experience and attention. Decisions made during this time will directly affect the project schedule and quality. Input from the project manager's peers and supervisor should be sought for quality assurance of the project development process.

Design Division approval of geometric schematics for new location or added capacity projects should be obtained before beginning detailed design.

This section includes the following groups of tasks which may be performed concurrently:

Traffic Control

- 50200. [Plan sequence of construction](#)
- 50210. [Develop conceptual detour/road closure plan](#)

Permits and Agreements

- 50220. [Obtain miscellaneous permits](#)
- 50230. [Design environmental mitigation details](#)
- 50240. [Develop Environmental Permits, Issues, and Commitments \(EPIC\) sheet](#)

Design Data Collection

- 50250. [Review data collection needs](#)

Stream Crossing Hydraulics

- 50260. [Refine hydrologic study](#)
- 50270. [Prepare stream crossing hydraulics](#)
- 50280. [Prepare hydraulic report](#)

Traffic Control

50200: Plan sequence of construction

Description. The designer must consider the construction sequencing, or staging, of the improvements to provide a design that is efficient to construct and maximizes mobility and safety during construction. Considerations include work zone safety of the traveling public, department employees, and contractor's employees.

The construction sequence must be detailed enough to identify the following:

- ◆ Additional needs for easements, rights of way, or railroad agreements
- ◆ Required modifications to final horizontal curve radii and superelevation, grades and stopping sight distances - especially modifications needed for access to existing businesses and residences
- ◆ Additional environmental impacts due to construction (e.g., wetland and wildlife impacts, hazardous material disturbance, or water quality impacts due to an intermediate construction phase)
- ◆ Previously unidentified project costs due to construction sequencing.

Safe, continuous operation for motorcyclists, pedestrians and bicyclists should be considered in all stages of construction.

Reasonable access to all properties must be maintained during construction, unless other arrangements are made with the property owners.

If an off-system roadway must be closed to traffic during construction, coordination with local entities is required. Road closure approval must be obtained. See Task 50290: [Obtain approval of road closure/detour plans](#).

In some cases, planning the sequence of construction may involve determining time of day limitations for construction activities to avoid impacts to traffic and adjacent properties.

Pertinent Project Types. All projects

Responsible Party. Roadway design engineer

Subtasks.

- ◆ Plan the sequence of construction with input from the area engineer, drainage, traffic, structural engineer, and construction inspection staff.
- ◆ Obtain preliminary roadway and drainage plans. See work done according to Task 20560: [Perform preliminary hydraulic analysis/design](#).

- ◆ Review construction year traffic data to evaluate lane closure impacts. Traffic data should have been previously obtained. See Task 10430: [Obtain traffic data](#).
- ◆ Make a site visit to inspect existing conditions pertinent to sequence of construction (e.g., presence of fire stations, hospitals, or other facilities requiring uninterrupted access). This site visit may supplement earlier site visits. See Task 10110: [Perform site visit](#).
- ◆ Determine the need for construction speed zoning and traffic control requirements at intersections.
- ◆ Prepare preliminary staging plan using typical sections with plan views showing complex areas.
- ◆ Coordinate plan with appropriate district and area office staff (construction, right of way, etc.).

Helpful Suggestions.

- ◆ Make sure that nontypical and transition areas are detailed, because they are not represented in typical sections.
- ◆ Consider the types of construction equipment that will be available or used, and ensure that the access and operational room needed for such equipment is provided.
- ◆ Evaluate pavement design for compatibility with proposed construction sequence. See Task 20510: [Prepare pavement design report](#).
- ◆ Understand that pavement surface quality, degradations in pavement friction, discontinuities and abrupt elevation changes can impact motorcycle and bicycle safety.

Critical Sequencing.

- ◆ Construction staging can have a direct impact on requirements for lengthy project activities such as right of way acquisition or environmental permitting.
- ◆ Construction sequencing should be developed as one of the first steps in detailed design.

Resource Material.

- ◆ [Texas Manual on Uniform Traffic Control Devices \(TMUTCD\)](#)
- ◆ TTI: [Maximizing Motorcycle Safety in Work Zones](#)
- ◆ Traffic Operations, [Signs and Markings Manual](#)
- ◆ Traffic Operations, [Procedures for Establishing Speed Zones Manual](#)
- ◆ TxDOT [Traffic Control and Work Zone Standard Sheets](#)

50210: Develop conceptual detour/road closure plan

Description. Detours and road closures may be necessary to maintain traffic operations at acceptable levels of service during construction. Detours may include rerouting traffic to existing parallel

routes, constructing temporary paved routes, or a combination of both. Effects on existing parallel routes and their capacity to handle additional traffic must be evaluated. 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.

Consider the layout and operation of traffic control devices and drainage facilities for detours. Preparing final detour plans is described in Task 50910: [Design detour roadways](#).

Pertinent Project Types. Projects requiring a plan to maintain traffic operations during construction

Responsible Party. Roadway design engineer

Subtasks.

- ◆ Obtain input from the area engineer, traffic and drainage engineers, and construction personnel.
- ◆ Obtain preliminary roadway, drainage, and sequence of construction plans.
- ◆ Obtain construction year traffic data for the project facility and potential parallel detour routes.
- ◆ Consider the impacts to existing parallel facilities if capacity of the road being improved is substantially decreased during construction. Impacts to schools, emergency vehicles, pedestrians, bicyclists, and neighborhoods due to traffic rerouting should be considered.
- ◆ Make a site visit to inspect existing conditions including parallel routes. See Task 10110: [Perform site visit](#).
- ◆ Evaluate the condition of detour pavements and their ability to carry long term traffic.
- ◆ If a roadway must be closed to traffic during construction, coordination with local entities is required and road closure approval must be obtained. See Task 50920: [Obtain approval of road closure/detour plans](#).
- ◆ If off-system roads are to be used as part of a detour plan, approval by the road owner (city, county, private) must be obtained. Coordinate with TxDMV Motor Carrier Division, if necessary.
- ◆ Describe how access to all properties will be maintained during construction, unless other arrangements are made with property owners.
- ◆ Coordinate detour plans with appropriate district and area office staff (roadway, drainage, traffic engineers, construction, and right of way staff).
- ◆ Submit a signed copy of the District Engineer's road closure approval memo to the Design Division with the PS&E and supporting documents.

Helpful Suggestions.

- ◆ Detours should 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](#)) should be considered. Design the detour to meet the lowered construction speed limit.
- ◆ For details on items that will be required for the traffic control plan, refer to information in Task 50900: [Finalize sequence of construction](#).
- ◆ Consider safety lighting needs.

Critical Sequencing.

- ◆ The detour plan should be developed as one of the first items in final design, along with the sequence of construction plan.
- ◆ Coordination and preliminary approval of road closure/detour plans should be initiated when a road closure or detour is first considered.
- ◆ Written approval of the road closure/detour plan should be obtained as soon as the detour plan is completed to the point that road closure/detour timing can be reasonably well defined and the plan has been approved by the district.

Authority.

- ◆ Texas Transportation Code, Chapter 224 - [Subchapter D. Detour Roads](#)
- ◆ 43 TAC [§22.12 Closures](#)

Resource Material.

- ◆ [Texas Manual on Uniform Traffic Control Devices \(TMUTCD\)](#)
- ◆ Traffic Operations Division - Request for Regulatory Construction Speed Zone ([Form 1204](#))
- ◆ Traffic Operations, [Signs and Markings Manual](#)
- ◆ Traffic Operations, [Procedures for Establishing Speed Zones Manual](#)
- ◆ TxDOT [Traffic Control and Work Zone Standard Sheets](#).

Permits and Agreements

50220: Obtain miscellaneous permits

Description. 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.

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 earlier

as part of the environmental work on the project. These permits may not be received until environmental clearance is obtained, but coordination should be well underway by this point in the project development process. See Task 30210: [Determine environmental permit requirements](#).

Pertinent Project Types. Projects having potential for impacting resources or entities

Responsible Party. Project manager

Subtasks.

- ◆ Evaluate designs for impacts to resources and entities.
- ◆ Investigate possible design modifications to reduce or eliminate impacts.
- ◆ Discuss potential modifications and mitigation alternatives with area and district staff, including the environmental coordinator.
- ◆ Review permit application requirements identified in Task 30210: [Determine environmental permit requirements](#).
- ◆ Develop supporting data for permit application, as required.
- ◆ Prepare permit application and proposal for mitigation of impacts, if applicable.
- ◆ Review permit application and mitigation proposal with area and district staff.
- ◆ District environmental coordinator and/or Environmental Affairs Division project manager submit permit applications to resource agencies.
- ◆ Respond to agency requests for additional information.

Helpful Suggestions.

- ◆ Resource agencies consider impact minimization or avoidance of utmost importance. Conduct a thorough analysis of preliminary engineering assumptions and conclusions regarding impacts. It is helpful to develop your own justification for impacts, especially if you did not perform the preliminary engineering.
- ◆ It is recommended that you discuss assumptions and decisions made during preliminary design with appropriate team members.
- ◆ Get familiar with recent permitting decisions made by resource agencies on similar projects. Obtain this information from the district environmental coordinator.
- ◆ Agreements with railroad companies are often difficult and time-consuming to obtain. These should be initiated as soon as possible. See Task 20430: [Initiate railroad coordination](#).

Critical Sequencing.

- ◆ Obtaining permits can be a lengthy process and is often critical in the project development schedule. Coordination should begin as soon as the need is identified and should be followed throughout project development.

Resource Material.

- ◆ [TCEQ Stormwater Permits for Construction](#)
- ◆ TxDOT [Stormwater Management Program](#) (SWMP)
- ◆ EPA Clean Water Act Laws and Regulations, [Section 404](#)
- ◆ TxDOT [Hydraulic Design Manual](#)
- ◆ TxDOT [Bridge Project Development Manual](#)
- ◆ Federal Aviation Administration [Obstruction Evaluation/Airport Airspace Analysis \(OE/AAA\)](#)

50230: Design environmental mitigation details

Description. Mitigation for impacts due to highway improvements, should be defined in project environmental documents, permit conditions, or agreements with regulatory or resource agencies. Mitigation measures are typically defined, without much detail, during advance planning. Mitigation plans should have been prepared according to Tasks 20520: [Consider impacts on historic structures](#) and Task 30390: [Prepare environmental mitigation plans](#). 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 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 project manager should consult with the Director of Transportation Planning and Development and the Environmental Affairs Division at the start of detailed design.

Pertinent Project Types. Projects requiring mitigation of environmental impacts

Responsible Party. Project manager

Subtasks.

- ◆ Obtain input from the biologist, landscape architect, geotechnical engineer, and drainage engineer to coordinate the most cost effective sustainable solution to meet the environmental commitment.

- ◆ Obtain permits and agreements with resource agencies.
- ◆ Explore possible regional alternatives and separate contracting on projects involving significant mitigation.
- ◆ Coordinate mitigation measures with others (e.g., wetland creation/restoration or threatened/endangered species relocation with Environmental Affairs Division, or site acquisition with district right of way office).
- ◆ Prepare mitigation plans.
- ◆ Review and update the mitigation cost estimate as necessary. See Task 30390: [Prepare environmental mitigation plans](#).
- ◆ Send plans to the district environmental coordinator to review for compliance with the environmental document.

Helpful Suggestions.

- ◆ Mitigation may need to be completed before construction, and if mitigation requires the acquisition of property, acquisition of these parcels should be emphasized.
- ◆ 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.
- ◆ Projects can be cleared environmentally and approved for letting only after addressing State Historic Preservation Office comments on historic structures.

Critical Sequencing.

- ◆ This task should be initiated subsequent to the field review. Timing of the completion of mitigation plans is project-specific and should be driven by the terms of agreement and permit requirements with resource agencies.

Resource Material.

- ◆ TxDOT [Bridge Project Development Manual](#) for projects involving lead paint and asbestos removal

50240: Develop Environmental Permits, Issues and Commitments (EPIC) sheet

Description. 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 avoided during construction due to the presence of endangered species, wetlands, etc.

Pertinent Project Types. All projects

Responsible Party. Project manager and District Director of Transportation Planning and Development

Subtasks.

- ◆ Review the environmental document and all permits and clearances to determine what requirements or restrictions apply to the project.
- ◆ Download the latest [EPIC standard sheet](#) from the TxDOT CAD Standard files.
- ◆ Ensure that areas to be avoided during construction due to endangered species, wetlands, or for other reasons are clearly identified on the EPIC sheet.
- ◆ Ask the district environmental coordinator to review the draft EPIC sheet for compliance with the environmental document.

Helpful Suggestions.

- ◆ 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.
- ◆ The District Director of Transportation Planning and Development will need to certify that the environmental commitments shown in the Environmental Oversight Compliance System (ECOS) have been incorporated into the PS&E by the EPIC sheet inclusion.

Critical Sequencing.

- ◆ EPIC sheet should be started when preliminary work begins to assure details are not overlooked.
- ◆ Completion of the EPIC sheet is specific and should be driven by the terms of agreement and permit requirements with resource agencies.

Resource Material.

- ◆ TxDOT EMS (Environmental Management System) Program, [EPICs Guidance Document](#)
- ◆ Inside TxDOT, Design Division, [TxDOT CAD Standards - Roadway files](#)

Design Data Collection

50250: Review data collection needs

Description. Most field data collection will have occurred during preliminary design. However, as a large project develops, it is common for the designer to determine that existing data may be insufficient or need updating. Typically, some modifications to the original project concept occur as a project develops and conditions change. For example, if the development of the project has taken several years, traffic data and turning movements may need to be updated. Often, stream crossing hydraulics are not studied in detail during preliminary design.

Geotechnical investigations are necessary for the satisfactory long-term performance of structure foundations, retaining and noise walls, high embankments, pavement design, and stabilization of soft soils beneath pavements. For coastal pavement structure and drainage consult the [Hydraulic Design Manual](#). If additional data is needed to complete the design of any of these features, it should be obtained at this time.

Previous data collection may include those described in the following: Task 20290: [Perform other surveys](#) and Task 20505: [Perform preliminary geotechnical surveys](#).

The project manager gathers and reviews all survey and geotechnical data collected, and reviews modifications to the project scope made since preliminary design. The project manager, in coordination with the roadway, structural and drainage engineers, determines the need for additional survey data. The project manager should contact the district pavement engineer, the district structural engineer, if one is available, and the Bridge Division, as necessary, to identify additional geotechnical survey needs.

Pertinent Project Types. All projects

Responsible Party. Project manager

Subtasks.

- ◆ Gather and review existing data.
- ◆ Evaluate the project for changes made after original surveys and investigations (e.g., changed field conditions, project scope, environmental mitigation requirements, access revisions, or additional structures).
- ◆ Identify additional data required to finalize design.
- ◆ Prepare work authorization for additional work.
- ◆ Perform additional data collection and field and laboratory investigations.
- ◆ Compile data and report results of investigations.

Helpful Suggestions.

- ◆ Field conditions may change, and this can warrant additional data collection, especially in urban areas.
- ◆ Other issues, such as environmental mitigation, roadway access, retaining and noise wall locations, are often determined after performing initial field surveys.
- ◆ The project manager must determine if, and to what extent, conditions necessitate additional data collection.
- ◆ Geotechnical investigations may have been performed during the preliminary design phase. It is beneficial to discuss the extent and quality of this geotechnical data in the Design Concept Conference. See Task 50110: [Conduct Design Concept Conference](#).

- ◆ Particular attention should be directed to high fills or deep cuts, highly expansive soils, the presence of groundwater, channel stability, coastal tides, and anticipated need for bridges, pavement, retaining walls, and noise walls.
- ◆ Investigations should include data for designing high mast illumination, signal, and overhead sign structures.

Critical Sequencing.

- ◆ This task should occur as soon as possible after beginning detailed design.

Resource Material.

- ◆ [TxDOT Survey Manual](#)
- ◆ TxDOT [Hydraulic Design Manual](#)
- ◆ TxDOT [Bridge Design Manual - LRFD](#)

Stream Crossing Hydraulics

50260: Refine hydrologic study

Description. 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 hydrologic study is typically prepared during preliminary design as described in Task 20555: [Perform hydrologic study](#). At this stage, a refinement of the original study should 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, if there has been a significant delay between schematic development and PS&E development.

If the project is in a tidal area, consider storm surge (tide) analysis.

Pertinent Project Types. Projects involving a stream or floodplain crossings

Responsible Party. Hydraulic engineer

Subtasks.

- ◆ Identify any new, relevant data.
- ◆ Contact Bridge Division for bridge structure lateral restraint design requirements.

- ◆ 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. See Task 20555: [Perform hydrologic study](#).
- ◆ Based on the model, determine whether watershed revisions change stream water surface elevations.
- ◆ Coordinate with the local FEMA floodplain administrator (FPA) for changes to water surface elevations and flood maps.

Helpful Suggestions.

- ◆ Assistance is available from Design Division Hydraulic Engineers.

Critical Sequencing.

- ◆ This task should occur before Task 50270: [Prepare stream crossing hydraulics](#).

Resource Material.

- ◆ TxDOT [Hydraulic Design Manual](#)

50270: Prepare stream crossing hydraulics

Description. 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, Federal Emergency Management Agency (FEMA) rules and regulations, the National Flood Insurance Program (NFIP), and any other local or state agency requirements.

The FHWA requires a bridge scour evaluation in the hydraulic design process for span bridges. The results of such an analysis may highlight the need for design adjustments such as increasing opening size, deeper foundations, pier and abutment protection, or other mitigation measures.

Bridge class culverts will also 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.

Storm drains which drain sag points where runoff can only be removed through the storm drainage system should be designed for a minimum 50-year frequency storm.

Pertinent Project Types. Projects involving a bridge, culvert, stream, or floodplain crossing

Responsible Party. Hydraulic engineer**Subtasks.**

- ◆ Perform a site visit to gather information about the watershed characteristics.
- ◆ Perform hydraulic analysis of existing conditions.
- ◆ Review the results of FEMA or other studies performed during preliminary design preparation. See Task 20270: [Obtain hydraulic studies](#).
- ◆ Identify whether the affected community participates in the FEMA National Flood Insurance Program (NFIP). If so, compliance with FEMA minimum criteria may be required.
 - Assess the accuracy of the FEMA hydrologic studies or computer model.
 - If appropriate, update the FEMA hydrologic model to reflect watershed revisions caused by proposed construction.
 - Hold preliminary coordination with the local FEMA floodplain administrator (FPA) or local government having flood control jurisdiction over the waterway.
- ◆ Design improvements in coordination with the roadway design and structural engineers as applicable.
- ◆ Perform hydraulic analysis of proposed structures, using the current effective FEMA model, when available.
- ◆ Perform scour evaluation and coordinate findings with structural and geotechnical engineers for proper foundation design.
- ◆ Coordinate design recommendations with local FEMA floodplain administrator (FPA) or local government having jurisdiction.

Helpful Suggestions.

- ◆ Assistance is available from Design Division Hydraulic Engineers.
- ◆ Contact local FEMA floodplain administrator (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 (HEC-RAS) from the Corps of Engineers. Typically, FEMA encourages that the 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.
- ◆ Floodplain encroachments must be explained in the environmental document.

Critical Sequencing.

- ◆ Conduct water crossing hydraulic design along with final alignment design.
- ◆ Hydraulic design may result in the need for drainage easements in areas not already owned 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. See Task 50410: [Review right of way requirements](#).

Resource Material.

- ◆ TxDOT [Hydraulic Design Manual](#)
- ◆ Bridge Division, Bridge Scour Plan of Action for Bridges with Item 113 Coded "3", [Form 2604](#)

50280: Prepare hydraulic report

Description. Show all hydraulic documentation correctly in the final plans. For specific requirements, use the Reference materials below or contact the Design Division Hydraulic Engineers and/or Bridge Division Project Development.

FHWA requires a bridge scour evaluation during the hydraulic design process for all bridges. At federal request, the Bridge Division will send layouts, sheets, and reports to the Federal Highway Administration (FHWA). Major hydraulic structures on FHWA Projects of Department Interest (PoDI) or major projects will be submitted through Bridge Division to FHWA. Allow time to manage this lengthy process.

