Rail Highway Operations Manual

November 2023

Manual Notice 2023-1

From: Jeffrey Davis, Rail Division Director

Manual: *Rail Highway Operations Manual*

Effective Date: November 29, 2023

Purpose

The Texas Department of Transportation (TxDOT) *Rail Highway Operations Manual* has been updated to comply with administrative rule changes and business practices as well as to define both District and Division responsibilities on distinct types of projects and coordination efforts.

This manual is not a railroad operations manual and does not cover items related to train scheduling or railroad worker safety.

Contents

Overall Changes:

- Replaced Traffic Safety Division, TRF-RSS with Rail Division RRD
- Replaced Federal Signal Program, FSP with Section 130 or Sec 130
- Replaced TRF – RSS project manager with RRD Project Manager
- Reorganized content with chapters and flowcharts
- Added and omitted sections within chapters
- Replaced number sign (#) with numbers
- Replaced single and double apostrophe with inches and feet
- Replaced mathematical symbols to word descriptions
- Added various links

Chapter 1 — Introduction

- Section 1 — Overview of Railroads in Texas
  - Redefined description and roles of the RRD four main sections
  - Removed the quantities of railroad crossings and revised Spur Permit to Permitted track
- Section 2 — Rail-Highway Projects
  - Added description of Maintenance Notice Letter
  - Added description of outside projects Impacting TxDOT and Railroad Right of Way

Chapter 2 — Construction Project Development

- Section 1 — Construction & Maintenance Agreement Timelines
  - Updated timelines
  - Updated C&M Agreement Flowchart
- Section 2 — Preliminary Activities
  - Added new subsection on railroad coordination
  - Updated preliminary information including DES's Project Development Process Manual reference and documents needed
  - Updated Design Meeting items to include sidewalk, road closure, traffic signal preemption, drainage and other utilities and sign boards
  - Updated RRD policy on Preliminary Engineering Agreements, including documents required
  - Added local government to sign preemption request form
  - Added note concerning Utility provider shall obtain agreement with railroad to relocate affect utility
  - Added new Right of Way Division subsection concerning signboard responsibilities
- Section 3 — Project Design Phase
  - Updated underpass plan submittal notes involving shoefly approval
  - Updated the Required Documents sub section to
  - Added Area Map sub section
  - Updated 5% Theoretical Cost Estimate sub section to include district to notify RRD on project completion paragraph
  - Added DES's Hydraulic Design Manual reference
  - Updated preemption documentation needed in agreement
  - Updated information regarding railroad costs estimates
- Section 4 — C&M Agreements
  - Updated to include utility agreement types
  - Updated signboard and other agreement types
  - Updated agreement amendments to include actual costs exceed estimate by 15% or more
- Section 5 — Design Build Projects
  - Added UPRR will only enter agreements with TxDOT

Chapter 3 — Maintenance Projects

- Section 1 — Letter Agreements
  - Updated description of invasive vs. non-invasive work

- Added subsection on letter agreement and Maintenance Notice letter including railroad flagging

Chapter 4 — Safety Projects (Section 130)

- Section 1 — Overview
  - Updated funding and eligible type of work
  - Updated Section 130 work at permitted crossings
  - Updated partnering with State and Local safety projects
- Section 2 — Preliminary Activities
  - No significant updates
- Section 3 — Diagnostic Inspection
  - Updated RRD staff, items to be evaluated
- Section 4 — Crossing Closure Projects
  - Updated Federal and railroad cost share
  - Updated closure process
  - Removed obsolete Federal Signal Program and Basic closure program sections
- Section 5 — Design Phase
  - Added Scope of Work (SOW) subsection and statement
  - Updated local government coordination requirements
  - Added District programming of CSJ for Section 130 projects thru TxDOTCONNECT
- Section 6 — Project Agreements
  - Added Construction & Maintenance Agreement and Advance Funding Agreements subchapters

Chapter 5 — Replanking Projects

- Section 1 — Program Overview
  - Updated eligible activities starting with 2022 program
  - Updated flowchart
- Section 2 — Railroad Crossing Surfaces
  - Updated that timber crossings are no longer reimbursable
- Section 3 — Project Selection
  - Updated program call information
  - Added District programming of CSJ in TxDOTCONNECT
- Section 4 — Design Phase

- Added RR SOW and TCP Subchapter and paragraph

- Section 5 — Project Agreements
  - Removed subparagraph on items not covered

Chapter 6 — Railroad Capital Improvement Projects

- Section 1 — Overview
  - Updated items covered by this chapter
  - Revised flowchart
- Section 3 — Common Design Issues
  - Updated dismantling or modifying active warning devices
  - Added subchapter on work impacting crossings licensed to State
- Section 4 — Project Agreements
  - Updated Project Agreement Process

Chapter 7 — Exhibit A and PS&E Design

- Section 1 — Section 1 - Common Rail-Highway Design Issues
  - Updated detour, cantilever flashing light usage
  - Updated use of schematic to start review
  - Updated guidance on humped crossing mitigation
- Section 2 — Crossing Closures & Consolidations
  - Updated general considerations including trains occupy crossing
- Section 3 — Traffic Signal Preemption
  - Updated general definitions including traffic signal design
  - Updated Traffic signal preemption priority list
  - Added Cutover and Annual Testing of Preempted Traffic Signals subchapter
- Section 4 — Track Design
  - Updated general notes and definitions
- Section 5 — Exhibit A Design
  - Updated general layout requirements
  - Removed item 10, “Stencil DOT on mast”
  - Updated guidelines on traffic control plans
  - Updated guidelines on Projects with Overpasses
  - Updated guidelines on Projects with Underpasses
  - Updated guidelines on Projects with at-grade crossings

- Updated guidelines on Projects with Traffic Signal Preemption
- Updated guidelines on Projects with Existing or Proposed Quiet Zones
- Updated Guidelines on Projects with Culverts, Drainage Pipes or Conduits

◆ Section 6 — PS&E Design
- Updated general notes and requirements

Chapter 8 — Right-of-Entry Process

◆ Section 1 — Overview
- Updated general notes and requirements
- Revised Flowchart

◆ Section 2 — Process
- Added subsection on Union Pacific Templates and CST's Standard Specification Manual reference

Chapter 9 — Construction and Inspection Processes

◆ Section 1 — Overview
- Revised Flowchart

◆ Section 2 — After C&M Agreement Execution
- Updated conditional release description
- Updated Authority to Order Material
- Added subsections dealing with railroad flagging and Property Access Training for State employees

◆ Section 3 — Inspections
- Updated general notes

◆ Section 4 — Invoices
- Added Maintenance Projects
- Added Subsection on applicable flagging charges
- Updated guidance to use OnBase

Chapter 10 — Other Rail-Highway Programs

◆ Section 3 — Other Programs
- Updated Basic Closure Program amount under Section 130

Chapter 11 — Quiet Zones

◆ Section 1 — Overview

- Revised new flowchart

- Section 4 — Implementing a Quiet Zone
  - Updated Safety Upgrades on TxDOT Roadways

Chapter 12 — Database

- Section 1 — Crossing Database
  - Updated general information
- Section 2 — Texas Railroad Information Management System (TRIMS)
  - Updated general information
  - Noted that WebTRIMS was removed

Chapter 13 — Maintenance

- Section 1 — Grade Crossing Maintenance
  - Updated information on maintenance and district inspection
- Section 2 — Preempted Traffic Signals
  - Added reference to Chapter 7

Chapter 14 — Policy

- Section 2 — Laws Impacting Rail-Highway Projects
  - Replaced spur permit with permitted crossings
  - Revised code from 23USC 409 to 407

Contact

Questions on the manual or its contents may be directed to the Rail Division.

Archives

Past manual notices are available in a PDF archive.

Table of Contents

Chapter 1 — Introduction

Contents:

Section 1 — Overview of Railroads in Texas

Manual Purpose

Within the state of Texas, there are over 10,000 miles of railroad tracks and 80,000 centerline miles of roadway. The Texas Department of Transportation (TxDOT) Rail-Highway Operations Manual covers responsibilities and best practices on projects that impact both roadway and railroad rights of way. The Manual defines both TxDOT district and division responsibilities on the various types of projects and coordination efforts required between railroad companies and other entities.

This manual is not a railroad operations manual and does not cover items related to train scheduling, railroad worker safety or commonly asked questions from the public related to railroad operations.

TxDOT Role with Railroads

The TxDOT Rail Division (RRD) interfaces with railroad companies as a primary function. The Rail Division is comprised of an administration and four main sections: Planning and Programming, Safety, Rail Letting and Rail Grade Crossing. This manual will mostly deal with the Rail Letting and Rail Grade Crossing Sections.

The Rail Planning and Programming Section has the authority to implement rail improvements through public-private partnership agreements and provide investments in freight rail relocation projects, rail facility improvements, rail line consolidations or new passenger rail developments. This section also manages lease agreements with operators on state-owned facilities and manages construction contracts for state or federally funded rehabilitation projects on both state-owned and private facilities.

The Railroad Safety Section promotes safety in all areas of railroad operations to reduce deaths, injuries and damage to property resulting from railroad crashes by conducting railroad investigations and inspection in all five Federal Railroad Administration (FRA) disciplines.

The Rail Grade Crossing Section manages the Federal Highway Administration (FHWA) Section 130 Program (formerly titled FSP Program), the state Replanking Program of on-system at-grade crossings and maintains a database of all public railroad crossings. The Rail Letting section generates railroad related agreements for TxDOT construction and maintenance work that

impacts railroad rights of way and assists with other issues related to public railroad crossings.

District personnel coordinate design, construction and maintenance of road projects impacting railroads within their district. They are also responsible for reviewing invoices related to railroad construction work and coordinating district activities with their railroad company counterparts.

The Texas Railroad Information Management System (TRIMS) went live in March 2013 as the database to manage railroad crossing data and rail-highway project information. See Chapter 12 for more information.

See the TxDOT Rail Division website for further information. The Rail Division external website contains general information that is of use to both internal and external users. The Rail Division Crossroads internal website contains more proprietary information such as sample plan sets, internal and external contact information and guidance memos.

Operating Railroads in Texas

Class I railroad companies are defined as having annual carrier operating revenues of $433 million or more (as of 2011).

Currently, there are three Class I railroad companies operating in Texas which account for about 84% of freight railroad track (including trackage rights) in the state:

1. Union Pacific Railroad (UPRR): (about 43% of track in Texas)
2. BNSF Railway Company (BNSF): (about 35% of track in Texas)
3. Canadian Pacific Kansas City Limited (CPKC): (about 6% of track in Texas).

The remaining railroad track in the state is operated by over 50 different shortline railroad companies. Shortline railroad companies are defined as having annual operating revenues of less than $20 million (1991 dollars). These railroad companies are typically regionally located and partner with Class I railroad companies for switching railroad car shipments with customers.

Railroad rights of way are typically privately owned and operated by railroad companies, and widths of the right of way vary. The Surface Transportation Board, the federal agency tasked with oversight of interstate commerce and right of way of the interstate railroad system, also may have records of railroad ownership for active and abandoned railroad right of way.

Railroad Crossings

There are four general types of railroad-highway crossings:

1. Railroad Over (roadway underpass grade separation): Railroad structure crosses over roadway and/or sidewalk.
2. Railroad Under (roadway overpass grade separation): Railroad crosses under a roadway and/or sidewalk.
3. Grade Crossing: Roadway crosses railroad tracks at-grade (same level as roadway) with or without adjacent sidewalks.
4. Pedestrian Pathway Crossings: Pathway crosses railroad tracks at grade, but more than 25 feet from an adjacent parallel roadway grade crossing.

Crossings are further defined by:

- Public versus private railroad crossings.
  - Public crossings are typically located on public roadways where both sides of the crossing are maintained by a public agency and the road is open for public use.
  - Private crossings are typically located at driveways and on private roadways or where one or both approaches are maintained by a private entity. This also includes a roadway that is owned by a public road authority, but gated, for example, a municipal water treatment plant.
- Active versus passive warning traffic control devices.
  - Active warning devices contain train-activated components such as mast flashers, cantilevers, bells, and/or gates.
  - Passive warning devices are non-train activated roadway signs for traffic control.

Types of Railroad Tracks and Common Track and Signal Equipment

The following are typical types of railroad tracks and facilities encountered:

- Mainline tracks: Typically higher speed tracks, these represent the majority of track miles. These tracks are used for long distance shipping. Multiple mainline tracks may be adjacent to one another.
- Passing/siding tracks: Located adjacent to a mainline track, these tracks are used to store trains waiting for a train traveling the opposite direction to pass or faster trains to overtake them.
- Wye track: A curved track which connects two perpendicular tracks.
- Spur track: A short section of track which typically branches off a mainline track to an industry customer.

- Permitted track (formerly called a spur track): Railroad spur installed by crossing permit from TxDOT where the railroad company is responsible for the majority of construction and maintenance of the crossing.
- Switching track: Used for switching rail cars.
- Switch or turnout: Used to control movement of train at location of two divergent tracks. Can be mechanical or electrical.
- Diamond (also known as an interlock): The at-grade crossing of two separate railroad tracks. Controlled by an interlock switch.
- Control point: Location used to manage train movements and are typically on each side of a siding.
- Rail yard: Locations of multiple adjacent tracks used for storing and switching of cars.
- Wayside signals: Railroad signals used to control train movements. These can include powered switches, train abnormality detectors and actual train movement signals. This also includes any buried or overhead communication lines.
- Railroad highway grade crossing signals: Train or railroad personnel activated signals that warn a motorist of an approaching train.

Section 2 — Rail-Highway Projects

TxDOT Projects on Railroad Right of Way

With few exceptions, an agreement between TxDOT and the operating railroad company must be in place giving TxDOT permission to enter and perform work on railroad right of way. Any work performed by the railroad company in conjunction with the project is usually fully reimbursed by TxDOT unless the railroad company has crossed TxDOT right of way by `crossing` permit or the railroad company has agreed to cost participate on the project. Details of cost participation and reimbursement are provided in the project agreement between TxDOT and the railroad company.

`RRD` serves as the Office of Primary Responsibility for executing agreements with railroad companies on rail-highway projects.

Typically a separate Contractor Right of Entry Agreement is required between TxDOT's contractor and the railroad company to allow the contractor to do work on behalf of TxDOT `while` on railroad right of way.

Types of Work with Benefit to a Railroad Company

When designing projects that impact railroad rights of way, TxDOT must negotiate with the railroad company on project design, costs, construction schedule and various terms of the agreement. Designers should be aware of projects which typically provide benefit to railroad companies and projects which are generally discouraged by railroad companies.

Projects that usually provide benefit to railroad companies include:

- Closing an at-grade crossing.
- Grade separating (overpasses preferred) an existing at-grade crossing.
- Safety upgrades to at-grade crossings such as installation of `flashing` lights and gates or traffic signal preemption.
- Improving drainage on railroad right of way.

Projects that are generally discouraged by railroad companies include:

- New at-grade crossings.
- Widening at-grade crossings (to support increased vehicular traffic).
- Overpass projects that do not span the railroad right of way or do not meet preferred horizontal and vertical clearances.

- Underpass projects which do not meet railroad company design requirements or have significant impact on railroad operations during construction.
- Joint drainage projects (highway parallel to rail line) which include grading, fill placement or cut lines on railroad right of way.
- Any project which restricts the addition of future track or increases drainage onto railroad right of way.

Maintenance Responsibilities

In Texas, the road authority and railroad company assume both separate and joint maintenance responsibilities at rail-highway grade crossings. The crossing surface panels over the railroad where the roadway crosses the rail line, railroad warning devices within railroad and vegetation on railroad are maintained by the railroad company. Since the crossing surface panels extend down the roadway to the edges of the railroad ties, the railroad company maintains the roadway surface from edge of railroad tie to edge of railroad tie.

The road authority is responsible for maintaining the roadway approaches up to the edge of the crossing surface, advanced warning signs and pavement markings.

Joint maintenance responsibilities are typically found with common ditches between a highway and rail line, as well as other drainage and traffic signal preemption features.

While local, state, and federal governmental entities may provide funds for the replacement or upgrade of crossing surface panels and railroad warning devices, the railroad company is generally responsible for performing this work and future maintenance.

See Chapter 14 for various state laws related to maintenance at railroad crossings.

Types of Agreements

Examples of common agreements executed with railroad companies include:

- Preliminary Engineering Letter of Authority (LoA): Preliminary engineering agreement to allow the railroad company to charge TxDOT for engineering plan review, create railroad estimates and other project preliminary engineering work.
- Maintenance Agreement: Simple agreement notifying the railroad company of the type of maintenance work. The agreement will also include an authorization for the railroad company to provide railroad flaggers.
- Maintenance Notice Letter. A notice signed by TxDOT informing the railroad of maintenance work being done in the railroad right of way with no compensation to the railroad by TxDOT required. Typically used with the BNSF railway and many short-

line railroads. The Maintenance Consent Letter with Contractor Endorsement is used on Union Pacific Railroad related maintenance projects.

- Joint Use Agreement: Typically used for constructing and maintaining a common ditch or other drainage work benefiting both the railroad company and TxDOT.
- Pipe/ Wireline License Agreement: Used to allow for the installation and maintenance of TxDOT utility structures such as storm drains, wireline crossings for lighting, ITS or preemption, etc.
- Construction & Maintenance Agreement: Agreement allowing TxDOT to construct and maintain an existing or new road crossing of the railroad and to reimburse the railroad company for their expenses. The agreement may also include property rights descriptions to document railroad encumbered by the TxDOT project.
- Contractor Right of Entry Agreement: Allows a contractor onto railroad to perform intrusive work. Agreement includes indemnification, rules and regulations, and other requirements while the contractor is on railroad.

These agreements will be discussed in greater detail later in this Manual.

Outside Projects Impacting TxDOT and Railroad Right of Way

Occasionally other parties may have projects which impact TxDOT and railroad companies. Work may affect either the railroad and/or TxDOT right of way. Examples of these projects may include:

- Local agency, developer or industry projects including new roads or pathways.
- New traffic signal to be preempted by a railroad crossing (discussed in Chapter 7).
- Design approvals.

Quiet Zones are discussed in Chapter 11.

Any new road, driveway or pathway impacting TxDOT right of way and crossing a railroad shall not be approved until the TxDOT district has a copy of an approved railroad agreement allowing said crossing of the railroad property. A copy of the agreement shall be posted into the TRIMS database program (see Chapter 12).

Any new traffic signal on TxDOT right of way or maintained by TxDOT that is interconnected with a railroad crossing shall be approved in writing by both Traffic Safety Division and RRD as detailed in Chapter 7. A copy of the signed railroad request and the agreement with the railroad shall be posted into the TRIMS database program.

- Transfer of an agreement from one party to another.
- These agreements are unique in nature. RRD will coordinate review and approval.

Chapter 2 — Construction Project Development

Contents:

Section 1 — Construction & Maintenance Agreement Timelines

Preliminary Design to Agreement Execution

When planning construction projects which impact railroad right of way, the following chart gives approximate timelines needed for rail coordination from preliminary design meeting to execution of a C&M Agreement.

C&M Agreement Timelines

Project Type	Lead Time (Months)
Conduits Under or Over Track	6-12
Common Ditch, Pipeline or Joint Usage (Encroachments on Railroad Right of Way)	9-18
Overpasses (New or Modified)	12-18
At-Grade Roadway Reconstruction or Widening	12-24
Traffic Signal Preemption	18-24
Projects Involving Track Construction or Relocation	24+
New At-Grade Crossings	24+
Underpasses (New or Modified)	24+
Maintenance Notification Letter	6+

The Maintenance Notification Letter represents routine maintenance projects or projects with minimal impact on railroad right of way. These projects are covered in Chapter 3.

C&M Agreement Flow Chart

The flow chart on the following page depicts the process for obtaining a C&M Agreement with a railroad company on a construction project.

NOTE: Not all steps are applicable to every construction projects. Project steps and time frames will vary depending on the scope of the project.

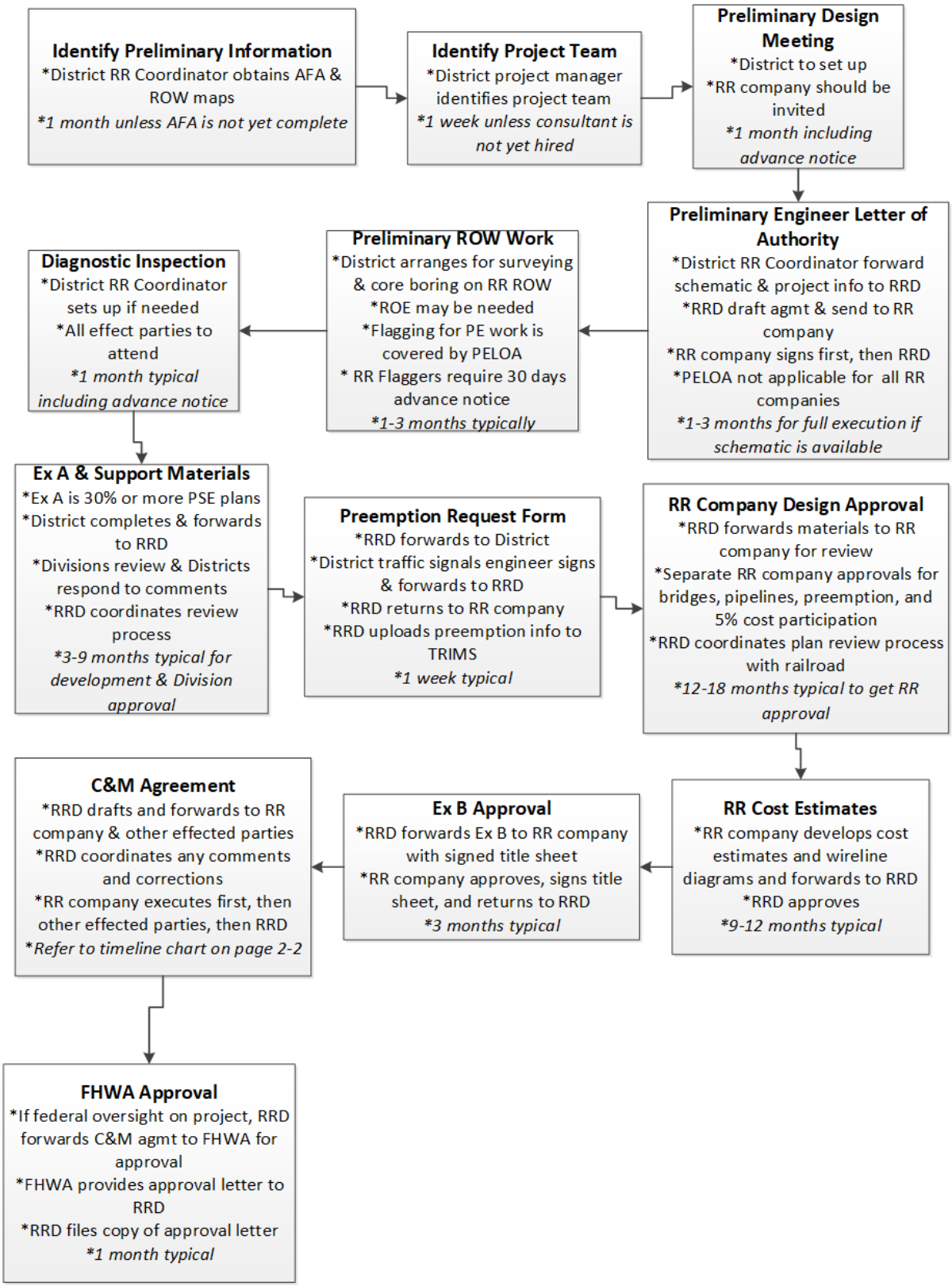

Figure 2-1. C&M Agreement Flow Chart

Section 2 — Preliminary Activities

Determining if Railroad Coordination is Needed

Per Federal-aid guidelines (https://www.fhwa.dot.gov/federalaid/150731.cfm), any projects with a terminus near railroad right of way need to be cleared by the railroad. The terminus has included up to and including the advanced railroad signage for a grade crossing. Rail Division must clear all projects with a notice to the railroad for all work on or within 50 feet of the railroad right of way line. The district coordinator should be informed by the district project managers on work that is within 500 feet of railroad right of way to determine railroad impact.

TxDOT shall certify all projects at one of four levels per Design Division:

- No railroad work.
- Railroad agreement executed; work performed prior to letting.
- Railroad agreement executed; work during construction.
- Railroad agreement not executed; work during construction.

The district shall certify the projects and provide the information to Design Division. RRD will review and approve the list or request revisions. See Design Division *Project Development Process Manual* for descriptions of the certifications.

Preliminary Information

All TxDOT project personnel should review and follow the Design Division's *Project Development Process Manual* for the development of any projects.

As districts identify construction projects impacting railroad right of way, the following documents should be obtained:

- Existing license agreement or permit for the crossing or location being impacted by the project to be obtained by RRD.
- Advanced Funding Agreements (AFA) between TxDOT and a local government for the project to be obtained by the district.
- Copy of executed agreement between the local government and railroad company (if applicable) to be obtained by the district.
- Right of way maps to be obtained by the district.

If the existing agreement can be obtained, RRD will verify if TxDOT or the roadway authority either has a license to cross railroad right of way or if the railroad is crossing the roadway right of way via permit. RRD will also verify the responsibilities established with all parties in the original agreement and if the new project is impacted by these responsibilities.

An AFA can be used as an attachment to a C&M Agreement to avoid a three-party agreement involving the local government. In this scenario, the C&M Agreement can be executed between TxDOT and the railroad company with the AFA attached to clarify maintenance responsibilities. The AFA also specifies the party responsible for preliminary engineering and the party responsible for the project construction.

The RRD contract specialist determines if an existing safety (Section 130) or replanking project exists at any of the at-grade crossings on the project. If so, the safety or replanking project may be canceled and paid for under the construction project. See comments regarding Highway Safety Improvement Projects and Section 130 projects in Chapter 4, Section 130.

If a district or local let project involves safety/HSIP funding or affects traffic signals and/or sidewalks, contact Rail Division for potential partnering. See Chapter 4, Section 130 for further details.

Project Team

In the early planning stages, several parties may be needed for proper railroad coordination:

- Railroad company point of contact.
- Local government point of contact (if applicable).
- Consultant (if applicable).
- District project manager.
- District design engineer.
- District railroad coordinator.
- Area engineer.
- RRD contract specialist.
- Bridge Division point of contact (bridge projects only).
- Traffic Division point of contact (signal, signage, and preemption projects only).

The railroad company point of contact determines which additional contacts from the railroad company may be needed for coordination. Departments the railroad company may include are

real estate department, legal department, track design, structural engineers, environmental engineers, maintenance, local operations, and flagging.

Consultants with previous track design experience should be used on any projects involving track design (typically underpass projects). Familiarity with both American Railway Engineering and Maintenance-of-Way Association (AREMA) and individual railroad company track standards are essential when evaluating the consultants.

Preliminary Design Meeting

Prior to plans and schematics being developed, the district project manager should contact the railroad company and local government (if applicable) to schedule a preliminary design meeting. At this meeting, the following items should be discussed:

- Project timelines.
- Design elements, including sidewalks, road closures, etc.
- Preliminary schematic.
- At-grade crossing protection devices.
- Traffic signal preemption.
- Planking (crossing surface).
- Drainage, electrical and other utilities across railroad right of way.
- Commercial signs or billboards.
- Bridge horizontal and vertical clearances and crash walls.
- Railroad company future track needs.
- Railroad company cost participation.
- Railroad company cost estimates.
- Work to be performed by railroad company.
- Any required shoofly tracks, railroad signal relocates or track work.
- Adjacent at-grade crossings and wayside signals with existing circuitry that could impact railroad company cost estimate.
- Potential project benefits for the railroad company TxDOT could use in negotiations.
- Railroad right of way and construction access for the contractor.
- Railroad right of way acquisition (if applicable).
- Need for absolute work windows during construction (when trains cannot be run).

- Railroad coordination during project development.

The preliminary design meeting should also clarify how the various railroad agreements and coordination with the railroad company will be handled throughout project development prior to letting. Questions to be answered:

- Who will submit and be a party to the Preliminary Engineering Letter of Authority (PELOA)?
  - RRD policy is that all PELOA Agreements are two party agreements for simplification.
  - All project invoices from the railroad company should go to the same party that signs the agreement.
    - If TxDOT is letting the project, the agreement will include TxDOT and the railroad company.
      If the local government is letting the project, the agreement will include the local government and the railroad company. TxDOT will typically provide only design approval to the local government and is not a party to the C&M Agreement.
- Who from TxDOT and the local government will review and approve project documents prior to submittal to the railroad company, including the Exhibit A plans and C&M Agreement?
- Who will be the point of contact to submit all documents to the railroad company?
- Who will be a party to and draft the C&M Agreement? RRD prefers two-party C&M Agreements between the party letting the project and the railroad company. The AFA is typically referenced in the C&M Agreement to clarify the third party's responsibilities on the project.

NOTE: The Union Pacific Railroad (UPRR) may require that all traffic signal preemption agreements are three party agreements if local government traffic signal maintenance is involved. At a minimum, the local government agency shall sign the preemption request form. See Chapter 7 for more information.

Meeting minutes from the preliminary design meeting should be sent by the district to the project team for comments and concurrence. In some cases, an informal approval from the railroad company may be required for the design features on the project prior to development of Exhibit A plans.

Preliminary Engineering Letter of Authority (PELOA)

Many railroad companies require a PELOA to reimburse the railroad company for charges incurred for:

- Review and approval of proposed engineering design.
- Development of cost estimates for work performed by the railroad company.

- Development of railroad wireline diagrams.
- Real estate reviews of property impacted by the project.
- Legal review of agreements.
- Meeting attendance during project development.
- Track surveys.
- Railroad flagging in support of Preliminary Engineering activities.

These agreements, drafted by RRD, may also provide authorization to the railroad company to provide flagging for preliminary design activities on the railroad right of way. Presently, railroad companies have the following requirements for PELOAs:

- UPRR and CPKC: PELOAs are required for all construction projects other than pipe and wireline installations or general maintenance work on railroad right of way.
- UPRR may also require a PELOA for bridge maintenance work, if applicable.
- BNSF: PELOAs are required for traffic signal and preemption projects. All other construction projects may require a PELOA at the discretion of the BNSF contact.
- Shortline railroad companies: Check with RRD for current requirements.

PELOAs are sent with a project schematic. If an approved Exhibit A is available, this will take place of the project schematic.

Project Schematic

The district initially arranges to have a project schematic developed. The project schematic is a general profile view showing the roadway alignment with the railroad and clarifying if any crossings of the railroad are at-grade or grade separated.

Other Preliminary Agreements

Preliminary activities on the railroad right-of-way may require separate letter agreements with the railroad company. The agreements clarify insurance and right of entry requirements and provide authorization to the railroad company to provide flagging services. These agreements are typically between the party (TxDOT or local government) providing engineering services on the project and the railroad company. Preliminary activities could include:

- Surveying.
- Boring.
- Subsurface Utility Engineering (SUE).

- Environmental mitigation (asbestos, lead, etc.).

The district railroad coordinator will assign the draft of these agreements to the appropriate district staff.

The three Class I railroads have a contract flagging company for flagging services. Standard provisions allow for the TxDOT contractor to directly reimburse the contract flagger for their services.

Diagnostic Inspection

After the preliminary design meeting, the district railroad coordinator should arrange a diagnostic inspection (if applicable) with the railroad company and project team to visit the project location and discuss:

- Train operations, including train speed and counts.
- Safety requirements.
- At-grade crossing safety devices.
- Impact to track, wayside signals, preemption, and equipment, if any.
- Phased construction.
- Other railroad company and TxDOT projects which could impact project.
- Environmental and hydraulic/drainage issues.
- Existing billboards on railroad right of way that may need to be relocated.
- Right of way and utility issues.
- Design issues.

Notes from the diagnostic inspection should clarify all topics discussed with the project team and list attendees. The district railroad coordinator compiles the notes.

Utility Relocation

Utility companies with facilities located on railroad right of way have separate existing agreements with the railroad companies. **These utilities may not appear on statewide one call utility location services.** The railroad company normally has their own one call center. These utilities may not respond to any request for location without coordinating through the railroad.

If these utilities need adjusting to accommodate a construction project, TxDOT or the local government will coordinate the relocation activity with the utility owner. The utility owner or

provider shall obtain their own agreement with the railroad to relocate the affected utility.

Railroad owned utility relocation and railroad company staff coordination of relocation costs will be addressed in the C&M agreement.

Right of Way Division Coordination

Relocation of commercial signs within the railroad property does not fall under the responsibilities of the RRD. All commercial sign issues are managed by the Right of Way Division (ROW). RRD agreements cannot be used to obtain an easement or fee purchase of railroad right of way. Commercial sign payments may be included in the final C&M agreement upon approval from the Right of Way Division.

Section 3 — Project Design Phase

Exhibit A and Support Documentation

The district produces or uses a consultant to produce an Exhibit A, which is a 30% or more Plans, Specifications and Estimates (PS&E) detailing the work to be performed within railroad right of way. Depending on the scope of work involved, various support documents require review and approval by the railroad company.

Further guidance on how to develop an Exhibit A is provided in Chapter 7.

Underpass Plans

Underpass projects are generally more complicated than all other types of projects and require multiple stages of submittals:

- Project concept/schematic.
- Proposed track shoofly designs must be reviewed and approved by the railroad company before bridge plan submittal.
- 30% plans (Exhibit A).
- 60% plans.
- 100% plans (Exhibit B).

Required Documents

Below is a list of required documents that may be needed for design approval and/or for the C&M Agreement:

- Overpass (new or modification):
  - Exhibit A, 30% or more PS&E.
  - Exhibit B, 100% Plans.
  - Railroad Scope of Work (RR SOW).
  - Design Conformance to Railroad Guidelines (DCRG) Report, if applicable.
  - Metes and bounds property description or area map.
  - Boring logs, if applicable.
  - 5% theoretical cost estimate, if applicable.
  - Hydraulic analysis, if applicable.
  - Overhead checklist (CPKC projects only).

- Railroad Work Matrix, if applicable.

◆ Underpass (new or modification):

- All items for overpass required documentation.
- Typical Selection Report (TSR), if applicable.
- Cooper E-80 loading calculations, if applicable.
- Shoofly track design.

◆ At grade crossing (new or modification):

- Exhibit A, 30% or more PS&E / Railroad Scope of Work (RR SOW).
- Metes and bounds property description or area map.
- Railroad Work Matrix, if applicable.

◆ Traffic signal preemption:

- Exhibit A, 30% or more PS&E.
- Preemption Form (TxDOT Form 2304).
- Traffic signal timing data and phasing diagram.
- Signed preemption request.

◆ Culverts, drainage pipes, or conduits on or over railroad right of way:

- Exhibit A, 30% or more PS&E.
- Pipeline or wireline license request form.
- Hydraulic analysis, if applicable.
- Cooper E-80 loading calculations, if applicable.
- Railroad Work Matrix, if applicable.

◆ Joint usage (ditch, sidewalk, etc.) or longitudinal encroachments:

- Exhibit A, 30% or more PS&E.
- Hydraulic analysis, if applicable.
- Railroad Work Matrix, if applicable.

Design and C&M Agreement Approval Documents

A brief description of each type of document is available to determine current examples and procedures on the RRD website.

Design Conformance to Railroad Guidelines (DCRG) Report

A DCRG report details how the proposed overpass design meets or does not meet railroad company design guidelines. DCRG reports include:

- Brief description of project and need.
- If overpass spans railroad right of way (bridge bents outside of right of way).
- Angle the overpass crosses the rail line.
- Vertical clearance.
- Horizontal clearance.
- Lighting for railroad.
- Fencing on bridge.
- Utilities and any relocations.
- Excavation and demolition work.
- Preparation work on railroad right of way (tree removal, etc.).
- If drill shaft locations are within zone of railroad live load surcharge, and if shoring will be required.
- How drainage is blocked from falling on railroad right of way.
- Where future tracks may be placed.
- Need for crash walls, assuming future tracks are in place.
- Photos.

Metes and Bounds Property Description

A legal property description to define the railroad right of way encumbered by the construction project, complete with description and map of parcels. Area encumbered may also include area needed temporarily for project construction.

Area Map

The Union Pacific Railroad, BNSF Railway and several shortline railroads will accept an area map to document the area needed by the project in place of a metes and bounds property description. The area map is comprised of a CAD drawing, tied into state plane coordinates, or a latitude/longitude, and used by the affected railroad for their GIS mapping.

The railroad will generally only allow an area needed for the proposed crossing. This would include edge of road to edge of road for at-grade crossings and edge of sidewalk to edge of sidewalk for pathway projects. For bridge projects, an additional 20-foot-wide strip outside of the edge of bridge will be the limit.

Photos

Photos should show area where the project will occur and clarify if any commercial billboards or signboards located on railroad right of way will need to be relocated. Photos should be from an actual site visit and not taken from online images.

5% Theoretical Cost Estimate

In certain cases, where an existing at-grade public crossing with active warning devices is being replaced with a bridge and federal funds are used, the railroad or another local government will need to participate in the project funding. See Title 23, Code of Federal Regulations, Section 646.210 for details. This theoretical cost will be based on the following design criteria:

- The approach roadway geometry will be designed using the minimum design criteria allowed for the functional class and annual average daily traffic (AADT) of the subject roadway (i.e., minimum k-values, design speed, grades, vertical clearance, etc.). Approach roadway for the theoretical structure will terminate as soon as the grade has returned to existing roadway profile.
- The bridge length will be the minimum length possible to fully span the railroad right of way. Any other features that would need to be spanned based on actual conditions (ie., other roadways, waterways, etc.) are not considered. Only a bridge overpass will be considered for the theoretical structure, even if an underpass is ultimately proposed for the actual project.
- The bridge superstructure type for the theoretical structure will be the same as for the proposed bridge span crossing the railroad right of way.
- The width of the theoretical structure will be the same as the proposed bridge width if the number of lanes remains the same as the number of lanes on the existing grade crossing. If the proposed bridge has more lanes than the existing grade crossing, the theoretical structure will be the width of the proposed bridge minus the width of the number of extra lanes for the proposed bridge.
- If retaining walls are used for the proposed bridge to limit the amount of embankment, retaining walls will be used for the theoretical structure.
- Other design features required for the proposed structure, such as culverts, illumination, attenuators, riprap, etc., will be included with the theoretical structure.

The geometry of the theoretical structure will be presented as a .pdf file which contains an elevation view showing vertical geometry of the structure and approaches, and a typical section showing the theoretical bridge cross-section. The bridge engineer will prepare an estimate in spreadsheet form based on the quantities for the theoretical structure. Costs for each item associated

with the theoretical structure should be similar to a current project estimate. If no current project estimate is available, use the most recent statewide average low bid unit prices.

If the highway or rail line is relocated to eliminate the at-grade crossing, the 5% theoretical cost will be the lesser of:

- Actual cost of relocation project.
- Estimated cost of relocation project.
- Estimated cost of a theoretical overpass as described above.

Upon substantial completion of the project, RRD is notified by the district, and a letter is sent to the railroad for payment. The payment is received and processed by FIN. These funds are typically used to offset the federal obligation of the project by the same amount. Substantial completion is typically when the at-grade crossing is closed, and traffic moved to the grade separated structure.

Hydraulic Analysis

An analysis showing contours and direction of water flow with calculations. Review the guidelines in the Design Division's *Hydraulic Design Manual*.

Overhead Checklist

Also known as the overhead grade separation data sheet, this form gives a general description of design features on overpass projects, including horizontal and vertical clearances, fencing, and lighting.

Railroad Work Matrix

A railroad work matrix is needed for projects requiring a detailed outline of the division of labor and materials to properly bid out the project to a TxDOT contractor, obtain a proper estimate from the railroad company and coordinate the project construction schedule. The railroad work matrix needs to address:

- Track installation and removal responsible party (railroad company or TxDOT contractor).
- Track tie-ins to live track responsibilities party (railroad company or TxDOT contractor).
- Responsible party for supplying the track materials (rail, ties, ballast, subballast).

- Need for derailers or guardrail and responsible party to provide and install, if needed.
- Responsible party to perform site grading and groundwork.
- Assigned responsible party for providing and installing any drainage features.
- Responsible party for utility adjustments.
- Process for material delivery to the project site.
- Responsible party for delivering the materials.
- Material(s) stockpile location.
- Live track closures needed to facilitate construction.
- Equipment needed on railroad right of way to construct the project.

Typical Selection Report (TSR)

Used on underpass projects, the TSR identifies materials and construction methods to be used on the railroad bridge proposed to be built or modified by TxDOT or local governments. In the rare case that an underpass bridge is being developed on a new road alignment or a road alignment with an existing at-grade crossing, the method will typically involve an at-grade shoofly track alignment that routes the railroad around the footprint of the proposed structure to allow for its construction. If this method is performed in a cut excavation, longitudinal shoring will likely be required under the influence of railroad live load.

More commonly, a railroad underpass replaces an existing underpass structure due to deficient vertical or horizontal clearance in conjunction with a safety or added capacity project. In this case, three options are available, considering maintenance of rail traffic.

- **Option 1:** Build the proposed underpass adjacent to the existing underpass and develop a revised railroad alignment that ties into the approaching railroad alignment. The railroad company may be open to this option if there is already a horizontal curve at this location or if the design speeds are low enough that a jog in the railroad alignment is acceptable. For tangent existing track alignments, the railroad company typically does not approve of providing such a permanent realignment.
- **Option 2:** Build the proposed underpass on the same alignment as the existing and construct a bypass shoofly alignment with a temporary bridge structure (if maintenance of highway traffic is required). This temporary bridge structure can be of lower cost open deck construction with shorter spans and vertical clearance less than the final ultimate condition for the short duration of its usage. Phasing of the lower roadway construction should be considered in developing the temporary shoofly bridge and new mainline bridge layouts. A subset of the second option involves building a permanent bypass shoofly alignment. This is only entertained if it proves

more cost effective overall than a temporary structure and if the railroad company cost participates in providing what effectively is provision for a future second track.

- **Option 3:** Construct a "roll-in" where the replacement structure is built near or adjacent to the existing bridge and physically lifted or slid into place on new substructures in a short duration process that reduces the time of complete closure of the railroad (usually 72 hours maximum). While the "roll-in" technique can create significant cost savings in avoiding a temporary structure and approach track alignment, it also carries measurable construction risk considering the delay potential to the railroad company. TxDOT has had limited success in achieving railroad company approval of "roll-in" replacements, and they should only be pursued if early coordination with the railroad company is undertaken and if the railroad line has limited traffic.

Structure selection should consider the railroad company's preferred structure selection if feasible. Refer to railroad company published guidelines for preferred structure types. Generally, railroad companies prefer multi-girder steel deck girder bridges due to weight savings (ease of removal replacement) and ease of repair. TxDOT preference is multi-girder composite prestressed girder bridges due to construction cost savings, but these have limited span capability and higher vertical clearance requirements in railroad company guidelines.

In the case of replacements involving limited vertical clearance or long span applications, a through plate girder bridge may be needed to minimize structure depth below the rail or span roadways with a large number of lanes and/or clear zone. The designer should be aware this is the railroad company's least favorable structure type due to its fracture critical nature and expense. Clear safety improvements or cost savings (e.g., avoiding a pump station or major railroad grade raise) will need to be demonstrated to successfully gain railroad company approval of a through girder structure. Ballasted deck structures are required for all underpass projects over a roadway, and TxDOT preference is for a composite concrete deck in lieu of a steel plate deck if railroad company approval can be obtained and target vertical clearance is achievable.

Preemption Form (TxDOT Form 2304)

This form is used to determine the amount of advanced preemption time needed from the railroad company for a traffic signal interconnected to an at-grade crossing. See Form 2304 and 2304-I for instructions on how to fill out the form in TxDOT E-Forms.

Traffic Signal Timing Data

If traffic signal controller is existing, data should be downloaded from controller to show minimum green, yellow change and red clearance times during normal and preemption phases as well as delay time and track clearance green time. If traffic signal controller is not existing, show proposed times to be programmed into controller.

Pipeline or Wireline License Request Form

The Pipeline or Wireline License Request Form is provided to the railroad company to clarify the exact location where pipe or wire will be installed, material used for pipe or conduit and product the line will carry.

Cooper E-80 Loading Calculations

Cooper E-80 Loading Calculations for underpass bridges, retaining walls or culverts under a track are used to verify the proposed element meets Cooper E-80 standard.

Design Approval Process

After the project documents have been approved by the district, the district railroad coordinator forwards them to the assigned RRD contract specialist who then coordinates the review of these documents with the proper division personnel. Division reviews include:

- Bridge design.
- Grade crossing warning devices.
- Traffic signal preemption.
- Track design.
- Hydraulics.
- Pedestrian elements.
- Landscape architecture.
- Utility application.

After all comments have been resolved from the divisions, the RRD contract specialist forwards the documents to the railroad company for review.

For follow-up comments, the district will work with the railroad company point of contact.

Preemption Request Form

The railroad may require a signed preemption request form. The form lists the type and amount of preemption, the preemption circuits requested on the project, and the number and gage of the conductor wire.

This form will be signed by the government entity maintaining the traffic signal after construction. The district will coordinate

signatures. The signed preemption request form needs to be included with the Exhibit A in the final agreement packet.

Design Approval Expiration

Design approval from railroad companies typically lasts for three years. If a project has been approved but pulled from letting, the Exhibit A and support materials will need to be reviewed again if three years have lapsed.

Railroad Company Cost Estimates

Construction projects will require an estimate from the railroad company for labor and materials provided by the railroad company on the project. Construction activities requiring a railroad company cost estimate:

- Flagging.
- Preliminary and construction engineering.
- Construction inspection.
- Planking or replanking.
- Installation, relocation, or removal of grade crossing warning devices.
- Railroad circuitry adjustments.
- Installation or adjustment of railroad drainage structures under tracks.
- Relocating railroad utilities on railroad right of way.
- Licensing fee for C&M Agreement and Right of Entry Agreement.

Prior to drafting a C&M Agreement, RRD will review the estimates to verify:

- Project location and description information is correct.
- Estimates are accurate given comparable recent projects.
- Quantities of major items match design shown in Exhibit A. Major items for grade crossing warning devices include gates, cabins, mast flashers, cantilevers, foundations, signs and flashing light pairs. On planking projects, major items include length and size of crossing surface panels and rail and tie quantities.
- Profit is not billed by a railroad company.
- A maximum 5% overhead rate is billed if an audited rate does not exist for a contractor or railroad company. FHWA approved additive rates are used by railroad companies as indicated on the railroad estimate.

Any railroad wireline diagrams should also be verified for:

- Correct location of shunt placement given any preemption time requested and speed of fastest train on each track.
- Location of warning devices matches design in Exhibit A.
- Warning devices and flashing lights match design in Exhibit A.
- Gate and cantilever lengths match Exhibit A.
- Cabin location matches Exhibit A.
- Distances between cabin, warning devices, roadway, and rail match Exhibit A.
- Roadway design (number of lanes, medians, shoulders, and widths of these items) matches Exhibit A.
- If needed, phased implementation shown to match Exhibit A.

NOTE: With proper supporting documentation, federal railroad reimbursement policy permits TxDOT to pay the actual cost of railroad work, even if it is more than the project cost estimate.

See Chapter 9, Construction and Inspection Process, Section 4, Invoices.

Section 4 — C&M Agreements

Drafting the C&M Agreement

RRD drafts the C&M Agreement for projects constructed by TxDOT. The following is required prior to a C&M Agreement submittal by RRD to the railroad company:

- RRD must receive an approved railroad cost estimate.
- Design approval from the railroad company.
- Approval of metes and bounds or area map.
- Approval of the theoretical (5%) cost share, if applicable.

Types of C&M Agreements

- Overpass: New, replaced or modified with no railroad company cost participation.
- Overpass with 5% railroad company cost participation: Used when a new overpass removes an existing active at-grade crossing and federal funding is used on the project.
- Underpass: New, replaced, modified, or converted.
- Force Account: Signal or track work on projects involving roadway widening, new at-grade crossings, planking, etc.
- Preemption: Traffic signal preemption.
- Joint Usage: Highway projects that encroach on or run parallel to the railroad right of way.
- Wireline License Agreement: Intelligent Transportation Systems (ITS) conduits crossing railroad right of way. Note: ITS lines can be included in grade separation C&M Agreements.
- Pipeline Agreement: Storm water pipelines crossing railroad right of way under the track. Note: parallel pipelines can be included in at grade crossing agreement.
- Permitted Railroad Crossing: TxDOT projects where the railroad company has crossed TxDOT right of way by permit. For more information see Chapter 6, Railroad Capital Improvement Projects.
- Crossing Closure: Closing the approaches and existing at-grade crossing.

C&M Agreement Content

- Description of work and responsibilities on the project by all parties signing the agreement.

- Statement of license the railroad company provides to TxDOT and/or the local government for use of railroad property.
- Statement of any fees TxDOT or other party will pay to railroad company.
- Maintenance responsibilities for all parties in the agreement, both during and upon completion of project.
- Statement that TxDOT and/or the local government to require contractors to provide railroad insurance and Right of Entry Agreement with railroad company prior to working on railroad right of way.
- Payment article that requires the railroad company to obtain an Authority to Order Materials memo from TxDOT or the local government before ordering materials. A Work Order from TxDOT or the local government is required before beginning work.
- Termination article that allows any signatory party to cancel the agreement.
- Fiber optic article to clarify TxDOT contractor will contact railroad company for locating fiber optic cable prior to construction.
- Mandatory contract articles.
- Signature blocks for all signatory parties. Supplemental documents previously obtained for the project design phase. See page 2-11 of this chapter.

Easements versus License Agreements

Standard TxDOT practice is to pursue license agreements on construction projects impacting the railroad right of way. TxDOT does not pursue easements on railroad right of way, and RRD works with the Right of Way Division to negotiate any terms and fees related to license agreements with railroad companies.

Commercial sign relocation or removal is handled by the Right of Way Division as are any related fees.

Agreement Execution

Railroad company review of the C&M Agreement includes:

- Engineering.
- Legal.
- Real estate.
- Track planning, if applicable.

After all non-TxDOT required parties have signed the C&M Agreement, RRD will then sign. The agreement is now considered fully executed. RRD will send a copy of the agreement to all signatory parties and the district railroad coordinator.

C&M Agreement Submittal to Federal Highway Administration (FHWA)

On projects involving federal oversight, TxDOT is required to submit a copy of the fully executed C&M Agreement to FHWA. FHWA will review and approve the C&M Agreement by signing the title sheet on a copy of the C&M Agreement.

RRD provides a copy of the C&M Agreement to the Design Division (DES) who coordinates FHWA review and approval.

Agreement Amendments

If an agreement needs to be modified after the C&M Agreement has been fully executed, RRD will draft an amendment. An amendment is required when:

- Scope of work for the project has changed.
- Actual costs exceed estimated cost by more than 15%.
- A new required article is needed in the C&M Agreement as determined by the TxDOT Contract Services Division (CSD).
- A mistake is identified in the C&M Agreement or any attachments.

RRD will coordinate signatures from all parties.

Section 5 — Design Build Projects

Overview

Design Bid Build: TxDOT employs design bid build project delivery method when:

- District designs the project in house or hires a consultant to design the PS&E.
- Construction Division (CST) assists in letting the project to a contractor.
- Contractor constructs project after approval from Texas Transportation Commission.

Design Build: Larger construction projects where a single contractor is hired to both design and build the project on an accelerated schedule.

Comprehensive Development Agreements (CDAs) may also be used as a form of design build project delivery. CDAs may include provisions for a developer to operate and maintain the facility upon completion of the project.

As of 2021, Union Pacific Railroad will only enter into PELOA and C&M agreement with TxDOT and not with the developer of a design-build project.

Design Build/Developer Contract

The following considerations should be discussed up front on design build projects prior to execution of the Design Build contract between TxDOT and the developer:

- Does Design Build contract clarify that the developer is responsible for all documents and meetings necessary for C&M Agreement execution and that the developer is required to enter into a Right of Entry Agreement and provide proper railroad insurance?
- If the project includes overpass or underpass work, will the project have an Exhibit A and Exhibit B? (On these types of projects, the Exhibit A may be the 100% PS&E since construction may begin shortly after approval. This differs from bid build projects where the Exhibit A may be completed approximately 18 months before the Exhibit B.)
- How will review of Exhibit A plans and support materials be reviewed by TxDOT, and will the developer be contractually obligated to respond to the comments and revise these items?
- Will there be a need for TxDOT or the developer to issue an Authority to Order Materials or a Work Order? If so, who will issue the order?
- Will preliminary project activities require flagging from the railroad company? Which party will execute the flagging agreement with the railroad company and pay flagging invoices?

- Which party will execute a PELOA Agreement and pay the invoices from the railroad company?
- Is there a date that TxDOT PELOA and other agreements transfer to the developer including responsibility for paying invoices?
- How will the developer access railroad right of way during construction? Will temporary at-grade crossings be needed?
- Which parties will perform inspection and pay invoices for any track or signal work performed by the railroad company?
- Which party will pay any real estate and Right of Entry fees required by the railroad company?
- What maintenance responsibilities will the developer have upon completion of the project?
- Who will draft the C&M Agreement? Which parties will sign the C&M Agreement?
- Will the Right of Entry Agreement be tied to the C&M Agreement?
- If TxDOT is responsible for review and paying invoices, who at TxDOT will review the invoices?

Design and C&M Agreement Phases

Sections 1 through 4 of this chapter clarify processes on bid build projects. In general, all the steps shown in these sections apply to design build projects, but often many of the processes normally performed by the district railroad coordinator or RRD may be performed by the developer. Examples of these tasks include:

- Development of Exhibit A and all support documentation.
- Drafting of PELOA Agreement and any other preliminary agreements.
- Drafting of C&M Agreement.
- Issuance of Authority to Order Materials and Work Orders.
- Project inspection.
- Approving and paying railroad company invoices.
- Paying any permitting fees to the railroad company.

Refer to the terms in the design build contract or CDA for clarification of responsibilities of TxDOT, the developer and any local government.

Although RRD may not draft the C&M Agreement, TxDOT will always be a party to the agreement for any state highway. The C&M Agreement should clarify responsibilities of all parties as described in this section and may vary significantly in content from a C&M Agreement for a bid build project.

Chapter 3 — Maintenance Projects

Contents:

Section 1 — Letter Agreements

Letter agreement or maintenance consent letters for maintenance work and other work with minimal impacts to existing roads or facilities in the railroad right of way typically require four to six months for execution. As the need is identified, the district railroad coordinator provides the RRD contract specialist with the following required documents for the project:

- Scope of Work.
  - Description of the work to be performed on railroad right of way.
  - Confirmation work remains within existing licensed area.
  - Estimated number of days of flagging.
  - Railroad protective liability insurance limits and general escalated insurance limits.
- Exhibits detailing the actual work at each crossing.
  - Traffic control plan sheets.

NOTE: Contraflow is not allowed through a railroad crossing unless specifically approved in writing by the railroad.

- TxDOT standard sheets.
  - Signing and striping standard sheets.
- Location Map.

Types of Work Requiring a Letter Agreement and Maintenance Notice Letter

All work on or within 50 feet of railroad right of way needs to be cleared with the railroad. The larger railroads require a formal notice sent to them while other railroads may accept an email correspondence with acknowledgement from the railroad to clear a maintenance project. A maintenance project pertains to the maintenance of the roadway and the right of way on railroad property to preserve existing condition or to repair back to previous condition. This applies to work done by state labor or by a contractor working on behalf of the state.

Flagging

- Projects in which the railroad company provides flagging.

- A flagging agreement will be required between TxDOT and the railroad. This agreement is needed for TxDOT to pay the invoices submitted by the railroad.

- Projects in which an authorized third party, hired by the awarded contractor, provides the flagging.
  - A Maintenance Notice Letter or Maintenance Consent Letter will be required. The awarded contractor pays for the third-party flagging invoices and TxDOT reimburses the contractor.
- Projects with work parallel to or within 50 feet of the railroad right of way and no flagging required.
  - A Maintenance Notice Letter is required. No work will be done on railroad property.

Examples of work covered under maintenance projects:

- Seal coat and pavement maintenance.
- Overlays and inlays.
- Striping and street sweeping.
- Bridge inspection.
- Minor bridge repair or maintenance.
- Surveying.
- Mowing.
- Barrier or guardrail repair.
- Installation or replacement of roadside signs.
- Culvert or ditch maintenance.
- Traffic signal maintenance.
- Traffic control plans.
- Removing rail on abandoned rail line within railroad right of way.

Main Considerations

- Flagging: The flagging agreement or Maintenance Notice Letter will state how many days of flagging are anticipated for the work to be performed. Flagging agreements will include an estimated daily cost of flagging to be charged by the railroad company. A flagger will be required if there is any work within 25 feet of the nearest rail, in railroad right of way or if there is the potential

to foul the tracks. The railroad has the final authority when flagging is needed. Note: On permitted railroad crossings, the railroad company provides flagging free of charge.

- Insurance: Railroad protective liability insurance will be required for any contractor to work on or within the railroad right of way. The contractor is required to list the railroad company as an additional insured on their escalated general insurance certificate if the work is parallel to or within 50 feet of the railroad right of way. TxDOT is self-insured and will not be required to provide additional insurance for state labor.
- Right of Entry Agreement: The flagging agreement or Maintenance Notice Letter will state if an executed Right of Entry Agreement is required for the contractor performing the work.

Flagging Agreement Execution

Flagging agreements are submitted by RRD to the railroad company electronically. The railroad company signs and returns the agreements to be fully executed by RRD.

Maintenance Notice Letter Execution

The railroad company will review the submitted Maintenance Notice Letter or Maintenance Consent Request further. This review could take up to six months.

As of 2021, the Union Pacific Railroad requires a Maintenance Consent Letter with Contractor Endorsement (MCL) on all maintenance projects in their right of way. The received MCL will clear a project for letting and takes the place of traditional contractor right of entry. The MCL will then be distributed by RRD to all necessary parties for execution by the contractor.