Information obtained during Task 50260: [Refine hydrologic study](#) is used in performing this task.

Pertinent Project Types. Projects having storm drains, bridges, or bridge-class culverts

Responsible Party. Project manager

Helpful Suggestions.

- ◆ Do a field review to become familiar with the watershed site to improve drainage design and reduce construction problems.

Critical Sequencing.

- ◆ Hydraulic calculation sheets and scour reports should be reviewed by the district and then submitted to the Bridge Division for review and approval before PS&E submission.
- ◆ For bridge projects, send the following information with the bridge layout submission:
 - scour evaluation (do not send for bridge-class culverts)
 - hydraulic calculation sheets (send for bridges and bridge-class culverts).

Authority.

- ◆ Bridges, Structures, and Hydraulics, [23 CFR Part 650](#)

Resource Material.

- ◆ FHWA
 - Evaluating Scour at Bridges, [Technical Advisory](#), October 28, 1991
 - [Evaluating Scour at Bridges](#), Fifth Edition, April 2012
 - [Hydraulics Engineering Software](#)
 - [Urban Drainage Design Manual](#), Third Edition, 2009
- ◆ TxDOT [Bridge Project Development Manual](#)
- ◆ Bridge Division, Bridge Scour Plan of Action for Bridges with Item 113 Coded "3", [Form 2604](#)
- ◆ AASHTO Highway Drainage Guide
- ◆ TxDOT [Hydraulic Design Manual](#)
- ◆ TxDOT *Geotechnical Manual*, [Scour](#)

Section 3 — Final Alignments/Profiles

Overview

Finalizing alignments is necessary before proceeding into detailed roadway design and plans development. Setting final alignments should be performed by an experienced roadway design engineer because it involves “fine tuning” the horizontal curve radii, superelevation, grades, and stopping sight distance to optimize the design. Environmental impact minimization, safety enhancement, operational improvement, and constructability are elements that should be taken into account during this process. Drainage headwater elevation and hydraulic grade lines are an important determinant in setting roadway grades.

This section includes the following task.

50300. [Design final controlling conditions](#)

50300: Design final controlling conditions

Description. Finalizing controlling conditions is a necessary first step in completing roadway design. Preliminary design development does not take into account as detailed analysis of conditions as is required for final design. 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, or drainage facilities. Changes may also be required for minimizing impacts to Section 4(f) properties, wetlands, rights of way, and threatened or endangered species.

Finalizing controlling conditions is not complete without a thorough review of preliminary hydraulic assumptions. Final design considerations for drainage facilities may require curve or grade changes.

Pertinent Project Types. Projects where controlling conditions are being established or will be revised

Responsible Party. Roadway design engineer

Subtasks.

- ◆ Gather previous schematic designs and engineering reports.
- ◆ Prepare cross sections for preliminary alignment, including sections at access connections.
- ◆ Reevaluate alignments for opportunities to minimize environmental impacts.

- ◆ Reevaluate alignments while considering constructability and final design of detailed geometrics.
- ◆ Ensure compliance with basic design criteria. See the *Roadway Design Manual*, [Chapter 2](#).
- ◆ Request the additional survey data required to finalize detailed design.
- ◆ Prepare cross sections for modified alignments.
- ◆ Prepare final alignment.
- ◆ Review stream crossing hydraulics and hydraulic grade lines.
- ◆ Ensure drainage considerations are addressed by adjusting roadway grades and curves with regard to hydraulic grade lines.
- ◆ Verify stream crossing elevations and hydraulics.
- ◆ Consider a lateral offset for roadway objects in urban and suburban areas to ensure that mirrors or other appurtenances of heavy vehicles do not strike roadway objects and passengers in parked vehicles are able to open their doors.

Helpful Suggestions.

- ◆ Areas requiring modification become apparent after developing cross sections and layouts, which show existing right of way, stopping sight distance, intersection and connection geometry, superelevation, proposed ditches, wetland limits, headwater elevations, major utilities, etc.
- ◆ Side roads and driveways should be checked closely to ensure that the intersecting road can be tied in without degrading stopping sight distance.
- ◆ Detailed consideration of construction staging often leads to minor alignment revisions for safe maintenance of traffic.
- ◆ Consider modeling of areas with complex features.

For hydraulic review and design:

- ◆ Detailed consideration of construction staging for major drainage structures can result in alignment revisions.
- ◆ An area of special concern occurs at drainageway intersections with the roadway. Grade changes often occur at these intersections. Drainage structure headwater elevations need to be predicted at these locations.
- ◆ The interrelated elements of ditch capacity, roadside slope safety, and roadway grade need to be properly designed to provide a safe facility. Ensure that proposed ditch capacity is adequate.
- ◆ If the job is in a tidal area, consider storm surge (tide) analysis.

Critical Sequencing.

- ◆ Final, detailed alignment setting should occur after the roadway design engineer thoroughly evaluates data prepared during preliminary design and coordinates the project with stakeholders.
- ◆ The roadway design engineer should feel comfortable that all project issues relevant to alignment setting are understood and coordinated with others.
- ◆ Final, detailed hydraulic review should occur after the roadway project engineer determines final controlling criteria, and after stream crossing hydraulics are completed.

Resource Material.

- ◆ FHWA Revisions to the Controlling Criteria for Design and Documentation for Design Exceptions, [Memorandum](#), May 5, 2016
- ◆ TxDOT [Roadway Design Manual](#)
- ◆ TxDOT [Hydraulic Design Manual](#)
- ◆ TxDOT [Bridge Project Development Manual](#) for information on bridge clearances and geometrics.

Section 4 — Roadway Design

Overview

This section discusses tasks necessary to finalize plan/profile and cross sections of the proposed facility and additional details related to roadway design.

Note that final determination of right of way requirements and preparation of a remedial action plan for hazardous waste clean up are important, relative to the project schedule. These two items have the potential to affect project schedules and costs greatly if not given proper attention.

This section includes the following tasks, which may be performed concurrently.

- 50400. [Prepare cross sections and compute earthwork](#)
- 50410. [Review right of way requirements](#)
- 50420. [Design landscape/aesthetic plans](#)
- 50430. [Develop plan and profile sheets](#)
- 50440. [Design pedestrian walkways and bicycle transportation facilities](#)
- 50450. [Design miscellaneous details](#)
- 50460. [Review project for design exception/waivers](#)
- 50470. [Prepare hazardous material remediation plan](#)
- 50480. [Develop Exhibit A for railroad agreements](#)

Earthwork

50400: Prepare cross sections and compute earthwork

Description. Plotting proposed cross sections and estimating earthwork volumes are important steps to be conducted early in the design process. Cross sections should be plotted at critical locations while finalizing project alignments. Once final alignments are set, including ditch and cross structure preliminary sizing, develop final cross sections, and earthwork volumes. See Task 50300: [Design final controlling conditions](#).

Pertinent Project Types. All projects involving earthwork

Responsible Party. Roadway design engineer

Subtasks.

- ◆ Prepare proposed cross sections and earthwork volumes using final alignments.
- ◆ Evaluate and modify side slopes and ditch grades to provide a safe and economic design.
- ◆ Evaluate tie-ins at intersections and driveways.
- ◆ Prepare to provide earthwork construction cross section data to the prospective bidders upon request for their use in bid preparation. Refer to Task 60134: [Provide earthwork construction cross section data to contractors, if requested](#).

Helpful Suggestions.

- ◆ Volumes and haul distances are an important economic consideration for roadways on new alignment. Earthwork volumes are of minor importance, typically, in setting grades for roadway widening projects.
- ◆ Roadside safety, in terms of side slopes, ditch size and configuration, and use of roadside barriers must be properly considered in preparing proposed cross sections. These items are detailed in the TxDOT [Roadway Design Manual](#).

Critical Sequencing.

- ◆ Develop proposed roadway cross sections and earthwork volumes after setting alignments and reviewing stream crossing hydraulics.

Resource Material.

- ◆ TxDOT [Roadway Design Manual](#)
- ◆ TxDOT [Bridge Project Development Manual](#)
- ◆ AASHTO Roadside Design Guide

50410: Review right of way requirements

Description. Once alignments are finalized, determine proposed right of way (ROW).

ROW acquisition types include fee title, drainage easements, and control of access, etc. Access to private property during construction may require temporary construction easements. Rights for continuous maintenance of permanent construction facilities should be acquired in fee title or an easement interest in areas requiring minimum maintenance. A drainage easement may also be required in areas without permanent highway structures to protect against development that would restrict the natural drainage flow, and to allow access for maintenance of the drainage channel.

See Task 40200: [Prepare right of way map and property descriptions](#).

Pertinent Project Types. Projects requiring additional ROW

Responsible Party. Roadway design engineer

Subtasks.

- ◆ Plot existing ROW and lateral limits of earthwork construction on plan sheets using cross-sections generated while computing earthwork. See Task 50400: [Prepare cross sections and compute earthwork](#).
- ◆ Show proposed ROW limits on plans.
- ◆ In coordination with the drainage engineer, determine the need for drainage easements at water crossings and possibly for long parallel channels.
- ◆ Determine control of access lines and show on plan layout; ensure that control of access lines match those shown on the ROW map.
- ◆ Schematic revisions and resubmittal are required as a result of changing control of access.
- ◆ Determine the need for temporary construction easements and incorporate into the ROW map.
- ◆ Coordinate acquisition with the district ROW section.

Helpful Suggestions.

- ◆ Many aspects of ROW acquisition are controlled by our legal system. It is important for the engineer to coordinate unclear issues with the district ROW section.
- ◆ Consider safety, constructability, and future maintenance in all ROW recommendations.
- ◆ ROW acquisition must be supported by a legitimate transportation necessity.

Critical Sequencing.

- ◆ Final ROW limits should be established before beginning the ROW acquisition process.

Resource Material.

- ◆ TxDOT [Right of Way Collection](#)
- ◆ TxDOT [Hydraulic Design Manual](#).

Landscape and Aesthetics

50420: Design landscape/aesthetic plans

Description. 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 right of way. Designers should encourage the development of pollinator habitat, forage, and migratory way stations for monarch butterflies, honey bees, and other native pollinators by planting native forbs and grasses. Plant establishment durations should be sufficient for an expected survival in a highway environment.

Pertinent Project Types. All projects, except restoration (2R) projects

Responsible Party. Roadway design engineer

Subtasks.

- ◆ Determine funding available for landscape and aesthetic improvements. Costs and staff availability for future maintenance should be considered.
- ◆ Write an Assessment of Landscape and Aesthetic Issues, if needed.
- ◆ Develop landscape and aesthetic plans in coordination with project design engineers, maintenance personnel, and affected parties.

Helpful Suggestions.

- ◆ 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.
- ◆ Ensure that environmental justice issues are addressed.

Critical Sequencing.

- ◆ Develop landscape and aesthetic plans before, or concurrently with, roadway details since landscape improvements may require facilities added to roadway improvements such as irrigation systems or access for maintenance.

Authority.

- ◆ Landscape and Roadside Development: [23 CFR §752.1 et seq.](#)
- ◆ Green Ribbon Projects: [43 TAC §11.100 et seq.](#)
- ◆ Transportation Enhancement Program: [43 TAC §11.200 et seq.](#)
- ◆ Landscape and Scenic Enhancement: [23 USC §319](#)

- ◆ Eligibility for Control of Noxious Weeds and Aquatic Noxious Weeds and Establishment of Native Species: [23 USC §329](#)

Resource Material.

- ◆ TxDOT [Landscape and Aesthetics Design Manual](#)
- ◆ TxDOT [Bridge Project Development Manual](#)
- ◆ TxDOT [Roadway Design Manual](#)

Plan/Profile and Roadway Details**50430: Develop plan and profile sheets**

Description. Plan and profile sheets are used to depict horizontal curve radii, superelevation rate, stopping sight distance (SSD), grade, lane and shoulder widths, and related information for a project. Develop plan and profile sheets based on schematic layout sheets.

Pertinent Project Types. All projects, except preventive maintenance, restoration (2R), illumination, traffic signals, etc.

Responsible Party. Roadway design engineer

Resource Material.

- ◆ TxDOT [PS&E Preparation Manual](#)

50440: Design pedestrian walkways and bicycle transportation facilities

Description. Legislation and regulations require consideration of pedestrian walkways and bicycle transportation facilities into transportation plans and project development. Transportation programs and facilities should accommodate users of all ages and abilities. It is federal policy for the department to integrate walking and bicycling into the transportation system, regardless of regional, climate, and population density differences. Non-motorists must be allowed to participate in the planning process to ensure inclusion of multimodal accommodations and operability of an intermodal transportation system.

Under The Moving Ahead for Progress in the 21st Century (MAP-21), several city-owned arterial streets were added to the NHS. A flexible, context-sensitive design approach is critical to achieving balanced design on these roadways.

The primary goal of a transportation system is to safely and efficiently move people and goods. Walking and bicycling are legitimate efficient modes of transportation for most short trips and can be linked to other transportation modes to significantly increase a trip distance.

Networks may include trails with an alignment separate from roadway, bridge structures used exclusively by pedestrians and bicyclists, or on-roadway bicycle lanes and walkways adjacent to roadways. Integrating pedestrian walkways and bicycle transportation facilities on new, rehabilitated, and limited access bridges with connections to streets and paths is encouraged.

Walking and bicycle transportation contribute to livability by tying the quality and location of transportation facilities to broader opportunities such as access to good jobs, affordable housing, quality schools, and safe streets. There are numerous individual and community benefits from non-motorized transportation including health, safety, environmental, and quality of life.

Pedestrian Elements. When any of the following factors are present, pedestrian accommodation and walkways should be included on a project:

- ◆ Facility is part of a locally adopted walkway planning document
- ◆ Parking lots
- ◆ Evidence of pedestrian traffic: pedestrians are observed, there is a beaten path, or significant potential exists for pedestrians to walk in the roadway.
- ◆ Pedestrian generators/attractors: residential areas, entertainment, businesses, schools, shops, or a transit route.

Pedestrian facilities are considered an accessible route with conditions and constraints unique to public rights of way. Curb cuts and other accessible provisions, as may be appropriate, are required on all Federal and Federal-aid projects involving the provision of curbs or walkways at all pedestrian crosswalks. Design according to the appropriate Standard(s) listed in the Resource Material section below.

Minimize use of smooth metal or diamond plates on walkways. Metal surfaces are low-friction surfaces and cause slipping for pedestrians and walking-aid users.

Shared-use paths, which are multi-use paths, provide off road transportation and recreational use by pedestrians, bicyclists, and persons with disabilities using various modes of travel. A shared-use path is unlike a sidewalk since most are physically separated from streets by open space or barrier. A shared-use path is also different from a trail; a trail's primary design purpose is for recreation.

If total bid items for all pedestrian elements (new or removed, signals, striping, walkways, ramps) are greater than \$50,000, a plan review is required eight weeks in advance of advertising the project for bids. Submit electronic plan set by email (Dropbox Service for larger plan files) or mail hard-copy to the department-contracted Registered Accessibility Specialist (RAS) and Construction Division (CST) ADA Inspector along with completed electronic Project Registration and Plan Review Registration forms. CST pays all fees for state let projects.

Pertinent Project Types. All projects, except preventive maintenance and restoration (2R) projects

Responsible Party. Roadway design engineer

Subtasks.

- ◆ Obtain reports on planning and public involvement conducted for the project. See Task 20480: [Develop bicycle and pedestrian accommodation](#).
- ◆ Determine the scope of pedestrian walkways and bicycle transportation facilities to be provided.
- ◆ Establish design criteria appropriate to the condition and funding. See the Resource Material section below.
- ◆ Prepare preliminary facility layouts and typical sections, and develop preliminary cost estimates for the project.
- ◆ Coordinate the project with local governments or jurisdictions benefiting from and supporting improvements, including related disciplines such as landscape architecture.
- ◆ Coordinate the project with other stakeholders such as railroad or utility owners whose right of way is being used for the improvements.
- ◆ Obtain additional design survey data needed to finalize designs.
- ◆ Prepare final plans and cost estimates.

Helpful Suggestions.

- ◆ Bicycle and pedestrian facilities usually have strong support from local citizens. Public support is important for a successful project.
- ◆ Avoid placing obstructions, tripping hazards, or reducing route through-width on walkways due to: guardrail, on-walkway surface curbs, trash bins, benches, transit shelters, utility structures, etc.
- ◆ Coordinate alignments with proposed utility locations. Avoid power poles or utility cabinets obstructing walkways.
- ◆ When crossing driveways, maintain walkway cross slope and grade according to PROWAG and TAS requirements. Refer to [TxDOT PED Standard Detail sheet](#).

Critical Sequencing.

- ◆ Bicycle and pedestrian transportation facility design should begin during the project preliminary design phase.
- ◆ Public input should be encouraged.
- ◆ Design work can begin once design surveys and coordination with local governments and stakeholders are near completion.
- ◆ Required RAS plan review eight weeks in advance of advertising the project for bids allows time for revisions before bids are solicited.

Authority.

- ◆ Access-Board, Architectural and Transportation Barriers Compliance Board (ATBCB), [36 CFR Chapter XI](#); Accessibility Guidelines [36 CFR §1119.1 ADA and ABA](#).
- ◆ Statewide and Metropolitan Planning and Programming, [23 CFR Part 450](#)
- ◆ Bicycle Transportation and Pedestrian Walkways, [23 USC §217](#)
- ◆ Federal Aid Highways - Standards; Metropolitan transportation planning; and Statewide and metropolitan transportation planning [23 USC Chapter 1](#)
- ◆ Standards for accessible transportation facilities, [49 CFR §37.9](#)
- ◆ Texas Government Code [Chapter 469, Elimination of Architectural Barriers](#)
- ◆ Texas Department of Licensing and Regulation, 16 TAC Part 4
 - [Rule §68.31 Variance Procedures](#)
 - [Rule §68.50 Submission of Construction Documents](#)
- ◆ Texas Transportation Code [§201.902. Road Use By Bicyclists](#)

Resource Material.

- ◆ FHWA Memorandum August 20, 2013 - [Guidance: Bicycle and Pedestrian Facility Design Flexibility](#). The following publications are incorporated by reference:
 - AASHTO Guide for Planning, Design, and Operation of Pedestrian Facilities, July 2004 (AASHTO Pedestrian Guide)
 - AASHTO Guide for the Development of Bicycle Facilities 2012. Fourth Edition (AASHTO Bike Guide)
 - NACTO [Urban Bikeway Design Guide](#) (NACTO Guide)
 - ITE Guide Designing Walkable Urban Thoroughfares: A Context Sensitive Approach
- ◆ [Texas Accessibility Standards](#), 2012 (TAS)
- ◆ TDLR Architectural Barriers Project Registration [Form AB05](#)
- ◆ TDLR Variance [Application](#)
- ◆ United States Access Board
 - (Streets and Sidewalks) Public Rights of Way Guidelines, [Section-by-Section Analysis](#)
 - [Chapter R1](#): Application and Administration
 - [Chapter R2](#): Scoping Requirements
 - [Chapter R3](#): Technical requirements
 - [Chapter R4](#): Supplementary Technical Requirements
 - (Building and Sites)

- Architectural Barriers Act, [ABA Standards](#): Facilities designed, built, altered, or leased with federal funds
- Americans with Disabilities Act, [ADA Standards](#): Places of public accommodation, commercial facilities, and state and local government facilities
- ◆ Online: Inside TxDOT, Traffic Division, [Texas Manual on Uniform Traffic Control Devices \(TMUTCD\)](#)
- ◆ TxDOT [Roadway Design Manual](#)
- ◆ TxDOT [Bridge Design Manual - LRFD](#)
- ◆ TxDOT [Landscape and Aesthetics Design Manual](#)

50450: Design miscellaneous details

Description. Miscellaneous details sheets are typically developed to show design details, which are not shown on standard detail sheets and areas where more detailed information will benefit the contractor's understanding of the project.