Chapter 4 — Safety Projects (Federal Railroad Signal Program)

Contents:

Section 1 — Overview

Federal Railroad Signal Program (Section 130)

The Section 130 Program (Section 130), formally the Federal Railroad Signal Program (FSP), is funded under the Surface Transportation Program (STP), Title 23, United States Code (USC) Section 130. This program is managed by the Rail Division's Rail Grade Crossing Section under Category 8 (Safety) of the Unified Transportation Program (UTP) as a bank balance allocation program. Each year, the Texas Transportation Commission authorizes the total amount of funding and the method of project selection, providing flexibility within each program year to cancel and add projects to the program without commission action.

The Section 130 program was historically funded with 90% federal and 10% state funds, and under the 2021 Infrastructure Investment and Jobs Act, 100% of the funding can be federal. TxDOT funding for the program is typically around $20 million annually, with funds set aside from the Highway Safety Improvement Program (HSIP) out of Category 8, excluding any cost participation from local governments and railroad companies. The 10% state match, if applicable, applies to projects both on and off the TxDOT system.

All open public at-grade crossings are eligible for Section 130. Permitted crossings where the state permits the railroad to cross existing state right of way (as described in Chapter 6, Railroad Capital Improvement Projects) and safety projects as described in this section may be funded with Federal Section 130 funds. For work on permitted Class I crossings, a match shall be required from the affected railroad, while work on other rail lines may be fully funded at the discretion of the Rail Division.

For non-permitted crossings, where the road was licensed by the railroad, federal and state funds may pay 100% of the costs.

Typical safety projects include:

- Installation/adjustment of railroad lights and gates.
- Traffic signal installation and/or preemption.
- Crossing closures.
- Crossing corridor improvements.
- Signing and striping improvements.

- Roadway or crossing surface improvements.
- Sidewalks and medians.
- Blocked crossing mitigation.

Any crossing locations identified for safety upgrades via the Section 130 which may have an existing construction project should be funded and constructed under the construction project unless RRD management and the district agree otherwise.

Starting in 2019, RRD also started to increase partnering with other district, division, or local government projects to supplement existing non-railroad safety projects such as sidewalk, traffic signal installation or preemption, and humped or vertical crossing mitigation. These partnering projects are reviewed on a case-by-case basis by RRD, in addition to the annual array of projects.

Section 130 Project Agreement Flow Chart

Figure 4-1 presents a flow chart depicting the process for obtaining a project agreement for a typical Section 130 project.

NOTE: Not all steps are applicable to every Section 130 project. Project steps and time frames vary depending on the project scope.

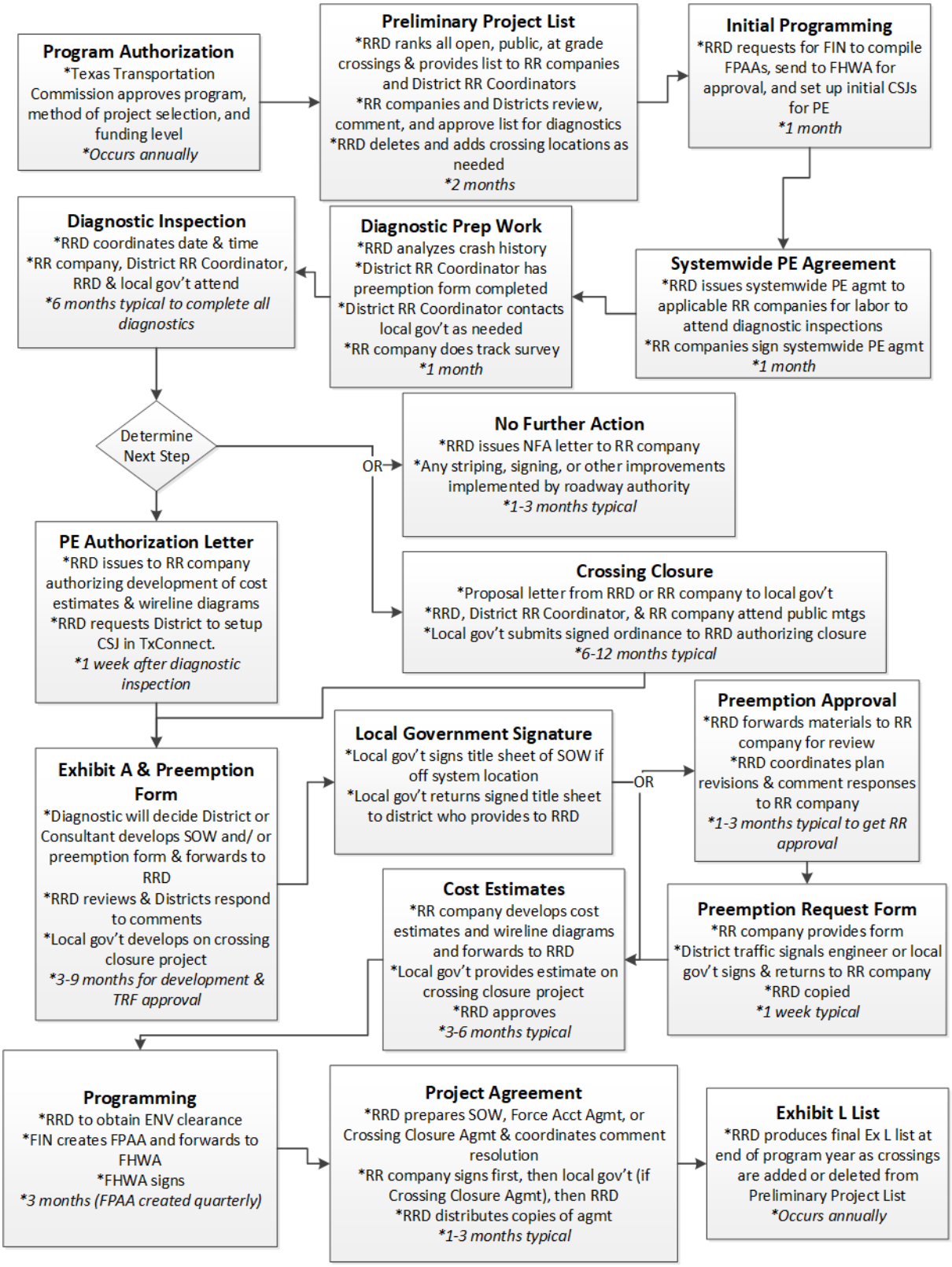

Figure 4-1. Project Agreement Flow Chart

Section 2 — Preliminary Activities

Initial Programming

RRD will compile estimated preliminary engineering costs for Section 130 projects and request a separate Control Section Job (CSJ) project number from the Finance Division Letting Management Section for system-wide preliminary engineering for:

- UPRR.
- BNSF.
- CPKC.
- Shortline railroad companies (all under the same CSJ).

The Finance Division Letting Management Section will compile a Federal Project Authorization & Agreement (FPAA) to be sent to the Federal Highway Administration (FHWA) for each of these CSJs. The FHWA will review and approve the FPAAs to obligate federal funds for preliminary engineering. This occurs prior to issuing a System-wide PE Agreement to the railroad companies.

Project Selection

Statewide ranking of projects is performed by RRD annually based on the Revised Texas Priority Index (TPI_{REV}) process. The TPI_{REV} process separates active and passive crossings and evaluates each set independently. Project selection is also compiled using the Texas Rail Information Management System's ranking process.

Active Crossings

Active crossings are evaluated under a formula which includes a crash prediction model and a five-year crash history. Factors and weightings used in the crash prediction model are based on historical crash data for at-grade crossings in Texas. These factors include:

- Roadway surface (paved or unpaved).
- Crossing location (urban or rural area).
- The number of roadway lanes over the crossing.
- The number of railroad tracks at the crossing.
- The maximum train speed at the crossing.
- The minimum train speed at the crossing.
- Total daily trains.

- AADT.
- Nearby road intersection(s).
- The highest roadway approach speed limit at the crossing.

Passive Crossings

Passive crossings are evaluated under a four-step process:

- Eliminate crossings with less than two daily trains and no crashes in the past five years.
- Eliminate crossings meeting non-qualification criteria.
- Apply warrants.
- Rank by Texas Passive Crossings Index (TPCI).

Step 1: Initial Non-Qualification Criteria

Passive crossings with less than two daily trains and no crashes in the past five years are eliminated from consideration.

Step 2: Non-Qualification Criteria

Passive crossings remaining after Step 1 are eliminated from consideration if all the following criteria are met:

- No crashes in the past five years.
- The crossing has only one track.
- No passenger trains at the crossing.
- AADT is below median of initial subset (crossings after Step 1).
- Maximum train speed is less than or equal to 30 mph.
- `Fewer` than five daily trains.
- No nearby intersection (within 500 feet).
- Crossing angle is 60 degrees or greater.

Step 3: Apply Warrants

Crossings remaining after Step 2 are ranked first based on the number of warrants met. These warrants include:

- At least one crash in the past five years.

- Trains per day greater than or equal to the 95th cumulative percentile (urban and rural crossings evaluated separately).
- School buses per day greater than or equal to the 94th cumulative percentile (of subset of crossings serving school buses).
- Number of tracks at crossing greater than or equal to two.
- Maximum train speed greater than or equal to 49 mph and AADT greater than or equal to the 75th cumulative percentile (urban and rural crossings evaluated separately).
- AADT or exposure (train counts multiplied by AADT) greater than or equal to the 95th cumulative percentile for rural areas or greater than or equal to the 90th cumulative percentile for urban areas.
- Average number of heavy vehicles per day greater than or equal to the 95th cumulative percentile.
- Passenger trains per day greater than or equal to one.
- Highway parallel to and less than 75 feet from tracks when roadway speed limit is greater than 30 mph and exposure greater than or equal to the 75th cumulative percentile (urban and rural crossings evaluated separately), or school buses per day greater than or equal to the 50th cumulative percentile, or average number of heavy vehicles per day greater than or equal to the 75th cumulative percentile.

Step 4: Rank by TPCI

The TPCI ranking formula is needed to distinguish between crossings meeting the same number of warrants in Step 3. TPCI is a formula that evaluates and weights the following factors:

- Crashes in the past five years.
- Trains per day.
- School buses per day.
- Number of railroad tracks at the crossing.
- Train speed.
- AADT.
- Presence of nearby traffic signal.
- Heavy vehicles per day.
- Presence of nearby intersection (non-signalized).
- Highest roadway approach speed limit at the crossing.
- Crossing angle with roadway.

- Presence of humped or dipped crossing.

The crossing prioritization process currently does not include stopping distance or sight distance information due to a lack of existing data.

Preliminary Project List

The percentage of active and passive crossings selected for the program year will determine how to integrate the two lists. For example, if the list includes 300 total crossings with 200 active crossings and 100 passive crossings, the top two ranked active crossings will be ranked first and second with the top ranked passive crossing ranking third. Or if 300 total crossings were chosen with 150 active crossings and 150 passive crossings, the top ranked active crossing will be ranked first with the top ranked passive crossing second. Active and passive crossings will be integrated in the same format until the total number of desired crossings is obtained.

Before a finalized list of crossings selected for diagnostic inspections is completed, adjustments are made to the TPI_{REV} ranking by the following processes:

- RRD removes any crossings with an existing Section 130 project.
- Districts may remove crossings with invalid data.
- Districts may recommend other crossings to be added for safety or preemption upgrades.
- Railroad companies may remove crossings with invalid data.
- Railroad companies may recommend adding crossings for safety or preemption upgrades.
- Railroad companies may recommend upgrades as part of a corridor improvement.

Corridor Improvements

Although the Section 130 has limited funding each year, corridor improvements to upgrade a series of at-grade crossings along the same track may be eligible for funding if:

- Deemed high priority to TxDOT.
- The railroad company chooses to cost participate.
- Significant savings could result by upgrading all crossings at the same time.

RRD will evaluate any proposed corridor improvements with the district and the railroad company to determine eligibility. The railroad company may agree to a cost share participation for the corridor improvement.

System-wide PE Agreement

Many of the railroad companies will require a System-wide PE Agreement prior to attending diagnostic inspections. RRD will issue the list of crossings to each of the railroad companies, commonly referred to as the Preliminary Project List, for signature and concurrence on the initial list for diagnostic inspections. A fully executed System-wide PE Agreement provides a method to pay the railroad companies and railroad consultants for activities up to and including RRD issuing the Exhibit B. At that time, any funds for the work will be part of the Construction CSJ and under the review and approval of the district.

Section 3 — Diagnostic Inspection

Diagnostic Preparation Work

Prior to the diagnostic inspection, the following activities are recommended:

- Crash reports analyzed and brought to the diagnostic by the RRD Project Manager.
- Broken gate, vehicle on track, or near miss reports may also be analyzed and brought to the diagnostic by the railroad company; these reports are produced by the railroad company.
- District railroad coordinator arranges to have traffic signal preemption forms (TxDOT Form 2304) completed, if needed.
- District railroad coordinator contacts and invites the local government to discuss current issues at the crossing or pending projects.

Diagnostic inspections are coordinated by the RRD project manager.

Diagnostic Inspection Team Composition

The diagnostic inspection team typically includes:

- District railroad coordinator.
- RRD project manager.
- Railroad company project manager.
- Railroad company signal maintainer (as needed).
- Local government representative (as needed).
- FHWA or FRA representative (as needed).

Diagnostic Inspection Activities

The diagnostic inspection is conducted on site at the crossing to discuss and note:

- Existing and future traffic counts.
- Future roadway projects.
- Train operations and future plans.
- Quiet Zone considerations (existing or proposed).
- Safety upgrades such as lights and gates, signing, pavement markings and striping, and traffic signal preemption.
- Upgrades to a corridor to be considered.

- Adjustments to civil features such as curb and gutter, culverts, guardrail or retaining walls.
- Tree trimming or other measures to increase sight distance.
- Median installation, sidewalks, and road approach work.
- Traffic signal work.
- Required utility adjustments.
- Power accessibility to the crossing.
- Possibility of closing the crossing.
- Design responsibilities for the improvements.
- Materials and labor responsibilities for the proposed improvements.
- Identification of items eligible for federal and state reimbursement.
- Cost participation from both the railroad company and local government.
- Inspection process during construction.
- Invoice review and approval process.

A detailed sketch of the proposed crossing with safety enhancements along with applicable notes will be provided by the responsible RRD project manager.

The sketch typically includes:

- Any existing gates, cantilevers, or mast flashers labeled for removal, relocation or to remain.
- Any proposed gates, cantilevers, or mast flashers.
- Any proposed or existing front, side, or back lights.
- Distances to any relocated or proposed gates, cantilevers, or mast flashers from edge of roadway.
- Distances to any relocated or proposed gates, cantilevers, or mast flashers from edge of nearest rail (to the tip of the gate) or center of tracks (to the center of signal mast).
- Any proposed or existing railroad cabins (in proximity to railroad crossing).
- Distances from edge of roadway and edge of nearest rail to near edge of cabin (both distances measured perpendicularly).
- Distance between adjacent gate and cantilever.
- Distance between near edge of sidewalk and center of gate, cantilever, or mast flasher.
- Proposed or existing medians, curbs, and sidewalks.
- Drainage features, metal beam guard fence, or retaining wall needed for installing railroad active devices.

- Any utilities that might impact the railroad signals.
- All roadway lanes, lane widths and shoulder widths.
- Number of tracks and distance between tracks (track centers), as well as any tracks to be removed.
- Estimated length of gates (optional).
- Estimated length of cantilevers.
- Existing or proposed sidewalks or shared use pathways.
- Locations of bores, ground boxes and traffic signal cabinet for preemption projects.
- Documentation of responsible party for installing conduit for preemption.
- Name of roadway crossing the tracks and any parallel roads.
- Distance to parallel roads.
- North arrow.
- If applicable, show lane assignments (through only, right turn only, etc.).

A diagnostic inspection form is also completed on site. Refer to RRD Crossroads website for more information.

The sketch and diagnostic inspection form are uploaded into the TRIMS Project Management Module by the RRD project manager.

After the Diagnostic Inspection

Typically, there are three separate paths Section 130 projects will follow after the diagnostic inspection:

- Pursue safety enhancements.
- No further action letter.
- Pursue crossing closure.

Project Engineering Authorization Letter

The diagnostic team may recommend safety upgrades with any railroad force account work including:

- Adjusting railroad signal circuitry.
- Providing or changing active warning devices.
- Providing traffic signal preemption.

- Replanking the crossing surface.

In these scenarios, the RRD project manager will issue a Project Engineering Letter of Authority (PELOA) to authorize the railroad company to begin developing cost estimates for work by the railroad company and develop any necessary wireline diagrams.

The PELOA is uploaded into the TRIMS Project Management Module by the RRD project manager.

RRD requests the district enter the Section 130 project in the TxConnect management system. The district will then provide the project's CSJ to the RRD.

No Further Action Letters

In some cases, the diagnostic team may determine that railroad company force account work is not recommended. Some reasons may include:

- Inaccurate crossing train counts or AADT.
- TxDOT or the local government plans for a future construction project impacting crossing.
- Local opposition to the project.
- Crossing already gated with signals up to current standards (including preemption if the crossing is near an intersection.

The RRD project manager will issue a letter to the railroad company with a copy to the local government and district railroad coordinator informing them of the decision. In some cases, minor upgrades may still be recommended to the local government or district via a separate letter or memo. These may include:

- Signing and striping upgrades.
- Roadway surface improvements.
- Tree trimming or removal of sight obstructions.

No Further Action Letters are uploaded into the TRIMS Project Management Module by the RRD project manager.

Section 4 — Crossing Closure Projects

Introduction

When TxDOT, the local government and the railroad company collectively agree to consolidate and close crossings, TxDOT makes funding available to local governments for the following related improvements:

- Removal of the existing pavement at the crossing.
- Construction of a satisfactory terminus of the roadway at the removed crossing.
- Installation of proper signs acknowledging the closing of the crossing.
- Upgrades to the existing railroad signals.
- Improvements to the existing streets near the closed crossing to handle the diverted traffic.

No funding is provided to the railroad company, as the crossing closure is considered a benefit to them. A signed agreement between TxDOT, the railroad company, and the local government will be executed before the work is authorized.

Section 130 program can match the railroad contribution up to $100,000 from TxDOT to the local government per individual public road closure. The local government must use the Section 130 funds from TxDOT only for roadway, safety and operational improvements associated with the crossing closure within the vicinity of the closed crossing, as approved in advance by TxDOT. The railroad company contribution may add incentive dollars, which can be used at the local government's discretion. The railroad contribution may include in-kind service such as removal of the crossing surface and warning devices.

For locations that are part of the Section 130 preliminary project list, and a crossing closure project is subsequently denied by a local government, RRD may follow a new path to include various safety upgrades. RRD reserves the right to cancel a closure project after a predetermined time, typically one year from the date of the closure Proposal Letter (defined below).

Contracting (Section 130 or Basic Closure Program)

The work activities associated with the closure of the crossing may be performed by:

- Local government labor.

- Labor from other governmental entities.
- Private contractors.

In the event the local government determines that the work will be performed using private contractors, the local government must solicit for a minimum of three bids and have one person working directly on the project complete the Local Government Project Procedures for the Texas Department of Transportation training course. If three bids cannot be obtained, the local government should notify TxDOT to explain the circumstances surrounding the bid solicitation. The local government must award the work to the lowest responsive qualified bidder.

Closure Approval

The following steps must take place for a crossing closure project to proceed:

1. Once the proposal is developed, a Proposal Letter is sent to the local government from RRD or the railroad company to clarify the intention of removing the crossing and anticipated adjacent roadway improvements associated with the project.
2. RRD, the district, and the railroad company should attend and participate in all public meetings.
3. The local government submits a signed ordinance/resolution to RRD stating the crossings to be closed.

Section 5 — Design Phase

Exhibit A Preparation

The district or RRD assigned consultant prepares the Exhibit A plan set following the diagnostic inspection to show all work to be done on the project by TxDOT, the local government and the railroad company.

Starting on September 1, 2022, a Scope of Work Sheet may be used on certain projects in lieu of an Exhibit A plan set. See the Scope of Work Sheet segment below for more information.

For roadwork, sidewalk work or crossing closure projects, the local government may choose to prepare the Exhibit A plans showing details of the closure or may seek assistance from the district. If the local government wants to be reimbursed with Section 130 funds for either preliminary engineering or construction activities, an executed advanced funding agreement shall be in place prior to obligation of the funds. No local government work is authorized for reimbursement prior to the written authorization for that phase of work.

All Exhibit A's must be signed, sealed, and dated by the engineer designing the plans.

On local roadways, the following items of work are typically constructed by the local government:

- Median installation.
- Civil features such as curb and gutter, guardrail, retaining walls and culverts.
- Traffic signal adjustments.
- Utility adjustments.
- Removing sight distance obstructions such as vegetation.
- Signing and striping (may be performed by TxDOT).
- Roadway alignment improvements.
- Installing conduit for traffic signal preemption.

The proposed civil work may be funded by the affected road agency or Section 130. The railroad company may be willing to perform these duties as part of negotiating the final agreement.

The railroad company provides materials and labor for:

- Active warning devices and railroad cabin.

- Track circuitry.
- Traffic control.
- Providing a preemption connection between railroad cabin and traffic signal cabin (to determine limits during diagnostics).
- Replanking (crossing surface).

These items are reimbursed by TxDOT under Section 130 funding.

For details on how to develop an Exhibit A plan set, see Chapter 7 of this Manual.

RRD will review and approve Exhibit A's, as well as any preemption forms, prior to preparing the individual project agreement.

Local Government Signature

If a local government manages the road at the at-grade crossing, the title sheet of the Exhibit A must be signed prior to submitting the Exhibit B to the railroad company. By signing the title sheet, the local government agrees to the work shown on the Exhibit A, responsibilities shown in the Master Agreement, and the cost participation shown in the estimate. The district railroad coordinator arranges to have the sheet signed.

Preemption Request Form

The railroad companies will review any preemption forms submitted for a Section 130 project. After approval, some railroad companies may request a railroad specific Preemption Request Form be completed and signed. The form clarifies which preemption circuits are requested on the project and the total amount and type of preemption time.

RRD will arrange to have the form signed by the government that maintains the traffic signal. Preemption forms, reports, and request forms are uploaded into the TRIMS Project Management Module by the RRD project manager. A copy of the signed preemption request form will be included in the Exhibit A packet with the railroad signal sheet.

Scope of Work Sheet

A Scope of Work sheet may be used in lieu of engineering plans and a formal Exhibit A if the project will only consist of work by the railroad including, but not limited to:

- Installation of Crossbuck or Stop/Yield signs.
- Passive to active signals.

- LED or other light updates to existing flashing lights and gates.
- Modification or replacement of the existing railroad signals and/or signal house (bungalow).
- Modification or installation of new preemption when the traffic signals are maintained by TxDOT.

NOTE: for traffic signals maintained by a local agency, a full plan set with a signed cover sheet including the local government signature shall be used for the Exhibit A.

The Scope of Work sheet shall not be used for any typical let work and/or civil work such as curb and gutter, sidewalk or road approach. For off state system crossings, a simple, no cost Advanced Funding Agreement shall be executed with the affected government and referenced on the Scope of Work sheet.

Cost Estimates

A cost estimate and circuit diagram are provided from the railroad company for labor and materials provided by the railroad company. Estimates will clarify any cost participation by the railroad company and will be reimbursed through a railroad agreement.

The local government will produce an estimate for any labor and materials provided by the local government. Estimates will clarify any cost participation by the local government. Unless approved by TxDOT, materials and labor provided by the local government are usually not reimbursed via Section 130 funding. Construction work funded by Section 130 will need to be covered under an Advanced Funding Agreement.

For crossings on the state highway system, the district may pay for any TxDOT labor or materials out of district funds. This work is typically similar to work provided by a local government on an off-system crossing. Work by a TxDOT contractor is also paid out of district funds. If Section 130 funds are used for these types of projects, the district must proceed through the typical letting process.

The RRD project manager will review and approve all estimates prior to development of the Exhibit B, Force Account Agreement or Crossing Closure Agreement.

For further information on reviewing railroad company cost estimates and circuit diagrams, see Chapter 2 of this Manual.

Programming

RRD will request the district railroad coordinator setup and obtain construction CSJs through the TxDOTCONNECT system for all Section 130 projects which will

use federal funding to reimburse the railroad companies, district work and/or local governments. The district will update TRIMS with the CSJ and inform RRD.

For non-let railroad work, RRD will request Finance Division's Letting Management Section (FIN) to setup a project number and obligate funds once a draft agreement including signed Plansets/ SOW and railroad estimates are completed.

FIN will request each quarter that the Finance Division Letting Management Section provide construction CSJs for each of the planning CSJs. The Finance Division Letting Management Section will create a new FPAA to include the construction CSJs for an amount based on estimates to be paid out to railroad companies and local governments. FHWA will review and approve the FPAA. FIN will then setup the CSJs in PeopleSoft and notify RRD of the Federal Project Number.

RRD will update TRIMS and the final plan sets with the proper numbers before sending the agreements to the railroad companies for final execution.

For let Section 130 funded projects, the district will notify RRD of the CSJ and let date (see Section 2 for further detail). The project will be coordinated as a typical maintenance and construction project (including obligation by FIN prior to letting).

Section 6 — Project Agreements

Master Agreements

RRD has Master Agreements with all the Class I railroad companies and some of the shortline railroad companies to facilitate individual project agreements on Section 130 projects. These agreements typically cover:

- Program and project documents and required approvals.
- Construction and maintenance details for preparing and approving plans, specifications, and estimates.
- Local government construction and maintenance responsibilities to for off-system public crossings.
- Cost participation.
- Authority to Order Materials and Work Orders.
- Subcontracting requirements.
- Federal-aid policy guide requirements.
- Methods of payment.
- Conditions for reimbursement.

A full agreement for an individual crossing is not required if a Master Agreement exists.

Reimbursement Methods

There are three methods for reimbursing a railroad company. The appropriate method depends on the scope and complexity of the project and whether the railroad company uses its own labor or a contractor to perform the work.

Railroad Company Uses Own Workforce

If the railroad company uses its own workforce to perform the labor, reimbursement is usually made on an actual cost basis. However, if TxDOT and the railroad company agree, reimbursement can be based on a lump sum cost estimate. This would typically occur on smaller projects where actual cost to the railroad company is easily estimated. Project costs and method of reimbursement (actual or lump sum) are approved in the individual project agreement.

Railroad Company Uses a Contractor on Continuing Contract

The railroad company may use a contractor to perform the work under a continuous agreement with the railroad company. The continuous agreement must be for a minimum of three years. The contractor's costs are included in the project estimate and reimbursed at actual cost during construction unless a lump sum arrangement is shown in the individual project agreement. The railroad company directly invoices TxDOT and reimburses their contractor separately.

The railroad company may also provide labor (inspection, etc.) and include estimated costs in the individual project agreement. Reimbursement to the railroad company will be at actual cost.

Railroad Company Uses a Contractor for Individual Project

The railroad company may choose to solicit bids for the project from a minimum of three contractors. The lowest qualified bid will be accepted and reimbursed at actual cost. If three bids are not received, RRD may still accept the lowest qualified bidder if at least three contractors were contacted and one or more chose not to bid the project.

The railroad company directly invoices TxDOT and reimburses their contractor separately.

The railroad company may also provide labor (inspection, etc.) and include estimated costs in the individual project agreement. Reimbursement to the railroad company will be at actual cost.

Individual Project Agreement

Typically, there are four separate paths Section 130 projects will follow after Exhibit A's/ SOW, cost estimates and railroad circuit diagrams are completed:

- Exhibit B.
- Force Account Agreement.
- Construction & Maintenance Agreement.
- Crossing Closure Agreement.

Exhibit B

If a Master Agreement exists between TxDOT and the railroad company, RRD prepares an Exhibit B as per terms of the Master Agreement. The Exhibit B normally consists of:

- Signed cover page providing TxDOT's approval of work and cost estimates.
- Exhibit A (with signature from local government) or SOW.
- Cost estimates from the railroad company.

- Cost estimates from the local government (if applicable).
- Railroad company `signal` diagrams.

Depending on the terms in the Master Agreement, the Exhibit B may need to be executed by the railroad company.

The fully executed Exhibit B is uploaded into the TRIMS Project Management Module by the `RRD` project manager.

Force Account Agreement

If a Master Agreement does not exist with the railroad company, `RRD` prepares and negotiates a Force Account Agreement for the crossing project. The Force Account Agreement will typically include the items listed above shown in both the Master Agreement and Exhibit B.

`RRD` will coordinate any comments on the proposed Force Account Agreement from the railroad company and revise the agreement as needed. The agreement will be executed first by the railroad company and then by `RRD`.

The fully executed Force Account Agreement is uploaded into the TRIMS Project Management Module by the `RRD` project manager.

Construction & Maintenance Agreement (C&M)

If the crossing is being widened such as by installing medians, sidewalk, or hump or vertical alignment mitigation, and if the railroad determines the widened roadway shall require a new C&M agreement, then the C&M Agreement process from Chapter 2, Section 4, shall be followed.