Examples include, but are not limited to, the following:

- ◆ Intersection/ramp contour grading
- ◆ Nonstandard inlets
- ◆ Grate and manhole covers
- ◆ Asphalt or concrete pavement construction details
- ◆ Drainage structure backfill diagrams
- ◆ Curb and gutter transitions
- ◆ Driveway details
- ◆ Ditch details
- ◆ Special connections
- ◆ Unique details and dimensions

Pertinent Project Types. Projects requiring construction details that are not provided on standard sheets

Responsible Party. Roadway design engineer

Resource Material.

- ◆ TxDOT [Roadway Design Manual](#)
- ◆ TxDOT [PS&E Preparation Manual](#)

50460. Review project for design exceptions/waivers

Description. As the project progresses through final design, the need for a design exception or design waiver may be identified. Form 1002 PS&E Transmittal Data, Page 3, is the official place where PS&E basic design criteria are documented, as well as waivers or design exceptions for design features that did not meet nominal safety design of the controlling criteria minimum values or ranges. A second concern in a design exception or waiver is the continuum of substantive safety over actual long term or expected performance of the roadway.

For NHS and those routes added to the NHS by MAP-21, FHWA adopted design requirements apply, regardless of funding source. The department may consider designs which deviate from the NHS standards when warranted based on conditions, context, and consequences of the proposed project.

Design exceptions may be approved any time prior to finalizing the design of the project. See Task 20720: [Design exceptions or waivers](#).

Pertinent Project Types. All projects

Responsible Party. Roadway design engineer

Critical Sequencing.

- ◆ Submit design exception/waiver 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.

- ◆ Design Standards for Highways, [23 CFR Part 625](#)
- ◆ Standards for accessible transportation facilities, [49 CFR §37.9](#)

Resource Material.

- ◆ FHWA [Revisions to the Controlling Criteria for Design and Documentation for Design Exceptions](#), Memorandum, May 5, 2016
- ◆ TxDOT [Roadway Design Manual](#)
- ◆ AASHTO Guide for the Development of Bicycle Facilities (AASHTO Bike Guide)
- ◆ TxDOT [PS&E Preparation Manual](#)
- ◆ TxDOT [Bridge Project Development Manual](#)
- ◆ [Texas Accessibility Standards](#)
- ◆ FHWA, [Americans with Disabilities Act \(ADA\)/Section 504 of the Rehabilitation Act of 1973 \(504\)](#)

50470: Prepare hazardous material remediation plan

Description. 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, asbestos in structures, or soil contaminated with gasoline from underground storage tanks.

The PS&E 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. 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.

Pertinent Project Types. Projects involving known or anticipated hazardous materials

Responsible Party. Roadway design engineer and district environmental project manager

Subtasks.

- ◆ Obtain right of entry for initial site assessment and/or Phase I ESA. See Task 20230: [Obtain right of entry](#).
- ◆ Review findings of the hazardous materials survey. See 30335: [Perform hazardous materials assessment and investigation](#).
- ◆ Prepare remediation plan and cost estimates.
- ◆ Obtain guidance for the remediation plan from the Environmental Affairs Division.

Helpful Suggestions.

- ◆ Work closely with the district environmental project manager and the Environmental Affairs Division.

Resource Material.

- ◆ Online: Inside TxDOT, Environmental Affairs Division:
 - [Hazardous Materials Toolkit](#)
 - ENV-HMM Contracting Standard Operating Procedures
 - [\(SOP\)](#)

Railroad Agreements

50480: Develop Exhibit A for railroad agreements

Description. The Exhibit A is a procedural document related to the development of an Agreement between the department and the railroad. The Agreement must be executed before a project can be awarded to a contractor.

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.

An Exhibit A is a 30% plan set showing work to be performed within the railroad's right of way. Information should include the project title sheet and map, index, railroad company, subdivision, milepost, and DOT numbers identified on the title sheets and title blocks of other sheets. 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 should be signed, sealed, and dated by a licensed Texas Professional Engineer. See the *Rail-Highway Operations Manual* listed below for more extensive information.

Maintenance-type project scopes with minimal impacts to railroad rights of way are handled by a Letter Agreement. A few of the project types are:

- ◆ Seal coats
- ◆ Overlays
- ◆ Minor bridge repair and inspection
- ◆ Surveying
- ◆ Mowing

A Construction & Management Agreement is for more extensive heavy construction within the railroad right of way.

Pertinent Project Types. Projects containing work within railroad right of way

Responsible Party. District Project Manager, District Railroad Coordinator, TRF-RSS Contract Specialist

Subtasks.

- ◆ Obtain detailed geometry and as-built construction plans of existing railroad crossings, as applicable.

- ◆ Make a site visit to 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.
- ◆ Develop Exhibit A, including a description of work to be performed by TxDOT and the railroad company.
- ◆ Submit Exhibit A in accordance with the process outlined in the [Rail-Highway Operations Manual](#).

Helpful Suggestions.

- ◆ Designers should familiarize themselves with the railroad company’s design standards prior to project design development.
- ◆ For bridge projects, additional information needed for Exhibit A can be added to the bridge layout.
- ◆ Be sure railroad Agreement provisions are included in the final PS&E.
- ◆ TRF-RSS is the office of primary negotiation with the railroads. For complex rail-highway grade separation projects, contact Traffic Operations Division-Rail Safety Section (TRF-RSS) if considering a meeting with railroad owner(s) when Exhibit A is nearly complete, especially where railroad passes over highway.

Critical Sequencing.

- ◆ Contact the TRF-RSS Contract Specialist at least 12 months before letting for railroad overpasses (new or modified), and 24 months before letting for railroad underpasses (new or modified) to coordinate rail planning and obtain a Construction & Maintenance Agreement.
- ◆ Projects will not be let until the railroad Construction & Maintenance (C&M) Agreement or Letter Agreement has been fully executed.

Resource Material.

- ◆ Online: Inside TxDOT, Traffic Operations Division, [Rail-Highway Operations Manual](#)
- ◆ Railroad Grade Crossing Replanking Project Submission Form, [Form 1876](#)
- ◆ TxDOT CAD Traffic Standards, [Railroad Crossing Details](#) - Signing, Striping, Device Placement, and Sign Mounting Details
- ◆ Railroad Requirements [General Note Sheets](#) (Exhibit A & B) instructions and plan sheets for Bridge and non-Bridge projects
- ◆ [PS&E Requirements on Projects with Railroads](#), Instructions, Scope of Work and Bridge/Non-bridge Projects plan sheets
- ◆ TRF-RSS, [Railroad Design Guidelines](#)

- ◆ FHWA [Railroad-Highway Grade Crossing Handbook](#)
- ◆ TxDOT Railroad [Construction and Maintenance Agreement Requirements](#) and examples

Section 5 — Operational Design

Overview

Operational design involves subsections of Illumination, Intelligent Transportation Systems, Signals, and Signing/Striping. Construction plans result from each of the tasks within this section. This section includes the following groups of tasks. The tasks may be performed concurrently.

50500. [Design illumination](#)

50510. [Design Intelligent Transportation System](#)

50520. [Design signalization plan](#)

50530. [Design signing and pavement markings](#)

Illumination

50500: Design illumination

Description. There are two types of roadway lighting: continuous lighting that meets warrants and safety lighting.

Safety lighting is typically needed at interchanges, decision points, high-volume rural or suburban intersections, weigh stations, rest areas, and safety/security for pedestrians, bicyclists and transit users.

Continuous lighting provides uniform lighting on all mainlanes, ramps, direct connectors, and interchanges. Continuous lighting requires the financial participation of the city. Either type may use conventional roadway lighting or high mast poles.

Determination of the eligibility of the project for illumination and compliance with warranting conditions should have been initiated when preliminary illumination locations were established in Task 20580: [Establish preliminary illumination locations](#).

An FAA form 7460-1 must be completed according to 14 CFR §77.9. Required notification applies to any construction or alteration:

- ◆ Exceeding 200 feet above ground level (AGL)
- ◆ Within 20,000 feet to a public use or military airport, which exceeds 100:1 surface from any point on the runway of each airport with its longest runway *more* than 3,200 feet

- ◆ Within 10,000 feet to a public use or military airport, which exceeds 50:1 surface from any point on the runway of each airport with its longest runway no more than 3,200 feet
- ◆ Within 5,000 feet of a public use heliport, which exceeds a 25:1 surface

Pertinent Project Types. Projects warranting continuous roadway lighting or safety lighting

Responsible Party. Designer with illumination experience

Subtasks.

- ◆ Obtain agreement with local government for maintenance of proposed continuous lighting.
- ◆ Obtain preliminary roadway, drainage, traffic, and utility adjustment plans.
- ◆ Obtain design year traffic data.
- ◆ Make a site visit to inspect existing conditions. Lighting design needs to coordinate with roadway features, maintenance and operations issues, and surrounds.
- ◆ Obtain or prepare a lighting justification report.
- ◆ Design high mast foundations according to bore logs and HMIF standard sheets.
- ◆ Coordinate plans with roadway design, traffic, and structural engineers.

Helpful Suggestions.

- ◆ Technical assistance with design is available from the Traffic Operations Division - Traffic Engineering Section (TRF-TE).
- ◆ Use breakaway devices according to TxDOT [Highway Illumination Manual](#) and AASHTO requirements.
- ◆ Find out where traffic barrier will be located. Try to place illumination structures behind barrier or protect with barriers designed for light pole structures.
- ◆ Determine the locations of existing and proposed utilities, drainage facilities, and traffic signs and signals.
- ◆ Consider maintenance requirements when locating illumination supports.
- ◆ For lighting on bridges, coordinate design illumination with bridge details so conduit is made part of bridge plans; this will avoid unsightly conduit additions to bridges.
- ◆ Determine illuminance design values according to roadway classification and *AASHTO Roadway Lighting Design Guide*.
- ◆ Texas is required by statute to use cutoff luminaires to minimize glare and light pollution when installing lighting using state funds.
- ◆ When designing lighting for a walkway adjacent to a roadway, the street must be lit to the same level as the walkway.

Authority.

- ◆ Health and Safety Code, [Chapter 425](#), Light Pollution - Regulation of Certain Outdoor Lighting
- ◆ Continuous and Safety Lighting Systems, [43 TAC §25.11](#)

Resource Material.

- ◆ Contact Traffic Division - Illumination Branch for TxDOT Photometric Files
- ◆ FAA [Obstruction Evaluation/Airport Airspace Analysis \(OE/AAA\)](#), information and latest Forms
- ◆ *Negotiated Contracts Procedures Manual*, [Traffic Engineering Agreements](#)
- ◆ Internal website: Crossroads, Contract Services Office, Standard Contracts, Traffic Engineering Agreements ([TEA-xx](#))
- ◆ TxDOT [Highway Illumination Manual](#)
- ◆ [FHWA Roadway Lighting - Resources](#)
- ◆ *AASHTO Roadway Lighting Design Guide*
- ◆ [NFPA 70: National Electric Code®](#)
- ◆ ANSI/IESNA RP-8, Roadway Lighting
- ◆ TxDOT [PS&E Preparation Manual](#)
- ◆ TxDOT [Traffic Electrical and Illumination Standards](#): Electrical Details (ED); High Mast Illumination Details (HMID); High Mast Illumination Foundation (HMIF); High Mast Illumination Pole (HMIP); Roadway Illumination Details (RID); and Roadway Illumination Poles (RIP)

Intelligent Transportation System**50510: Design Intelligent Transportation System (ITS)**

Description. ITS projects should 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:

- ◆ Dynamic Message Signs (DMS)
- ◆ Traffic detection devices
- ◆ Travel time estimation

- ◆ Traffic maps - congestion, construction, weather
- ◆ Integration of traffic control and transportation management systems
- ◆ Traffic signals which adapt to traffic and change their timing in each cycle
- ◆ Closed-Circuit Television (CCTV) to monitor traffic conditions and incidents
- ◆ Lane Control Signals (LCS) to warn the public of lane closures due to incidents or construction
- ◆ Communication infrastructure.

The project manager should coordinate work with the district traffic engineer, the Traffic Operations Division - ITS and Signal & Radio Operations Branches 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 rights of way 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.

Pertinent Project Types. Projects involving high traffic volumes or complex traffic movements; however, rural projects with lower traffic volumes may need ITS applications.

Responsible Party. Project manager, traffic operations engineer

Subtasks.

- ◆ Find out where traffic barrier will be located, and try to place hazardous objects behind barriers that are already proposed for other purposes.
- ◆ Obtain recent information on ITS alternatives, this is a rapidly advancing field.
- ◆ Incorporate standard communications equipment when possible.
- ◆ Consult with the District Traffic Engineer and the ITS or Signal & Radio Operations Branches of the Traffic Operations Division.
- ◆ When possible, submit plans to Traffic Operations Division for early review.

Helpful Suggestions.

- ◆ Technical assistance is available from TRF Division for designing ITS and developing contracts for ITS design or construction.

- ◆ 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, weaving).
- ◆ Consider ITS regional opportunities and possible connections to manage traffic through long corridors.
- ◆ Utilize existing structures and roadside barriers for ITS, if possible.

Critical Sequencing.

- ◆ ITS plans should be designed concurrently with roadway plans to assure that necessary provisions, such as mounting structures and conduit systems, are made part of the overall plans.

Authority.

- ◆ [Executive Order - Accelerating Broadband Infrastructure Deployment](#), 2012
- ◆ [National ITS Architecture](#)
- ◆ Nationally Significant Freight and Highway Projects, [23 USC §117](#)
- ◆ National Highway Freight Program, [23 USC §167](#)

Resource Material.

- ◆ TxDOT [Traffic Standards](#) for ITS equipment
- ◆ FHWA [Information as a Source of Distraction](#), November 2015

Signals

50520: Design signalization plan

Description. 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 should not be installed, unless the investigation reveals that at least one of the warrants contained in the [Texas Manual on Uniform Traffic Control Devices \(TMUTCD\)](#) 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 should be considered when determining if a signal(s) should 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 (appurtenances, software, hardware, and timing), then an agreement should be established with the controlling agency before the signal is installed and activated.

Pertinent Project Types. Projects warranting signalization

Responsible Party. Traffic engineer

Subtasks.

- ◆ Obtain or perform a signal warrant study.
- ◆ A roadway design engineer may design the signals and prepare the plans; however, a traffic or transportation engineer should carefully check the design and specifications.
- ◆ Coordinate plans with the roadway design engineer, drainage engineer, etc.
- ◆ Coordinate signal design and details with local government, if signals will be operated and maintained by a local government.
- ◆ Obtain concurrence from the local government for locating signals within their jurisdiction and ensure that required agreements are executed as described in the TxDOT *Negotiated Contracts Procedures Manual*, [Traffic Engineering Agreements](#).
- ◆ Obtain preliminary roadway, drainage, and utility adjustment plans.
- ◆ Obtain existing and design year traffic data.
- ◆ Make a site visit to inspect existing conditions and verify intersection and stopping sight distances.
- ◆ Order and obtain geotechnical foundation designs for signal foundations.

Helpful Suggestions.

- ◆ Technical assistance is available from the district traffic engineer and the Traffic Operations Division - Traffic Engineering Section.
- ◆ Coordinate intersection geometry, turn lane lengths, median types, and access control at signalized intersections. In urban areas having remote signal timing control and coordinated signals, signal control design should be discussed with the local entity.
- ◆ Signal and supports should 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 striping, ramps, and walkways before preparing pedestrian signal layouts to ensure proper location of pedestrian poles and signal heads.
- ◆ Pedestrian crossing times should be sufficient for the expected user population to cross the street safely, and meet or exceed the requirements contained in the TMUTCD.

Resource Material.

- ◆ Internal website: Crossroads, Contract Services Office, Standard Contracts, Traffic Engineering Agreements ([TEA-xx](#))
- ◆ Railroad Signal Final Inspection Report, [Form 2568](#)
- ◆ Internal: Crossroads TRF e-form, Traffic Signal Authorization, [Form 2108](#)
- ◆ [Texas Manual on Uniform Traffic Control Devices \(TMUTCD\)](#), Traffic Control Signal Needs Studies.
- ◆ TxDOT *Negotiated Contracts Procedures Manual*, [Traffic Engineering Agreements](#)
- ◆ TxDOT [Traffic Standard sheets](#) - Traffic Signal Pole Standards

Signing and Striping**50530: Design signing and pavement markings**

Description. Signing and pavement marking plans include plan view layouts of final signs, striping, pavement markers, and other pavement markings. Show cross sections and sign size and legend details for the locations of all overhead signs. Detail all ground mounted guide signs and reference locations on the plans. Use sign summary sheets to detail color, location, size of structural steel.

Pertinent Project Types. All projects

Responsible Party. Traffic engineer

Subtasks.

- ◆ Obtain roadway and drainage plans.
- ◆ Prepare a signing, striping, and pavement marking schematic and obtain preliminary approval from the Traffic Operations Division for roadways with new guide signing. This is not required for upgrades of existing signs; in this case, plans can be prepared without schematics.
- ◆ Obtain a geotechnical survey and coordinate with a structural engineer when designing overhead sign bridge foundations.
- ◆ Coordinate plans with the roadway design engineer.
- ◆ Prepare final signing and pavement marking plans.

Helpful Suggestions.

- ◆ Consider contrast and shadow markings on light-colored pavements.

- ◆ If a fixed-site Commercial Motor Vehicle (CMV) inspection facility is within the project limits, confirm if signing meets the Traffic Division Standard sheets for freeway CMV inspection stations. Coordinate with Texas Department of Public Safety. See Task 20540: [Perform preliminary planning for commercial motor vehicle inspection stations](#).
- ◆ Roadway and traffic engineers should coordinate intersection and ramp geometry early in the design process. There may be some areas of channelization improvement that become apparent only when preliminary striping designs are prepared.
- ◆ Roadway and traffic engineers need to coordinate lane transitions at project ends (especially lane drops) during early stages of design. The combination of signing and design speed requirements will likely require the lane transition to be longer than geometrically necessary.
- ◆ Overhead sign bridge supports should be located to maximize safety.
- ◆ Striping of pedestrian facilities, such as crosswalks, must be closely coordinated with the design of curb ramps.

Critical Sequencing.

- ◆ Preliminary design can be as simple as a line diagram showing proposed number of lanes, lane drops, and proposed overhead and large ground mounted, guide signs, and their proposed locations.

Resource Material.

- ◆ TxDOT [Signs and Markings Manual](#)
- ◆ [Texas Manual on Uniform Traffic Control Devices \(TMUTCD\)](#)
- ◆ [Traffic Delineator and Pavement Marker Standards](#)
- ◆ TxDOT [traffic Standards](#)
- ◆ [Sign Crew Field Book](#)
- ◆ [Pavement Marking Handbook](#)

Section 6 — Bridge Design

Overview

This section includes tasks typically performed by a structural engineer. The Engineer of Record (EOR) typically reviews the shop drawings for these items. The Engineer (E) typically reviews other items classified as working drawings.

The EOR is typically the Design Engineer who signs and seals the contract plan set (Bridge Division, District, or Consultant). The E is usually the Area Engineer for the project. Format electronic submittals and provide sign/sealed engineering calculations, as required.

Bridges include bridge-class culverts.

This section includes the following groups of tasks, listed in chronological order.

- 50600. [Perform final geotechnical surveys](#)
- 50610. [Prepare preliminary bridge layouts](#)
- 50620. [Prepare bridge details](#)
- 50630. [District reviews bridge plans](#)
- 50640. [Submit Exhibit B to railroad company](#)

Final Geotechnical Surveys

50600: Perform final geotechnical surveys

Description. Geotechnical investigations are necessary to design for satisfactory long-term performance of structure foundations. For major projects, some geotechnical data may have been collected during preliminary design. All required data to finish designs should be obtained at this time. See Task 20505: [Perform preliminary geotechnical surveys](#).

To make a single data collection effort, coordinate obtaining geotechnical data for designing and planning the following:

- ◆ Bridges
- ◆ Radio towers
- ◆ Retaining walls
- ◆ Noise wall

- ◆ Illumination
- ◆ Overhead sign and signal structures
- ◆ Pavement structures
- ◆ Embankments
- ◆ Soil in proposed cut
- ◆ Trench excavation protection (shoring)
- ◆ Excavation and backfill for structures

Pertinent Project Types. Projects involving foundation design

Responsible Party. Project manager

Subtasks.

- ◆ Gather and review existing geotechnical data.
- ◆ Evaluate project for changes made after original geotechnical investigations are performed during advance planning (e.g., added structures, changed structure limits).
- ◆ Contact the Bridge Division, as necessary, for guidance in obtaining additional geotechnical data.
- ◆ Identify additional data required to finalize design.
- ◆ Prepare or obtain a work authorization for this additional work.
- ◆ Perform field and laboratory investigations. Site conditions may require additional evaluations for additional types of failure.
- ◆ Report results of investigations.

Resource Material.

- ◆ TxDOT Bridge Division [Geotechnical Manual](#)

Bridge Layouts

50610: Prepare preliminary bridge layouts

Description. A preliminary bridge layout depicts proposed features of a structure and is used to obtain early approvals before beginning detailed design. Submit preliminary bridge layout review to Bridge Division – Project Development for review and approval before any detail work is performed. Preliminary layouts are reviewed for bridge cost information (BCI) and compliance to specific design standards. Preliminary bridge layout reviews include bridge class culverts.

For a bridge project involving a railroad, Exhibit A includes the bridge layout with additional information of interest to the railroad owner. See Task 50480: [Develop Exhibit A for railroad agreements](#).

Pertinent Project Types. Projects including bridges to be newly constructed, replaced, or modified.

Responsible Party. Project manager

Subtasks.

- ◆ Review commitments made during the public involvement phase for information related to restrictions on bridge types.
- ◆ Obtain preliminary engineering recommendations, as-built construction plans, and bridge inspection reports for existing structures.
- ◆ Obtain layouts depicting existing structures, utilities, rights of way, crossroads, and railroad crossings.
- ◆ For rehabilitation and/or widening projects, contact the Bridge Division - Project Development staff to obtain a load rating and condition survey.
- ◆ Coordinate preliminary bridge hydraulics with the drainage engineer.
- ◆ Obtain additional geotechnical or survey data needed to finalize designs. See 50600: [Perform final geotechnical surveys](#).
- ◆ Identify necessary design exceptions.

Helpful Suggestions.

- ◆ The Bridge Division - Project Development staff are available for assistance with preparing preliminary layouts, particularly if a bridge will be widened or modified in any way, or if unusual features exist.
- ◆ A site visit is highly recommended. Items such as stream gages and utilities seldom appear on as-built construction plans.
- ◆ Assuming a structural engineer is working on the project team at this time, alert the structural engineer to commitments made to resource agencies. These may affect wetland and natural resources impact minimization, bent locations, substructure type, and construction methods.
- ◆ The designer should determine and document the need for design exceptions before submitting layouts to the Bridge Division.

Critical Sequencing.

- ◆ Start bridge layouts after developing final alignments and preliminary bridge hydraulics.

- ◆ Finalize bridge layouts after completing bridge hydraulics, including scour analysis, and any geotechnical investigations.
- ◆ Obtain district approval of bridge layouts, hydraulic calculation sheets, and hydraulic reports before submitting them to the Bridge Division.

Resource Material.

- ◆ Online TxDOT, Home, Business, Resources: [Engineering Software](#) for highway design such as, Bridge Geometry, Bent Cap Analysis, and Beam-Column Analysis
- ◆ TxDOT [Hydraulic Design Manual](#)
- ◆ Bridge Division
 - General Presubmittal Information, [Shop Drawings](#)
 - Internal document: [Review Types by BRG PS&E Group](#) (Preliminary Review Guidance)
 - [Guide](#) to Electronic Shop Drawing Submittals
 - [Required](#) Shop/Working Drawing Submittals
 - TxDOT [Bridge Design Manual - LRFD](#)
 - TxDOT [Bridge Project Development Manual](#)
 - Bridge Detailing [Guide](#)

Bridge Design and Details**50620: Prepare bridge details**

Description. Update bridge layouts, as necessary, after Division preliminary review and approval of the layouts. Bridge design includes determining superstructure and substructure of span bridges and culvert details 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.

Pertinent Project Types. Projects including bridge class culverts requiring non-standard design and new, rehabilitated, or modified span bridges

Responsible Party. Structural engineer

Subtasks.

- ◆ Update preliminary bridge layouts per Division and comments.
- ◆ Obtain the following from the roadway design engineer:
 - Current typical section
 - Alignments

- Superelevation and transition locations
 - Pedestrian features
 - Required clearances
 - Proposed utilities
 - Roadway lighting
 - Drainage conveyance method
 - Construction staging
 - Resource agency commitments
 - Information regarding special issues such as noise wall on bridges and overhead fiber optic and power line restrictions
- ◆ Obtain current bridge hydraulics from the drainage engineer.

Helpful Suggestions.

- ◆ A site visit is highly recommended.
- ◆ Notify the structural engineer about commitments made to natural resource agencies. These may affect wetland impact minimization, floodplain constraints, bent locations, substructure type, superstructure type, and construction methods.
- ◆ Bridge design and detailing also includes many areas, such as retaining walls, bridge rails, structural pedestrian features, lateral restraint, fender systems, utility attachments, bridge illumination, landscape/aesthetic components and drainage systems.

Resource Material.

- ◆ TxDOT [*Bridge Design Manual - LRFD*](#)
- ◆ TxDOT [*Bridge Detailing Manual*](#)
- ◆ TxDOT [*Hydraulic Design Manual*](#)
- ◆ TxDOT [*Geotechnical Manual*](#)
- ◆ TxDOT [*Landscape and Aesthetics Design Manual*](#)

50630: District reviews bridge plans

Description. 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 Bridge Division - Project Development Section. The district is also responsible for incorporating these structural details into the final plan set (e.g., updating the index of sheets, numbering the plan sheets).

Pertinent Project Types. All projects

Responsible Party. Project manager

Helpful Suggestions.

- ◆ If structural plans are prepared by a consultant, they should be reviewed by a member of TxDOT with structural expertise. The Bridge Division is available for assistance, if needed.

Resource Material.

- ◆ TxDOT [Bridge Project Development Manual](#)
- ◆ TxDOT [Bridge Detailing Manual](#)

50640: Submit Exhibit B to railroad company

Description. Railroad company approval of Exhibit B (as-let PS&E plan set) is required for underpass and overpass projects.

After receiving the final PS&E, an Exhibit B to the railroad Construction and Maintenance (C&M) Agreement is prepared and forwarded to the appropriate railroad company for final approval of all aspects of a proposed bridge.

Pertinent Project Types. Bridge projects involving grade separated railroad crossings

Responsible Parties. District Project Manager and RR Coordinator

Critical Sequencing.

- ◆ Overpass projects typically require all signatories on the Exhibit B title sheet before the contractor can access the right of way. Exhibit B signed title sheet is attached to all original copies of the C&M Agreement.
- ◆ Underpass projects require a signed Exhibit B prior to execution of C&M Agreement.

Resource Material.

- ◆ TxDOT [Railroad Operations Volume](#)
- ◆ TxDOT [Bridge Project Development Manual](#)

Section 7 — Drainage Design

Overview

This section discusses project elements typically designed by the drainage engineer. Tasks fall into categories of hydraulic design, drainage details, and storm water pollution prevention plan preparation. Drainage design requires continuous coordination with roadway design activities.

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 should be considered for use as a mitigation measure to reduce the runoff impact to receiving water quality.

This section includes the following groups of tasks. Tasks are listed in approximate chronological order but may be performed concurrently, unless noted otherwise. Work performed at this stage is done after preparing stream crossing hydraulics.

- 50270. [Prepare stream crossing hydraulics](#)
- 50700. [Perform hydraulic design for culverts and storm drains](#)
- 50710. [Perform hydraulic design for pump station\(s\)](#)
- 50720. [Prepare culvert and storm drain details](#)
- 50730. [Prepare pump station details](#)
- 50740. [Design Storm Water Pollution Prevention Plan](#)

Hydraulic Design

50700: Perform hydraulic design for culverts and storm drains

Description. Roadway culvert and storm drain hydraulic design includes determining culvert and storm drain sizes and grades to handle design stormwater flows. The designer should evaluate the land use to determine the best structure for the location.

Culverts carry surface water across or from the highway right of way. They also must carry traffic and earth loads; therefore, culverts require both hydraulic and structural design. Structures measuring 20 ft. or more along the roadway centerline are classified as bridges.

Since storm drains receive water through inlets and carry the water through long underground conduit, it is desirable to maintain a minimum self-cleaning velocity in storm drains to prevent deposition and loss of capacity. Repair or replacement can be very expensive.

Pertinent Project Types. Projects involving new or retrofit culvert and storm drain systems

Responsible Party. Drainage engineer

Subtasks.

- ◆ Review preliminary engineering recommendations, as-built construction plans, drainage area maps, and hydrology reports.
- ◆ Obtain proposed typical sections, alignments, superelevation, geometric layouts, existing and proposed utilities, construction staging, natural resource agency commitments, and preliminary cross sections from the roadway design engineer.
- ◆ Make a site visit to inspect existing facilities, flow patterns, and erosion conditions.
- ◆ Review site drainage history with maintenance and local public agency personnel.
- ◆ Request information about existing or proposed major outfall storm drains, and review existing and proposed detention ponding by others. Determine if detention by TxDOT is appropriate.
- ◆ Update hydrology design to match current and proposed roadway design.
- ◆ Design cross drainage facilities.
- ◆ Design parallel ditch and culvert facilities.
- ◆ Finalize all computer runs for inclusion in plans.
- ◆ Submit bridge class culverts to Bridge Division for preliminary layout review. See Task 50610: [Prepare preliminary bridge layouts](#).
- ◆ Review design results and proposed drainage changes with local agencies.

Helpful Suggestions.

- ◆ Perform a site visit, preferably during a major rain event. Personally inspect items such as broken or damaged culverts, culvert end treatment type, localized flooding, sedimentation, and utilities. Taking these issues into account can be critical to the design of drainage facilities. Research commitments made to natural resource agencies.
- ◆ Drainage design should include consideration of pedestrian facilities, utility impacts, driveway grades, outfall and ditch erosion, wildlife habitat, and retaining wall drainage.
- ◆ Placement of concrete traffic barrier should be evaluated for drainage impacts.

- ◆ 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.

Critical Sequencing.

- ◆ Roadway culvert designs can be performed after the detailed hydrology study is completed, final roadway alignments are determined, and stream crossing hydraulics are finished.

Resource Material.

- ◆ FHWA [Hydraulic Design of Highway Culverts](#), 3rd Edition
- ◆ Online TxDOT, Home, Business, Resources: [Engineering Software](#) for highway design such as, Bridge Geometry, Culvert Analysis, and Flow Manager
- ◆ Bridge Division, Scour Summary Sheet for Bridge Class Culverts, [Form 2606](#)
- ◆ AASHTO Highway Drainage Guidelines
- ◆ TxDOT [Hydraulic Design Manual](#)
- ◆ TxDOT [Roadway Design Manual](#)

50710: Perform hydraulic design for pump station(s)

Description. 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 should 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 should be used only when absolutely necessary. Also, backup systems should be considered.

Texas Evacuation Routes should 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.

Pertinent Project Types. Projects with mild or no slope for stormwater drainage

Responsible Party. Drainage engineer

Subtasks.

- ◆ Review preliminary engineering recommendations, drainage areas, and hydrology report.

- ◆ Make a site visit to inspect existing flow patterns near proposed sump and outfall areas. Consider the effect of the pump effluent on the outfall recipient.
- ◆ Order additional survey data, if necessary, for outfall design.
- ◆ Modify design storm water flow rates as necessary.
- ◆ Design outfall.
- ◆ Select pump type and size.
- ◆ Design control house.
- ◆ Analyze for, and design to avoid, flotation of pump wet well.
- ◆ Request input from TxDOT or local public agency personnel responsible for maintenance of pump systems.

Helpful Suggestions.

- ◆ Avoid the need for pump stations, if possible, as they require substantial maintenance.
- ◆ Perform a site visit to determine a gravity flow alternative to a pump station, if one exists. Such an alternative would likely require additional right of way or easements to be initiated as early as possible.

Critical Sequencing.

- ◆ Pump designs should be performed simultaneously with roadway drainage design.

Resource Material.

- ◆ FHWA Hydraulic Engineering Circular No.22, [Urban Drainage Design Manual](#), Third Edition
- ◆ TxDOT [Hydraulic Design Manual](#)
- ◆ FHWA [Highway Stormwater Pump Station Design](#), Hydraulic Engineering Circular No. 24 (HEC-24)

Drainage Details

50720: Prepare culvert and storm drain details

Description. The primary aim of an urban 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. Culverts are used to carry water underneath a roadway; storm drains typically drain sag areas.

Culvert detail sheets typically include following elements:

- ◆ Culvert cross sections
- ◆ Ditch plan/profiles
- ◆ Miscellaneous drainage details
- ◆ Culvert hydraulics (table or computer output)
- ◆ Drainage facility/quantity summaries
- ◆ Standard details

Storm drain detail sheets typically include the following information:

- ◆ Drainage areas
- ◆ Storm drain plan/profiles
- ◆ Ditch plan/profiles
- ◆ Detention/retention facility details
- ◆ Storm drain hydraulics (table or computer output)
- ◆ Drainage facility/quantity summaries
- ◆ Outfall details
- ◆ Inlet details
- ◆ Manhole and junction box standards
- ◆ Location of underground utilities.

Pertinent Project Types. Projects involving proposed pipe or box culvert construction or storm drain construction

Responsible Party. Drainage engineer

Subtasks.

- ◆ Prepare plan/profile sheets for inlet and outfall ditches, generally perpendicular to roadway, as required. These situations usually require a drainage easement.
- ◆ Prepare plan/profile sheets for large ditches, or canals, running generally parallel to the roadway, as required. These ditches do not include typical roadside ditches detailed on the roadway plan/profile sheets.
- ◆ Prepare culvert cross sections.
- ◆ Evaluate need for a geotechnical survey for trench excavation and shoring. See Task 50600: [Perform final geotechnical surveys](#).
- ◆ Prepare detention/retention facility plans, cross sections, and outfall profiles.
- ◆ Prepare drainage area maps; these may be superimposed on the storm drain plan.

- ◆ Prepare storm drain plan/profiles.
- ◆ Identify and obtain standard details for items such as inlets, manholes, junction boxes, and end treatment.
- ◆ Prepare details for non-standard inlets, manholes, and junction boxes.
- ◆ Prepare drainage details such as outlet protection, outlet structures, and utility accommodation details.
- ◆ Identify pipe strength requirements.
- ◆ Prepare drainage facility/quantity summaries.
- ◆ Finalize computer runs for inclusion in plans.
- ◆ Obtain necessary standard detail sheets.

Helpful Suggestions.

- ◆ Perform a site visit during a significant event to identify contributing drainage from adjacent properties.
- ◆ During detailing of drainage design, utility conflicts become defined. Utility conflicts should be avoided wherever possible by redesigning proposed drainage facilities. Whether borne by utility owners or TxDOT, utility adjustments are public costs and should be minimized when possible.
- ◆ The drainage engineer must coordinate construction staging with the roadway design engineer. Drainage problems can be caused by not considering conditions during construction phases.
- ◆ Furnish preliminary storm drain plans to local agencies, if TxDOT proposes to connect to the local agency's system.

Critical Sequencing.

- ◆ Storm drain and culvert drainage details can be prepared during, or immediately following, design of storm drain and culvert drainage. See Task 50700: [Perform hydraulic design for culverts and storm drains](#).

Resource Material.

- ◆ FHWA Hydraulic Engineering Circular No.22, 3rd Edition, [Urban Drainage Design Manual](#)
- ◆ Online TxDOT, Home, Business, Resources: [Engineering Software](#) for highway design such as, Bridge Geometry, Culvert Analysis, and Flow Manager
- ◆ TxDOT [Roadway Design Manual](#)
- ◆ TxDOT [Hydraulic Design Manual](#)
- ◆ TxDOT [Bridge Project Development Manual](#)

50730: Prepare pump station details

Description. Pump station detail sheets typically include the following information:

- ◆ Wet well details
- ◆ Control house structural details
- ◆ Outfall plan/profiles
- ◆ Control panel details
- ◆ Electrical service/motor control center details
- ◆ Electrical wiring diagrams
- ◆ Miscellaneous drainage details
- ◆ Pump hydraulics (table or computer output)
- ◆ Quantity summaries

Pertinent Project Types. Projects involving pump facility construction

Responsible Party. Project manager

Subtasks.

- ◆ Prepare drainage area maps for areas draining to the pump station.
- ◆ Prepare pump outfall plan/profiles.
- ◆ Prepare control house details.
- ◆ Prepare electrical service/motor control center details.
- ◆ Prepare control panel details.
- ◆ Prepare backup generator details and specifications.
- ◆ Prepare wiring diagrams.
- ◆ Prepare structural details for pump house wet wells and site plans.
- ◆ Prepare pump details and specifications.
- ◆ Prepare miscellaneous drainage details.
- ◆ Prepare miscellaneous pump station details.
- ◆ Prepare quantity summaries.
- ◆ Finalize hydraulic analysis or computer runs for inclusion in plans.
- ◆ Determine a suitable source of energy for the backup generator (gasoline, diesel, gas).

Helpful Suggestions.

- ◆ Refer to the TxDOT [Hydraulic Design Manual](#) for design considerations and hydraulic calculations.
- ◆ The pump station should be located outside the roadway clear zone. In cases where this is not feasible, the pump station should 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.
- ◆ The control house shall include electrical outlets and lights for convenient maintenance.
- ◆ Consider installing a high fence around the station to discourage vandalism.
- ◆ The flow line of the pipe inflow to the wet well should be at or above the pump cut off elevation to prevent stormwater from backing up in the pipe system. Consider including multiple pumps and/or alternate power sources in the design for added dependability.
- ◆ Controls for pump stations may be linked to Intelligent Transportation System centers for monitoring or control purposes. The Traffic Operations Division may assist in designing pump controls, or an electrical consultant may be considered.

Critical Sequencing.

- ◆ Pump details can be prepared during, or immediately following, pump design task.

Resource Material.

- ◆ TxDOT [Hydraulic Design Manual](#)
- ◆ FHWA [Highway Stormwater Pump Station Design](#), Hydraulic Engineering Circular No. 24 (HEC-24)

Storm Water Pollution Prevention Plan**50740: Design Stormwater Pollution Prevention Plan**

Description. Designing erosion and sediment control devices includes determining the type and size of facilities for minimizing erosion and siltation during and after project construction. Stormwater Pollution Prevention Plans (SW3Ps) 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 selected bid items or Force Account will serve as the project SW3P.

Pertinent Project Types. Projects that will disturb one or more acres

Responsible Party. Project manager

Subtasks.

- ◆ Review commitments to resource agencies.
- ◆ Obtain drainage designs and plans.
- ◆ Make a site visit to inspect existing erosion conditions.
- ◆ Design permanent and temporary erosion control measures to be consistent with proposed construction staging. Consider roadside safety in selecting the type of devices to include.
- ◆ Develop SW3P to be consistent with the requirements of the current Construction General Permit (CGP) for storm water discharges (TXR150000) published by the Texas Commission on Environmental Quality (TCEQ).
- ◆ Prepare the MS4 Notice of Intent (NOI) if construction stormwater will be discharged into TxDOT's MS4 system.

Helpful Suggestions.

- ◆ The drainage engineer should coordinate designs with the landscape architect for revegetation. This is especially important when designing items for controlling long-term erosion.
- ◆ SW3P details may be shown on construction phasing plans. This is especially useful for detailing erosion and sediment control by construction stage.

Critical Sequencing.

- ◆ SW3P designs and plans should be prepared after the roadway drainage design and traffic control plans are substantially complete.

Resource Material.