Crossing Closure Agreement

For crossing closure projects, `RRD` will prepare a Crossing Closure Agreement regardless of whether a Master Agreement exists with the railroad company. The Crossing Closure Agreement typically includes similar articles and attachments as listed above for both a Master Agreement and Exhibit B and will also include a copy of the signed ordinance/resolution stating the crossing to be closed. A local government is typically given two years from the date of the executed Crossing Closure Agreement to invoice TxDOT for any improvements to adjacent roadways identified in the agreement.

`RRD` will coordinate all comments on the proposed Crossing Closure Agreement from participating parties (district, railroad company or local government) and revise the agreement as needed prior to submitting to all signing parties for execution. For three-party agreements, the agreement is usually executed first by the railroad company, then the by the local government, and finally, by `RRD`. For

two-party agreements, the agreement will be executed first by the railroad company and then by RRD.

The fully executed Crossing Closure Agreement is uploaded into the TRIMS Project Management Module by the RRD project manager.

After Project Agreement is Executed

RRD distributes a copy of the executed Exhibit B, Force Account Agreement or Crossing Closure Agreement to:

- The District.
- The railroad company.
- The local government.

Exhibit L

At the conclusion of each program year, RRD will track the final list of crossing locations selected for improvements with Section 130 funding. This list will consist of the preliminary project list, with any No Further Action projects removed, and any additional projects added. The list is referred to as the Exhibit L.

Advanced Funding Agreements

Advanced Funding Agreements (AFA) are coordinated between the local government and the affected district. Once executed, RRD will obligate any funds needed per the terms of the AFA. An AFA is typically executed to cover design and/or construction by local agencies for civil work funded by Section 130. Any railroad work on the project is typically handled by a TxDOT Section 130 agreement between TxDOT and the railroad company and shall be referenced, but the amount not part of the local government AFA.

For off system work covered by SOW only, a no cost or similar AFA shall be executed between TxDOT and the local government prior to federal obligation.

Chapter 5 — Replanking Projects

Contents:

Section 1 — Program Overview

Background

The replanking program, a state designated program, is used to provide dedicated state highway funds for replacing at-grade crossing surfaces located on the state highway system. This is codified in 43 TAC §7.106. RRD manages the program.

Program Authorization and Funding

The replanking program is managed under Category 10 (Supplemental Transportation Projects) of the UTP as a bank balance allocation program. Each year, the Texas Transportation Commission authorizes the total amount of funding and the method of project selection. This provides flexibility within each program year to cancel and add projects to the program without commission action. It is funded with 100% state funds, excluding any cost participation from railroad companies. Funding for the program is typically around $3.5 million annually.

Program funds are not typically used for the following and must be funded out of the district's maintenance budget, except that starting with the 2022 program, replanking program funds can be used for railroad provided traffic control and asphalt work.

Program funds are not typically used for:

- Traffic control and detours.
- Notification of roadway closures in advance on portable changeable message signs.
- Engineering labor in developing Exhibit A layouts.
- Roadway work (level adjustments to match the crossing surface panels).
- Any base material or concrete work directly beneath subballast at the crossing.
- Temporary riprap crossings installed adjacent to the at-grade crossing if the roadway cannot be closed during construction (shoofly).
- Striping and signing.

If the railroad is to perform the asphalt and/or traffic control and be reimbursed by the replanking program, the district should still provide the Traffic Control Plans as part of the Replank Scope of Work.

Use of non-standard crossing surface such as StarTrak may instead be funded under the Section 130 program.

Ineligible Crossings

The following types of at-grade crossings are ineligible for the Replanking Program:

- Private crossings.
- Closed, out of service, or abandoned crossings unless agreed to by RRD.
- Off system crossings (roadway owned by county, city, or other local government not TxDOT).
- Locations where the railroad crossed TxDOT right of way via a crossing permit or other agreement.

Also, any crossing locations identified for replanking which may have an existing construction project should be funded and constructed under the construction project.

An at-grade crossing may use funding from both the Section 130 and replanking programs to fund safety and surface upgrades if the crossing qualifies under the prioritization scheme of both programs.

Replanking Project Agreement Flow Chart

The flow chart on the following page depicts the process for obtaining a project agreement on a replanking project.

NOTE: Not all steps are applicable to every replanking project. Project steps and time frames will vary depending on the project scope.

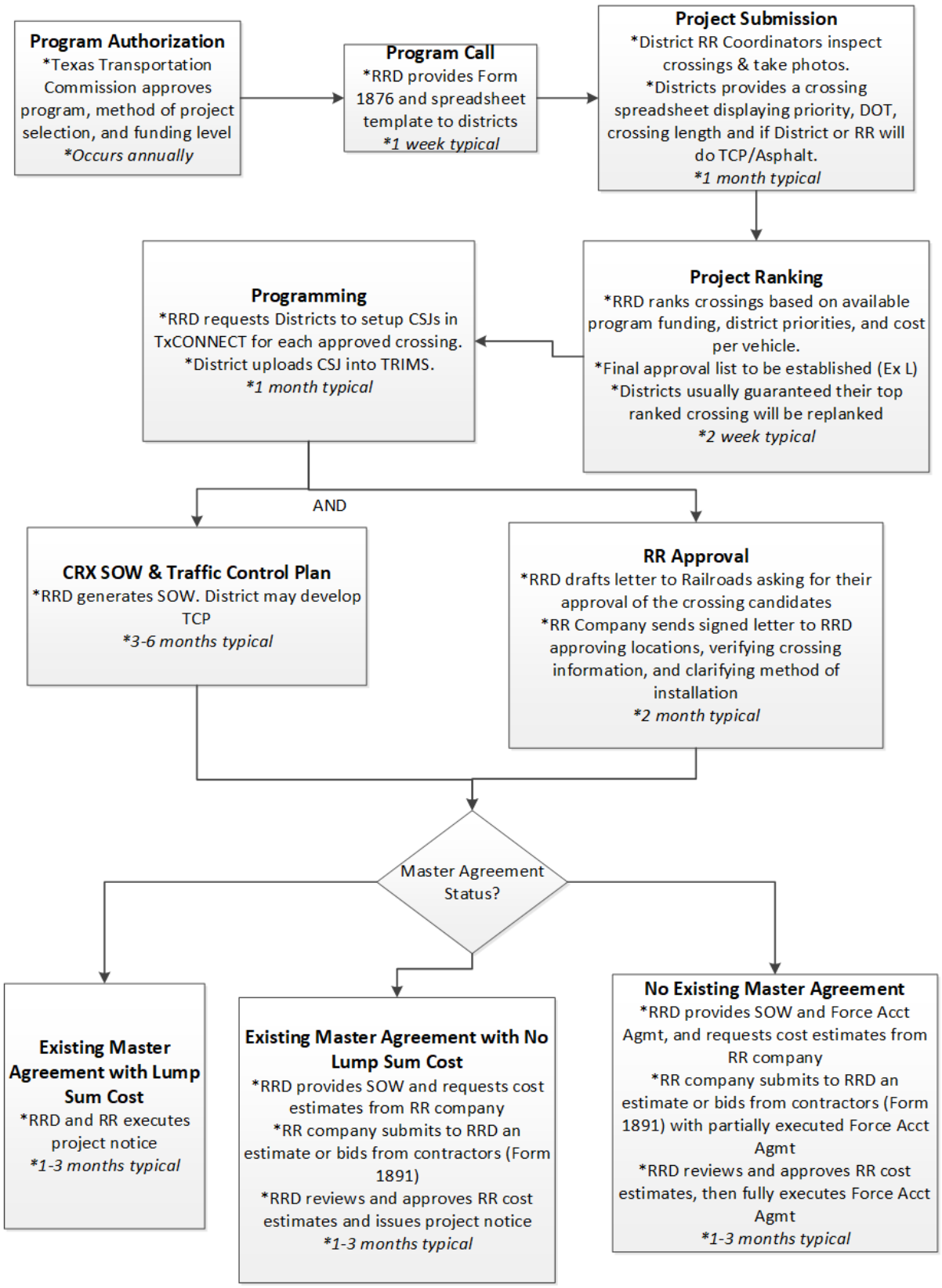

Figure 5-1. Replanking Project Flow Chart.

Section 2 — Railroad Crossing Surfaces

Crossing Surface Details

Railroad crossing surfaces typically include the following details:

- Surface is made of precast concrete panels 8-foot in length along the length of the track.
- Composite material may be used in lieu of concrete in areas of significant truck traffic where material will not degrade in climate conditions.
- Asphalt may be used in lieu of concrete, particularly for temporary crossings during construction.
- Timber crossing is no longer reimbursable under the replanking program.
- Panels are bolted directly into the railroad ties beneath.
- Panels installed between the rails are referred to as gauge panels while panels between the rails and the roadway surface are referred to as field panels.
- Rubber flangeways are installed between rails and concrete panels to prevent electrical shorting of the rails.
- A drainage pipe may be installed parallel to the rail on either or both sides of the rail.
- When replacing panels, the railroad company typically replaces the subballast, ballast, ties, and rail at the crossing and beyond roadway edges.
- Track panels are typically assembled in 80-foot preassembled sections which include rail and ties bolted together (without crossing surface panels).
- Existing track is cut and removed, and new track panel is jointed (bolted) to existing rail.
- New track panel is welded to existing track after the crossing surface panels are installed.
- The railroad company uses tamping machine to install and adjust ballast.
- Surfaces may take a few days or weeks to settle after train and truck traffic use the crossing.
- Adjustment of roadway elevation may be needed after the crossing surface settles; this is typically done by adding asphalt level-up near the crossing surface.

Inspecting Crossing Surface Panels

Crossing surface panels wear over time due to many factors:

- Truck traffic.
- Train traffic.

- Presence of humped or dipped crossing.
- Soil conditions.
- Lack of base material.
- Drainage issues.

Typical crossing surface panels may last from seven to 15 years depending on various conditions but can last for shorter periods of time in particularly harsh environments. Before deciding to replace a crossing surface panel, consider the following:

- Does the entire surface need to be replaced or only portions with obvious wear?
- Are panels rocking? If so, are trucks snagging the edges of the field panels due to a humped crossing condition?
- Is the crossing draining properly so existing soil is not settling under the crossing?
- Would changes to the material or thickness of material under the subballast improve the crossing?
- Would a different crossing material work better than the existing material based on the truck traffic and climate?
- What can be done on the crossing approaches to smooth the crossing?

These factors should be considered in determining if the replanking program should be used or supplemented as a means to improve the crossing surface. The railroad company has final authority in determining if a crossing can be repaired or a full replacement is needed.

Section 3 — Project Selection

Program Call and Project Submission

Each year RRD issues a program call for candidate crossings by providing the Railroad Grade Crossing Replanking Project Submission Form (TxDOT Form 1876) and a tabulation spreadsheet example to each district. Prior to completing the form, the district railroad coordinator should visit crossings on the state highway system to determine the need for crossings requiring new planking. The district railroad coordinator should then complete the form by:

- Performing a site inspection to verify the condition of the crossing and taking a photo of the crossing rather than attaching an outdated image.
- Completing basic crossing information.
- Verifying AADT in TRIMS or performing a field count.
- Rating and describing the condition of the crossing.
- Contacting the Transportation Planning and Programming Division (TPP) if the AADT shown in TRIMS does not match existing counts.

The district completes one form for each crossing submitted and ranks each crossing according to district priority. RRD strives (within funding limitations) to include each district's top priority ranked submission in the current year's program.

The district should also note if a full closure would be allowed or if cost estimates for partial closures should be prepared by the railroad company, or shoofly by the district. The district will have the final authority in approving a full closure. See Section 4 for more details.

Project Ranking

RRD establishes each program year's crossings by:

1. Calculating the cost of replanking the highest ranked crossing in each of the 25 districts.
2. For all other crossings submitted, calculating a cost per vehicle to replank the crossing and prioritizing these crossings across the state by lowest cost per vehicle (highest priority).
3. Determining which crossings from Step 2 can be funded from available program funds for the program year.

The cost per vehicle metric is used to ensure the best program value is obtained considering the volume of traffic using the crossing. In other words, a crossing with greater traffic volumes will have

higher priority than another crossing with lower volumes with the same estimated cost of replanking.

After the finalized list of crossings for replanking is established, RRD furnishes a list to each district and railroad company. This list is typically referred to as the Exhibit L.

Corridor Improvements

Although the replanking program has limited funding each year, corridor improvements to upgrade a series of at-grade crossings along the same track or railroad company may be eligible for funding if:

- Deemed high priority by RRD.
- Railroad company chooses to cost participate.
- Significant savings could result by upgrading all the crossings at the same time.

RRD will evaluate any proposed corridor improvements with the district and the railroad company to determine eligibility.

Calculating Cost Per Vehicle

The total estimated cost of replanking a single crossing is obtained by multiplying the estimated cost of replanking per track-foot by the width of the crossing. For the purposes of this calculation, "the width of the crossing" is the length of the track traversing the roadway plus 3 feet beyond the edge of the pavement or sidewalk on both sides of the roadway (a total of an additional 6 feet). The total cost includes the cost of replanking multiple tracks at the same crossing if multiple tracks are to be replanked.

The estimated cost per vehicle is the total estimated cost of the project divided by the AADT at the crossing. AADT is determined by an actual count if available or an estimated count provided by TPP. AADT is not determined based on a future projected count.

Programming

RRD will request the district railroad coordinator setup CSJs in TxDOT CONNECT for each crossing to be replanked through the replanking program. The district railroad coordinator will upload to TRIMS and inform RRD. The CSJ will be shown on the Replank Scope of Work and/or Traffic Control Plansets.

Cancellations

Replanking projects may be canceled for several reasons:

- Railroad company abandons tracks.
- Railroad company plans to resurface crossing on their own.
- Railroad does not respond within 90 days to the Exhibit L project notice.
- TxDOT construction project may be used to replank crossing.
- Cost estimates are too high.
- Temporary roadway closures are not feasible.

RRD will reallocate the funds on a case-by-case basis. The funds may be used to:

- Resurface another crossing in the same district.
- Supplement a cost overrun on other crossing projects.
- Benefit the replanking program in another way.

Section 4 — Design Phase

RR SOW and Traffic Control Plan (TCP)

RRD will send a request to the district for CSJ and associated spreadsheet of projects on the replanking. The district shall upload the CSJ to TRIMS. The district shall also inform RRD the following:

- TxDOTCONNECT project number and CSJ.
- If the district or railroad will prepare and provide temporary traffic control.
- If the district or railroad will apply asphalt road approach work.

RRD will prepare RR Scope of Work (RR SOW) using the tabulation spreadsheet or Form 1876. If applicable, the district may provide the TCP detailing the signage and possible routes at the crossing. All plan sheets and non-standard TCPs must be signed, sealed, and dated by a licensed professional engineer. If the railroad develops the traffic control plan, then TxDOT Standard TCP sheets may be used as a guide. The railroad shall submit the actual TCP to the district a minimum of 30 days before the closure is planned.

Whenever practical, the highway should be fully closed in both directions for 36 to 48 hours and traffic detoured during construction, allowing the railroad company to replank the entire roadway to reduce construction time and provide a more durable crossing surface. Closing one side at a time, a typical practice on roadway construction projects, is usually not feasible on replanking projects due to issues in matching grades on the crossing surface panels and mobilization of railroad company crews. However, the crossing may be replanked at night or on a weekend in some cases, and this should be noted on the RR SOW. Alternatively, a temporary crossing (shoofly) adjacent to the roadway may be used if the roadway cannot be closed.

Railroad Company Approval

RRD will issue a letter to each railroad company with crossings on the Exhibit L and associated crossing data. The railroad companies will review the list and comment on any crossings as necessary. After all comments are resolved, the railroad companies send a signed letter to RRD to:

- Approve crossings on the list.
- Verify crossing data shown on the list.

- Clarify who will perform replanking work (railroad company labor or contractor).

Cost Estimates

If a Master Agreement which includes a provision for lump sum payment does not exist, RRD provides the Exhibit A or RR SOW to the railroad company to produce an estimate for work involved in replanking the crossing.

The district may prepare a cost estimate for labor and materials provided by the district, although this work is not funded through the replanking program.

RRD will review and approve railroad company cost estimates prior to preparing the individual project agreement. For further information on reviewing railroad company cost estimates, see Chapter 2.

Section 5 — Project Agreements

Master Agreements

TxDOT has Master Agreements with all the Class I railroad companies and some of the short-line railroad companies to facilitate individual project agreements for work on replanking program projects. These agreements typically cover:

- Process for adding and deleting crossings for the program each year.
- Program and project documents and required approvals.
- Construction and maintenance responsibilities of TxDOT and the railroad company.
- If TxDOT will pay railroad company on an actual cost basis or fixed cost per track foot of replanking (sometimes categorized by daytime or night/weekend installation rates).
- Process of approving cost per track foot each program year.
- Work Orders.
- Inspection of materials.
- Conditions for reimbursement.

Reimbursement Methods

There are three methods for reimbursing a railroad company. The appropriate method depends on whether the railroad company uses its own workforce or a contractor to perform the work.

Railroad Company Uses Own Workforce

If the railroad company uses its own workforce to perform the work, reimbursement is usually made on a lump sum basis. The reimbursement for an individual crossing will be determined by multiplying the length of crossing surface panels along the track by the cost per track foot agreed upon with the railroad company. Lump sum reimbursements typically occur when a Master Agreement exists with the railroad company.

Actual cost reimbursement to the railroad company may also be used. In these scenarios, a cost estimate is developed prior to construction by the railroad company and approved by RRD. Actual cost reimbursement is typically used when a Master Agreement does not exist with the railroad company.

Project costs and method of reimbursement (actual or lump sum) are approved in the individual project agreement.

Railroad Company Uses a Contractor on Continuing Contract

The railroad company may use a contractor to perform the work under a continuous agreement with the railroad company. The continuous agreement must be for a minimum of three years. A copy of this agreement must be provided to RRD.

The contractor's costs are included in the project estimate and reimbursed at actual cost during construction unless a lump sum arrangement with the railroad company is shown in the individual project agreement. The railroad company directly invoices TxDOT and reimburses their contractor separately.

The railroad company may also provide labor (inspection, etc.) and include estimated costs in the individual project agreement. Reimbursement to the railroad company will be at actual cost.

Railroad Company Uses a Contractor for Individual Project

The railroad company may choose to solicit bids for the project from a minimum of three contractors. The lowest qualified bid will be accepted and reimbursed at actual cost not to exceed the original bid. A Form 1891 (Detailed Estimate for Railroad Solicitation of Bids) is completed for each bidding contractor which groups various costs on the project and helps to ensure balanced bids. If three bids are not received, RRD may still accept the lowest qualified bidder if at least three contractors were contacted and one or more chose not to bid the project.

The railroad company directly invoices TxDOT and reimburses their contractor separately.

The railroad company may also provide labor (inspection, etc.) and include estimated costs in the individual project agreement. Reimbursement to the railroad company will be at actual cost. Refer to RRD Crossroads website for more information.

Individual Project Agreement

Typically, there are two separate paths replanking program projects will follow after Exhibit A/SOW and cost estimates have been completed and approved:

- Project Notice.
- Force Account Agreement.

Project Notice

If a Master Agreement exists with the railroad company, RRD will prepare a Project Notice. The Project Notice normally consists of:

- Signed cover page providing TxDOT's approval of work, cost estimates and selection of contractor (if railroad company solicited bids from contractors).

- Exhibit A/SOW.
- Cost estimates from railroad company or railroad company's continuing contractor (if applicable).
- Cost estimates from bidding contractors (if applicable).
- Standard TCP if SOW is used.

Depending on the terms in the Master Agreement, the Project Notice may need to be executed by the railroad company.

Force Account Agreement

If a Master Agreement does not exist with the railroad company, RRD prepares and negotiates a Force Account Agreement for the crossing project. The Force Account Agreement will typically include the items listed above shown in both the Master Agreement and Project Notice.

RRD will issue the Force Account Agreement to the railroad company for comments. Once comments are resolved, the railroad company will execute the agreement and return to RRD for final execution.

After Project Agreement is Executed

RRD distributes a copy of the executed Project Notice or Force Account Agreement to:

- District.
- Railroad company.

The fully executed Project Notice or Force Account Agreement is uploaded into the TRIMS project management module by RRD.

RRD will coordinate with FIN to setup the CRX project in Peoplesoft.

Chapter 6 — Railroad Capital Improvement Projects

Contents:

Section 1 — Overview

Introduction

Rail projects started by the railroad companies are referred to as railroad capital improvement projects. Some common railroad capital improvement projects that may impact highways and TxDOT rights of way are:

- Adding new track parallel to an existing track.
- Adding a new track to an industry customer through TxDOT right of way (previously called permitted track).
- Maintenance, such as replacement of ties, rail and ballast including at-grade crossing work.
- Underpass bridge inspection, repair, and replacement.
- Upgrades to circuitry and switching.
- Adjustments related to abandoning, removing, or placing a rail line out of service.
- Rail yard expansion.
- Installation of new maintenance driveways.
- Installation of new drainage structures.
- Work impacting state licensed crossings on railroad right of way.

In this chapter, a project may be started by a railroad company or by a customer to be served by the railroad. The term railroad company will be used for these projects in this chapter. For road or pathway projects, see Chapter 1.

Any final agreements or notices discussed in this chapter may be uploaded into TRIMS as a "RR Capital Improvement Project". This is typically completed by RRD staff.

Capital Improvement Project Agreement Flow Chart

The flow chart on the following page depicts the process for obtaining a project agreement on a railroad capital improvement project.

NOTE: Not all steps are applicable to every railroad capital improvement project. Project steps and time frames will vary depending on the project scope.

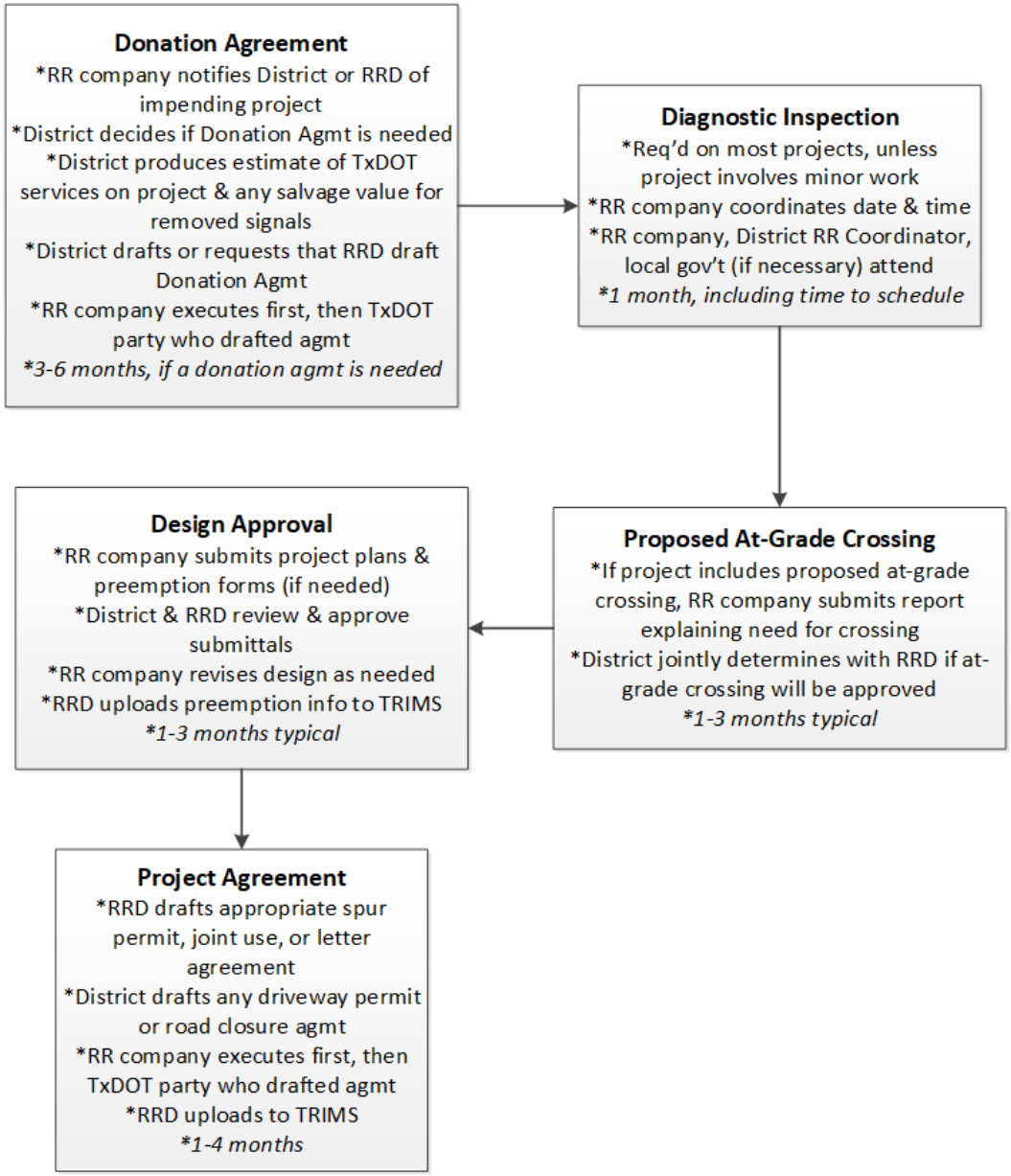

Figure 6-1. Railroad Capital Improvement Project Flow Chart

Section 2 — Preliminary Activities

Donation Agreements

One key difference between TxDOT construction projects and railroad capital improvement projects is TxDOT cannot extend credit to another party for services provided prior to reimbursement. Therefore, a Donation Agreement is needed between TxDOT and the railroad company so the railroad company can provide funding for the work prior to the work being performed. TxDOT employees may charge time and materials to the project. Once the project is complete, any funding paid via the Donation Agreement above what was charged by TxDOT is reimbursed to the railroad company.

Once a district is notified of an impending railroad capital improvement project, a decision must be made by the district on whether a Donation Agreement should be pursued between TxDOT and the railroad company. Donation Agreements allow TxDOT to be reimbursed for labor and materials provided on railroad capital improvement projects. Some examples of TxDOT services may include:

- Reviewing railroad company plans and support documentation.
- Attending project meetings and diagnostic inspections.
- Drafting permit agreements.
- Coordinating utility locates and relocates.
- `Providing` traffic control (if TxDOT agrees).
- Reviewing traffic control plans.
- Reimbursement for salvage value of active warning devices paid for by public funds being removed by the railroad company.
- Project inspection.
- Public outreach efforts.
- Other labor and materials TxDOT may provide during construction.

A Donation Agreement typically includes an attached estimate of TxDOT services as well as a project location map. The agreement will specify design standards required from the railroad company, requirements on utility adjustments, and insurance requirements for railroad companies working on TxDOT right of way.

Donation Agreements usually take three to six months to execute. If the district decides to pursue a Donation Agreement, any plans developed by the railroad company cannot be reviewed until the agreement has been fully executed. In some cases, the district may decide not to pursue a Donation Agreement. Reasons may include:

- Scope of work by TxDOT is minor (plan review only).
- No lane closures are involved.
- Project provides benefit to TxDOT,
- Project affects another TxDOT project schedule.
- TxDOT agrees to forego Donation Agreement based on negotiations with railroad company.

If a Donation Agreement is executed, it will be recognized by the commission typically within one month of the agreement being executed.

Diagnostic Inspection

A diagnostic inspection should be conducted for any projects that:

- Add additional tracks.
- Affect traffic flow during construction.
- Impact grade crossing warning devices.

Maintenance projects or projects that do not impact the traveling public may not require a diagnostic inspection.

The diagnostic inspection should be coordinated between the railroad company and the district railroad coordinator.

For further information on conducting a diagnostic inspection, see Chapter 4.

Section 3 — Common Design Issues

Project Work Within TxDOT Right of Way

Some railroad capital improvement projects may include work on TxDOT right of way. Typical work would include:

- Installing railroad warning devices and crossing surface panels for a new track, installing additional trackage, or updating existing signal equipment.
- Installing an underpass bridge for a permitted track.
- Installing crash walls on TxDOT right of way to support a second track on railroad right of way.
- Retaining walls and guardrail.
- Grading and drainage features.
- New maintenance access to railroad right of way.

Installation of warning devices and crossing surface panels will be carried done the railroad company. For all other work, the district may choose to allow the railroad company (or railroad contractor) to perform the work provided:

- Design is approved.
- Traffic control and detours are approved in advance.
- Work is inspected and approved by area office.

Proposed Grade Separated Crossings

TxDOT may allow a grade-separated crossing if the private industry or railroad company desiring the crossing agrees to finance and construct it. The district, in conjunction with the Design Division (DES) and the Rail Division (RRD), determines the need for a grade separation based on the following factors:

- Projected AADT.
- Volume, type, and time of train movements.
- Location of proposed crossing.
- Safety of the traveling public.
- Other pertinent considerations.

Proposed At-Grade Crossings

Upon receiving a request for a crossing `across state right of way`, the district first investigates the possibility of the applicant (railroad company or private industry or both) obtaining rail service by alternate means that will not require an additional highway crossing. This usually means servicing through a different railroad company or through joint use of a nearby existing `permitted` track crossing or rail line. If an alternate plan is `impracticable`, the district should forward the `permitted` track request to `RRD`, along with a report and recommendations. The report should include:

- A map showing the location of the proposed `permitted` track crossing.
- AADT at this location.
- Applicant's estimate of the number and length of trains anticipated to cross the highway during each 24-hour period.