- ◆ TxDOT [*Hydraulic Design Manual*](#)
- ◆ Inside TxDOT, Environmental Affairs Division, [Public Storm Water Program](#)
- ◆ Inside TxDOT, Environmental Affairs Division, [MS4 Notice of Intent \(NOI\)](#) district maps of MS4 boundary areas
- ◆ TxDOT [*PS&E Preparation Manual*](#)

Section 8 — Retaining/Noise Walls & Miscellaneous Structures

Overview

This section discusses project elements typically designed by a roadway or structural engineer.

This section includes the following groups of tasks, which may be performed concurrently:

50600. [Perform final geotechnical surveys](#)

50800. [Prepare retaining and/or noise wall layouts](#)

50810. [Prepare retaining and/or noise wall plans and details](#)

50820. [Prepare plans for miscellaneous structures](#)

Retaining/Noise Wall Layouts

50800: Prepare retaining and/or noise wall layouts

Description. This task involves preparing a retaining wall and/or noise wall layout and performing subsequent research needed for submittal to the Bridge Division. Wall layouts show horizontal and vertical geometry, cross sections, wall type, and geotechnical data as appropriate.

Pertinent Project Types. Projects involving retaining or noise walls

Responsible Party. Roadway design engineer

Subtasks.

- ◆ Review all commitments made during the public involvement phase to determine if agreements were made relative to wall types, heights, locations, or aesthetic treatments.
- ◆ Obtain plots of existing utilities, right of way limits, and catch points of earthwork construction on cross-section sheets to determine proposed wall locations.
- ◆ Coordinate with the drainage engineer regarding drainage needs at the top of, and possibly through and under walls.
- ◆ Coordinate the aesthetics of walls with a landscape architect and stakeholders.
- ◆ Coordinate wall locations with proposed utility adjustments for construction clearances.
- ◆ A standard soils computer program is used for a uniform representation of core boring data on a statewide basis. Contact the Geotechnical Branch of the Bridge Division for technical assistance.

- ◆ Obtain any additional geotechnical data necessary to finalize designs. Refer to the TxDOT *Geotechnical Manual* for soil core boring information.
- ◆ Retaining walls exceeding a 25 ft height require Bridge Division approval of the layout.

Helpful Suggestions.

- ◆ Establish a smooth vertical alignment along the top of retaining walls for a pleasing appearance.
- ◆ Coordinate retaining/noise wall layouts with bridge layouts to ensure compatibility of elevation, horizontal control, and proposed aesthetic treatments.
- ◆ Walls founded in soft soils may require deep foundations. Proper preliminary geotechnical investigation is important.
- ◆ Coordinate with district maintenance personnel regarding maintenance requirements adjacent to walls.
- ◆ The Bridge Division is available for consultation upon district request.

Critical Sequencing.

- ◆ Wall layouts can be started after developing final alignments and preliminary cross-sections.
- ◆ Wall layouts can be finished after completing the final geotechnical survey. See Task 50600: [Perform final geotechnical surveys](#).
- ◆ Retaining wall layouts should be submitted at least six months before submitting the PS&E.

Resource Material.

- ◆ FHWA [Highway Traffic Noise: Analysis and Abatement Guidance](#)
- ◆ Online: Inside TxDOT, Bridge Division, [Geotechnical and Approved Wall Systems](#)
- ◆ Online: Inside TxDOT, Environmental Affairs Division, [Traffic Noise Toolkit](#)
- ◆ TxDOT [Landscape and Aesthetics Design Manual](#)
- ◆ TxDOT [Hydraulic Design Manual](#).

Retaining/Noise Wall Design and Details

50810: Prepare retaining and/or noise wall plans and details

Description. Wall plans include details for constructing the walls and related items such as footings, piles, drainage systems, and tie-backs.

TxDOT standard sheets exist for walls, with various facings available.

Pertinent Project Types. Projects involving retaining or noise walls

Responsible Party. Roadway design engineer

Subtasks.

- ◆ Update wall layouts as requested by Bridge Division, if applicable.
- ◆ Coordinate with the drainage engineer regarding drainage needs at the top of, and possibly through and under, walls.
- ◆ Coordinate with landscape architect regarding aesthetics of, and landscaping around, walls. Review proposed aesthetic treatment with stakeholders.
- ◆ Prepare plan details and obtain standard sheets as necessary.

Helpful Suggestions.

- ◆ Establish a smooth vertical alignment along the top of retaining walls to provide a pleasing appearance.
- ◆ The Geotechnical Branch of the Bridge Division may be contacted for technical assistance.
- ◆ Refer to the Geotechnical Manual, for additional information to be included on layouts for various types of retaining walls.

Critical Sequencing.

- ◆ Wall designs and plan details can be started as soon as approval of wall layouts is obtained.

Resource Material.

- ◆ FHWA [Highway Traffic Noise: Analysis and Abatement Guidance](#)
- ◆ Online: Inside TxDOT, Bridge Division, [Geotechnical and Approved Wall Systems](#)
- ◆ Online: Inside TxDOT, Environmental Affairs Division, [Traffic Noise Toolkit](#)
- ◆ TxDOT [Landscape and Aesthetics Design Manual](#)
- ◆ TxDOT [Hydraulic Design Manual](#)

Miscellaneous Structures

50820: Prepare plans for miscellaneous structures

Description. Examples of miscellaneous structures include non-standard concrete traffic barrier (CTB) which accommodates parallel roadways with differing profiles, overhead sign bridges, high mast illumination, or different applications of bridge rail. Occasionally, there is the need to modify standard TxDOT designs.

Pertinent Project Types. All projects

Responsible Party. Roadway design engineer

Subtasks.

- ◆ Obtain TxDOT standard details for items involved.
- ◆ Research special design details used on similar projects.
- ◆ Contact the project development staff of the Bridge Division for technical assistance.

Resource Material.

- ◆ TxDOT [*Bridge Project Development Manual*](#)
- ◆ TxDOT [*Bridge Railing Manual*](#)
- ◆ TxDOT [*Highway Illumination Manual*](#)

Section 9 — Traffic Control Plan

Overview

This section describes elements typically designed by a traffic engineer or roadway design engineer.

A Traffic Control Plan consists of the following elements:

- ◆ Sequence of construction staging/phasing plan
- ◆ Detour plan (when required)
- ◆ Temporary signing, striping and pavement marking plan
- ◆ Contract provisions

Traffic Control Plans should 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 right of way. 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 Plan procedures should be based on the project characteristics to provide optimal development of the project Traffic Control Plan.

This section includes the following tasks. Tasks are listed in approximate chronological order, but may be performed concurrently.

50900. [Finalize sequence of construction](#)

50910. [Design detour roadways](#)

50920. [Obtain approval of road closure/detour plans](#)

50930. [Prepare details for temporary signing, striping, and pavement marking](#)

50940. [Develop contract requirements](#)

50950. [Review Traffic Control Plan](#)

Sequence of Construction Staging/Phasing Plan

50900: Finalize sequence of construction

Description. Construction staging plans detail the recommended phasing of project improvements. Staging should maximize mobility and safety during construction, while considering ease of construction.

Detours may be required to maintain traffic during certain construction stages.

Detailed layout and arrangement of work zone signs, work zone pavement markings, traffic control devices, and drainage facilities should be provided for each construction stage.

Pertinent Project Types. Projects impacting the normal flow of traffic

Responsible Party. Traffic engineer or roadway design engineer

Subtasks.

- ◆ Obtain preliminary roadway, drainage, and traffic plans. Refer to plans prepared while planning the sequence of construction. See Task 50200: [Plan sequence of construction](#).
- ◆ Evaluate potential of construction impacts on existing traffic (e.g., pavement drop offs, work adjacent to travel lanes, lane closures).
- ◆ Consider need for nighttime illumination of construction area.
- ◆ Prepare written description of construction sequence (optional).
- ◆ Coordinate with District Pavement Engineer to obtain temporary pavement designs.
- ◆ Coordinate plans with appropriate district and area office staff to include design, construction, drainage, utilities, and traffic.

Helpful Suggestions.

- ◆ Make sure that nontypical and transition areas are detailed. The designer should envision what the driver will see along the project.
- ◆ Consider safe operation for pedestrians and bicyclists in all stages of construction. Construction markings, traffic control devices, and barriers should be designed with this goal.
- ◆ Continuous safe access to all properties during construction is necessary. Staging must consider property owner access; plans must describe how this need will be met.
- ◆ Consider incorporating the effects of utility adjustments performed during construction.

Authority.

- ◆ 43 TAC §22.12 [Closures](#)

- ◆ 23 CFR §630 [Subpart J - Work Zone Safety and Mobility](#)

Resource Material.

- ◆ [Texas Manual on Uniform Traffic Control Devices \(TMUTCD\)](#), Part 6 Temporary Traffic Control
- ◆ Online: TxDOT, Business, Resources, Statewide Standard CAD Files, Traffic Engineering - Barricade and Construction Standards, Work Zone Standards, and [Traffic Control Standard Sheets](#).

Detour Plans**50910: Design detour roadways**

Description. 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.

Detailed layout and arrangement of construction signs, construction pavement markings, traffic control devices, and drainage facilities should be provided for each detour. Plans should include grade, stopping sight distance, and superelevation cross sections, as appropriate.

Pertinent Project Types. All projects involving detours

Responsible Party. Roadway design engineer

Subtasks.

- ◆ Obtain preliminary roadway, drainage, and traffic plans. Refer to plans prepared while finalizing the sequence of construction. See Task 50900: [Finalize sequence of construction](#).
- ◆ Prepare preliminary detour plans. See Task 50210: [Develop conceptual detour/road closure plan](#).
- ◆ Determine grades, stopping sight distances, horizontal curve radii, superelevation, and typical cross sections.
- ◆ Determine right of way required, if any.
- ◆ Coordinate detour plans with local entities and major traffic generators.
- ◆ Evaluate impact on existing utilities (e.g., access utility cover and clearances).
- ◆ Coordinate with District Pavement Engineer to obtain temporary pavement designs.
- ◆ Coordinate plans with appropriate district and area office staff to include design, construction, drainage, and traffic.

- ◆ Prepare final detour plans.

Helpful Suggestions.

- ◆ Make sure that nontypical and transition areas are detailed.
- ◆ Consider safe operation for motorcycles, pedestrians and bicyclists in all stages of construction. Construction markings, traffic control devices, and barriers should be designed with this goal.
- ◆ Consider impacts to existing, parallel facilities in addition to the roadway's capacity to handle traffic. Consider impacts to schools, emergency vehicles, pedestrians, bicyclists, and neighborhoods due to traffic rerouting.
- ◆ Detours should 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](#)) should be considered. Design the detour to meet the lowered construction speed limit.
- ◆ Continuous safe access to all properties during construction is necessary. Staging and detour designs must consider this need; plans should describe how the need will be met.

Critical Sequencing.

- ◆ Prepare detour designs and plans after the roadway, drainage, and traffic plans are substantially complete and the construction staging plan is developed.

Authority.

- ◆ Transportation Code, Chapter 224, [Subchapter D. Detour Roads](#)

Resource Material.

- ◆ [Texas Manual on Uniform Traffic Control Devices \(TMUTCD\)](#), Part 6 Temporary Traffic Control
- ◆ TTI: [Maximizing Motorcycle Safety in Work Zones](#)
- ◆ Traffic Operations Division - Request for Regulatory Construction Speed Zone ([Form 1204](#))
- ◆ Online: TxDOT, Business, Resources, Statewide Standard CAD Files, Traffic Engineering Barricade and Construction Standards, Work Zone Standards, and [Traffic Control Standard Sheets](#).
- ◆ TxDOT [Roadway Design Manual](#)
- ◆ TxDOT [Signs and Markings Manual](#)

50920: Obtain approval of road closure/detour plans

Description. 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.

Obtain written concurrence from entities having jurisdiction over affected roadways. Place signed local entity concurrence documents in the project file of record.

On-system roadways should not be closed, unless highly unusual circumstances exist. On-system closures require an executed signed Agreement for Temporary System Closure.

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.

Refer to related information in Task 50210: [Develop conceptual detour/road closure plan](#).

Pertinent Project Types. Projects including an on-system or off-system road closure or detour route on an existing off-system facility

Responsible Party. Project manager

Subtasks.

- ◆ Submit closure requests to the local government agencies through appropriate channels in the district.
- ◆ Notify local post office, police, emergency services, fire departments and school districts of road closure.

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 Detour” 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)

- ◆ Prepare a map showing the 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 and on all roads used as a detour.

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- ◆ Send a road closure memorandum to the District Engineer for approval. Include the following in the memorandum:
 - Road closure duration
 - Recommendations to expedite project completion (i.e. calendar days, liquidated damages)
 - Documentation of required notifications, concurrence letters and/or agreements
 - Map prepared as described above
 - Submit a signed copy of the District Engineer’s road closure approval memo to the Design Division with the PS&E and supporting documents.
 - See Task 51070: [Submit PS&E to Design Division](#).

Helpful Suggestions.

- ◆ Allow enough lead time for municipal officials’ approval of closure request.
- ◆ 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.

Critical Sequencing.

- ◆ Discussion and preliminary approval of road closure/detour plans should be initiated when a road closure or detour is first considered.
- ◆ Written approval should be obtained as soon as detour plans are completed to the point where road closure/detour timing can be reasonably defined.

Authority.

- ◆ Road closure requests submitted to the Department by others 43 TAC §22.12 [Closures](#)
- ◆ Transportation Code
 - General Provisions and Administration, [Chapter 201](#)
 - General Provisions, [Chapter 221](#)
- ◆ Government Code
 - Interagency Cooperation Act, [Chapter 771](#)
 - Interlocal Cooperation Contracts, [Chapter 791](#)

Resource Material.

- ◆ Internal online: Contracts and Purchasing Division, Contract Services, Standard Contracts: Traffic - [Temporary System Detour](#)
- ◆ [Negotiated Contracts Procedures Manual](#)

Temporary Signing, Striping, and Pavement Marking

50930: Prepare details for temporary signing, striping, and pavement marking

Description. For detour routes 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. Dimension typical sections and plans both horizontally and vertically as necessary to result in a safe product.

Traffic control plans (TCP) detail how construction of project improvements will be accomplished. TCP should maximize traffic operations and safety, and should maximize 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 should be used whenever possible because of contractor and inspector familiarity with these sheets.

Pertinent Project Types. All projects except those that are simple enough to be described using barricade and construction standards

Responsible Party. Roadway design engineer

Subtasks.

- ◆ Obtain construction staging and detour plans.
- ◆ Determine the need for construction speed zoning and traffic control at intersections.
- ◆ Coordinate plans with appropriate district and area office staff.
- ◆ Prepare final traffic control plans.

Helpful Suggestions.

- ◆ Make sure that nontypical and transition areas are detailed.
- ◆ Consider safe operation for motorcyclists, pedestrians and bicyclists in detailing the TCP. Design construction markings, traffic control devices, and barriers with this goal.

Resource Material.

- ◆ [Texas Manual on Uniform Traffic Control Devices \(TMUTCD\)](#), Part 6 Temporary Traffic Control
- ◆ TTI: [Maximizing Motorcycle Safety in Work Zones](#)
- ◆ Traffic Operations Division - Request for Regulatory Construction Speed Zone ([Form 1204](#))

- ◆ Online: TxDOT, Business, Resources, [Statewide Standard CAD Files](#), Traffic Engineering Barricade and Construction Standards, Work Zone Standards, and Traffic Control Standard sheets
- ◆ TxDOT [Roadway Design Manual](#)
- ◆ TxDOT [Signs and Markings Manual](#)

Contract Provisions

50940: Develop contract requirements

Description. A traffic control plan may require developing specific contract requirements.

Contract requirements may address the following subjects:

- ◆ Work hour restrictions
- ◆ Lane closure restrictions
- ◆ Access to work area
- ◆ Use of off-duty law enforcement personnel
- ◆ Accelerated construction provisions

Pertinent Project Types. Projects impacting the normal flow of traffic

Responsible Party. Roadway design engineer

Helpful Suggestions.

- ◆ Design Division and Traffic Operations Division Field Coordination personnel are available to provide assistance.

Review

50950: Review traffic control plan

Description. Each district should have a District Safety Review Team (DSRT). This should be 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 team might include:

- ◆ District Design Engineer
- ◆ District Construction Engineer

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- ◆ District Traffic Engineer
 - ◆ District Maintenance Engineer
 - ◆ Area Engineer
 - ◆ Traffic Safety Coordinator
 - ◆ Public Information Representative

The District Safety Review Team should review as many traffic control plans as practical, but more importantly, the team should be involved in the development process to eliminate the need for lengthy reviews.

The review process should 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.

Pertinent Project Types. Projects affecting the normal flow of traffic

Responsible Party. Project engineer(s) supported by a multidisciplinary team

Authority.

- ◆ 23 CFR §630.1002 et seq. [Work Zone Safety and Mobility](#)

Resource Material.

- ◆ FHWA Work Zone Management Program, [Transportation Management Plan \(TMP\) Development Resources](#)
- ◆ [Texas Manual on Uniform Traffic Control Devices \(TMUTCD\)](#)
- ◆ TxDOT Traffic Operations Division, [Traffic Control Standard Detail Sheets](#)

Section 10 — PS&E Assembly/Design Review

Overview

The end of the design process is the assembly of the plans, specifications, and estimate (PS&E) package and supporting documents. The design review process gives the designer the last opportunity to check PS&E for completeness, accuracy, and to minimize potential for construction related problems including contractor claims. Refer to the TxDOT [PS&E Preparation Manual](#) for detailed information.

This section includes the following Tasks. The tasks are listed in approximate chronological order, but may be performed concurrently.

- 51000. [Conduct environmental reevaluation](#)
- 20720. [Design exceptions or waivers](#)
- 51010. [Prepare PS&E package](#)
- 51020. [Conduct district PS&E review](#)
- 51030. [Assemble project plans](#)
- 20490. [Update cost estimates](#)
- 51040. [District conducts final agreement/permit and public interest statement reviews](#)
- 51050. [Collect outside, additional funding based on Advance Funding Agreements](#)
- 51060. [District performs final review of PS&E](#)
- 51070. [Submit PS&E to Design Division](#)
- 51080. [Obtain approval for program overruns](#)

51000: Conduct environmental reevaluation

Description. If a project has received environmental clearance, but project advancement is delayed, policy or regulations change, there are major project design changes, or grants may be needed, a reevaluation is required to establish whether the environmental decision remains valid or additional work is needed.

The Purpose and Need Statement for a project may not be changed for a reevaluation. Change to the purpose and need for a project would 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.

Environmental reevaluations are performed to determine whether:

- ◆ Environmental approval (FONSI or ROD) is still valid
- ◆ Approved environmental document (EA, DEIS, FEIS) is still valid.

Reevaluations are generally required three years after either environmental clearance, or approval, when any one of the following occurs:

- ◆ Changes in design, scope, land use, or right of way requirements
- ◆ New environmental impacts not discussed in the original documentation are identified or previously discussed impacts change.
- ◆ Regulatory changes.

Reevaluation can be either a brief letter or a document. The extent of changes or impact differences should determine the type of reevaluation.

Pertinent Project Types.

- ◆ An FEIS is not submitted to the department delegate within three years from the date of DEIS circulation.
- ◆ Three years after final approval of FEIS, FEIS supplement, or last major approval or grant there is no activity (i.e., no design work, no right of way acquisition, etc.).
- ◆ Significant environmental impacts, which were not evaluated in the original DEIS document, will require a supplemental DEIS.
- ◆ Reevaluation may be required for project design or scope changes, affected environment changes, policy or regulation changes.

Responsible Party. District environmental coordinator

Helpful Suggestions.

- ◆ In some cases, project activities may continue during reevaluation if the reevaluation is to address only limited issues.
- ◆ In conducting a reevaluation, the design team should reassess the project relative to the initial Purpose and Need Statement that sets the foundation for detailed design decisions.
- ◆ Public involvement needs must be reassessed as part of the reevaluation.

Critical Sequencing.

- ◆ Begin this task soon after determining its need to avoid project delay.

Authority.

- ◆ Federal projects, [23 CFR 771.129](#) Reevaluations
- ◆ State projects, [43 TAC § 2.85](#) Reevaluations

Resource Material.

- ◆ Environmental Affairs Environmental Compliance Toolkits [Reevaluations](#)

51010: Prepare PS&E package

Description. At this point in project development, the plans, specifications, and estimate (PS&E) should be complete. Completed electronic plan files should be assembled within the latest department software delivery program and guidelines, and in an order consistent with the *PS&E Preparation Manual* “Plan Sheet Sequence”.

Original signed contract documents supporting design decisions and agreements should be filed in the District File of Record location. Submit electronic copies of original supporting documents in the PS&E submittal to the Design Division (DES). Duplicate copies may become the default file of record, if originals are lost or destroyed.

In the situation where there are Design Exceptions, Waivers, or Variances, the original Design Exception documents will be retained in the district File of Record and a copy of all documents shall be submitted to the Design Division field office.

The department maintains delegated signature authority information at the internal Contracts and Purchasing Division - Contract Services website. An employee who signs any official TxDOT document is indicating compliance with TxDOT policy and procedures.

The PS&E package includes, but is not limited to:

- ◆ Completed Form 1002 (signed and dated). Use the form to review the PS&E package for completeness.
 - Page 1, lists certification status and documents to accompany submittal.
 - Page 2, provides project duration, funding, environmental, and permit/agreement information.
 - Page 3, provides proposed design information and exceptions or waivers applied for the submitted project.

- ◆ Engineer Seal sheet that bears the engineer’s seal, signature, and date with a statement of responsibility for the contract specifications, special provisions, general notes and specification data
- ◆ Copy of Management Plan approval memo for using a start work delay special provision
- ◆ Contract Time Determination Schedule (signed and dated by engineer)
- ◆ Project Agreements with other agencies or governments (signed copies)
- ◆ Temporary Road Closure Request
- ◆ Crash analysis for 2R projects – Engineer’s signed analysis statement and supporting data
- ◆ Copy of submitted TDLR registration
- ◆ Copy of FAA Determination for No Hazard to Air Navigation for construction project near regulated aviation facility airspace
- ◆ PS&E Stage Gate Checklist, [Form 2443](#)
- ◆ Proposal Submittal sheet and Pre-Letting Checklist from the District PS&E reviewer
- ◆ Original Design Exception(s), Waiver, or Variance documents and Summary of Basis of Decision signed and dated giving indication of “Approval” or “Non-Approval”. Original documents are retained in the DES Design Exception files.

Contact the Local Government Projects Office for any additional information on projects let by local public agencies.

Pertinent Project Types. All projects

Responsible Party. Project manager

Subtasks.

- ◆ Compile plans and a latest [Form 1002](#). Include utility plans, specifications, and cost estimates, if utility adjustments are to be part of the construction contract.
- ◆ Estimate the cost of new, removed, and replaced pedestrian elements in the project estimate; show total on Form 1002. Pedestrian items include walkways, curb ramps, pedestrian signal equipment, etc. Submit plans for RAS review.
- ◆ Prepare the specifications list (spec list) of governing project specifications and special provisions.
- ◆ Verify quantities and unit prices on the cost estimate.
- ◆ Prepare “spec data” sheets, including data which supplements the project specifications and which will be placed in the plans as the General Notes and Specification Data sheets.

Obtain the following for inclusion with the PS&E package:

- ◆ Verify number of working days and need for a prebid conference.
- ◆ Identify and separately group [non-participating](#) items on the cost estimate (i.e., items not paid by federal-aid funds).
- ◆ Submit requests to the Construction Division for special provisions, special specifications, and bid codes at least *two months* before scheduled letting PS&E due date to DES. This allows time to have spec requests sent through the spec committee review process.
- ◆ Coordinate railroad agreements. See Task 20430: [Initiate railroad coordination](#).
- ◆ Ensure that all environmental commitments are addressed in the PS&E and the environmental process is complete. See Task 50240: [Develop Environmental Permits, Issues, and Commitments \(EPIC\) sheet](#) and Task 50740: [Design Storm Water Pollution Prevention Plan](#).
- ◆ Evaluate the need for expedited construction prosecution and progress: such as, A+B bidding; increased liquidated damages; Calendar Day working day charges; or, lane rental.

Helpful Suggestions.

- ◆ For projects with accelerated construction schedules, the working day charges for Calendar Day definition should be considered.

Critical Sequencing.

- ◆ Complete the PS&E package according to Financial Management Division – Letting Management office, PS&E Review and Processing Schedule.
- ◆ Prepare a Management Plan for projects that will use a delay start work special provision. Submit Plan to the Design Division no later than one week prior to PS&E Review and Processing Schedule, “Post Candidate List of Projects for Letting”.

Authorization.

- ◆ Project certifications - state and federal, [23 CFR §635.309 Authorization](#)

Resource Material.

- ◆ Signature Authority: (Internal) Crossroads, Contracts and Purchasing Division, Contract Services web-page, [Delegation of Authority](#)
- ◆ TxDOT [Legal Manual](#)
- ◆ Internal link: Financial Management Division - Letting Management [PS&E Review and Processing Schedule](#)
- ◆ PS&E Transmittal Data, [Form 1002](#)
- ◆ PS&E Stage Gate Checklist, [Form 2443](#)
- ◆ Specification Resources, [Guidance and Templates](#)
- ◆ Mainframe estimates and contract guidance, [DCIS User Manual](#)

51020: Conduct district PS&E review

Description. An in-house district review of the plans, specifications, and estimate (PS&E) package by a multidisciplinary team is required. This quality control review is conducted to allow others with subject matter expertise the opportunity to identify inconsistencies in the package.

The plans shall describe the location and features in sufficient detail to facilitate construction and control the contract and estimate of the project.

Pertinent Project Types. All projects

Responsible Party. District design engineer

Subtasks.

- ◆ Distribute the PS&E package to review team members, preferably before the review meeting.
- ◆ At the review meeting, cover project highlights concentrating on items that should receive a more detailed review.
- ◆ Utilize the Advance Planning Risk Analysis (APRA) tool to review all risk issues and make sure that the project is ready for letting. Refer to Task 10200: [Prepare cost estimate](#) for more information regarding the APRA tool and the User Guide.
- ◆ Gather review comments at the meeting and set up a deadline for follow-up comments.
- ◆ Conduct follow-up meetings with reviewers, as necessary, to clarify their comments.
- ◆ Revise the PS&E package, as required.

Critical Sequencing.

- ◆ Perform the review with respect to the Financial Management Division (FIN) - Letting Management office, “PS&E Review and Processing Schedule” letting month deadlines for the fiscal year.

Resource Material.

- ◆ TxDOT [PS&E Preparation Manual](#)
- ◆ Internal link: Financial Management Division - Letting Management [PS&E Review and Processing Schedule](#)

51030: Assemble project plans

Description. Completed electronic plan sheet files should be assembled within the latest department software delivery program and guidelines. Finalize title sheet information.

The construction plan set is considered copyrighted intellectual property. Verify all plan sheets show a TxDOT title block with contract CSJ, County, District, Route, and sheet number information specific to the project contract. The PS&E plans title sheet should show the copyright notice “©”, Texas Department of Transportation, and year of creation at bottom center of the sheet to show that the department owns the copyright. The TxDOT title block/information on each plan sheet applies to plan sheets provided by others (utilities, local entities, etc.) who provide plan sheets for construction under the state-let project contract.

The state or federal funding project number is only shown on title sheet.

For information on the order of plan sheet order, refer to the TxDOT [PS&E Preparation Manual](#).

Pertinent Project Types. All projects

Responsible Party. Project manager

Subtasks.

- ◆ Sign, seal, and date appropriate sheets.
- ◆ Prepare General Notes and Specification Data sheets.
- ◆ Prepare Estimate and Quantities (E&Q) sheet(s).
- ◆ Prepare and insert TxDOT Standard Detail sheets.
- ◆ Finalize title sheet and title block data.

Critical Sequencing.

- ◆ Assemble plans according to the district schedule.

Resource Material.

- ◆ TxDOT [PS&E Preparation Manual](#)
- ◆ Internal link: Financial Management Division - Letting Management [PS&E Review and Processing Schedule](#)
- ◆ Inside TxDOT, Division, Design: [Statewide Standard CAD files](#)

50140: District conducts final agreement/permit and public interest statement reviews

Description. Before submitting the PS&E to the Design Division, the district should 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 PS&E, 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.
- ◆ 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 should be bid as alternatives with all, or at least a reasonable number of, acceptable materials or products listed.

Pertinent Project Types. Projects involving any third-party agreement/permit or incorporating experimental or proprietary products

Responsible Party. Project manager

Subtasks.

- ◆ Ensure all permits have been issued and are current; check permit expiration dates.
- ◆ Ensure all permit conditions are met; failure to meet the conditions of a particular permit could delay a project.
- ◆ Ensure that all necessary agreements are obtained (e.g., utility agreement, railroad agreement).
- ◆ Submit a Public Interest Statement to FHWA, if federal participation is anticipated.

Critical Sequencing.

- ◆ Conduct the final agreement and permit review after assembling project plans.

Authority.

- ◆ Proprietary Materials - Regulation: Material or Product Selection [23 CFR §635.411](#)

References.

- ◆ [Guidance on Patented and Proprietary Product Approvals](#), FHWA Memorandum
- ◆ [Patented and Proprietary Products: Database of FHWA Approvals](#), memo

51050: Collect outside, additional funding based on Advance Funding Agreements

Description. Advance funding agreements (AFAs) define the cost participation and payment method for outside funding participation on a project. The AFA should 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 Task 10510: [Prepare and execute advance funding agreements](#).

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 Construction Division (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 local government has indicated the bid prices are acceptable.

Pertinent Project Types. Projects having AFAs

Responsible Party. Project manager

Subtasks.

- ◆ Obtain the final project cost estimate and funding agreements.
- ◆ Determine participation level for each party to the funding agreement.
- ◆ Verify amounts previously received.
- ◆ Coordinate with the district director of transportation planning and development regarding the need to obtain funding.
- ◆ Send Notice of Financial Clearance. See Task 60100: [Perform financial clearance analysis](#).

Critical Sequencing.

- ◆ Collect funding in accordance with provisions of the agreement.

Authority.

- ◆ Federal State and Local Participation, [43 TAC §15.52 Agreements](#)

Resource Material.

- ◆ Internal online, Contracts and Purchasing Division, Contract Services, Standard Contracts, Advanced Funding (AFA), [AFA Notice of Financial Clearance Form](#)
- ◆ TxDOT, Prebid and Post Bid Notice of Financial Clearance, [Negotiated Contract Procedures Manual](#)

51060: District performs final review of PS&E

Description. Final PS&E review has been delegated to the districts. Before submitting the files to the Design Division, the district conducts a final review to ensure that the completed PS&E is ready to submit. The District Engineer must certify each project for their district by signing the project plans title page in the “Approved For Letting” signature box.

Design Division will do a compliance review to verify all files have been received and meet required state and federal guidelines.

Performance End Date (PED). Federal aid projects are required to have a PED. Costs incurred after this date may not be eligible for reimbursement. At the present time, the date is to be entered in the DCIS field by the date shown on the Letting Management “PS&E Review and Processing Schedule”. PED dates are specified by letting month. If a PED extension is needed, a Request must be submitted.

Pertinent Project Types. All projects

Responsible Party. District design engineer

Helpful Suggestions.

- ◆ Update standard project details, specifications, and special provisions to reflect the latest copy of all such documents.
- ◆ Helpful checklists are available in the TxDOT [PS&E Preparation Manual](#).

Critical Sequencing.

- ◆ Final PS&E review should be conducted following completion of all documents.

Resources.

- ◆ [Performance End Date Procedures for Districts and Divisions Guide](#)
- ◆ [Performance End Date Extension Request Form](#)

51070: Submit PS&E to Design Division

Description. Following district review, send the electronic PS&E package, including supporting documents, to the Design Division. Submit according to the project’s letting date timeline found on the Finance Division - Letting Management, PS&E Review and Processing Schedule.

Design Division will do a compliance review to verify all contract documents and design will meet project and funding requirements.

For Category 8, safety projects consult the Traffic Division.

For all projects with bridge structures, including bridge class culverts, submit final bridge layout sheets and estimate of all bridge structures to BRG PS&E Review Section.

Pertinent Project Types. All projects

Responsible Party. District Design Engineer

Authority.

- ◆ Project Approval and Oversight, [23 USC §106](#)
- ◆ Standards, [23 USC §109](#)

Subtasks.

- ◆ Seal and date DCIS (S1) screen.
- ◆ Release the estimate to the Design Division after running the Proposal.
- ◆ Send the PS&E submittal to Design Division for compliance review and processing.

Resource Material.

- ◆ TxDOT [PS&E Preparation Manual](#)

51080: Obtain approval for program overruns

Description. When overruns exist, there is usually a justification such as additional scope of work not originally anticipated or a significant increase in unit prices. Program overrun memorandums are required to ensure accountability in cost estimating and provide detailed justification for increased funding levels. Handle project cost estimate increases before letting as described in Minute Order 109864.

Various levels of approval are required depending on the funding category and the amount of the program overrun.

Categories 1 and 11 – The District Engineer may approve all increases that do not exceed the district’s authorized funding in these categories.

Categories 2, 3, 4, 6 – Appropriate Division Director may approve all increases not to exceed \$2.5 million. The Executive Director may approve all increases up to an amount not to exceed \$25 million. The Commission will consider all increases in excess of \$25 million.

Categories 5, 7 – The District Engineer may approve all increases within the limits outlined in the MPO’s Transportation Improvement Program, otherwise only with MPO approval not to exceed the MPO’s allocation for these categories.

Categories 8, 9 (Safety Rest Areas), 10 – The appropriate District Engineer, Division Director, or Agency Director may approve all increases that do not exceed the program’s allocation.

Categories 9, 12 – All increases require Commission approval.

Pertinent Project Types. Projects having final cost estimates exceeding programmed cost estimates

Responsible Party. Project manager

Subtasks.

- ◆ Verify estimates unit costs are correct and within reasonable limits.
- ◆ Obtain the project’s final cost estimate and compare it to the programmed estimate.
- ◆ Coordinate with the Director of Transportation Planning and Development regarding obtaining any needed additional funding.

Critical Sequencing.

- ◆ Prepare program overrun memorandums as soon as the final project cost estimate is prepared.

Resource Material.

- ◆ *TxDOT [PS&E Preparation Manual](#)*
- ◆ Online: Inside TxDOT, Texas Transportation Commission, Minute Order Search, Minute Order, November 2004, [109864](#)

Chapter 6 — Letting

Contents:

[Section 1 — Final Processing and Letting](#)

Section 1 — Final Processing and Letting

Overview

This section describes the final processes for the completed PS&E package (geometric standards, drawings, specifications, project estimates, and certifications relating to completion of right-of-way acquisition and relocation, utility work, and railroad work), supporting documents, and proposal.

TxDOT releases the plans and proposal to contractors for bidding through a request for submission of bids made by advertisement. The competitive bid process, also known as design-bid-build, is the method of project delivery; electronically submitted bids shall be publically posted within 48 hours after bids are opened. Bids are forwarded to the Transportation Commission for approval and the approved contract is awarded (let) to the lowest responsive bid submitted by a qualified bidder.

Districts have primary responsibility for PS&E review. Design Division does compliance and completeness reviews before PS&E/Proposal or addenda are posted to the public.

FHWA will be involved with projects according to the Oversight Agreement. Additionally, FHWA will have cradle-to-grave involvement with Major Projects having federal funding and total cost greater than \$500 Million or TIFIA loan projects. Involvement is due to the inherent high risk of these projects. FHWA NEPA oversight is excluded, since the NEPA responsibility has been assumed by the department. Department projects considered a Major Project are automatically an FHWA Project of Division Interest (PODI).

Final review by the district generally involves, but is not limited to the following tasks:

- ◆ Checking to ensure the project is authorized for letting
- ◆ Reviewing plans for consistency with approved design standards and criteria
- ◆ Checking for completeness of plans
- ◆ Checking for compliance with applicable rules and regulations
- ◆ Ensuring that funding is allocated
- ◆ Ensuring that other legal requirements are met to satisfy the letting process

This section includes the following tasks. The tasks are listed in approximate chronological order, but some tasks may be performed concurrently.

60100. [Perform financial clearance analysis](#)

60110. [Prepare and review proposal](#)

60120. [Funding and approval of PS&E](#)

- 60130. [Release final proposal](#)
- 60132. [Advertise request for bids](#)
- 60134. [Provide earthwork construction cross section data to contractors \(if requested\)](#)
- 60136. [Amend issued proposal documents or plans](#)
- 60140. [Conduct prebid conference](#)
- 60150. [Conduct bid opening](#)
- 60152. [Tabulate and review bids](#)
- 51050. [Collect outside, additional funding based on advance funding agreements](#)
- 60154. [Award contract](#)
- 60160. [Notify the public in advance of construction](#)
- 60170. [Store and retain project records](#)

60100: Perform financial clearance analysis

Description. For projects having Advance Funding Agreements (AFAs), a Notice of Financial Clearance is needed prior to the bid process. The Notice is a standardized form available from the Contracts and Purchasing Division, Contract Services. See Task 10510: [Prepare and execute advance funding agreements](#) and Task 51050: [Collect outside, additional funding based on Advance Funding Agreements](#).

Projects with outside funds arranged through AFAs are conditionally awarded, and contracts are not released until the District Engineer indicates all funds are received.

Pertinent Project Types. Projects having Advance Funding Agreements

Responsible Party. District engineer

Resource Material.

- ◆ Internal online, Contracts and Purchasing Division, Contract Services, Standard Contracts, Advanced Funding (AFA), AFA [Notice of Financial Clearance](#) Form
- ◆ TxDOT, Prebid and Post Bid Notice of Financial Clearance, [Negotiated Contracts Policy Manual](#)

60110: Prepare and review proposal

Description. The district prepares the proposal document that includes all the information necessary for bidders to bid a project's construction work. The proposal is the legal project document covering the itemized material quantities to construct the project and the regulations, agreements, and specifications under which the contract will be executed. The proposal document does not include construction plan drawings.

The district is responsible for reviewing the proposal for completeness and agreement with the PS&E. The proposal document includes the following information:

- ◆ Addendum Acknowledgment page
- ◆ Proposal to the Texas Transportation Commission cover page indicates number of working days for the project, type of work, county, and proposal guaranty amount. Verify all information is accurate.
- ◆ Bid Bond
- ◆ Bidder's Check Return Form (for proposal guaranty)
- ◆ Notice to the Bidder
- ◆ Bid inserts. List should match the Plans E/Q sheet(s)
- ◆ Various Certifications and Statements
- ◆ Engineer Seal
- ◆ General notes
- ◆ Specifications List
- ◆ DBE and SBE goals
- ◆ Wage Rates for appropriate county
- ◆ Special Provisions (full documents)
- ◆ Special Specifications (full documents)

Pertinent Project Types. All projects

Responsible Party. District reviewers

Critical Sequencing.

- ◆ Review the proposal to ensure any necessary changes are made before the proposal is released to prospective bidders.