Dismantling `or Modifying` Active Warning Devices

If the railroad company decides to remove an existing active warning device, TxDOT may seek reimbursement for salvage value if the device was paid for with public funds and is less than 10 years old.

`The railroad may also modify existing active warning devices subject to concurrence from RRD. Upon receipt of a request by the railroad company, RRD will review the proposal by consulting with the district and with the rail safety section. RRD will then provide concurrence in the form of an email or a signed letter with a copy uploaded to the TRIMS database.`

Out of Service versus Abandoned Tracks

After a railroad company determines an in-service track is no longer needed, the company may choose to either place the track out of service or to abandon the track entirely. If the track is placed out of service, the railroad company should notify `RRD`. The following should occur until the track is placed back in service:

- A 'Tracks Out of Service' sign is placed in lieu of crossbuck signs.
- Gate arms and traffic control devices such as warning signs and pavement markings from the crossing are removed.
- Railroad signals are either removed, hooded, or turned from view to indicate they are not in operation.
- Railroad company contacts the FRA to have crossing inventory updated.

- RRD updates TRIMS crossing inventory.

The railroad company will remain responsible for maintaining the crossing surface, including the rail and ties. If the track will remain out of service for a long period, or if the railroad ties and/or crossing surface are starting to fail, TxDOT may contact the railroad company to remove the crossing surface, rail and ties, or obtain railroad permission to allow TxDOT to remove same.

If the track is formally abandoned by the railroad company, the track is typically first removed by the railroad company as well as all at-grade crossing signs and signals. Once a track is abandoned, maintenance of the crossing falls on the roadway authority. The roadway authority may contact the railroad company to purchase the underlying property.

Salvaging of the rail and/or ties is generally only allowed by the railroad company or their approved contractor. A letter may be needed from RRD if the state or their contractor will salvage the rail.

Work Impacting State Roads Licensed in Railroad Right of Way

The railroad may at their cost expand or modify their facilities on their right of way where TxDOT roads cross the railroad right of way by license.

The railroad shall provide plans, and, upon written approval by the district, RRD shall issue a letter of approval to the railroad for the work.

The railroad work may be wholly on railroad right of way or have a portion on state right of way. Any railroad work on state right of way will need a Crossing Permit or other suitable agreement as specified in Section 4 of this chapter.

Section 4 — Project Agreements

Design Approval

Submittals on railroad capital improvement projects come from the railroad company to the district office. After approval by the district office, the materials are forwarded on to the RRD contract specialist who distributes the materials to the appropriate parties at the divisions for review and approval. Reviewing parties are the same as those requested for a TxDOT construction project.

For documentation needed on submittals, see Chapters 2 and 3. For review of Exhibit A plan set, refer to the checklists in Chapter 7.

Preemption forms, reports and request forms are uploaded into the TRIMS project management module by RRD.

Project Agreement Process

After all comments are resolved, the RRD contract specialist will draft an appropriate agreement giving permission for the work to be performed:

- Crossing Permit Agreement: Used for a new track crossing a highway on TxDOT right of way.
- Joint Use Agreement: Typically used for double tracking projects, maintenance projects or other railroad capital improvement projects on railroad right of way which impact a highway. This may include the railroad adding a track parallel to a state road, and a slope or other permanent use of state right of way is needed.
- Letter Agreement: May be used for minor work with minimal impact to highway facilities or TxDOT right of way.

These agreements usually specify the railroad company will be responsible for all costs involved in the construction of the project and will not include any attachments other than an Exhibit A plan set. A cost estimate for work performed by TxDOT would not be included since this would be covered by a Donation Agreement.

Typical timelines for execution of these agreements are six to nine months from initial submittal of Exhibit A plan set to full agreement execution.

Project agreements are uploaded into the TRIMS project management module by RRD.

If driveway access is needed or driveway locations need to be modified, approval from the TxDOT area office via a driveway permit is required. Districts will issue any required roadway closure agreements.

Crossing Permit Contents

Crossing Permit Agreements usually have similar requirements as C&M Agreements but may include additional requirements the railroad company or private industry must adhere to in accordance with 43 TAC § 7.105.

- Modifications to the highway: If TxDOT elects to modify the highway in any way that will affect the premitted track at-grade crossing, TxDOT will have the right to make such modifications, and the railroad company or private industry will make the necessary changes to the crossing surface and railroad warning devices at their expense.
- No Abnormal Delays in Traffic Flow: No general switching of trains across the highway is permitted. Train operations crossing the highway must be conducted in a way as to not delay traffic flow for more than a normal period of time. If more than the normal time is needed, the railroad company or private industry must notify TxDOT in writing as to the necessity and circumstances for more time.
- Future Need for Grade Separation: If in the future, TxDOT determines a grade separation is required, the railroad company or private industry or both will finance and construct the structure. The terms of the grade separation structure will be handled under a separate agreement.

Chapter 7 — Exhibit A and PS&E Design

Contents:

Section 1 — Common Rail-Highway Design Issues

New At-Grade Crossings

Most railroad companies strongly oppose public projects that introduce new at-grade crossings. New at-grade crossings add maintenance and liability costs to a railroad company. However, in some cases, new at-grade crossings are unavoidable and railroad companies are willing to allow them if two to three other existing public at-grade crossings are closed and anticipated traffic counts at the new crossing do not exceed the combined traffic counts of the closed crossings. The TxDOT RRD Rail Letting Section serves as the office of primary negotiation with the railroad companies in these scenarios.

Frontage Roads

It is recommended that new frontage roads are designed as either:

- Overpasses over a rail line.
- U-turns before a rail line.

Frontage roads crossing a rail line at grade are not desirable.

A U-turn before a rail line should consider a barrier to ensure errant vehicles do not drive onto the railroad tracks.

Grade Separations

Overpasses are the preferred option versus underpasses for grade separations. Overpasses are preferred due to:

- Minimum disruption to rail service during construction.
- Drainage.
- Simplify future track expansion.
- Simplify future highway widening.
- Clearance issues due to oversized vehicles eliminated.
- Pedestrian design.
- Maintenance costs.
- Lower throwaway costs.

When designing overpasses, access to adjacent properties should be considered early during project development.

Accessing Railroad Right of Way

The project designer should become familiar with the project site and determine how project work within railroad right of way will be constructed. Temporary at-grade crossings are discouraged and may add both project cost and risk. Whenever possible, designers should aim to design any temporary pavement, ramps or detours that assist a contractor in construction of the project to eliminate the need for a temporary at-grade crossing.

If a temporary at-grade crossing is needed, it should be included in the Exhibit A for the railroad company to review up front and will be included in the C&M Agreement.

Oversize Vehicles

Whenever railroad protective devices are proposed, the crossing should be evaluated for any oversize vehicles that could damage railroad signal equipment. Possible solutions include:

- Avoiding use of cantilevers.
- Installation of median with flasher/gate to remove need for cantilever.
- Use of cantilever that does not cover all approach lanes.
- Use of non-standard cantilever 23 foot 4 inches minimum of vertical clearance.
- Move masts further than design minimums from edge of roadway or shoulder.
- Use of cantilever further out than design minimum to cover lanes.

Advanced Flashers

At locations where the approach view of an at-grade crossing may be obstructed, the use of ground-mounted or overhead amber flashing beacons with the Grade Crossing Advanced Warning Sign (W10-1) may be considered. When used, the flashers should operate without any actuation, i.e., always flashing. Train activated beacons are no longer recommended. As an alternative, railroad provided cantilevered flashing lights may be used in lieu of amber flashing lights.

Temporary Special Shoring

There may be cases with shoofly track alignments where temporary special shoring is needed to shore a track section adjacent to an open cut for:

- Roadway excavation.
- Construction of new substructure.
- Construction of new superstructure.

Traditionally, temporary special shoring on transportation projects is designed by the contractor. The railroad company requires TxDOT obtain a fully designed temporary special shoring system included in Exhibit A and approved by the railroad company prior to letting.

The shoring must be designed in accordance with AREMA and any guidelines provided by the railroad company.

Design Guidelines

For development of Exhibit A plans, project managers and designers are encouraged to familiarize themselves with the railroad company's design standards, as well as TxDOT annotated exceptions, prior to design. While the railroad company does not formally accept these annotated exceptions, they are published to give TxDOT's recommended practices to designers where a difference of opinion on certain guidelines exists. Many shortline railroad companies do not have established design guidelines. Designers are recommended to follow the BNSF/UPRR joint guidelines.

See the RRD website for railroad company design standards and guidelines. Additional design references are found in Chapter 14.

Standard Sheets

Traffic Safety Division (TRF) standard sheets which apply to rail-highway projects include:

- Railroad Crossing Details (RCD signing, striping and device placement).
- Sign Mounting Details (SMD).

These sheets should supplement other design materials used for at-grade crossing design and are inserted as part of the PS&E on construction projects. Refer to TRF website for more information.

Railroad or Highway Relocation

Relocating a rail line or highway may be considered as a design option to:

- Improve operational problems caused by occupied crossings.
- Improve environmental characteristics (ie., train horns, pollution, etc.).
- Improve safety by reduction of at-grade crossings.
- Use existing right of way for the rail line or highway for another public purpose.

Railroad relocation generally involves the complete rebuilding of railroad facilities, including the acquisition of new right of way. Designers should strive to avoid at-grade crossings on relocated rail lines. Zoning the property adjacent to the railroad as light and heavy industrial further isolates the railroad corridor from residential and commercial activity. Businesses and industries desiring rail service can relocate in this area.

Planning for highway relocations should consider routes that would eliminate rail-highway intersections by avoiding the need for access over railroad tracks or by providing grade separations.

Humped Crossings

Vertical curves should be evaluated on all approaches over an at-grade crossing. Significant grades can cause the following problems:

- Low-clearance and long wheelbase vehicles can get stuck on the track at the crossing.
- Crossing surface or field panels can become loose or dislodged if a vehicle catches on the approach edge of the panel.
- Inadequate turning radius from the adjacent road, causing vehicles to leave the paved roadway, which could lead to the vehicle stalling on the crossing.

Adjusting the roadway profile to eliminate problems with humped crossings can add significant cost to the project. The following guidelines are recommended:

- At an existing at-grade crossing, inspect the crossing for damaged, missing or dislodged field panels as well as any other damage on the approach pavement adjacent to the panels to determine if vertical clearance is an issue. The maximum approach grade should not exceed 3 inches of the rail elevation at a point 30 feet away from the center of the nearest rail on both sides of the crossing.
- For new at-grade crossings, follow the above guidance.
- The crossing may be widened and/or additional pavement installed to keep the design vehicle on asphalt when turning onto the crossing.

As railroad companies replace ballast over time during routine maintenance, the elevation of the rail will increase, adding to the problem.

Solutions for humped crossings include:

- Installation of Low Ground Clearance Grade Crossing warning signs (W10-5 and W10-5P).
- Restricting use of crossing for low clearance and long wheelbase vehicles.
- Improving approach grades to the crossing, including any turning radii from an adjacent roadway.

Any changes to the crossing should be reported by the district railroad coordinator to RRD, including installation of W10-5 signs so the TRIMS and Federal Railroad Administration crossing databases may be updated.

Passive Crossings

All passive public crossings must have a stop or yield sign installed with the crossbuck sign. Passive crossings must have:

- Sufficient approach sight distance down the tracks to allow a driver to stop before the crossing when an approaching train is seen.
- Sufficient sight distance down the tracks to allow a tractor-trailer to clear the tracks from a stop at the crossing before a train arrives.

All new public crossings are recommended to include active warning devices. Refer to Part 8 of the TMUTCD for more information.

Section 2 — Crossing Closures and Consolidations

Introduction

In the interest of public safety, TxDOT, local entities and the railroad companies strive to consolidate or close at-grade crossings. When consolidation or closure is not an option, they strive to deploy other operational or safety improvements to improve safety at railroad at-grade crossings.

When proposing crossing closures within a community, the corridor of crossings over the same rail line should be considered. The corridor should be evaluated for:

- Any at-grade crossings that may be closed.
- Any at-grade crossings that may be improved.
- Any at-grade crossings that can be grade separated.
- Traffic analysis of the proposed roadway network.

General Considerations

Several considerations may influence the decision to eliminate a rail-highway at-grade crossing:

- Traffic analysis of proposed roadway network.
- Density of crossings, especially when closer than a quarter of a mile apart.
- Support from local community.
- Sight distance restrictions.
- Traffic and train counts.
- Roadway speed limit.
- Train speed.
- Number of lanes.
- Number of tracks.
- Trains occupying the crossing.
- Roadway profile.
- Roadway surface (paved or unpaved).
- Adjacent traffic signals or intersections.
- Emergency vehicle routing.

- Economic consequences related to businesses or anticipated growth.
- Crash history and analysis.
- Track abandonments or out-of-service tracks.

Authorization of a Crossing Closure

Once a crossing has been identified for closure and the local government is in agreement, the local government shall authorize the closure by passing a resolution or ordinance.

Section 3 — Traffic Signal Preemption

Introduction

Traffic signal preemption involves a special timing sequence upon the arrival of a train when an at-grade crossing exists within 250 feet of the signalized intersection. A traffic signal controller is preempted by warning from the railroad crossing equipment. There are two forms of preemption:

- Simultaneous preemption. Occurs when the traffic signal controller is preempted at the same time the active warning devices begin to flash.
- Advance preemption. Occurs when the traffic signal controller is preempted prior to the active warning devices beginning to flash.

The primary function of preemption timing is to ensure a vehicle stopped on the railroad tracks at a red light is given sufficient time to clear the railroad crossing prior to the arrival of the train. It is also used to restrict traffic movements toward the tracks from the traffic signal when a train is approaching or within the crossing.

Review the TRF website for updates on policies regarding preemption and training.

Need for Preemption

Preemption circuitry must be installed anytime an at-grade crossing is within 250 feet of a signalized intersection (see Section 8C.09 of the TMUTCD). However, preemption should also be considered anytime traffic may back up over the tracks. If traffic backs up over the tracks before an unsignalized intersection, a traffic signal with preemption may be installed under warrant 9 in Section 4C.10 of the TMUTCD.

Preemption Sequence

Most railroad preemption sequences include the following steps:

1. **Right of Way Transfer.** This phase clears out any existing vehicular or pedestrian movements when the traffic signal controller (TSC) first receives a preemption call. The TSC will ensure a programmed minimum green, pedestrian walk and pedestrian clearance time is met prior to terminating the phase.
2. **Track Clearance.** This phase clears out the traffic going over the at-grade crossing, including a vehicle which may be stopped on the tracks at a red light.

NOTE: The higher the amount of advance preemption time requested from the railroad company, the higher the required track clearance green time under most circumstances in the absence of a gate down circuit.

3. **Dwell or Limited Cycle Phases.** After track clearance, the TSC controls any phases that do not move over the tracks. If only one phase is active, the traffic signal is said to be in dwell. If multiple phases are activated, the traffic signal is said to be in limited cycle.
4. **Exit Phase.** After the preempt call has ended from the railroad company equipment, the traffic signal transitions into exit phase. This phase has the heaviest traffic movement toward the tracks and may be the same phase as the track clearance.

Total Preemption Time

The total time requested from the railroad company for traffic signal preemption includes:

- Minimum time.
- Clearance time.
- Buffer time.
- Equipment response time.
- Advance preemption time.

Minimum Time

The FRA requires the active warning devices to flash for a minimum of 20 seconds prior to the arrival of the train at the crossing. This includes 3 seconds of initial flash time prior to the gates descending and 5 seconds while the gates are down prior to the arrival of the train.

Clearance Time

Clearance time is the additional time required from the railroad company for the active warning devices to begin flashing prior to the arrival of the train. This is typically required at skewed crossings or where multiple tracks exist.

Buffer Time

Buffer time is additional time provided to account for trains that may accelerate on the approach to the crossing. This is determined by the railroad company and is normally 5 seconds.

Equipment Response Time

Equipment response time is provided for the crossing equipment to determine the speed of an oncoming train. This is determined by the railroad and is normally 5 seconds.

Advance Preemption Time

Advance preemption time is the additional time requested for the TSC to activate the preempt phase from the railroad company equipment beyond what is provided to the railroad active warning devices.

Traffic Signal Design

Following are recommendations when designing traffic signals with railroad preemption:

1. At the traffic signal, if the track clearance green phase includes left-turning vehicles and there is through traffic on the opposite side of the intersection, include a left turn arrow for a protected left turn during preemption. The track clearance green phases should include both the through movement and protected left turn. Note: The protected left turn movement is not always used during normal operation (when traffic signal is not preempted).
2. Include battery backup at the TSC.
3. Use a minimum 12 color coded conductor traffic signal cable between the railroad cabin and the TSC.
4. Include a label in the TSC and railroad cabin to alert technicians of the presence of railroad preemption circuits.
5. Traffic signal poles should not block view of railroad gates, mast flashers and cantilevers.
6. Care should be taken to restrict any vehicular movements towards the tracks when the traffic signal is in dwell or limited cycle phases. Restricted left turns or blank-out signs (i.e., No Left Turn) may assist.

Preempt Priorities

There are many forms of preemption that may occur at a TSC, including:

- Emergency vehicles.
- Public transportation vehicles.

The TMUTCD states that railroad preemption is the highest priority within the TSC when multiple preempts exists. The designer should also confirm:

- TSC has enough preempt plans to support all preempt modes.

- Traffic signal cabinet has enough relays to support all preempts.
- Solid state preemption controllers may be used to eliminate the need for preempt relays.

When using multiple preemption circuits for railroad preemption, the circuits must be prioritized in the TSC to ensure the preemption functions as designed.

Other Preemption Design Scenarios

Other scenarios for railroad preemption occur on occasion and require a deviation from generally accepted practice. Some of these scenarios include:

- At-grade crossings downstream of a traffic signal on one-way streets with the direction of travel coming from the traffic signal and going towards the tracks.
- At-grade crossings with an adjacent traffic signal on both sides of the tracks.
- Signalized intersections where the tracks cross two legs of the intersection.
- Pre-signals may be used when the storage distance between the tracks and near edge of the pavement at the intersection is less than the length of the design vehicle such that the design vehicle would be stopped on the tracks when at a red light.
- Queue cutter signals may be used when queues at a traffic signal extend over an at-grade crossing at a significant distance beyond the intersection.
- At-grade crossing in the middle of signalized intersection.

See Chapter 14 for other design resources.

Types of Circuits

Several types of circuits are used with railroad preemption. Some common circuits include:

- Advance preemption circuit.
- Gate down circuit.
- Supervised circuit.

Advance Preemption Circuit

The advance preemption circuit sends a call to the traffic signal controller (TSC) to go into preemption to begin right of way transfer.

Gate Down Circuit

The gate down circuit ensures that the track clearance phase terminates when the gates are horizontal. The gate down circuit provides 2 separate benefits. First, it eliminates the preempt trap by ensuring track clearance green does not terminate prior to the gates descending. Otherwise, a red indication could occur at the traffic signal and another vehicle could queue back over the tracks. Second, it ensures that the track clearance green is not unnecessarily long when maximum right of way transfer time is needed.

Supervised Circuit

A supervised circuit monitors the cable connection between the railroad company and the traffic signal and can send the traffic signal into flash if the connection is broken after right of way transfer and track clearance phases.

Constant Warning Circuitry

Constant warning circuitry from the railroad company is recommended. Constant warning circuitry along the rail can detect the speed of an oncoming train and know when to preempt the traffic signal and know when to drop a preempt call if a train stops on the approach. Railroad circuitry is installed based on the fastest speed allowed over the crossing, but not all trains will travel this speed over the crossing.

Adjacent Crossings

As circuitry along the tracks extends beyond adjacent grade crossings, the need for preemption at adjacent crossings should be considered. Preempting adjacent crossings at different times can be significantly more costly otherwise. However, this is determined by the railroad company.

Cutover and Annual Testing of Preempted Traffic Signals

Any change to a preempted traffic signal should include a cutover inspection after the work is completed using TxDOT Form 2625 to document the results. This includes any modification to the traffic signal cabinet. An annual joint inspection, also documented on TxDOT Form 2625 should be done with members of the railroad, traffic signal maintainer, state railroad or federal railroad inspector, and district staff.

Section 4 — Track Design

Introduction

Most railroad companies prefer any required track work to support a TxDOT construction project be completed by a TxDOT contractor. Railroad companies assist by:

- Cutting rails.
- Welding or bolting together new track sections.
- Installing switches.
- Relocating signal equipment.

This is not common with all railroad companies. Project designers should coordinate responsible party to provide materials, remove existing track sections, dispose of materials, and install new materials prior to developing plans and specifications. If not properly assigned at the beginning of a project, TxDOT may be at risk of a change order during construction.

The goal of effective track design is to ensure the heavy weight distribution of railroad equipment can travel across the railroad tracks safely and efficiently without destroying the railroad equipment or disrupting the ballast or base material beneath the tracks. This is accomplished using following components.

Rail

Rails classified in weight per linear yard of a single rail (i.e., 132# rail).

The size and type of rail to be used in a project is the choice of the operating railroad company. Heavier weights are used on mainline tracks, while smaller sizes may be used on spur and siding track.

Track Panels

Panels are typically 80 foot in length and include:

- Rails.
- Tie plates.
- Ties.

Track panels are particularly useful when replanking an existing at-grade crossing. After the existing rails are cut on both ends, an existing section of track is removed down to the subgrade. After the subgrade, subballast, and ballast are placed, the track panels are installed. The track panel is bolted on both ends, and a tamping machine installs ballast. The temporary joint bars are then removed, and the rails are welded together. Crossing surface panels are bolted into the ties.

Securement

Securing the rails to the ties is done by using:

- Tie spikes and tie plates for timber ties.
- Tie clips and rail seat pads for concrete ties.

Tie plates and clips also assist in distributing the load of a train over the tie.

Ties

Ties are supporting members, either timber or concrete, to which rail is fastened. They provide distributive support for the rail and assist in maintaining track alignment and separation between rails.

Timber ties are manufactured from hardwoods such as oak or Douglas fir and pressure treated with a creosote/tar solution to prevent decay. Timber tie size is usually 7 inch by 9 inch by 8 foot 6 inches. Timber tie spacing is usually 18 inches or 19.5 inches on center.

Concrete ties are prestressed with rebar, resist decay, and generally have a longer useful life than timber ties. Concrete tie size is usually 11 inch by 9 inch by 8 foot 6 inches. Concrete tie spacing is usually 20 inches or 24 inches on center.

Switch ties may be timber or concrete ties of varying lengths (generally 9 feet to 20 feet) that are used to support the track structure at the location where a single track diverges into two or more tracks by means of the turnout and switch mechanism.

In recent years there has been increasing interest in the development and use of ties made of composite materials, primarily polymers mixed with timber or concrete. Composite ties are not in general use by any of the major railroad companies, though there are some installed at various locations around the country as test projects.

Ballast

Ballast restrains the movement of crossties to prevent lateral movement of the track structure, provides distributive support to the crossties, and provides drainage for the track structure above. Desired typical ballast depth is within 2 inches of top of the ties and 9 to 12 inches below the

bottom of the ties. The width of the ballast section is usually 6 to 12 inches from the ends of the tie with a two-to-one slope downward from that point to ground level.

Sub-ballast

Sub-ballast consists of smaller particles that provide for additional support of the track structure and a foundation course to aid further with drainage. As track structure ages and upper ballast deteriorates, those smaller particles migrate downward, effectively deepening the lower ballast layer. Maintenance and rehabilitation projects add newer upper ballast, causing the entire track structure to gradually rise vertically over time.

Subgrade

On new construction, core samples are usually collected to determine the type and depth of constructed subgrade (compacted aggregate) that should be used to support the track structure. On existing older rail lines, the subgrade is typically the native soils present when the railroad was built.

Track Design Standards

AREMA has standard track components and design plans that are often referenced for track design. The Class I railroad companies (BNSF, CN, CP, CSX, CPKC, NS, UPRR) also have their own specific engineering and design standards for some components and design that may vary from AREMA standards and supersede AREMA standards. Some of these are also common standards used by more than one railroad company, such as BNSF/UPRR common standards.

TxDOT has permission from UPRR and BNSF to use their standards and common standard sheets in PS&E packages. The designer should confirm from the railroad company the standard to use prior to developing the track design plans. Track design should only be performed by individuals with prior track design experience familiar with both AREMA and railroad company standards.

Turnouts

A turnout is a track panel that diverts trains from one track to another. The length of the turnout is determined by angle of the turnout casting (referred to as a “frog”). The shorter the turnout, the sharper the angle of divergence will be, which restricts train operating speeds through the turnout. The initial point of divergence where the two tracks effectively meet is referred to as the “switch” and the moveable rails at that location referred to as a “switch point”.

Grades and Horizontal Curves

Railroad optimum design for grades is 0.5% or less, though up to 1.5% is acceptable in certain circumstances. Steeper grades result in continual reduction in train speed and can actually cause a train to stall if the grade is too steep, or require the use of additional locomotives, which is a major operating cost.

Horizontal curvature is not nearly as critical, though it can affect train speed and handling. The degree of curvature and desired train speed will impact the amount of superelevation used. Consecutive curves also require the design of a tangent length of track between curves to prevent the train from rocking, which can result in derailments.

Section 5 — Exhibit A Design

Sheet Layout

The Exhibit A plan set is a:

- 30% PS&E (Plans, Specifications and Estimates) plan set on construction projects.
- Plan sets showing applicable work within railroad rights of way on all other projects (FSP, replanking, railroad capital improvement).

Exhibit A should include the following:

- Title sheet with Index of Sheets (not required on replanking projects).
- Project layout sheet.
- Active warning device forms (if installing or modifying).
- Signing and striping forms (if not shown with active warning devices).
- Traffic signal layouts and phasing forms (if preemption is involved).
- Plan view of conduits, pipes, and culverts under track forms.
- Planking layout (if installing or modifying).
- Bridge or roadway plan and profile.
- Rail survey (bridge projects; out to 1000 feet on both sides of bridge on overpass projects and out to 1500 feet on both sides of bridge on underpass projects).
- Roadway typical sections (planking and construction projects).
- Rail typical sections (planking and underpass projects).
- Ditch cross sections on 100-foot centers (joint drainage projects).
- Railroad requirements sheets (construction projects).

Any traffic control plan, detour route, and boring logs sheets are usually considered support material and are not part of the Exhibit A.

The following checklists are provided in development of these plan sets.

Guidelines on All Exhibit A's

1. Title sheet included with a project map and Index of Sheets.
2. All sheets numbered and named correctly with Index of Sheets.

3. Project information correctly identified: CSJ, County, Roadway, City, District and CCSJ if applicable.
4. Railroad company, subdivision, milepost, and any DOT numbers identified on title sheet and in title blocks of other sheets.
5. If there are multiple tracks, each track labeled and identified: mainline, siding, spur, yard, wye, etc.
6. Train data shown: Number of switching and through movements, including speed for each type of movement.
7. AADT and design speed of roadway traffic shown.
8. General Notes: All `work done by` railroad company, work done by state and work done by local government identified correctly.
9. General Notes: Traffic control being provided by the state, not the railroad company (Note: Reverse is true on FSP projects).
10. Railroad right of way shown in plans. Width of railroad right of way shown.
11. Existing utilities and utility relocations shown.
12. Existing conditions and proposed conditions shown.
13. Number of days of flagging and number of days inspection shown (if needed).
14. Drawing should be 1:20 scale whenever possible. Text should be large enough to be clearly legible when the sheet is reduced to 8.5 by 11-inch size.
15. If plans are drawn in colors, colors are clear, well defined, and easily legible when printed or copied in black and white.
16. Final Exhibit A plans should be sealed, signed and dated by the licensed Texas Professional Engineer.

Guidelines on Construction Project Exhibit A's

1. Title sheet project description reflects work in railroad right of way, not the overall PS&E.
2. Project plan view layout included if work impacts multiple rail lines or crossings.
3. Fencing parallel to track to discourage trespassing shown (if `railroad required`).
4. Impacts to any existing railroad signals shown.
5. Ensure Railroad Requirements Sheets are included at end of Exhibit A and are the `current` version. Use Bridge or Non-Bridge sheets depending on project scope. Only sheet 1 of 3 may be modified; sheet 1 must be sealed, signed, and dated by the licensed Texas Professional Engineer.

6. Any absolute track windows requested from the railroad company shown. (If so, this needs to be requested from the railroad company. Typically applies to overpasses over rail yards or underpasses.)
7. Any required right of way acquisitions shown.
8. Direction of increasing railroad milepost shown.

Guidelines on Projects with Traffic Control Plans

NOTE: Any construction, safety, replanking or railroad capital improvement projects where lane closures are involved or phased construction exists should include a proper traffic control plan for review and development of cost estimates.

1. Phased construction shows how railroad right of way is impacted during all applicable phases.
2. Any lane closures or lane shifts, over at-grade crossings which impact crossing surface, railroad signals/signs or preemption shown.
3. Effects to adjacent at-grade crossings shown for any project detours. This includes narrowing lanes and/or lane drops prior to the railroad crossing to prevent traffic queuing over an at-grade crossing.
4. Pedestrian elements properly detailed during all phases.
5. Any temporary traffic signals and preemption details shown for applicable construction phases.
6. All gates, signs, and cantilevers visible in each phase (driver view not obstructed). Any unnecessary gates deactivated by railroad company when not needed. Any unnecessary signal lights bagged or removed.
7. Temporary traffic control for maintenance or construction jobs should also be submitted to the railroad for review and concurrence. Use of contraflow through a railroad crossing is discouraged. Railroad written approval of contraflow shall be required and may involve having a designated railroad flagger onsite at all times the contraflow is in progress.

Guidelines on Projects with Overpasses

1. Make sure the drain slots are blocked over the railroad right of way and ensure the proposed bridge will not increase the volume of water or change the drainage flow to the railroad right of way.
2. Roadway grades, widths of lanes, width of shoulders and medians are shown.
3. Fencing provided over railroad right of way, or if not, an explanation is provided in the DCRG. Fence needed on bridge if gap is greater than 2 feet between structures Note: Fencing is not

typically provided unless there are pedestrian elements on the bridge, a rail yard or rail switch is beneath bridge, or there is a history of vandalism in the area. Refer to the individual railroad company current grade separation guidelines.

4. Splashboard provided on barrier if bridge is in area where snow blower could blow snow onto railroad right of way.
5. Lighting provided over tracks, but in a location where changing bulbs is easier and vertical clearance is not reduced (i.e., not directly over tracks). Electrical service needs to be located on TxDOT right of way. Lighting required when bridge covers 80 feet of track or more, with distance measured along the track.
6. Access provided to all adjacent property owners in proposed facility.
7. Any right of way preparation work (removing trees, etc.) on railroad right of way identified.
8. Any temporary at-grade crossings or haul roads shown, including planking work by railroad company. Temporary at-grade crossings should restrict access by the public by locked fence or other means.
9. Hike and bike access provided on bridge if needed.
10. Any railroad cantilever and flashing light and gates under bridge will not hit bridge.
11. Highway stationing shown.
12. Bridge National Bridge Inventory (NBI) number shown if available.
13. Railroad access road shown (if needed).
14. Distance between dual structures shown.
15. Crash walls shown, and (if railroads require) guard rail installed by railroad on the track if center of any existing or future track is closer than 25 feet to face of column.
16. Note included to stencil in DOT number and railroad milepost on BNSF structures. Note clarifies that BNSF will maintain.
17. Dimensions shown from centerline of rail (both existing and future tracks) to face of footings and columns.
18. Permanent vertical clearance at least 23-foot 4 inch minimum for UPRR and 23-foot 6 inch for BNSF and CPKC. Must be shown from edge of railroad right of way to edge of railroad right of way, with point of minimum vertical clearance identified.
19. Minimum temporary vertical per individual railroad company grade separation guideline.
20. Future tracks shown at 20-foot centers. A future track may be shown on both sides of existing track at same elevation as existing track if no other information available.

21. All bents and abutments are off railroad right of way. If this is not true, an explanation is provided in the DCRG, including how far design elements encroach into railroad right of way.
22. For any demolition, such as removing a pier in railroad right of way, specify the distance below ground of the structural element that must be removed. (UPRR and CPKC prefer 3 feet below finished grade and 2 feet below base of rail, whichever is lower; BNSF prefers 3 feet below finished grade and 3 feet below base of rail, whichever is lower.)
23. Plan details match information provided in the DCRG.
24. Rail survey provided for all tracks under the overpass.

Guidelines on Projects with Underpasses

1. Vertical clearance shown (typically 16-foot 6 inch minimum and 18-foot 6 inch on major freight corridors).
2. Warning signs included for vertical clearance if less than 20 feet.
3. Details for shoofly bridges included (if shoofly bridge is used during construction).
4. Location and details of shoring included.
5. Details of responsible party performing the work (contractor or railroad company), responsible party providing materials and any absolute work windows shown.
6. Bridge columns protected from vehicular traffic with proper barriers and object markers.
7. Details of any adjacent at-grade crossings impacted by construction shown.
8. For any demolition, such as removing a pier in railroad right of way, specify the distance below ground of the structural element that must be removed. (UPRR and CPKC prefer 3 feet below finished grade and 2 feet below base of rail, whichever is lower; BNSF prefers 3 feet below finished grade and 3 feet below base of rail, whichever is lower).
9. Anti-graffiti fence shown (if required by railroad company).
10. Storm sewer and pump station design shown.
11. Plan details should match TSR. Refer to railroad company design guidelines when determining how to design underpass bridge and develop TSR/Exhibit A. See the RRD website for railroad company design guidelines.

Guidelines on Projects with At-Grade Crossings

1. Design matches field notes from diagnostic inspection.
2. Design incorporates findings from crash reports.

3. Are there any adjacent intersections that require preemption or does project include a traffic signal with preemption? Warrant 9 in Section 4C.10 of the TMUTCD may be used as justification for the traffic signal. As an alternative, a 4 way stop or a 2 way stop (stop signs on roadway parallel to rail line) may be used to assist in moving traffic over an at-grade crossing.
4. Signing:
   a. Do Not Stop on Tracks (R8-8) signs on any approaches over at-grade crossings heading towards an adjacent intersection where vehicles may stop.
   b. Stop (R1-1) or Yield (R1-2) sign at a passive crossing; Stop Ahead (W3-1) and Yield Ahead (W3-2) signs may also be required (see Section 2C.36 of the TMUTCD).
   c. Crossbuck (R15-1) signs on right side of roadway; a second on left may also be present.
   d. Number of Tracks (R15-2P) sign if more than one track.
   e. Emergency Notification Signs (ENS) on all approaches (I-13, not R15-4).
   f. Low Ground Clearance Grade Crossing signs (W10-5; W10-5p) if crossing has a high vertical profile.
   g. Grade Crossing Advance Warning Signs (W10-1; W10-2; W10-3; W10-4) on all approaches and parallel roads within 100 feet of roadway intersection; if parallel road is within 100 feet of crossing, install W10-1 sign on opposite side of roadway from tracks.
   h. Warning signs may be supplemented with No Gates or Lights (W10-13P) plaque at passive crossings.
5. Sidewalks and shared use pathways:
   a. Gates typically not required, but bell must be present.
   b. Crossbuck signs on both sides of roadway for both approaches.
   c. Sidewalks shall cross perpendicular to rail. Sidewalks do not end at railroad right of way.
   d. Railroad masts adjacent to sidewalks include backlights.
   e. Sidewalks and shared use pathways shall have sufficient clearance around rail signal systems so as not to conflict with them when activated.
   f. ADA ramps and proper crosswalks shown at adjacent traffic signals with pedestrian signals.
6. Crossing has been evaluated for truck traffic:
   a. Turning radii at adjacent intersections.
   b. Turning vehicles will not hit gates and cantilevers.
7. Humped crossings have been evaluated and mitigated.
8. Curbs or islands should not be closer than 10 feet from center of rail, but many railroad companies prefer not closer than 10 feet from nearest rail.

9. Medians:
   a. Needed for island gates.
   b. Protected with painted curb or object marker so they are not hit at night.
   c. 10-foot minimum width (back of curb to back of curb) preferred.
   d. Edge of island is parallel to rail, not perpendicular to roadway.
10. Any culverts under roadway need to be adjusted for roadway widening.
11. Is metal beam guard fence (MBGF) needed to protect gates or for roadway drop-offs? (See Appendix A of the TxDOT Roadway Design Manual.)
12. Any sight distance issues on either approach such as curved approaches? A Train When Flashing (W10-4B) side-mounted or overhead device may be used. Alternate method such as a cantilevered flashing light may be used.
13. Superelevation on track accounted for on roadway design.
14. Any track being abandoned should be removed along with crossing surface panels and replaced with same material as adjacent pavement.
15. An Exempt Sign (R15-3P, W10-1aP) may be placed when a rail line is not used, but the track is not out of service. This plaque informs drivers that a stop is not required except when rail traffic is approaching or occupying the grade crossing, or the driver's view is blocked.
16. A Tracks Out of Service (R8-9) sign is used with bagged railroad signals in lieu of the Crossbuck sign (R15-1) for tracks temporarily placed out of service.
17. Active or passive devices must be relocated by the railroad company if an existing track is removed at a multiple track crossing.
18. Striping is correct:
    a. Stop bars are 8 feet from centerline of the railroad signal post or 15 feet from near rail for passive crossings; may be located further back based on site evaluation and studies.
    b. Distance to nearest railroad crossing solid line varies based on approach speed (TMUTCD, Table 2C-4, Condition B, Deceleration to 0 mph):

Solid Line Placement for Railroad Crossings

Approach Speed (mph)	Distance from Centerline of Track
20	100
25	100
30	100
35	100
40	125

Solid Line Placement for Railroad Crossings

Approach Speed (mph)	Distance from Centerline of Track
45	175
50	250
55	325
60	400
65	475
70	550
75	650

c. 50 feet from railroad crossing solid line to railroad crossing solid line.

d. Solid 8-inch white line separates multiple approach lanes and extends 10 feet from back railroad crossing solid line.

e. Grade Crossing Advanced Warning Sign (W10-1) sign adjacent to railroad crossing pavement markings.

f. Double yellow line extends back a minimum 50 feet from nearest rail on two-way left turn lane; area should be hashed out.

g. Pavement markings required where speed limit is 40 mph or greater and at all active crossings on every approach lane; exceptions may be granted at passive crossings in urban areas. (See Section 8B.27 of the TMUTCD.)

19. Sign sizes correct per Table 8B-1 of the TMUTCD.

Guidelines on Projects with Active Railroad Warning Devices

1. Gates shown perpendicular to the roadway and not normally parallel to tracks (i.e., skewed crossings).
2. Gates, cantilevers, and striping have correct distances shown. The below information is for reference only; the final design and placement of active warning devices is determined by the railroad company.

   a. 12-foot minimum, 15-foot typical from centerline of railroad signal mast to centerline of nearest track; on skewed crossing tip of gate must be a minimum of 12 feet from centerline of track.

   b. Minimum 4 feet 3 inches (5 feet 3 inches for BNSF and UPRR) from center of gate mast to edge of curb; or 6 feet from center of gate mast to edge of pavement when shoulder is present; or 8 feet 3 inches (9 feet 3 inches for BNSF and UPRR) from edge of pavement if no shoulder is present.

   c. Minimum 4 feet center of gate to center of cantilever, but railroad companies prefer 6 feet.

   d. Minimum 6 feet edge of sidewalk to center of gate.

3. Any cabin relocations or installations identified. Correct dimensions:
   a. 30 feet edge of cabin to edge of pavement or curb.
   b. 25 feet edge of cabin to near rail.
   c. Cabin location not a sight distance issue for vehicles.

NOTE: Cabin location is subject to change by the railroad company.

4. Correct usage of backlights and side lights. Any side streets within 100 feet of rail would require side lights. Back lights required on all two-way non-divided roadways and if pedestrians use roadway.
5. Gate lengths are sufficient (generally not longer than 28 feet). Gates may cover up to two lanes.
6. Generally, a median is needed for multiple approach lanes. Median with flasher/gate is normally less expensive than a cantilever.
7. One pair of flashers shown for each approach lane.
8. Railroad company removes, provides and installs gates, cantilevers, mast flashers, and crossbucks.
9. Front lights are not needed on both a cantilever and a gate if one is in front of the other; same applies to back lights.
10. Note included 'The Railroad signal circuits and final design location were not designed by the undersigned engineer' above engineer's seal.
11. If warning signals are being removed, ownership of signals identified, including any salvage value.
12. General notes describe the type of railroad circuitry (constant warning, etc.).
13. Clearance time correct for active crossings with skew or multiple tracks.

Guidelines on Projects with Traffic Signal Preemption

1. Correct timing is identified on plan sheet (equipment response time, advance preemption time, clearance time, minimum time, and buffer time). Any traffic signal timings shown match timings in preemption form (TxDOT Form 2304).
2. All signal heads shown.
3. Phasing diagram for normal operation shown.
4. Preemption phasing diagram shown with right of way transfer, track clearance, dwell or limited cycle, and exit phases.
5. Plans identify conduits and traffic signal cable between traffic signal cabinet and rail cabin, including `responsible party for providing and installing` materials.

6. Traffic signal cable should be a minimum 12 conductor cable.
7. Plans clarify responsible party for traffic signal maintenance and operation.
8. Protected left turn provided for traffic on track clearance phase (if conflicting traffic is approaching the traffic signal from opposite side of the intersection).
9. Battery back-up provided for TSC.
10. Traffic signal poles do not block active warning devices.

Guidelines on Projects with Planking

1. Crossing surface panels identified by material (concrete, composite, asphalt, timber, etc.) and length to be removed and installed. Planking extends at least 3 feet beyond edge of pavement or sidewalk.
2. Planking installations shown in 8-foot sections along rail line. Note: Some railroad companies may prefer use of 9-foot or other size panels.
3. TxDOT installs subgrade material, and the railroad company removes existing and installs new sub-ballast, ballast, ties, rail, and planking surface. TxDOT provides level up.
4. If crossing surface panels are being removed, ownership of the panels is identified, including any salvage value.
5. Plans confirm full-width or half-width roadway closure.

Guidelines on Projects with Crossing Closures

1. Details of railroad company work (removal of warning devices and crossing surface panels, passive signing, roadway on railroad right of way, restoring ditch, etc.) shown.
2. Details of how crossing will be blocked from traveling public (curb and gutter to match existing, Type 3 barricade, turnaround, etc.) shown. Embankment should be filled to match existing terrain or ditch to discourage drivers from trying to use crossing.
3. Details shown of adjacent roadway improvements (if required).
4. Proper signs to mark closure are installed (if needed):
   a. No Outlet (W14-2).
   b. Dead End (W14-1).
   c. Type 3 barricades.
   d. Two-Direction Large Arrow Sign (W1-7 or W1-7T).

Guidelines on Projects with Existing or Proposed Quiet Zones

1. Modification of existing state roads to meet Quiet Zone requirements are typically at the cost of the local agency requesting the Quiet Zone. See Chapter 11 for more information.
2. Quiet Zone public crossings should be gated crossings with Supplementary Safety Measures (SSMs) such as:
   a. Four quadrant gates setup with maximum 2 feet separation between gate tips or 1 foot from median or channelization device with all exit and approach lanes gated.
   b. Medians with non-traversable curbs or channelization devices that extend back 100 feet from gate (or 60 feet with side streets) and all side streets within 60 feet of the nearest gate are closed; maximum 1-foot separation of gate end and curb or channelization device and all approach lanes are gated.
   c. On one-way streets, non-traversable curb extends back 100 feet from gate; 2 feet maximum separation between gates or 1 foot separation between gate and curb.
   d. A wayside horn may be used in lieu of an SSM.
3. Any non-traversable curbs are used on roadways that do not exceed 40 mph and must be at least 6-inches high. See 49 CFR § 222.9, definition of non-traversable curb.
4. No Train Horn (W10-9) sign or plaque (W10-9P) shown for crossings on all approaches and roadways parallel to rail within 100 feet of rail; time of day plaque shown if applicable.
5. Any private passive crossings in a Quiet Zone include a Stop (R1-1) sign, Crossbuck (R15-1) sign, and No Train Horn (W10-9) sign on all approaches.
6. Any pedestrian crossings include No Train Horn (W10-9) sign on all approaches.

Guidelines on Projects with Culverts, Drainage Pipes or Conduits

1. Notes indicate Class V Cooper E-80 culvert is installed across limits of railroad right of way or out to 30 feet from track center. Culverts to be installed under a road that is under a railroad underpass may be Class III, subject to approval of the railroad.
2. Safety end treatments (SETs) included on culverts.
3. Any conduits (electrical or drainage) rigid metal conduit (RMC).
4. Conduits (electrical or drainage) installed at least 5 feet below top of rail.
5. Boring pits located at least 30 feet from track center.
6. Wet boring not permitted.
7. Corrugated metal pipe (CMP), precast pipe or precast box is preferred to minimize impact to railroad operations.

8. Open trench construction impacting railroad operations shall not be used unless approved by the railroad company.
9. Minimum concrete cover (with steel reinforcement) on pipe shall be 2 inches.
10. Dimensions on Exhibit A match pipeline/wireline forms (UPRR only).
11. Top of pipe at least 5 feet below top of tie and 5 feet below bottom of ditch.
12. Preemption conduits and wires are treated as part of the preemption related agreement and a separate utility agreement is not needed. Wirelines for loop detectors, electrical lines or traffic signals may require a separate wireline license agreement.
13. Storm drain lines installed parallel to a track may be included in the road C&M agreement. Any storm drain line that crosses under a railroad track, direct buried, under a road, or under an underpass, must have its own pipeline license agreement.

Guidelines on Projects with Common Use or Encroachments

1. Future second track between encroachment area and existing track, shown 20 feet from existing track.
2. Orange construction fencing shown 25 feet away from rail, so a flagger is not needed.
3. All elements installed or modified in railroad right of way are to be clearly identified with distance shown from railroad right of way line.

Section 6 — PS&E Design

Confirming PS&E Design Matches Exhibit A Design

On construction projects, the Exhibit A design is a 30% design completed 12 or more months in advance of the final PS&E. Most railroad companies will request a review and approval of the PS&E (often referred to as an Exhibit B on construction projects) to verify certain elements of the design have not changed. Key elements that should not differ between the Exhibit A and 100% PS&E include:

- Horizontal and vertical clearances for overpasses.
- Location of overpass bents and abutments.
- Alignment of overpass or underpass.
- Width of overpass.
- Any drainage or hydraulic elements on railroad right of way.
- Fence details on overpass.
- Lighting details under overpass structures for the railroad.
- Location and design of crash walls.
- Locations of other features on railroad rights of way such as sidewalks, light poles, signing, retaining walls, guardrail, etc.
- Stencil of DOT number and railroad milepost on overpass (BNSF only).
- Haul road details.
- Railroad company access road details.
- Underpass material selection and design elements.
- Protection for underpass bents (barrier or other).
- Shoofly track design geometry and materials.
- Any other track design geometry and standards.
- Locations and types of railroad warning devices on at-grade crossings.
- Roadway approach grades on at-grade crossings.
- Roadway lane widths, shoulders, and medians on at-grade crossings.
- Construction phasing on railroad right of way.

PS&E Requirements

As part of the PS&E plan set on TxDOT construction projects, the following railroad specific plan sheets are required:

- Railroad Scope of Work Sheet.
- Railroad Requirements Sheets (Bridge or Non-Bridge).

These sheets should be identified in the Index of Sheets under the section heading 'Railroad'. Do not include the Exhibit A in the PS&E unless there is information which is not contained in the rest of the PS&E such as track realignments.

The Railroad Scope of Work Sheet is intended to clarify project specifics such as:

- General railroad information such as DOT number, railroad company, railroad milepost, railroad subdivision and train movements.
- Any work to be performed within railroad right of way identified as work to be performed by TxDOT contractors and work to be performed by railroad companies.
- Railroad flagging information.
- Railroad insurance requirements for TxDOT contractors and subcontractors including percentage of contract work within railroad right of way (needed to obtain railroad protective liability insurance).
- Whether a railroad Right of Entry Agreement is required and responsible party to obtain (TxDOT on behalf of contractor or contractor).
- Whether a railroad coordination meeting is required as part of the preconstruction meeting.
- Emergency contact information at the railroad company.

It is noted that on bridge projects, railroad protective liability insurance minimum limits are $5,000,000 single occurrence and $10,000,000 aggregate. On non-bridge projects, railroad protective liability insurance minimum requirements are $2,000,000 single occurrence and $6,000,000 aggregate. Contact RRD to verify current insurance requirements.

The percentage of work within railroad right of way is determined by dividing project bid items within railroad right of way by total cost of bid items on the project. Project engineering, contingencies, and other costs are not considered.

The Railroad Requirements Sheets clarify various information for contractors, including:

- Need for safety training.
- Operational requirements when working near tracks.
- Minimum construction clearances.

- Shoring and demolition requirements (bridge projects).
- Construction and as-built submittals (bridge projects).

Information on how to complete the Railroad Scope of Work sheet, Railroad Requirements sheets, and approved Right of Entry Agreements may be found on the RRD website.

The district railroad coordinator should assist the project designer to include these sheets in the PS&E prior to letting.

Special Specifications

If track work is involved, special specifications will usually need to be added to the PS&E. Examples include:

- Ballasted track construction.
- Underpass structure.
- Culverts or drainage pipes under track.
- Contractor prequalification for trackwork.

Any pipes underneath the track must meet Cooper E-80 loading requirements.

Designers should pay close attention to any track specifications to confirm the specification correctly identifies if a contractor is:

- Providing track materials.
- Performing track removal.
- Salvaging track materials.
- Building track panels.
- Performing track installation.
- Performing track tie-ins.

RRD and the Bridge Division can assist the districts if special specifications are needed.

The following items do not usually require special specifications since they are provided by the railroad company:

- Crossing surface panels.
- Active warning devices (i.e., gates, cantilevers, and mast flashers).
- Passive warning devices (i.e., crossbuck signs).

Force Account Estimates

A railroad company force account estimate should be added to the estimate for all work on the project provided by the railroad company, assuming this information is received prior to letting. RRD has posted a general guide on the RRD Crossroads site.

Chapter 8 — Right of Entry Process

Contents:

Section 1 — Overview

Right of Entry Agreement

All Class I and some shortline railroad companies operating in Texas require an agreement with contractors to perform work in the railroad's right of way. One of these agreements is a Right of Entry Agreement. Examples of work that will require a Right of Entry include:

- Bridge construction.
- Concrete repair on railroad right of way.
- Widening a roadway over an at-grade crossing.
- Adding sidewalks or shared use pathway over an at-grade crossing.
- Grading on railroad right of way.
- Installing structures on railroad right of way such as poles, luminaires, guardrail, retaining walls, medians, curb and gutter, barriers, etc.
- Fracture critical bridge inspection.
- Track work.
- Core drilling.
- Surveying along tracks.
- Surface work across tracks.

TxDOT is not a signatory party in these Right of Entry Agreements. This is a two-party agreement between the railroad company and an awarded contractor after a C&M or maintenance agreement has been executed by the state and the railroad company. TxDOT has agreed to facilitate Right of Entry Agreements for Union Pacific Railroad. Refer to the Standard Specifications for Construction and Maintenance of Highways, Streets and Bridges, Item 5, Article 8.3 for more information.

If a Right of Entry Agreement is required, the contractor cannot begin work within railroad right of way until a fully executed Right of Entry Agreement is obtained. Information for the railroad requirements for Right of Entry Agreements on each project can be found on the Scope of Work Sheet.

NOTE: Union Pacific Railroad Maintenance Consent Letters with Contractor Endorsement is covered in Chapter 3, Maintenance Projects.

Process for Obtaining a Right of Entry Agreement

The flow chart depicts the process for obtaining a Right of Entry Agreement on a construction project.

NOTE: Project steps and time frames vary depending on scope of the project.

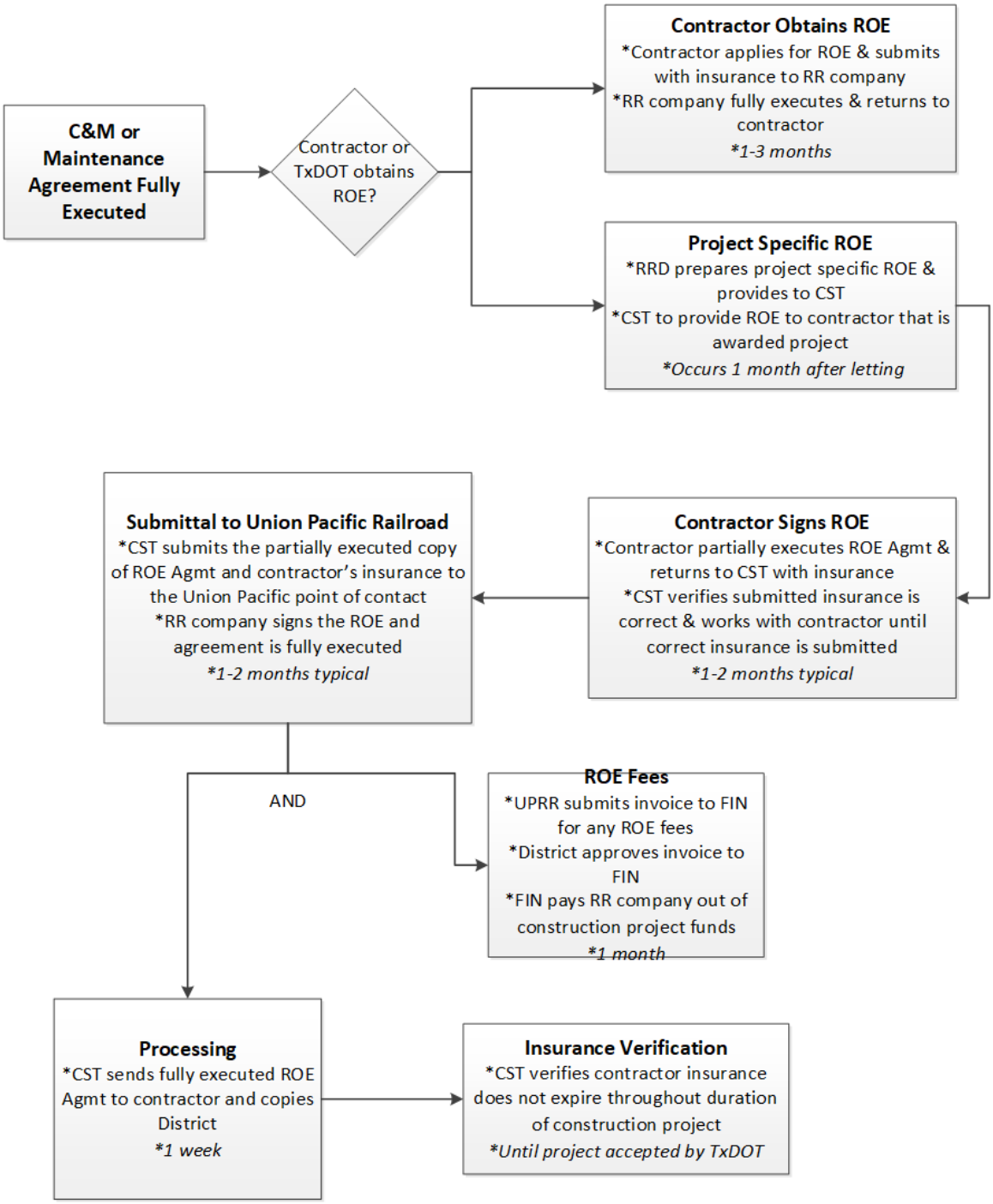

Figure 8-1. Right of Entry Agreement Flow Chart

Section 2 — Process

Right of Entry Agreement Union Pacific Templates

RRD has coordinated with the Union Pacific Railroad and accepted a modified Right of Entry Agreement. TxDOT Construction Division will obtain the Right of Entry Agreement on behalf of the contractor. Note: For renewals, contact the district railroad coordinator for assistance. The district railroad coordinator will also reach out to RRD for assistance.

For other railroad companies, the contractor is required to obtain the Right of Entry Agreement directly with the affected railroad.

Insurance Verification

The contractor is required to maintain railroad insurance throughout the duration of the construction or maintenance project as per the Standard Specifications Book. CST monitors the insurance limits throughout the project.

Chapter 9 — Construction and Inspection Processes

Contents:

Section 1 — Overview

Construction and Inspection Processes

The flow chart on the following page depicts the construction and inspection processes for construction, maintenance, Section 130, replanking, and railroad capital improvement projects.

NOTE: Not all steps are applicable to every project. Project steps and time frames will vary depending on scope of the project.