60120: Funding and approval of PS&E

Description. Funding obligation and project authorization to advertise for physical construction bids will be issued when applicable state and federal laws and regulations have met the following:

1. The PS&E must be approved for letting by the district engineer. Approval signifies that the project meets the scope of work, the plans were checked, and all federal and state requirements have been met.
2. Delayed start work special provision request for right of way acquisitions, relocations, hazardous material removal, remediation, railroad coordination, or utilities will require an Administration-approved Management Plan to demonstrate how these activities will not impact construction operations.
3. Design Division verifies compliance and completeness of the PS&E before plans and proposal are posted to the public.
4. Right of way clearance, utility, and railroad work have been completed or arrangements have been made to be complete, as required, for proper coordination with the physical construction schedule. If it is determined there are operational or economic problems to complete this work prior to physical construction, appropriate notifications shall be provided in the proposal.
5. Letter of Authority - Upon environmental clearance, Environmental Affairs Division (ENV) populates their ECOS database. The information is transferred and uploaded to DCIS and populates the environmental information. For local projects, ENV requests electronic forms from the Financial Management Division (FIN); these forms can be saved as a printable file and forwarded to the local sponsor.
6. Appropriate environmental measures are included in the PS&E to ensure that conditions and commitments made in project development to mitigate environmental harm will be kept. In keeping with approved guidelines, water pollution and soil erosion will be minimized as a result of highway construction operations.
7. There are no conditional lettings for incomplete environmental permits. The area of concern shall be placed on the EPIC sheet as an area where construction is not authorized until permits are obtained.
8. Rights of way:
 - a. Have been acquired, including access control. Legal and physical possession has been obtained. Occupants have vacated.
 - b. Not fully acquired. Right to occupy and use all rights of way for proper execution of the project has been acquired. Trial or appeal for some parcels may be pending. Occupants have vacated.
 - c. Right of use or occupancy is not complete. All occupants have had replacement housing made available to them; however, not all occupants have moved from the right of way. The department may request authorization on this basis only in very unusual circumstances. The department shall ensure that occupants, who have not moved from the right

of way, are protected against unnecessary inconvenience, injury, or coercion. Full explanation of the unacquired parcels shall be provided and notification shall be included in the proposal. Request for authorization under these conditions should be the exception and not the rule.

9. District provides Performance End Date (PED) on DCIS P1 screen before FIN will request federal funding authorization.
10. The project agreement must be supported by a documented current cost estimate aligned with the eligible work being completed.

Project authorizations with conditional approvals should be used under very limited circumstances and should not be used to reserve funding before the project is ready to proceed.

Authority.

- ◆ Authorization [23 CFR §635.309](#)
- ◆ [Stewardship and Oversight Agreement](#) between TxDOT and FHWA, May 2015
- ◆ Transportation Code, Authority to Issue Obligations, [§201.943.\(d\)](#)
- ◆ The Texas Constitution, Article III. Legislative Department. [Section 49-k](#). Texas Mobility Fund

Project Types. All projects

Responsible Party. District engineer assures compliance with state and federal laws, policies, and procedures by signing the PS&E title sheet.

Resources.

- ◆ [FHWA Major Project Delivery Process](#)
- ◆ TxDOT statewide funding brochure, [Transportation Funding](#)
- ◆ Online: Inside TxDOT, Financial Management Division, [Funding Needs and Potential Sources](#)

60130: Release final proposal

Description. The district builds, reviews, and revises proposals before they are released to bidders.

Contracts cannot be awarded for proposal solicitation that do not meet minimum advertising time. See Task 60132: [Advertise request for bids](#).

Online Bid Proposal Request System (BPRS) allows bidders to request/download proposal solicitation packages. Bidders create a secure online account.

Pertinent Project Types. All projects

Responsible Party. Construction Division

Helpful Suggestions.

- ◆ The district or area engineer offices must not distribute proposal copies under any circumstances. Construction Division controls release of bid proposals to qualified bidders.

Resource Material.

- ◆ Online: TxDOT Business, Contractors, [Bid Proposal Request System](#) (BPRS)
- ◆ Online: TxDOT [Proposal Request Forms](#)

60132: Advertise request for bids

Description. The department shall publish notice of the time and place at which bids on contracts will be read and awarded.

The Department posts online advertisement at Electronic State Business Daily (ESBD) and on TXDOT.gov.

Contract summary for maintenance projects is obtained from the Construction/Maintenance Contract System (CMCS). Bid contract information for construction contracts is obtained from the Design/Construction Information System (DCIS).

Bids are received through the department online electronic bidding system known as the integrated Contractor Exchange (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.

Pertinent Project Types. All construction and maintenance projects

Responsible Party. Finance Division

Authority Requirements.

- ◆ Notice of Letting and Issuance of Bid Forms, [43 TAC §9.13\(c\)](#)
- ◆ Texas Comptroller of Public Accounts, [Electronic State Business Daily \(ESBD\)](#)
- ◆ Advertising for bids and proposals, [23 CFR §635.112](#)
- ◆ Texas Government Code, State Business Daily; Notice regarding Procurements Exceeding \$25,000, [§2155.083](#)
- ◆ Transportation Code, [Bids and Contracts for Highway Projects, Chapter 223](#)

Resource Material.

- ◆ Maintenance Contracts - [Maintenance Contract Manual](#)
- ◆ TxDOT [Electronic Bidding System](#) (web-based), iCX information

60134: Provide earthwork construction cross section data to contractors (if requested)

Description. Contractor access to construction cross section data in electronic format allows the contractor to prepare more accurate and concise bids, particularly on projects with significant earthwork items.

Construction cross section data typically includes the following information:

- ◆ Cross section baseline (horizontal alignment data)
- ◆ Original ground cross sections
- ◆ Proposed design cross sections

Upon contractor request, district or area offices should provide earthwork construction cross section data to the requestor for bid preparation. This information should be in ASCII format (plain text file), GEOPAK XSR files, or PDF formatted cross section plots and made available prior to letting at no cost. Consultant engineering firms involved in TxDOT design projects should include this data as part of their deliverable to the district.

The following disclaimer must be included in the transmittal of the cross section data:

The following data is for non-construction purposes, only. It is the responsibility of prospective bidder to validate the data.

Texas Department of Transportation

If construction cross section data is provided directly in the plans, that data should also be clearly labeled “

“FOR INFORMATION PURPOSES, ONLY”.

Pertinent Project Types. All projects with earthwork construction cross section data

Responsible Party. District or Area Office

Critical Sequencing.

- ◆ Cross section data must be provided upon request and in a timely manner so the contractor can prepare an accurate bid on the project.

60136: Amend issued proposal document or plans

Description. Occasionally, it may become necessary to amend the proposal or plans after the project goes out for bid, but before contract letting. Contractors must not be given information not contained in the bidding documents to ensure that all prospective bidders receive identical information. An addendum must be approved according to policies in use. After approval to proceed, the district may request the estimate release.

For late addenda, the district shall notify all qualified bidders of the pending addendum. All amendments to the contract shall be processed officially and publicly published online. Changes should never be handled verbally. Reprographics sends out notices overnight (FedEx) to the bidders and iCX sends an email notification to the online bidders when the addendum is released or the proposal is canceled.

The Notification of Addendum lists the changes made to the original plans and proposal after the project was released for advertising. Bidders are required to acknowledge receipt of the addendum on the bidding documents. Failure to acknowledge the addendum will result in an incomplete bid.

Pertinent Project Types. All projects

Responsible Party. Project engineer

Helpful Suggestions.

- ◆ Amendments result in prospective bidders having to reevaluate their bid packet; therefore, any large amendments should be made as early as possible.
- ◆ Very minor amendments to the contract (minor quantity errors, misspelled words, etc.), which are not anticipated to impact bid prices, should not be made, unless combined with other essential changes.

Critical Sequencing.

- ◆ Completed changes must be received by the deadlines shown in the PS&E Review and Processing Schedule, to maintain the letting schedule.
- ◆ Filenames for amended plan sheets need to retain the same filename and format as the original file they are replacing; the amended files replace the originals. Filename errors can cause additional problems, such as unintentional overwritten plan documents or duplicate titled sheets (revised and its original).
- ◆ All revised PDF plan sheets shall have the revision/addendum number and the addendum release date on the lower right corner. This information ensures the contractor is using the correct construction information.

- ◆ When subsequent changes are made to the same PDF plan sheet, retain previous revision numbers on the drawing, but remove any clouds around the previous changes. All revisions should be identified on the drawing as well as the list of revision dates.
- ◆ An addendum should be issued only when plans or proposal errors may affect the competitiveness of the letting, there are significant quantity errors, or a contract material issue.
- ◆ For a late addendum, contact all the contractors who have pulled proposals. Document the notification date, time, method of contact, and person contacted. If all bidders have not been contacted, it may require canceling/postponing the project letting.

Resources.

- ◆ Internal: Financial Management Division, [Project Letting Approval Reporting System \(PLARS\)](#)
- ◆ Letting Schedule Modification, Form 2270
- ◆ [Bidder's List Index for State Let Projects](#) (by Bidder, District, and County)
- ◆ TxDOT [PS&E Preparation Manual](#)

60140: Conduct prebid conference

Description. Prebid conferences are conducted to explain a project's special requirements or unusual aspects. Maintain minutes for all prebid conferences, mandatory or optional. Include time, date, and location where the meeting took place. Provide a copy of the minutes to all bidders. Prebid conference information is entered in DCIS through the Contract Summary Screen - Conference Subscreen. Documents from the conference are placed in the project file.

Prebid conferences should be held one week or more after the initial announcement of the invitation for bids to allow prospective bidders enough time to obtain, read, and study the solicitation documents, and prepare a request for clarification, if any.

Mandatory prebid conferences are discouraged. Contractors have concerns for bid confidentiality and scheduling difficulties. Procedural errors may result in bid rejection. Mandatory prebid conference requires approval by the Director of the Design Division. If approved, the person responsible for holding the conference must give the Construction Division a list of bidders attending a mandatory conference. A "mandatory prebid conference" indicator has been added on the department's website. Projects requiring a mandatory prebid conference will be denoted with a "*" in the control CSJ column. Times and places of conference can be found on the bid item index pages.

Similar to a prebid conference is a "showing the project" meeting. This meeting is intended as an opportunity for interested parties to review the project, ask questions, or request information. All questions and requests are recorded. All questions with answers are provided to all bidders. If errors are pointed out by a contractor, analyze the overall effect on the contract. Major errors will

be corrected by issuing an addendum. Under no circumstances should statements be made about possible changes to the PS&E.

No additional project requirements may be added or changed at a prebid conference or a “showing the project” meeting. Bid documents must stand on their own so that all bidders are using the same information. Changes to a contract will be made by addendum.

Pertinent Project Types. All projects

Responsible Party. District area engineer

Helpful Suggestions.

- ◆ Hold a prebid conference about two weeks before letting, if possible.
- ◆ A minimum of seven days are required between the conference and bid opening dates. If a prebid conference is scheduled closer than seven days to the bid opening date, questions posed by contractors at the meeting may not be answered with an addendum.
- ◆ Never give the engineer’s estimate to the contracting community.

Resource Material.

- ◆ TxDOT [Construction Contract Administration Manual](#)
- ◆ Pre-Bid Meeting/Conference, CST [Form 2560](#)

60150: Conduct bid opening

Description. Bid openings are held in Austin and are conducted by Construction Division (CST) personnel. 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 prebid conference attendance. See Task 60140: [Conduct prebid conference](#).
- ◆ Proposal Addenda Acknowledgment page “checked”.
- ◆ Proper presentation of bids.
- ◆ Proposal guaranty check, etc.
- ◆ 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 Commission announces award to the verified lowest responsive bid.

Pertinent Project Types. All projects

Responsible Party. Construction Division

Authority.

- ◆ Federal-Aid contracts, Bid opening and bid tabulations. [23 CFR §635.113](#).
- ◆ Transportation Code: Filing, Opening, and Rejection of Bids, [§223.004](#).
- ◆ Acceptance, Rejection, and Reading of Bids: [43 TAC §9.15](#)

60152: Tabulate and review bids

Description. After the bid opening, the Construction Division tabulates and reviews the bids.

Bids are checked for accuracy, reasonable conformance to the engineer’s estimate, and for mathematical or material imbalance. Bids determined to be irregular may be rejected.

- ◆ Unbalanced bids:
 - *A mathematically unbalanced bid* is one that contains lump sum or unit bid items based on nominal prices and other work uses inflated prices, which do not reflect reasonable actual costs plus a reasonable, proportionate share of the bidder’s anticipated profit, overhead costs, and other indirect costs. Each bid item must carry a proportional share of total cost of work plus profit. The Transportation Commission may still award these projects.
 - *A materially unbalanced bid* is one that generates reasonable doubt that a mathematically unbalanced bid will result in the lowest, ultimate cost to the State. The Texas Transportation Commission must reject a materially unbalanced bid. Although there are other unbalancing methods, unbalanced bids generally result from two situations:
 - Maximize profits. Quantity errors (too low) in the estimate; the contractor bids a high price on these items. Conversely, the contractor may underprice items that will be used in significantly lesser quantities. In this case, the apparent low bidder might not be the actual low bidder once the quantity errors are corrected.
 - “Front loading”. The contractor’s bid prices are high on items of work occurring early in the project. This is similar to the evils of an advanced payment. In this case, the apparent low bidder might not be the actual low bidder when the State’s financial loss of potential interest income is calculated.
 - Tabulates bids in increasing amounts
 - Verifies the low bidder

Pertinent Project Types. All projects

Responsible Party. Construction Division

Authority.

- ◆ Construction and Maintenance Bid opening and bid tabulations [23 CFR §635.113](#).
- ◆ Contract and Grant Management, Highway Improvement Projects, [43 TAC §§ 9.15 - 9.17](#)

Resource.

- ◆ Internal, Construction Division, [Letting Manual](#)

60154: Award contract

Description. Construction contracts let by the State require award by the Texas Transportation Commission (the “Commission”) before execution of the contract. The Construction Division makes a contract award recommendation to the Commission after all bids are tabulated and reviewed, and after all letting and procedural requirements are checked.

For Federal-aid projects, FHWA concurrence in award is a prerequisite to Federal participation. Concurrence will be given only after receipt and review of the tabulated bids.

Concurrence from an MPO must be obtained for cost overruns on projects selected by the MPO in compliance with the MPO’s policy.

If a local entity is involved in funding a portion of a project, their concurrence is also required if the project overruns the cost estimate.

For projects let by local entities, concurrence in award must be obtained from TxDOT Assistant Executive Director for Engineering Operations before the local entity awards the project. Contact the Local Government Projects office for additional information.

A cost justification memorandum is required for all projects when either of the following occurs:

- ◆ Multiple bidders and the low bid deviation is $\pm 20\%$ or more from the estimate.
- ◆ One bidder and the low bid deviation is $\pm 10\%$ or more from the estimate.

Justification memoranda are prepared and explained by the district. Submit memo to the Construction Division Director for approval. The memo information is used to explain the bid deviation to the Commission. The Commission officially accepts or rejects bids at their monthly meetings. Construction Division notifies successful bidders of the contract award.

The contractor must obtain the authorization to proceed before activities may begin on a project.

Pertinent Project Types. All projects

Responsible Party.

- ◆ Contract Award: the Commission

- ◆ Contract award recommendation and concurrence: Construction Division
- ◆ Cost justification: District

Authority.

- ◆ Award of contract and concurrence in award. [23 CFR §635.114](#)
- ◆ Transportation Code, Contract information on internet website. [§223.0042](#)
- ◆ Award of Contract, [43 TAC § 9.17](#)
- ◆ Contract Execution, Forfeiture of Bid Guaranty, and Bond Requirements, [43 TAC §9.18](#)

Resource Material.

- ◆ Crossroads memo, “[Preparing Engineer's Estimates](#)” S. Simmons - 08.14.2009 (Internal)
- ◆ CST, Letting Overrun/Underrun Justification Memorandum, [Form 2195](#)
- ◆ Online: Inside TxDOT, Transportation Planning and Programming, [Local Government Projects](#)
- ◆ TxDOT [Construction Contract Administration Manual](#)
- ◆ TxDOT [PS&E Preparation Manual](#)

60156: Conduct preconstruction conference

Description. Conduct a meeting between district personnel, contractor, and contractor’s staff. This meeting is to establish lines of authority and communication; determine the responsibilities and duties of contractor’s personnel, subcontractors, and department personnel; and clarify potential sources of misunderstanding and work out the detailed arrangements necessary for the successful completion of the contract. Maintain a written record of the meeting (e.g., meeting minutes) in the project construction file. See Task 10215: [Project File of Record](#).

Since the Environmental Management System (EMS) is a core business process, the district and the contractor should introduce their personnel responsible for maintaining the Construction Stage Gate Checklist and the environmental compliance, permit requirements, and quality monitoring of construction activities at the preconstruction conference. The Construction Stage Gate Checklist is completed for projects that have environmental permits or soil disturbing activities. The forms must be kept with the project construction file and retained according to department guidelines.

Resource Material.

- ◆ Online: Inside TxDOT, Environmental Affairs Divisions, Environmental Management System - [Forms, Training, and EMS Policy Statement](#)

60160: Notify the public in advance of construction

Description. The district public information office should have project-level strategies to inform road users, businesses, area residents, and the general public about specific road construction and its implications for safety and mobility in the area. Public notices may include press releases to various media types, static or dynamic roadway signs, ITS, or notices posted on project-specific websites or social media.

Depending on project size, give public notices far enough in advance of construction start so that motorists can adjust their travel plans accordingly. For larger, long-term projects, a purpose-built application for mobile devices can be designed to provide latest updates to users or a project-specific website can keep the public informed.

To provide accurate public notices, the district public information officer should obtain project information from the project manager, area engineer, or the director of transportation planning and development. As a best practice, manage and provide up-to-date project information. There should be a contact number or email address for the public to communicate with project management.

Pertinent Project Types. Major projects that may affect normal traffic patterns

Responsible Party. District public information officer

Subtasks.

- ◆ Identify the level of notice needed for the project size and duration.
- ◆ Notify elected officials before beginning construction.
- ◆ Prepare and distribute press releases or other notices (e.g., community events, social media).

60170: Store and retain project records

Description. The File of Record is a collection of files related to project planning, development, design and construction such as, notes, calculations, plan or detail drawings, layouts, schematics or maps, structural or materials records, diaries that may be retained for reference, or other project records. See Task 10215: [Project File of Record](#) for a list of typical file documents.

Several individuals may contribute to a project record over a project's life cycle. Since there may be sensitive data in files, maintain the File of Record in a secured location designated by district policy.

Once the retention period is complete, records may be authorized for destruction. Destruction of records must be performed according to the TxDOT *Records Management* manual.

Pertinent Project Types. All projects

Responsible Party. Document life-cycle retention contributors:

- ◆ Project manager
- ◆ District engineering and design staff.
- ◆ District designated officer who administers district records management program.
- ◆ Design Exception files: Documentation related to the approval or denial of design exceptions, variances, and/or waivers are permanently retained for legal reference. Design Exception files are stored in designated filing location used exclusively for these files.
- ◆ Preliminary/construction project files. District maintains original files. Design Division maintains copies of original files, which become the default Files of Record in event that original files are lost or destroyed.
- ◆ TxDOT Information Management Division (IMD) Records Manager Officer – Department liaison with the Texas State Library and Archives. Supports compliance with state and federal requirements for records in any media format.

Authority.

- ◆ Government Code [Subchapter L. Preservation and Management of State Records and Other Historical Resources](#)
- ◆ Records Retention Scheduling, [13 TAC §6.1 et seq.](#)
- ◆ Retention of Contract and Related Documents by State Agencies, Government Code, [§441.1855](#)

Resource Material.

- ◆ Information Management Division, Enterprise Business Management Office, Enterprise Information Management (EIM) branch
- ◆ [Records Management](#) manual
- ◆ Internal: Crossroads, Information Management Division (IMD), Online Information Services (OIS), Records Retention Services and E-services, [Records Management](#)

Appendix A — Glossary

AASHTO

American Association of State Highway Transportation Officials. Provides policy, training, and technical standards, for all highway system development. Supports a relationship between the federal government and state departments of transportation.

Administrative Record

If the department is sued or lawsuit is threatened, department attorneys will select a subset of decisional documents from the project File of Record to create an Administrative Record.

BATIC

Build America Transportation Investment Center. U.S.DOT single point resource center for transportation partners and project sponsors to obtain federal transportation expertise.

CFR

Code of Federal Regulations. Federal regulations. Implements federal laws passed by Congress (USC), which regulates federal administrative agencies. Updated by the Federal Register.

Condemnation

Exercise of eminent domain power.

Core Team

Provides quality assurance (QA) function by working to build a quality deliverable. Responsibilities are shared between the district environmental project manager and an ENV project manager who may expand the team to include planners, local agency sponsor representatives, consultants, engineers, and subject matter experts.