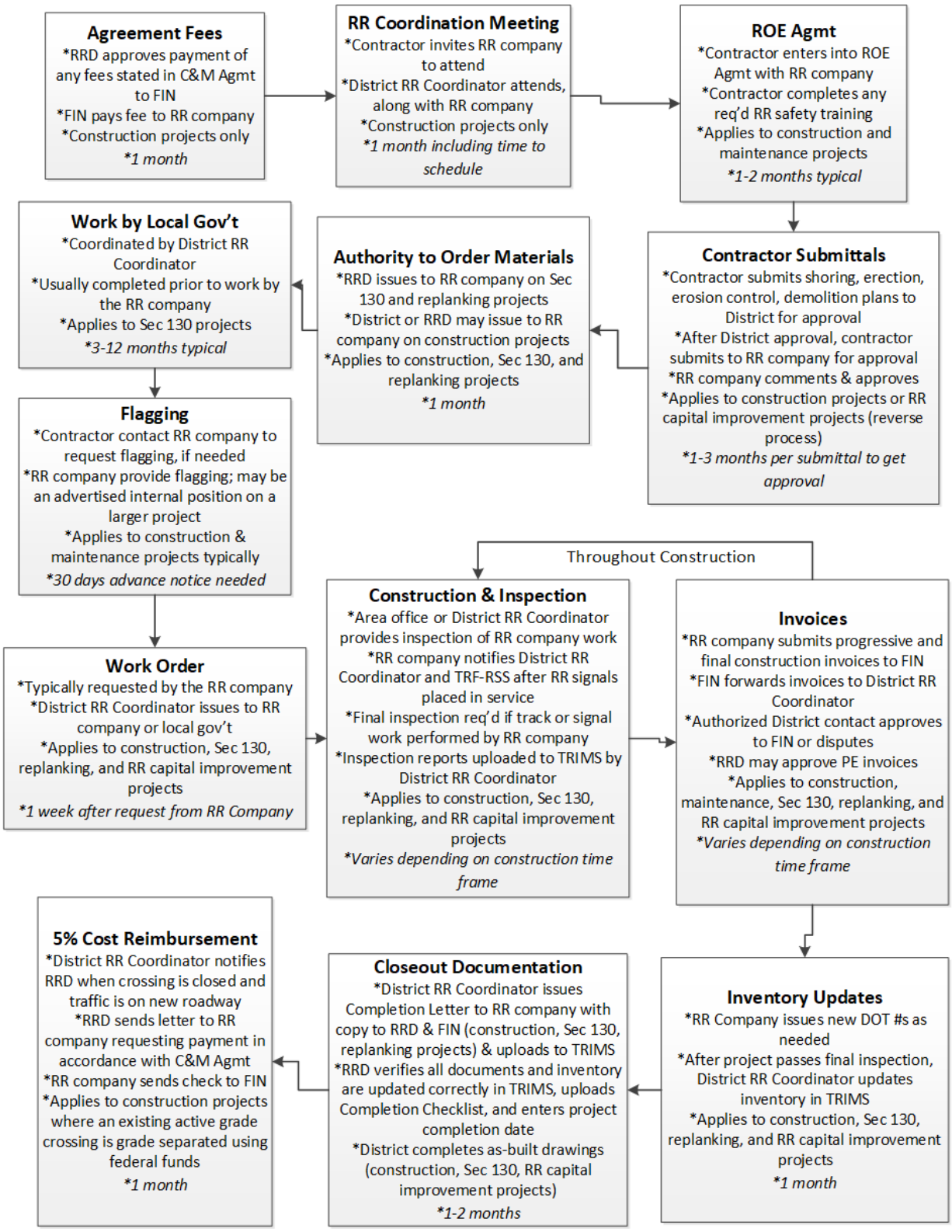

Figure 9-1. Construction and Inspection Processes Flow Chart

Section 2 — After C&M Agreement Execution

If C&M Agreement is Not Executed During the Ready to Let

The C&M Agreement may not be executed until after a construction project goes to letting. In these scenarios, TxDOT may choose a Conditional Let, to release a construction or maintenance contract to the contractor. Refer to the Design Division website for releasing projects after Ready to Let period.

If the Project has already let, the district may contact Construction Division (CST) and request a Conditional Release Option. This allows the contractor to start work outside of railroad right of way prior to having a fully executed contractor Right of Entry Agreement.

Agreement Fees

After the C&M Agreement is executed, the district will approve payment of any license agreement processing fees. TxDOT agrees to pay the railroad company as stated in the C&M Agreement. The fees are paid from the project CSJ. Fees may be agreed upon in the following situations:

- New overpass.
- Overpass widening or modification.
- ITS conduits under or over tracks.
- New underpass or modification.
- Utility installations.

NOTE: TxDOT does not pay license agreement processing fees for at-grade crossing work.

Railroad Coordination Meeting

A railroad coordination meeting is required on TxDOT construction projects. This meeting occurs at the same time as the preconstruction meeting. The district is responsible for arranging and conducting the meeting. Items of discussion:

- Construction schedule.
- Scheduling railroad flaggers.
- Scheduling railroad company signal and track crews.

- Train operations.
- Railroad safety requirements.
- Right of Entry Agreement and insurance.
- Construction issues such as stockpiling material near the rail, temporary haul roads and crossings, orange construction fencing parallel with rail, etc.
- Shoring and demolition submittals to the railroad company.
- Railroad company work `inspection process`.
- Railroad company invoices review and `approval process`.

The following individuals should be present at the meeting:

- District railroad coordinator.
- Area engineer.
- TxDOT project manager.
- Prime contractor.
- Subcontractors.
- Local government traffic signal representative (if preemption is involved).
- Railroad company.

Refer to the contractor Right of Entry Agreement for railroad contacts and preconstruction meeting requirements.

Right of Entry Agreement and Safety Training

Prior to working on railroad right of way, the contractor `will` be required to enter into a Right of Entry Agreement with the operating railroad company, if required in the PS&E. See Chapter 8 for details.

Most railroad companies require contractors working within their right of way to complete an online safety training course. Each individual working within the railroad right of way must possess a card certifying completion of the safety training course, including TxDOT personnel. Employees found working on railroad right of way not in possession of the card or demonstrating unsafe practices may be expelled from the property and/or fined by federal and/or state safety inspectors.

Contractor Submittals

TxDOT's contractor provides shoring, erection, erosion control and demolition plans for review and approval to the railroad company prior to beginning bridge work within railroad right of way.

Refer to the individual railroad company's guidelines for developing these plans. On underpass projects or projects with shoring within OSHA Zones A or B, shoring guidelines are typically included in the PS&E and would not need to be developed by TxDOT's contractor. See sheet 3 of the Railroad Requirements for Bridge Construction for further details.

Authority to Order Materials

On TxDOT construction and Section 130 projects, TxDOT will issue an Authority to Order Materials letter to the railroad company to begin assembling materials. This letter also provides the railroad with approval to begin necessary electrical service installation, final design, and incidental site work at the project location. Assembling materials can take up to 6 months, so the letter should be issued accordingly. The letter is issued by the district on construction projects unless RRD issues the letter upon C&M Agreement execution. On Section 130 projects, the letter is issued by RRD as part of the Exhibit B or with the executed Force Account Agreement.

On replanking projects, the Project Notice or Force Account Agreement includes the Authority to Order Materials for the railroad company.

Work by Local Government

On Section 130 projects, the TxDOT district railroad coordinator coordinates any work done by the city or county. This work includes:

- Median installation.
- Civil features such as curb and gutter, guardrail, retaining walls and culverts.
- Traffic signal adjustments.
- Utility adjustments.
- Removing sight distance obstructions such as vegetation.
- Signing and striping.
- Roadway alignment improvements.
- Installing conduit for traffic signal preemption (typically not reimbursed by TxDOT).

This work usually needs to be completed prior to any work done by the railroad company and will affect the issuance of the Work Order to the railroad company from RRD.

Railroad Flagging

Railroad flaggers are required when the contractor is working within 25 feet of the rail, using equipment that could foul the tracks, or at the discretion of the railroad

involved. The railroad company has the final authority in deciding if railroad flagging is are needed. The contractor is responsible for determining when flaggers will be needed based on the construction schedule.

On some projects, the railroad company may choose to post a flagging position internally for dedicated personnel to support the project throughout the duration of the construction. The Contractor Right of Entry Agreement will give detailed instructions on ordering and dismissing railroad flaggers.

The project inspector should verify railroad flaggers are only requested when needed by the contractor.

As of 2017, the Class 1 railroads use approved contract flaggers. TxDOT contractors and consultants request flagging support directly from the approved contract flaggers for the affected railroad. Standard provisions have been updated to allow the contractors and consultants to be reimbursed at actual cost plus an administrative fee.

Railroad Flagging for TxDOT Employees Only

If the railroad will provide their own labor for flagging, the district railroad coordinator shall request a flagging agreement from RRD in support of any railroad provided flagging. For a contract flagger, please follow the steps outlined on the Rail Division Crossroads site. This blanket purchase order is only used for TxDOT labor and is reimbursed through district funds.

Railroad Property Access Training

TxDOT and contractor personnel shall have a valid railroad specific property access training certification (PAT) in their possession while working on railroad property. This certification is non-transferrable between railroads. This includes attending diagnostic inspections, construction inspection, performing maintenance work, temporary traffic control or other activities. This does not include routine driving over a crossing.

Work Order

On construction, Section 130, and replanking projects, TxDOT issues a Work Order to the railroad company to provide labor for installation, modification, and removal of crossing surface panels, railroad warning devices, track and/or other railroad equipment. A Work Order will also be required for railroad flagging. On Section 130 projects, a Work Order is issued to the local government for any work to be reimbursed by TxDOT.

The Work Order is issued after the district has identified a proper means to inspect the work to be performed, including any traffic control performed by the railroad company's contractor. The railroad company will request the Work Order after materials have been assembled and 2 weeks prior to a crew beginning work.

The district will issue the Work Order on all types of projects.

Section 3 — Inspections

Construction Inspection

On construction or railroad capital improvement projects, TxDOT inspection of the railroad company is done by an inspector from the area office. On Section 130 and replanking projects, this is done by the district railroad coordinator. On Section 130 and construction projects, a representative from the local entity also provides inspection.

Whenever the railroad company is installing/modifying railroad warning devices and crossing surface panels, the district should inspect the materials supplied by the railroad company prior to installation.

Work performed by the railroad company should be verified that the work complies with the approved plan layout and specifications.

As district staffing levels vary, each district is given authority to decide the level of inspection provided for railroad company work. Examples include:

- Daily inspection by district railroad coordinator or area office inspector.
- Less frequent inspection by district railroad coordinator or area office inspector.
- Final inspection only by district railroad coordinator or area office inspector.

The district railroad coordinator or area office inspector should keep a record of:

- Materials delivered to site by railroad company or contractor.
- Materials installed by the railroad company or contractor.
- Number of railroad company workers on site.
- Equipment being used or rented by the railroad company or contractor.
- Flaggers, railroad inspectors or visitors on site.
- Weather conditions, emergency situations and other delays or events.
- Work performed by the railroad company or contractor.

Final Inspection

The district railroad coordinator should schedule a final inspection of the project as soon as practical with the railroad company after construction is complete and any active railroad warning devices have been placed in service. At request of the district, RRD may arrange the final inspection of non-construction and maintenance projects.

Final inspection includes plan verification and inspection of:

- All work performed by the road authority or contractor.
- All work performed by railroad company or contractor.
- Utility adjustments.
- Sight distance on approaches to at-grade crossings.

For sample inspection reports for `Section 130` and replanking projects, see the `RRD Crossroads website`.

Any findings in the final inspection will be noted in a final inspection report to the railroad company which must be resolved prior to submitting a final invoice.

Section 4 — Invoices

Reviewing Invoices

With some noted exceptions below, districts are responsible for reviewing, approving, and disputing progressive and final invoices from railroad companies to be paid by TxDOT. When reviewing, the following guidelines are given:

- Compliance with agreement:
  - Read and understand the terms in the agreement with the railroad company to verify when invoices may be paid.
  - Verify if any cost participation is required by the railroad company, and if so, that this has been deducted on the invoice.
- Verify the project location, railroad milepost and CSJ in the invoice match the project. In some cases, an invoice may have been charged to the wrong project.
- Check the dates for work performed on the invoice. The dates shown should be on or after the date shown on the applicable agreement or letter authorizing the labor or materials. If the work was performed prior to the proper authorization from TxDOT, contact RRD on how to proceed. In some cases, there may be provisions in the agreement for partial payment to be made to the railroad company.
- Common project steps include:
  - **Systemwide Preliminary Engineering Agreement (Section 130 Projects):** Also known as the Diagnostic Study Authorization Letter Agreement, this provides authorization to the railroad company to perform diagnostic inspections and be reimbursed for labor and other preliminary activities.
  - **Maintenance Projects:** An executed agreement authorizing the railroad company to provide flagging with each agreement stating the estimated number of days of flagging expected.
  - **Preliminary Engineering (Section 130 and Construction Projects):** These letters of authority authorize the railroad company to attend project meetings, provide preliminary engineering, and develop cost estimates and wireline diagrams. On construction projects, the agreement also authorizes the railroad company to perform real estate services.
  - **Authority to Order Materials (Section 130, Construction, and Replanking Projects):** On Section 130 projects, Authority to Order Materials is typically given when RRD issues the Exhibit B. Depending on the terms the railroad company may need to sign the Exhibit B. On construction projects, the district issues a signed letter to the railroad company authorizing the railroad company to order materials prior to installation at the project site. Alternatively, Authority to Order Materials may be provided within

the C&M Agreement or as separate letter issued by RRD. On replanking projects, Authority to Order Materials is typically issued by RRD as part of a Project Notice or Force Account Agreement for the replanking work.

- **Work Order (Section 130, Construction, and Replanking Projects):** The Work Order authorizes the railroad company to provide necessary labor for installation. On construction projects, the C&M Agreement will state if a Work Order is required to authorize flagging or inspection work. A Work Order may be provided in the transmittal letter to the railroad company with the fully executed C&M Agreement.
- **Project Completion Letter (Section 130, Construction, and Replanking Projects):** The Project Completion Letter is issued to the railroad company by the district to verify the project passed final inspection, and the railroad company should submit a final invoice within a specified time frame. The letter serves as justification to pay the final invoice and close the project with FIN.

◆ Track the overall amount invoiced by the railroad company against the estimate in the railroad agreement. If the amount invoiced exceeds the amount in the estimate, one of the following scenarios may be occurring:

- The estimate provided by the railroad company did not properly account for all labor or materials. In this case, a revised estimate will be needed from the railroad company or payment may be withheld until a resolution is reached.
- The scope of work needed by the railroad company was not sufficiently accounted for during design of the project. In this case, invoices need to be approved when total cost to the railroad company significantly exceeds what was shown the estimate. Written notification from the railroad company describing the reason must precede invoice submittal.
- Construction change orders may have impacted the services needed from the railroad company. In this case, invoices need to be approved if total cost to the railroad company significantly exceeds the estimate. Written notification from the railroad company describing the reason must precede invoice submittal.

◆ Check progressive invoices against previous invoices submitted for the same project to verify the railroad company is not double invoicing. Verify that labor provided does not match dates from previous invoices and that the same materials has not been previously invoiced.

◆ Various rates shown on the invoice do not need to be verified. These rates may be audited by the FHWA or other entity and are not the responsibility of the district to verify. Some of these rates may include:

- Overhead/FHWA labor rates/additive rates (unless no audited rate).
- Insurance rates.
- Equipment vehicle rates.
- Billable percentage.

- Per diem rates.
- Hourly labor rates.
- Shipping and handling rates.

- Profit should not be charged by the railroad company, but is acceptable for a railroad contractor. If a profit rate is included, verify it matches what was shown in the project estimate.
- A maximum 5% overhead rate may be charged for a contractor or railroad company that does not have an audited rate.
- Invoice clerk charges should not be disputed unless the hours shown seems unreasonably high. Typically, only a few hours should be shown per invoice.
- For materials invoiced, if an area office inspector, district railroad coordinator, or TxDOT contractor was present, a journal entry should verify approximate quantities of materials used. Smaller items such as ballast, wire, etc. do not need to be verified for quantity. Larger items such as foundations, gates, LEDs, cantilevers, mast flashers, cabins, etc. should be verified with journal entries and against the original estimate. If an inspector was not present, and the railroad company had a valid Work Order, a field visit after receiving the invoice may verify materials.
- For materials invoices, inspected materials on the job site serves as justification for payment. However, if materials are invoiced prior to being shipped to the job site, the invoice should be paid provided Authority to Order Materials was given to the railroad company. If materials fail inspection at a future date, payment can be withheld on future invoices until the issue is resolved.
- For labor invoiced, verify the number of laborers shown on the invoice matches what is shown in a construction diary if available. It is not necessary to verify labor hours as this is not realistic, and the total hours shown may not match actual due to railroad union rules.
- Actual labor is paid, not what is shown in the estimate. Rates may have increased since the agreement was executed, or the flagger may have been required to work overtime or on a weekend.
- Travel will be invoiced when the railroad company employees must travel to and from a job site. This will include per diem, lodging, and travel costs such as mileage, parking fees, toll fees, etc. Lodging invoices should be at a location within 1 hour of the project site.
- Some invoices may include credit card, lodging, and meal expenses for an entire month. However, this does not mean all the expenses are being charged to the invoice. Check the invoice details to verify which travel expenses are being charged to the project.
- For preliminary engineering invoices, communication with the railroad, a cost estimate and/or wireline diagram serves as justification for payment. In many cases, other labor may be charged to preliminary engineering such as a local manager's time for attending project meetings, performing site visits, etc. If an invoice for preliminary engineering is received prior to receiving an estimate and/or wireline diagram from the railroad company, the

invoice should be paid provided the total charges for preliminary engineering are in accordance with the PELOA. If the estimate and wireline diagram are not received in a timely manner and a preliminary engineering invoice has been paid, contact RRD for resolution. Section 130 preliminary engineering invoices are reviewed and approved by RRD.

- Project flaggers may be governed by railroad union or dispatching rules. This means even if a flagger was not on the project site for 8 hours, 8 hours might still be invoiced. Keep in mind a flagger must arrive at a job site before work begins and stay after the work for the day ends to install and remove warning devices along the railroad to warn oncoming trains of downstream construction work. Time is also charged for travel to and from the job site. If a flagger is needed for 30 days or longer, and it is determined the flagger is not needed, the flagger will still need to be paid even when the contractor is not working. In the event the flagger is not needed when scheduled, the area office will need to determine if TxDOT will be reimbursed by the contractor for flagging charges due to a problem created by the contractor.
- A contractor or railroad employee flagger may still charge to the project if sufficient notice is not given to cancel the flagging. Common examples are when no construction work is done, but the railroad flagger was not given a 24-hour notice to cancel. This should be brought up at the pre-construction meeting.
- On replanking projects, RRD has Master Agreements with some of the railroad companies authorizing a cost per track foot (currently UPRR and BNSF). On these invoices, verify that the correct amount is included on the invoice and that work was completed.
- On larger construction projects, the railroad company may create multiple internal work orders for track work, signals work, inspection, etc. The district will confirm with the railroad if the final invoice is for the entire project or only an internal work order.
- Some construction projects may require a real estate fee to be paid to the railroad company. These invoices are reviewed and approved by the district as covered in Chapter 8.
- On Section 130 projects designated as crossing closure projects, TxDOT is invoiced by the local entity. These invoices are reviewed and approved by the districts. Invoices are to be paid after the work to close the crossing and any additional work identified in the Crossing Closure Agreement on adjacent streets has been completed by the local entity and verified by the area office. The invoice is paid in accordance with the amount shown in the Crossing Closure Agreement between TxDOT, the railroad company, and the local entity.
- Contractor Right of Entry fees are reviewed and approved by the district in accordance with the fee shown in the Right of Entry Agreement.

Invoice Process

Invoices are sent from the railroad company to FIN and forwarded to the appropriate district railroad coordinator. Invoices are subsequently approved, disputed with appropriate justification, or forwarded to RRD depending on the type of invoice. Only employees with invoice signature authority can approve invoices by sending an appropriate email to Finance Division Voucher Processing Section.

Invoices are paid or disputed within 30 days of submittal. If an invoice is disputed, the district contacts the railroad company directly with an e-mail copy to FIN and RRD. For questions regarding invoice reviews or disputes, districts are encouraged to contact RRD.

All approved invoices are tracked and processed through OnBase.

Section 5 — Project Closeout

Inventory Updates

Digital photographs are taken by the district railroad coordinator after construction is complete. For at-grade crossings, there are six photos taken:

- DOT number (usually on Emergency Notification Sign or on railroad cabin).
- Facing north (whether it be looking up the road or up the track).
- Facing east.
- Facing south.
- Facing west.
- Crossing surface.

On overpass or underpass projects, only a photo of the DOT number (written on a sheet of paper) and one photo of the bridge showing the roadway and rail line is needed. Any work performed at locations not at crossings does not require photos.

The district railroad coordinator is responsible for uploading the photos and updating crossing inventory data in TRIMS.

DOT Numbers

On construction or railroad capital improvement projects that introduce new crossings (at-grade or grade separated), the railroad company or industry must obtain a new DOT number for the crossing. The DOT number is assigned by the railroad company but may be issued by RRD in some cases.

Projects which will require new DOT numbers assigned for existing crossings include:

- Converting an at-grade crossing to a grade separated crossing or vice versa.
- Converting an underpass to overpass or vice versa.
- Relocating an at-grade crossing.

Completion Letter

After passing final inspection on construction, Section 130 and replanking projects, the district issues a Completion Letter to the railroad company requesting a final invoice within 90 days from the date of the letter. The Completion Letter is uploaded by the district railroad coordinator into the

TRIMS project management module. The Completion Letter is submitted with the final inspection report.

RRD may:

- Verify photos have been uploaded in TRIMS.
- Verify crossing inventory is updated correctly in TRIMS.
- Verify crossing inventory is updated correctly in the FRA database.
- Verify all project documents have been uploaded in TRIMS.
- Upload a project Completion Checklist in TRIMS.
- Enter a completion date for the project in TRIMS.

Any discrepancies identified during final project review may be corrected prior to the completion date being entered in TRIMS.

As Built Drawings

On Section 130 projects, the district railroad coordinator will arrange to prepare as built drawings by modifying any information in the Exhibit A which may have changed during construction. Changes would include:

- Distances from railroad warning devices and railroad cabin from roadway and rail line.
- Side and back light adjustments.
- Signing and striping.
- Other changes from plan design.

As built drawings are not required on replanking projects. On construction projects, the as built drawings are completed for the entire construction project.

5% Cost Reimbursement

On projects including a 5% cost participation from the railroad, the district railroad coordinator will notify the RRD contract specialist in writing when traffic has been shifted onto the new roadway and the at-grade crossing has been removed. RRD will issue a letter to the railroad company requesting that the 5% cost participation amount shown in the C&M Agreement be paid to TxDOT.

FIN will confirm with RRD and the district when payment has been received. Receipt of payment from FIN is uploaded into TRIMS by RRD.

Chapter 10 — Other Rail-Highway Programs

Contents:

Section 1 — Railroad Signal Maintenance Payment Program

Overview

The Railroad Signal Maintenance Payment Program is managed under Category 10 (Supplemental Transportation Projects) of the UTP as a bank balance allocation program to provide a fixed annual unit payment to railroad companies for maintenance of railroad signals. Each year, the Texas Transportation Commission authorizes the total amount of funding for the program.

Only open, public, in service, active at-grade crossings on the state highway system are eligible for the program, excluding any industry spur track crossings located on the state highway system covered by a rail spur permit. It is funded with 100% state funds. Funding for the program is typically around $1.1 million annually, and payment is provided per crossing on the following schedule:

- Mast flashers: $289.
- Cantilevers: $385.
- Gates: $770.

Payment for a crossing is made based on the highest level of protection present at the crossing. For example, if a crossing includes both gates and cantilevers on both approaches, $770 would be paid for the entire crossing.

Schedule of payment is subject to change on an annual basis.

Verification of Warning Devices

Before payment to the railroad company can be made under the Railroad Signal Maintenance Payment Program, the type of warning devices in place must be verified. RRD runs an inventory report annually via the TRIMS database and sends a letter with the following information to each railroad company:

- Listing of all public on-system at-grade crossings listed as active or passive.
- Type of warning devices at each of the active crossings.

A warning device must be in place at the beginning of TxDOT's fiscal year to be eligible for payment for that fiscal year. TxDOT's fiscal year begins September 1 of the previous calendar year through August 31 of the fiscal year.

For example, if a mast flasher was upgraded to a gate on September 15, 2015, payment for a gate would not occur until fiscal year 2017. For fiscal year 2016, payment would be paid for a mast flasher.

Any discrepancies are coordinated by RRD with the railroad company and the district railroad coordinator. If necessary, RRD will update inventory data in TRIMS.

The railroad company must sign and return the letter verifying inventory prior to TxDOT issuing payment.

Payment of Rail Safety Inspection Fee

TxDOT rail safety investigators conduct safety inspections of railroad facilities and equipment. Each year, railroad companies are required to pay a fee to TxDOT, authorized under 43 TAC §7.41, in support of this program.

TxDOT will not pay a railroad company under the Railroad Signal Maintenance Payment Program until the railroad company is current in payment of TxDOT rail safety program fees.

Programming

RRD will request a single CSJ each program year from the Finance Division Letting Management Section based on funding for the program in that year.

Payment to Railroad Companies

After concurrence is reached on the inventory list between TxDOT and the railroad company and the railroad company has paid any rail safety inspection fees, RRD issues a memo to FIN to pay the railroad company. Payment is made prior to the end of the TxDOT fiscal year.

Section 2 — Railroad Grade Separation Program (RGS)

Overview

The Railroad Grade Separation Program (RGS) is funded under Category 6 (Structures Replacement and Rehabilitation) of the UTP. Annual funding for the program varies, but is currently at $25 million. Projects and funding are approved on an annual basis by the Texas Transportation Commission. Funding is 80% federal and 20% state.

Projects eligible for the program must be on the state highway system, with a functional classification greater than local road or rural minor collector.

The program is divided into two program areas:

- Grade separations of existing at-grade crossings.
- Replacement of functionally deficient highway underpasses.

The Texas Transportation Commission approves the funding levels and methods used to prioritize and select projects by Commission Minute Order authorizing the Statewide Transportation Improvement Program (STIP).

Installation of Grade Separations at Existing At-Grade Crossings

Projects for the construction of grade separations at existing highway-rail at-grade crossings under the RGS Program are prioritized by RRD using a cost-benefit index (CBI). The CBI ranks the estimated savings (in millions of dollars) that would be realized over 50 years with construction of grade separated structures.

To compute the CBI, the following data is first required for each crossing:

- AADT.
- Trains per day (both through and switching movements).
- Total fatalities.
- Total injuries.
- Total crashes.

The total fatalities, total injuries, and total crashes should be based on a recent set of data that represents current conditions at the crossing. For example, if a recent safety project upgraded the crossing with lights and gates, the data should be based on a time frame after the lights and gates were installed.

The following assumptions are made in the CBI calculation:

- Cost per fatality.
- Cost per injury.
- Cost of property damage per crash.
- Time average train occupies a crossing (5 minutes).
- Personnel costs per hour per car.
- Personnel costs per hour per truck.
- Cost per stop per car.
- Cost per stop per truck.
- Average delay per vehicle stopped by a train (3 minutes).
- 80% of vehicular traffic is cars.
- 20% of vehicular traffic is trucks.

The cost per fatality, cost per injury and cost of property damage per crash are provided by the National Safety Council. Personnel costs are updated annually by CST based on multiplying the previous year's numbers by the Consumer Price Index.

The CBI for each at-grade crossing is calculated by completing the following steps:

1. Calculate the crash cost per year.
2. Calculate vehicles stopped per year.
3. Calculate the personnel delay cost per year.
4. Calculate the equipment delay cost per year.
5. Calculate the CBI.

Step 1. Calculate the Crash Cost Per Year

Calculate the costs of fatalities, injuries, and property damage separately. Then add the three costs for a total crash cost:

- (1) Total fatalities * cost per fatality = total fatality cost
- (2) Total injuries * cost per injury = total injury cost
- (3) Total crashes * cost of property damage per crash = total property damage cost
- Sum of (1), (2) and (3) = total crash cost.

Determine the crash cost per year by dividing the total crash cost by the year range of crash data:

- Crash cost per year = total crash cost / year range of crash data.

Step 2. Calculate Vehicles Stopped Per Year

The following assumptions are implied:

- Time a train occupies a crossing is 5 minutes, or 5/60 hour.
- Vehicles per hour = 1/24 *AADT.
- Vehicles stopped per train = 5/60 * 1/24 * AADT.
- Vehicles stopped per day = 5/60 * 1/24 * trains per day * AADT.

Therefore:

- Vehicles stopped per year = 365 * 5/60 * 1/24 * trains per day * AADT.
- Vehicles stopped per year = 1.26736 * trains per day * AADT.

Step 3. Calculate the Personnel Delay Cost Per Year

Using the assumptions shown previously:

- Personnel cost per stop = 3/60 * (personnel costs per hour per car * 0.80 + personnel costs per hour per truck * 0.20).

Therefore:

- Personnel delay cost per year = personnel cost per stop * vehicles stopped per year.

Step 4. Calculate the Equipment Delay Cost Per Year

Using the assumptions shown previously:

- Equipment cost per stop = cost per stop per car * 0.80 + cost per stop per truck * 0.20.

Therefore:

- Equipment delay cost per year = equipment cost per stop * vehicles stopped per year.

Step 5. Calculate the CBI

The CBI is calculated using the crash cost, personnel delay cost, and equipment delay cost. Costs are estimated over a 50-year expected life cycle of the grade separation and divided by $1,000,000 for simplicity.

- CBI = ((crash cost per year + personnel delay cost per year + equipment delay cost per year) * 50) / $1,000,000.

Replacement of Functionally Deficient Highway Underpasses

Selection and funding for the replacement of functionally deficient highway underpasses under the RGS Program are determined by a Bridge Inventory, Inspection, and Appraisal Program (BRINSAP) sufficiency rating. The following factors are considered:

- Roadway width.
- Vertical clearance.
- Right lateral clearance.
- AADT per lane.
- Estimated construction cost per AADT.

In addition to improving horizontal and vertical clearance, underpasses may be converted to overpasses under the RGS Program.