CWA

Clean Water Act. National legislation. Basis of CWA was enacted in 1948 as the Federal Water Pollution Control Act. The Act was reorganized and expanded in 1972 as the CWA. Regulates activities in and around wetlands and protects our nation's waters. Under CWA authority, EPA develops guidelines used by USACE for permit evaluations.

DSR

Design Summary Report. A dynamic document updated during development of a project. Auditable record of events and retained for the life of the project.

ECOS

Environmental Compliance Oversight System. The File of Record under state and federal law for environmental aspects of department sponsored projects.

Eminent Domain

Power granted to the department to take private property for public use. Landowner must receive compensation for the condemned property.

Engineer

Area Engineer for the project. Shown on Construction Specification Required Shop/Working Drawing Submittals matrix as “E”.

Engineer of Record

Design Engineer who signs and seals the contract plan set. Shown on Construction Specification Required Shop/Working Drawing Submittals matrix as “EOR”.

ESBD

Electronic State Business Daily. Texas Comptroller of Public Accounts website providing online postings for department construction and maintenance contracts and other business solicitations.

Expressway

Also known as a turnpike. It is a tolled, multilane, limited access highway built to Interstate standards. Operated by a government agency.

FAHP

Federal-aid Highway Program. Federal-State partnership supported by a multi-year plan of federal funding for the program. Strong central control establishes uniformity in policy and administration of regulations and procedures among the states. Authorizations and annual appropriations are essential to a continuous federal highway program.

Authorizations Post Interstate (1956-1990s) era

- ◆ **ISTEA:** Intermodal Surface Transportation Efficiency Act. Authorization and funding for surface transportation. First post-interstate legislation Signed into law by the President in 1991.

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- ◆ **TEA-21:** Transportation Equity Act for the 21st Century. Authorization and funding for surface transportation. Signed into law by the President in 1998.
 - ◆ **SAFETEA-LU:** Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users. Authorization and funding for surface transportation. Signed into law by the President in 2005.
 - ◆ **MAP-21:** Moving Ahead for Progress in the 21st Century Act. Signed into law by the President in 2012.
 - ◆ **FAST Act:** Fixing America's Surface Transportation Act. Signed into law by the President in 2015.

Federal-Aid Highway

A highway eligible for federal assistance other than a highway classified as a local road or rural minor collector.

Federal Register

Daily federal business publication of executive orders, proclamations, proposed rules, federal agency regulations, and public notices. Federal agencies are required to publish notice of proposed rule-making to enable citizens an opportunity to participate in rule-making changes prior to adoption of a final rule.

FHWA

Federal Highway Administration. Federal government agency within the U.S. Department of Transportation. Provides transportation research and support to State and local agencies.

File of Record

Official file for each department project. The File of Record, stored in a secure location, is subject to state or federal audit.

FMIS

Fiscal Management Information System. Tracking program for highway projects financed with Federal Aid Highway Program (FAHP) funds.

GIS

Geographic Information System. Geospatial data used by the department for transportation-related mapping and design. A variety of datasets can be added to web-based maps.

iCX

Integrated Contractor Exchange. Web-based electronic bidding system which requires electronic bid bond.

Joint-use Agreement

Utility has a compensable interest in land occupied by its facilities and the land will be jointly occupied and used for highway and utilities. The privileges retained by the utility and the interest acquired by the department must be agreed upon, in writing, to obligations, responsibilities, and conditions of occupancy for each party.

LGPO

Local Government Project Office. Provides guidance and training to support local governments, counties, regional mobility authority transportation projects under TxDOT oversight.

MARAD

United States Maritime Administration. MARAD is to ports as FHWA is to highways; both are governed by U.S.DOT. Land-side port improvements area collaboration through MARAD's StrongPorts program working with federal, state, and local agencies.

Megalopolis

Heavily populated urban region of continuous metropolitan areas.

Megaregion

Emerging geographical unit and network of metropolitan regions covering thousands of square miles and defined by layers of relationships such as, infrastructure systems, economic linkages, and environmental systems.

Mobility Corridor (5R)

Roadways intended for long distance, high speed travel. Very controlled access. May share other high speed, long distance travel modes in the corridor.

MPA

Metropolitan Planning Area. This is an entire urbanized area. In complex areas, there could be multiple MPOs that would jointly develop planning products and performance targets.

MPO

Metropolitan Planning Organization. Local decision making body responsible for metropolitan transportation planning as required by federal law.

MS4 Operator

Municipal Separate Storm Sewer System (MS4). Systems owned and operated by a local, county, state or federal agency, or special districts in which there are storm sewers, gutters, ditches, curbs, and similar conveyances of runoff that are not connected to a wastewater collection system or treatment plant.

MTP

Metropolitan Transportation Plan. Population centers that have census populations greater than 50,000 must have an MTP. Comprehensive, multimodal, long-range (20-25 year) transportation investment plan for systems and services.

National Highway System (NHS)

Federal-aid system. The System includes the Interstate System, principal arterials (rural or urban), and other connector highways providing access between NHS arterial routes. Major strategic highway network and connectors that are important to the United States defense policy, serve regional and interregional commerce, serve major population centers, international border crossings, ports, airports, public transportation and intermodal facilities, and major travel destinations.

NWP

Nationwide Permit. USACE general permits intended to regulate with little delay and paperwork for certain activities that have minimal impact. NWPs are adopted after the public have been given an opportunity to comment or request a hearing regarding the proposal.

Off-System Roadway

Roadway not on the State Highway System (i.e. local, county/city roads) and not maintained by the Department. For federal funding, this term applies to roadways not on the Federal-aid highway system and typically located in a rural area.

On-System Roadway

State Highway System roadway maintained by the Department. For federal funding the roadway is on a Federal-aid highway system.

PASS Route

Principal Arterial State System.

PeopleSoft FSCM

PeopleSoft Financial and Supply Chain Management. Formerly known as FIMS is the accounting system used by the department.

Project Management Plan

The Plan shall document the procedures, processes, and the role of the management team that are planned to effectively manage the scope, costs, schedules, quality, and delivery of the project.

Regional Mobility Authority (RMA)

A political subdivision formed by one or more counties to finance, acquire, design, operate, maintain, expand or extend transportation projects. Projects may be tolled or non-tolled. Authorized by Texas legislature.

Resurfacing

Transportation project to apply new or recycled pavement layer to existing to restore ride quality, skid resistance, and preserve pavement structural integrity.

Restoration (2R)

Transportation project to restore the pavement to its original condition.

Rehabilitation (3R)

Transportation project to extend the service life and enhance the safety of a roadway. Does not include added through lanes.

Reconstruction (4R)

Transportation project to construct a new roadway or upgrade an existing roadway to meet geometric design criteria for a new facility. Major improvements to provide long term service.

Route Hierarchy

Interstate, US, SH, State Loops or Spurs, FM/RM, County Roads (CR), and Business Routes (BR). If bridge structures cross highways of equal hierarchy, the lower route number determines name protocol; otherwise, naming is in terms of the higher class route alignment “at” the lower class location.

- ◆ I-10 over I-35 = I-10 Overpass at I-35
- ◆ I-35 over I-10 = I-10 Underpass at I-35
- ◆ FM 1234 over US 290 = US 290 Underpass at FM 1234
- ◆ CR 18 under US 183 = US 183 Overpass at County Road 18
- ◆ I-20 Business under RM 456 = RM 456 Overpass at I-20 Business

Rural Area

Area in the state outside an urban area (census population greater than 5,000).

SLRTP

Statewide Long-Range Transportation Plan. A 25-year multimodal plan to document funding needs for freight and public user modes to meet performance objectives.

Social Media Leverage

Using social media sites to inform the public, in selected geographic areas, about public participation opportunities, meetings, and local transportation issues.

State Highway System (On-System)

Commission-designated highway(s) determined as necessary for proper development and operation of the state highway system.

STIP

Statewide Transportation Improvement Plan.

STP

Surface Transportation Program. A federal-aid funding program that supports a broad range of multimodal surface transportation facilities.

SUE

Subsurface Utility Engineering. SUE is a process, not a technology. The SUE process combines civil engineering, surveying, and geophysics. It utilizes several technologies, including vacuum excavation and surface geophysics.

TAC

Texas Administrative Code. Texas agency regulations under 16 Titles of nonconsecutive-numbered subject categories. Title 43 – Transportation. Updated through the Texas Register. Similar to the CFR.

Texas Register

A weekly publication of notices for state agency rule making. Public record of proposed, adopted, or revised rules, which are codified into the Texas Administrative Code.

TFMP

Texas Freight Mobility Plan. Required by MAP-21 to provide goals, strategies, and performance measures for freight transportation.

TIFIA

Transportation Infrastructure Finance and Innovation Act. Credit program for multimodal surface transportation projects of regional and national significance. Created to obtain funding credit for surface transportation projects, which had difficulty in obtaining credit based on the uncertainty of project-based revenue. Title 23 TIFIA projects are eligible for tax exempt bonding authority – Private Activity Bonds (PAB).

TIP

Transportation Improvement Program. A capital improvement program developed cooperatively by local and state transportation entities. Short-term programming document.

TMA

Transportation Management Area. A UZA with census population greater than 200,000.

Transportation Code

Statutes created and amended by Texas legislative bills and gubernatorial actions. Seven Titles of codified transportation laws.

TTP

Texas Transportation Plan. This plan documents existing infrastructure and funding needs for all passenger and freight modes in the state over a 25-year horizon.

TXDOT

Texas Department of Transportation.

UC

Urban cluster. Urban area census population between 2,500 and 49,999.

USACE

United States Army Corps of Engineers. Civilians and soldiers working to provide environmental sustainability, strengthening the economy by supporting movement of commodities along the nation's waterways, and reduce infrastructure damage risks from disasters.

U.S.C.

United States Codes. Federal laws. Laws passed by Congress which are implemented when a regulation is issued and recorded in the CFR. USC laws cannot be enforced without regulation (CFR).

U.S. DOT

United States Department of Transportation.

UTP

Unified Transportation Program. A ten-year intermediate plan, which links the department's long-range planning (SLRTP) to detailed programming (STIP) and 24-month letting schedule. Developed annually.

Urban and Rural Areas

FHWA definitions based on census population of 5,000.

UZA

Urbanized area. Census designated urban area with more than 50,000 residents.

Appendix B — Financing and Construction of Transportation Projects

Contents:

[Section 1 — Participation Chart](#)

[Section 2 — Definitions](#)

Section 1 — Participation Chart

Attachment to Project Development Process Manual Chapter 1, Section 5

Condition	Preliminary Engineering	Construction Engineering and Construction Funds	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	100% State or 90% Federal/10% State or 80% Federal/20% State	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)	100% State or 80% Federal/20% State	100% State or 80% Federal/20% State	90% Federal/10% Local or 80% Federal/10% State/ 10% Local
Local On-system Improvement Project	100% Local	100% Local	Right of Way - N/A Utilities - 100% Local
Project is not on the State Highway System	100% Local or 80% Federal/20% Local	100% Local or 80% Federal/20% Local	100% Local or 80% Federal/20% Local
Project is on the FM/RM system (New FM/RM route)	100% State or 80% Federal/20% State	100% State or 80% Federal/20% State	100% Local
Project is on the FM/RM system (Existing FM/RM route)	100% State or 80% Federal/20% State	100% State or 80% Federal/20% State	90% State/10% Local or 80% Federal/10% State/ 10% Local
Project is on a Phase 1 Trunk System Corridor, On-System Turnpike Project, or Hurricane Evacuation Route	100% State or 80% Federal/20% State	100% State or 80% Federal/20% State	100% State or 80% Federal/20% State
State Park Road Program	100% State	100% State	100% State
On-State System Bridge Program	100% State or 80% Federal/20% State	100% State or 80% Federal/20% State	90% State/10% Local or 80% Federal/10% State/ 10% Local
Off-State System Bridge Program	80% Federal/10% State/ 10% Local or 80% Federal/20% State (See Note #1)	80% Federal/10% State/ 10% Local or 80% Federal/20% State (See Note #1)	100% Local
Off-State System Bridge Program - If bridge project connects Texas with a neighboring state	80% Federal/20% State	80% Federal/20% State	100% Local
On-State System Safety Program	100% State or 90% Federal/10% State	90% Federal/10% State	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	90% Federal/10% Local or 90% Federal/10% State	90% Federal/10% Local or 90% Federal/10% State

Attachment to Project Development Process Manual Chapter 1, Section 5

Condition	Preliminary Engineering	Construction Engineering and Construction Funds	Right of Way or Eligible Utilities
Transportation Enhancement Program, Transportation Alternatives Program, Transportation Alternatives Set Aside Program See Note #2	80% Federal/20% Local	80% Federal/20% Local	80% Federal/20% Local
On-State System Safe Routes to Schools Program	100% State or 100% Federal	100% State or 100% Federal	100% State or 100% Federal
Off-State System Safe Routes to Schools Program	100% Federal	100% Federal	100% Local or 100% Federal

All participation ratios shown depict the minimum local participation for eligible costs. For continuous lighting systems or safety lighting on the state highway system, refer to 43 TAC 25.11.

NOTE:

1. If approved in accordance with 43 TAC 15.55 (d).
2. For projects selected in the TE, TA, or TA-SA department Program call, federal participation is limited to the amount authorized by the commission, not to exceed 80% of the eligible costs.

Section 2 — Definitions

The following words and terms, when used in this Appendix B, shall have the following meanings, unless the context clearly indicates otherwise.

Congestion Mitigation and Air Quality Improvement Program (CMAQ)

A federal program, established and administered in accordance with 23 United States Code 104 and federal regulations, which provides federal funds for a project in a non-attainment area that contributes to the attainment of a natural ambient air quality standard or will have certified benefits to air quality.

Construction cost

All direct and indirect costs identified by the department's cost accounting system to a highway improvement or other transportation project, other than for right of way acquisition, preliminary engineering, and construction engineering.

Construction engineering cost/expenses

Engineering or project administration costs and expenses incurred, including indirect costs and expenses identified by the department's cost accounting system, on a highway improvement or other transportation project after contract award.

Eligible utilities

Costs of utility adjustments, required by a highway improvement or other transportation project, that are eligible, in accordance with federal and state law, for reimbursement by the department.

Farm and Ranch to Market (FM/RM) System Route

A road on the system of roads designated by the commission under Transportation Code, 201.104.

Federal funds

Financial assistance provided by the federal government for highway improvement and other transportation projects.

Highway improvement project

A project which provides for the design, construction, improvement, or enhancement of a public road, including bridges, culverts, or other appurtenances related to public roads, either on or off the state highway system.

Hurricane Evacuation Route

A designation given to a roadway that serves as the primary route for use by the public in the event of a hurricane or other evacuation event and includes appropriate signing, traffic flow indicators, and auxiliary travel lanes.

Local government

Any county, city, other political subdivision of this state, or special district that has the authority to finance a highway improvement or other transportation project.

Local government project

A highway improvement project for which at least one preliminary engineering or construction activity is performed or managed by a local government for which the local government is reimbursed with State or Federal funds by the department.

Local On-system Improvement Project

A project which provides for the design, construction, improvement or enhancement of a roadway on the State Highway System that is fully funded by and performed or managed by a local government that upon completion is maintained by the department.

Local participation

Financial assistance provided by a local government to participate in costs associated with highway improvement or other transportation projects.

Matching funds/participation ratio

Those portions of funds required or chargeable for the contribution toward a highway improvement or other transportation project's cost by a local government.

National Highway System (NHS)

A part of the National Intermodal Transportation System consisting of the National System of Interstate and Defense Highways and those principal arterial roads which are essential for interstate and regional commerce and travel, national defense, intermodal transfer facilities, and international commerce and border crossings as designated by the United States Congress by criteria set forth in federal law.

National System of Interstate and Defense Highways (Interstate Highway System)

A system of roads and bridges that constitute a part of the National Highway System designated by the United States Congress as essential for interstate and regional commerce and travel, national defense, intermodal transfer facilities, and international commerce and border crossings.

Off-State Highway System Bridge Program

A federally mandated program by which federal funds are made available to replace or rehabilitate bridges under the jurisdiction of a local government and not on the state highway system.

Off-state highway system routes

Those routes not designated on the state highway system which are the responsibility of local governments.

Off-System Turnpike Project

A tolled highway not on the state highway system.

Off-State Highway System Safe Routes to School Program

A program that makes federal funds available to improve bicycle and pedestrian safety of school age children in and around school areas on facilities under the jurisdiction of a local government and not on the state highway system.

Off-State Highway System Safety Program

A federally mandated program by which federal funds are made available for safety improvements to facilities under the jurisdiction of a local government and not on the state highway system.

On-State Highway System Bridge Program

A federally mandated program by which federal funds are made available to replace or rehabilitate bridges on the state highway system.

On-State Highway System Safe Routes to School Program

A program that makes federal or state funds available to improve bicycle and pedestrian safety of school age children in and around school areas on the state highway system.

On-State Highway System Safety Program

A federally mandated program by which federal or state funds are made available for safety improvements on the state highway system.

On-System Turnpike Project

A tolled state highway.

Other Transportation Project

A transportation improvement project or a transportation-related program that includes some or all of its funding from the Federal Highway Administration or the Texas Department of Transportation that is not on the State Highway System or the National Highway System.

Phase 1 Trunk System Corridor

Corridors of the Texas Trunk System prioritized for project development by the commission.

Preliminary engineering cost/expenses

Costs and expenses incurred, including indirect costs and expenses identified by the department's cost accounting system, on a highway improvement project before construction contract award.

Right of way costs

All direct and indirect costs identified by the department's cost accounting system for the acquisition of land or an interest in land necessary for the development of a highway improvement or other transportation project (including access rights to abutting properties, eligible utility relocation/adjustment costs, and other direct expenses when specified in the agreement).

Right of way procurement

That process identified with the acquisition of real property, access rights, mineral rights, and easements permitted in accordance with state law for the construction of approved highway improvement projects.

State funds

Money received by the department, other than federal funds, funds in excess of minimum requirements, or local participation, to be expended for highway improvement and other transportation projects.

State highway system

The system of highways in the state included in a comprehensive plan prepared by the department's executive director under the direction and with the approval of the commission in accordance with Transportation Code, 201.103.

State highway system routes

Those state numbered routes designated as part of the state highway system.

State Improvement Project

A highway improvement project for which all preliminary engineering and construction activity is performed by or managed by the department.

State Park Road Program

A program by which state funds are utilized to construct roads within or adjacent to public facilities administered by the Texas Parks and Wildlife Department.

Statewide Mobility Corridor

A transportation corridor or network designated by the commission that provides for or substantially affects significant multi-regional, intrastate, or interstate travel needs.

Surface Transportation Program

A federal-aid program where states may obligate federal funds to projects related to certain public roads.

Texas Trunk System

A rural highway network as described in 16.56 of this title (relating to Texas Highway Trunk System).

Transportation Alternatives Program

A federally mandated program identified in 43 TAC 11.300 et seq. of this title (relating to Transportation Alternatives Program), providing federal funding for transportation projects and activities that enhance the intermodal transportation systems and facilities within the state for the enjoyment of the users of those systems.

Transportation Alternatives-Set Aside Program

A federally mandated program identified in 43 TAC 11.400 et seq. of this title (relating to Transportation Alternatives-Set Aside Program), providing federal funding for transportation projects and activities that enhance the intermodal transportation systems and facilities within the state for the enjoyment of the users of those systems.

Transportation Enhancement Program

A federally mandated program identified in 11.200 et seq. of this title (relating to Transportation Enhancement Program), providing federal funding for transportation projects and activities that enhance the intermodal transportation systems and facilities with the state for the enjoyment of the users of those systems.

United States (U.S.) System Route

Those routes designated on the state highway system as U.S. highways and eligible for federal-aid funds as set forth in federal law and regulations.

Utility relocation/adjustment costs

Costs of work related to the adjustment, relocation, and removal of utility facilities accomplished in accordance with 21.21 of this title (relating to State Participation in Relocation, Adjustment, and/or Removal) and Chapter 21, Subchapter C of this title (relating to Utility Accommodation).