Integrating Grade Separation Projects with Underpass Projects

RRD works with the Bridge Division to jointly prioritize the highest priority grade separation and underpass projects. Areas for consideration in prioritizing these projects include:

- Cost of construction.
- Constructability and design issues.
- Available program year funding.
- District or TxDOT priority projects.
- Primary and secondary freight networks.
- Status of PS&E, utilities and right of way.
- Railroad company priorities.

After projects are selected and funding is obligated on the projects, RRD works with the districts and railroad companies to secure the proper agreements as described in Chapter 2.

Section 3 — Other Programs

Crossing Closure Program

Under the Basic Closure Program, TxDOT may offer up to $100,000 to a local government to close a public at-grade crossing that is not shown on the Section 130 Preliminary Project List. Funding for the Basic Closure Program is offered via Section 130. For more information, see Chapter 4.

Highway Safety Improvement Program (HSIP)

RRD participates in the Railway-Highway Grade Crossing portion of the HSIP, with the following goals:

- Grade separation of public at-grade crossings.
- Closing redundant or unnecessary crossings.
- Enhancing safety at public at-grade crossings.
- Improving inventory tracking of crossings and rail-highway projects.

Each year, RRD reports progress to the FHWA, including:

- Crash data on at-grade crossings.
- Quantity of public crossings, separated as active, passive, and grade separated.
- Annual funding obligated under Section 130.
- Procedures for prioritizing projects under Section 130.
- How TxDOT is analyzing crash data and tracking effectiveness of safety upgrades from the Section 130 program.
- Other efforts to improve at-grade crossing safety.

For more information, see the Highway Safety Improvement Program Manual.

Temporary Programs

Utilizing funding from Section 130, RRD may implement other programs designed to enhance safety on at-grade crossings. Examples may include:

- Replacement of crossbuck signs.
- Improving reflectivity of various signs.
- Installation of Stop and Yield signs at passive crossings.

- Programs to support implementation of federal or state laws.
- Programs to improve safety based on statistical analysis or research on at-grade crossings.

RRD identifies the need for these programs, method of implementation, and required coordination efforts with district railroad coordinators and railroad companies.

Chapter 11 — Quiet Zones

Contents:

Section 1 — Overview

Quiet Zones

A Quiet Zone refers to a section of a track that contains one or more consecutive public crossings at which locomotive horns are not required to be routinely sounded when trains pass through at-grade crossings. In the absence of a Quiet Zone, railroad companies are required by law to sound the horn on the approach at least 15 seconds before the train arrives at the crossing in advance of all public at-grade crossings until the train has passed through the crossing.

FRA allows local governments to apply for Quiet Zones to restrict the sounding of the horn when certain safety requirements are met. The requirements are intended to ensure that the safety features along the corridor of crossings are equal to or better than safety benefits provided by the sounding of the horn. As such, the local government will start the Quiet Zone process.

Quiet Zones involving more than one local government must include participation and approval by all local governments. If the Quiet Zone includes a TxDOT-managed road see "Safety Upgrades on TxDOT Roadways" in Section 4.

A Quiet Zone may apply throughout the day, or between the hours of 10 p.m. and 7 a.m., known as a Partial Quiet Zone.

Detailed requirements are found within 49 CFR Part 229 and are subject to change.

The flow chart on the following page depicts the process for establishing and maintaining a Quiet Zone.

NOTE: Not all steps are applicable to all Quiet Zone projects. Project steps and time frames will vary depending on scope of the project.

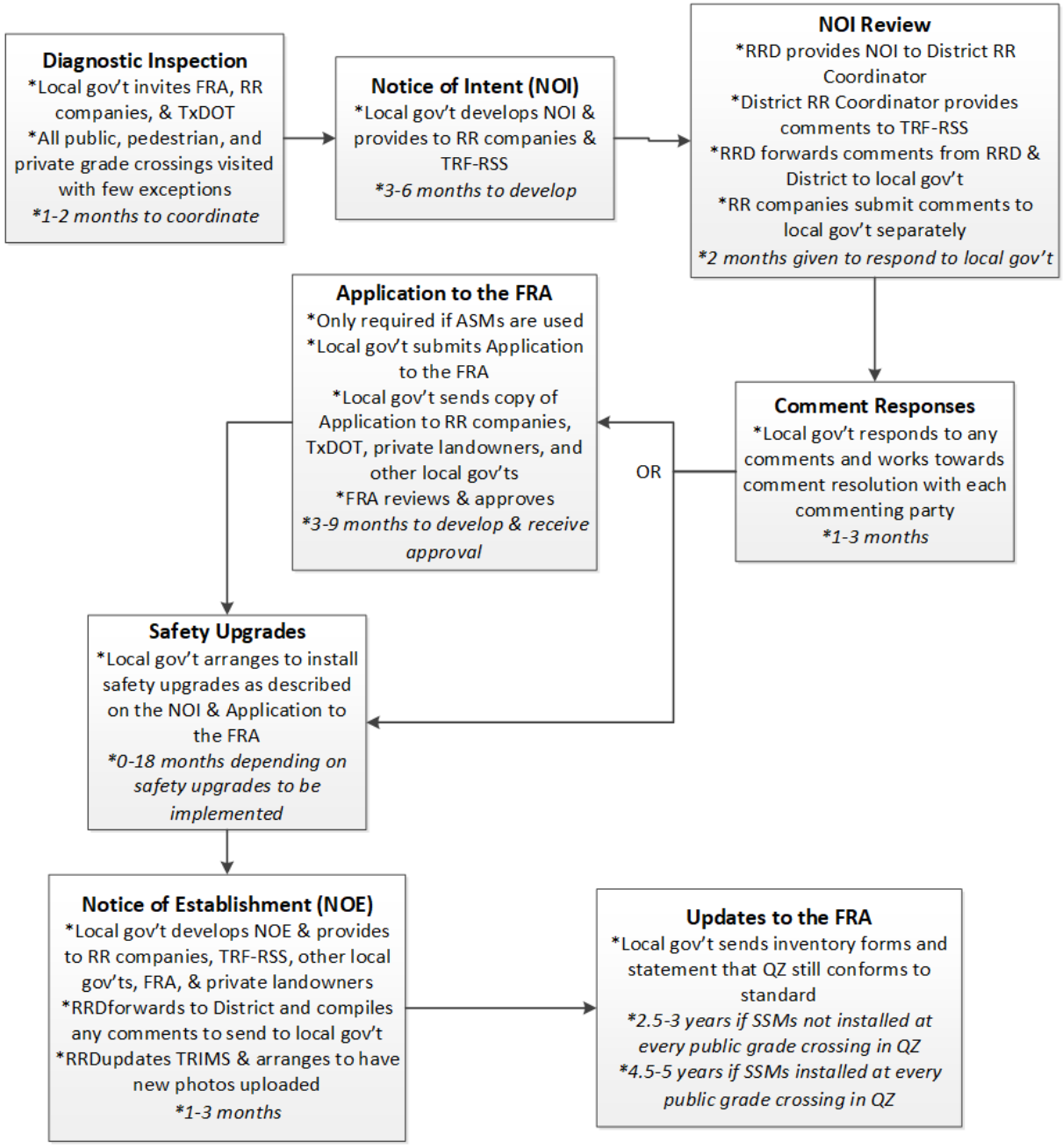

Figure 11-1. Quiet Zone Project Flow Chart

Section 2 — Preliminary Activities

Diagnostic Inspection

A diagnostic inspection is required prior to development of the Notice of Intent. The local government or city applying for a Quiet Zone sets up a diagnostic inspection to visit:

- All public at-grade crossings.
- All pedestrian crossings.
- Any private crossings the public can access or which access commercial or industrial property.

The following parties are invited to the diagnostic inspection with the local government:

- FRA.
- Railroad companies operating on crossings within the requested Quiet Zone.
- TxDOT (acting as state government or city responsible for grade crossing and road safety).

TxDOT is not required to attend the diagnostic inspection, but must be informed of the diagnostic in advance by the local government applying for the Quiet Zone. The district railroad coordinator may attend, or a representative from RRD.

Diagnostic inspections for Quiet Zones should identify:

- Recommended safety improvements at all crossings.
- How proposed Quiet Zone will qualify.
- Any other concerns at crossings when train horn is not sounded.
- Any discrepancies found with FRA inventory.

For more information on diagnostic inspections, see Chapter 4.

Notice of Intent (NOI)

Following the recommendations of a diagnostic inspection, a local government will produce a NOI to be provided the following parties:

- Railroad companies operating on crossings within the proposed Quiet Zone.
- TxDOT (acting as state government or city responsible for grade crossing and road safety).

All parties are given 60 days to comment on the NOI. Any parties not responding within 60 days are assumed to not have any comments.

Requirements of an NOI

NOI documentation must include:

- List of each public, private and pedestrian at-grade crossing within the proposed Quiet Zone including DOT numbers and street or highway names.
- Statement of time period when train horn will not be sounded.
- Explanation of existing safety devices or safety improvements local government will implement at each crossing to qualify for the proposed Quiet Zone.
- Point of contact at local government.
- Names and addresses of all individuals that were sent a copy of the NOI for comment.
- Copy of FRA Quiet Zone Calculator report if Quiet Zone does not have Supplementary Safety Measures (SSMs) at all public at-grade crossings within the Quiet Zone or spreadsheet of calculations.

All open public at-grade crossings within a new Quiet Zone must have:

- Gates that cover all approach lanes.
- Railroad constant warning circuitry (if reasonably practical).
- Railroad power-off indicators.
- No Train Horn (W10-9) warning sign on all approaches, including hours in effect for Partial Quiet Zones (unless a wayside horn is present).
- No Train Horn (W10-9) warning sign on any parallel roadways to rail within 100 feet of rail, including hours in effect for Partial Quiet Zones (unless a wayside horn is present).
- Bells if pedestrians use crossing.

All open private at-grade crossings within a new Quiet Zone must have:

- Crossbuck and stop sign on all approaches.
- No Train Horn (W10-9) warning sign on all approaches, including hours in effect for Partial Quiet Zones (unless a wayside horn is present).

All open pedestrian at-grade crossings within a new Quiet Zone must have:

- No Train Horn (W10-9) warning sign on all approaches, including hours in effect for Partial Quiet Zones (unless a wayside horn is present).

The Quiet Zone must `also` meet the following requirements:

- Quiet Zone must be a minimum of ½ mile long along track.
- There must be at least one open public at-grade crossing on either end of the Quiet Zone (not in a Quiet Zone) separating it from other Quiet Zones.
- Must be compliant with the TMUTCD.

The New Quiet Zone may not be ½ mile long if it is being added to an existing Quiet Zone, provided locomotive horns are not sounded within ½ mile of the New Quiet Zone.

Section 3 — Approving a Quiet Zone

Qualifying for a Quiet Zone

A Quiet Zone may be established without approval of the FRA using one of the following criteria:

- Installation of one or more Supplementary Safety Measures (SSMs) at all public at-grade crossings within the Quiet Zone.
- If Quiet Zone Risk Index is at or below Nationwide Significant Risk Threshold (NSRT) after any necessary SSMs are installed.
- If Quiet Zone Risk Index is at or below Risk Index with Horns after any necessary SSMs are installed.

The NSRT is an average value established for all gated public crossings in the United States where train horns are sounded. It is updated annually by the FRA and published on the FRA website. Any Quiet Zones which qualify under this rule no longer qualify if a revised NSRT drops below the Quiet Zone Risk Index.

Local governments may also establish a Quiet Zone with approval of Alternative Safety Measures to be approved by application to the FRA.

Supplementary Safety Measures (SSMs)

A list of approved SSMs to be installed on all approaches to an at-grade crossing, with associated effectiveness, is as follows:

- Temporary closure of at-grade crossing during hours which Partial Quiet Zone is in effect (Effectiveness: 1.0).
- Four-quadrant gate systems with no presence detection (Effectiveness: 0.82).
- Four-quadrant gate systems with presence detection (Effectiveness: 0.77).
- Four-quadrant gate systems with traffic of at least 60 feet with or without presence detection (Effectiveness: 0.92).
- Gates with channelization devices (Effectiveness: 0.75).
- Gates with non-traversable curbs with or without channelization devices (Effectiveness: 0.80).
- One way street with gates (Effectiveness: 0.82).
- Permanent closure of at-grade crossing (Effectiveness: 1.0).

The effectiveness represents the ability of the SSM to reduce at-grade crossing crashes. For example, closing a crossing reduces 100% of at-grade crossing crashes while installing gates with channelization devices reduces 75% of crashes. Effectiveness values are subject to change by the FRA.

The following requirements apply when installing SSMs:

- All approach and exit lanes must be covered by gates in a four-quadrant system.
- Horizontal distance between two gate ends must not be more than 2 feet.
- Horizontal distance between a gate and a raised median or channelization device or curb must not be more than 1 foot.
- Medians or channelization devices must extend at least 100 feet from gate arm, or if there is an intersection within 100 feet of gate, the median or channelization device must extend at least 60 feet from gate arm.
- Non-traversable curbs must be 6-inches height minimum and only used when the roadway speed limit is 40 mph or less.
- Any streets, alleys, or commercial driveways within 60 feet of at-grade crossing (parallel with rail) must be closed if medians or channelization devices are proposed.
- Non-traversable curb must extend back 100 feet from gate if only one gate is used on a one-way street.

Alternative Safety Measures (ASMs)

ASMs may also be proposed to the FRA who will determine the effectiveness used in Quiet Zone Risk Index calculations. There are 3 types of ASMs:

- Modified SSMs (i.e., channelization devices less than 60-foot long).
- Non-Engineering ASMs (i.e., traffic law enforcement program).
- Engineering SSMs (i.e., engineering improvements to address sight distance).

Quiet Zone Risk Index (QZRI)

A QZRI must be calculated whenever SSMs are not installed at all crossings. To calculate a QZRI, the following procedure is followed:

- Determine crossing Risk Index with Horns (RIWH) for each public at-grade crossing in proposed Quiet Zone prior to any adjustments for SSM effectiveness.
- Determine Crossing Risk Index (Crossing Risk Index = RIWH * 1.668 * (1-Effectiveness)) for each public at-grade crossing in proposed Quiet Zone after any current or planned SSMs/ASMs are installed.

- Determine RIWH (average of crossing RIWH in absence of any existing or proposed SSMs for all public at-grade crossings in Quiet Zone).
- Determine QZRI (average of Crossing Risk Index for all public at-grade crossings in Quiet Zone).

The initial RIWH calculation may be determined from the FRA website Quiet Zone Calculator and is a calculation based on:

- AADT.
- Trains per day.
- Number of day through trains.
- Total switching trains per day.
- Number of main tracks.
- Number of other tracks.
- Crossing location (urban or rural location).
- Roadway surface (paved or unpaved).
- Maximum train speed.
- Number of roadway lanes.
- Number of years of crash data.
- Number of crashes in crash data years.

Note that any existing grade separated or closed crossings may not be considered when calculating the QZRI. For any proposed closed crossings, the existing traffic counts at the crossing must be distributed among adjacent crossings for AADT calculations.

Wayside Horns

Wayside horns may be used in place of locomotive horns at individual or multiple at-grade crossings within Quiet Zones and are considered an even substitution for train horns. The wayside horn is a stationary horn located at a rail-highway at-grade crossing which directs noise down the roadway rather than at surroundings. Any at-grade crossing with a wayside horn is not considered when calculating the QZRI.

TxDOT Review

RRD is mailed a copy of an NOI by the local government or city. RRD forwards the NOI to the district railroad coordinator for any comments and compiles these comments with any comments from RRD for response to the local government.

NOIs are reviewed to ensure the proposed Quiet Zone:

- Meets requirements described in this chapter.
- Meets requirements typically included on FSP projects.
- Is calculated correctly if the Quiet Zone applies because the QZRI is less than or equal to the RIWH or NSRT.
- Individual crossing data (traffic counts, train counts, etc.) is correct if the Quiet Zone applies because the QZRI is less than or equal to the RIWH or NSRT.
- Includes all crossings along the section of rail indicated as shown in TRIMS.

For more information on reviewing plan sets, see Chapter 7.

Any data discrepancies noted between the NOI and TRIMS are verified between RRD, the local government and the railroad company. RRD coordinates any inventory updates in TRIMS and with the FRA.

Application to the FRA

If any ASMs are included on the NOI, the local government will submit an application to the FRA for approval of the proposed Quiet Zone.

The following parties are provided a copy of the application to the FRA by the local government:

- Railroad companies operating on crossings within Quiet Zone.
- TxDOT (acting as state government or city responsible for grade crossing and road safety).
- Any private landowners with private crossings within Quiet Zone.
- Any other government agencies or cities with jurisdiction over public crossings within the Quiet Zone.

The application must include:

- Inventory forms for all crossings prior to any Quiet Zone upgrades. Any changes to reported inventory information must be transmitted to RRD.
- Explanation of safety improvements local government will implement to qualify for the proposed Quiet Zone.
- Copy of recommendations of diagnostic team and list diagnostic inspection attendees.
- Copy of comments from TxDOT and all operating railroad companies in response to the NOI and response to these comments.
- Commitment to implement proposed safety improvements.

- Data analysis showing proposed improvements will reduce QZRI below NSRT or RIWH.
- 5 year projected vehicular and rail traffic counts for any new crossings located within proposed Quiet Zone.

Section 4 — Implementing a Quiet Zone

Notice of Quiet Zone Establishment (NOE)

A local government may issue an NOE after:

- All parties have been given 60 days to comment on the NOI.
- All comments from the NOI have been resolved with all commenting parties.
- FRA application has been approved (if ASMs are proposed).
- Any required safety upgrades have been implemented and inspected.

The following parties are provided a copy of the NOE by the local government:

- Railroad companies operating on crossings within Quiet Zone.
- TxDOT (acting as state `government or city` responsible for grade crossing and road safety).
- Any other government `or city` with jurisdiction over public crossings within the Quiet Zone.
- FRA.
- Any private landowners with private crossings within Quiet Zone.

The NOE must include:

- Date Quiet Zone will be established (no sooner than 21 days of mailing date).
- List of all crossings and street names within Quiet Zone.
- Statement of which provision of 49 CFR §222.39 that the Quiet Zone qualifies under.
- Copy of Quiet Zone Calculations if SSMs were not installed at all public crossings.
- Copy of FRA approval if application was sent to the FRA.
- Statement that operating railroad companies and TxDOT were invited to attend diagnostic inspection.
- Copy of recommendations of diagnostic team.
- Statement when train horn will not be sounded.
- Inventory forms for all crossings prior to any Quiet Zone upgrades.
- Inventory forms for all crossings after implementation of any Quiet Zone upgrades.
- Statement that NOI was provided to operating railroad companies and TxDOT along with date it was mailed.

- Confirmation that all comments were resolved or all parties had no comments if NOE is established within 60 days of NOI.
- Contact information for person responsible for Quiet Zone compliance at the local government.
- Listing of dates and names of all parties receiving a copy of the NOE.
- Statement signed by local government or city leader indicating that information on the NOE is accurate to the best of their knowledge.

RRD will forward NOE information to the district railroad coordinator and compile comments to be sent to the local government if necessary.

RRD will make necessary updates in TRIMS after receipt of the NOE and request new photos of crossings if needed.

Safety Upgrades on TxDOT Roadways

TxDOT does not fund Quiet Zone improvements on their own, as it is an enhancement to the local government or city. If the local government applying for the Quiet Zone proposed any upgrades on TxDOT facilities, an AFA or other document must be executed between the local government and TxDOT to cover the required improvements. TxDOT may arrange for the improvements or decide to have the local government perform the work. TxDOT is only required to meet standard guidelines such as TxDOT nominal curb height. Any modification to the TxDOT roadway including extra tall medians, signing, and striping, etc. is typically at the sole cost of the local government.

If the crossing qualifies on its own for Section 130 upgrades or other construction activities, TxDOT may (at their discretion) build the improvements as part of said projects.

Finally, upon approval of the district, TxDOT RRD shall issue a letter to the local government or city concurring with the proposed Quiet Zone.

Quiet Zone Updates to the FRA

Periodic updates are required to be submitted by the local government to the FRA. The updates are required:

- Every 2.5-3 years if SSMs are not installed at every public crossing within the Quiet Zone.
- Every 4.5-5 years if SSMs are installed at every public crossing within the Quiet Zone.

The updates to the FRA must include:

- A statement that the Quiet Zone still conforms to the standard under which it qualified.
- Accurate inventory form for every public, private, and pedestrian crossing within the Quiet Zone.

Termination of a Quiet Zone

A Quiet Zone may be terminated by:

- Request of local government.
- FRA after review of Quiet Zone at any time.
- FRA if Quiet Zone qualified because QZRI was originally below NSRT, and NSRT has now fallen below QZRI, and local government does not take proper steps to implement safety upgrades within the Quiet Zone.

The party terminating the Quiet Zone must contact all parties who were provided a copy of the initial NOE. RRD updates TRIMS as needed.

Chapter 12 — Database

Contents:

Section 1 — Crossing Database

Crossing Identification Numbering System

Every at-grade or grade separated crossing is assigned a unique U.S. Department of Transportation (USDOT) identification number, also referred to as a DOT number, consisting of six numeric characters and an alphabetic character. This applies to all public and private road and pathway crossings.

For at-grade crossing locations, the DOT number is typically seen on the Emergency Notification Sign (ENS) at the crossing or on a sign found on the railroad cabin.

If needed, new crossing DOT numbers shall be obtained from the railroad that operates over the crossing. If a new crossing is proposed, RRD will request a new DOT number from the affected railroad. The new crossing number will be populated into the TRIMS database.

FRA Database

The FRA maintains a database with data on public and private crossings within the United States. The database contains information for each crossing, including:

- Inventory form with basic information about the crossing.
- Crash reports filed with the FRA.
- Contact information.
- Historical changes to the inventory data.

Data on the FRA website is updated continually on request to the FRA by both railroad companies and public agencies. The crossing inventory form submitted to the FRA includes data provided by both the railroad company and by roadway authority. TxDOT RRD is the only agency in Texas authorized to update the public portion of the FRA database.

The FRA website is considered the official source of crossing inventory and accident data.

Section 2 — Texas Railroad Information Management System (TRIMS)

Overview

TxDOT has adopted TRIMS as a statewide database for tracking various data related to rail-highway applications. TRIMS is a geospatial database which employs roadway maps and satellite images from Microsoft Bing and Google, as well as rail line data from TPP.

Some of the features of TRIMS include:

- A crossing inventory module including photographs of each crossing.
- A project management module for tracking rail-highway projects and tying these to the crossing inventory via DOT numbers.
- Ability for TxDOT users to edit inventory and project data.
- Ability to view which data has been edited over time.

TRIMS Versions

There are two versions of TRIMS with various capabilities:

- CoreTRIMS.
- FieldTRIMS.

CoreTRIMS

The most advanced version of TRIMS, CoreTRIMS, allows users to view and edit data in both the crossing inventory and project management modules, depending on user access. CoreTRIMS is accessed on TxDOT workstations only.

FieldTRIMS

FieldTRIMS is a mobile data collection tool that does not need connection with the central TRIMS database. Users can update crossing inventory and take photos of crossings in the field. Later this data is synced with the central TRIMS database when internet service is available.

NOTE: The WebTRIMS module was retired.

Crossing Inventory Data Integrity

Integrity of inventory data in TRIMS is extremely important. Some of the uses of the crossing data include:

- Prioritization of at-grade crossings for safety upgrades under the Section 130 program.
- Prioritization of at-grade crossings for grade separation under the RGS Program.
- Various reports needed for state and federal government.

Some critical data at each at-grade crossing requiring regular updating includes:

- Train counts (through and switching).
- Minimum and maximum train speeds.
- AADT.
- Special vehicle movements.
- Percent trucks.
- Roadway speed limit.
- FRA reported crash history.

Other data requiring updates after a project impacting the crossing is completed includes:

- Crossing status (open, closed, abandoned, out of service or under construction).
- Crossing type (public, private or pedestrian).
- Crossing position (at-grade, railroad over or railroad under).
- Roadway type (one-way or two-way).
- Types and quantities of warning devices.
- Presence of medians or channelizing devices.
- Presence of adjacent intersections or traffic signals.
- Number of tracks at crossing.
- Crossing surface type.
- Crossing length.
- Quiet Zone presence.
- Number of lanes at crossing.
- Truck lane (if applicable).
- Number of sidewalks at crossing.
- Roadway surface.

- Roadway width.
- Shoulder type and width.
- Signs at crossing and on approaches.
- Pavement marking and illumination information.
- ENS information.
- Clearance restriction (if applicable).
- Highway functional class.
- Area land use and development type.
- Stopping sight distance and related information for passive crossings.
- Changes to rail lines (removals, additions and relocations).
- Photos of crossing.

Any changes to rail line data are coordinated through TPP for updates to the statewide rail map and server that links to TRIMS to reveal this information.

Crossing data found in TRIMS that does not typically require updating includes:

- DOT Number.
- Roadway approach directions.
- Railroad company, division, subdivision, and milepost.
- Highway and street name.
- City, county and TxDOT district.
- NBI bridge number.
- Latitude, longitude, and elevation.
- Crossing angle.
- Track orientation direction.
- Adjacent crossing information.

Crossing Data Responsibilities

On an annual basis or as railroad capital improvement projects are completed, railroad companies should submit to RRD accurate:

- Train counts (through and switching).
- Minimum and maximum train speeds.

RRD receives annual updates from Transportation Programming and Planning (TPP) to:

- AADT.
- Roadway speed limit.
- Roadway functional classification.
- Percent trucks.

This information may be found on the Statewide Planning Map maintained by TPP.

RRD typically receives updates from districts on:

- Special vehicle movements.

Average daily traffic in TRIMS is calculated using either the AADT estimation provided by TPP or by a Programmed Annual Average Daily Traffic (PAADT) if available. A PAADT is an actual count performed in the field by either TxDOT or local government. Since a PAADT represents actual counts taken, the PAADT is used in lieu of the AADT for the purposes of performing FSP or RGS program rankings.

RRD updates crash data monthly in TRIMS based on data found within:

- FRA database.

Crash Records Information System (CRIS)

CRIS is a statewide database used for filing police reports for crashes on any public roadway in Texas. CRIS can serve as a separate source of data for verifying crash data provided in the FRA database. CRIS data is not currently incorporated into TRIMS.

Crash reports may be obtained online.

TRIMS Project Management Module

The project management module in TRIMS includes information for all types of rail-highway projects. Some data in the project module includes:

- CSJ and project numbers.
- Project type (construction, replanking or safety).
- DOT numbers impacted.
- Location information (city, county, roadway, and district).
- Letting dates.

- Listing of project steps and completion dates.
- Project attachments including diagnostic notes, preemption forms, PE Agreements, C&M Agreements, Authority to Order Materials, Work Orders, inspection notes, approved invoices, Completion Letters, Completion Checklists, etc.
- Description of project and scope of work.
- Journal entries.
- Basic cost information.

RRD and district railroad coordinators share responsibility for project updates in TRIMS. RRD creates the projects, adds basic project information and steps, and typically uploads any agreement information and Completion Checklists to the project. Work Orders, inspection diaries, approved invoices, and Completion Letters are uploaded by districts.

Only TxDOT users have access to the TRIMS project management module. Consultants working on RRD projects may be allowed access to TRIMS on a case-by-case basis.

Chapter 13 — Maintenance

Contents:

Section 1 — Grade Crossing Maintenance

Railroad Company Responsibilities

Railroad companies are generally responsible for maintenance of:

- Crossing surface from edge of tie to edge of tie on state at-grade crossings (panels, rail, ties, ballast and subballast).
- Active warning systems (gates, mast flashers and cantilevers) including energy charges.
- Crossbuck, Number of Tracks, Stop, Yield and ENS signs.
- Vegetation and sight obstructions within 250 feet of at-grade crossing on railroad right of way.
- Railroad circuitry, including preemption circuitry and operation from railroad cabin.
- Superstructure of underpasses.

Although the railroad companies maintain these items, TxDOT provides assistance for railroad crossing surface replacement on state routes via the replanking program. See Chapter 5 for details.

District railroad coordinators should routinely inspect crossing surfaces to identify candidates for the replanking program. Also, any operational or maintenance issues regarding active warning systems, crossbuck signs or sight distance obstructions should be coordinated with RRD and the railroad company. Typical issues may include:

- Broken gates.
- Malfunctioning gates or flashing lights.
- Gates, cantilevers, crossbuck signs or mast flashers hit by vehicular traffic.
- Non-reflective signs (must be inspected at night).
- Missing signs.
- Vegetation causing sight distance issues.
- Scrape marks on gauge crossing surface panels or panels that rock or have shifted.
- Damaged crossing surface panels.
- Clogged or blocked drainage pipes at a crossing.

TxDOT Responsibilities

TxDOT is generally responsible for maintenance of the following items on state routes:

- Pavement up to crossing surface panels on both sides of at-grade crossing. This includes pavement between multiple sets of railroad crossing panels.
- Base material beneath subballast on at-grade crossing.
- At-grade crossing design features such as guardrail, retaining walls, medians, curbs and sidewalks.
- Signing, striping, raised pavement markers, delineators, and object markers (not including crossbuck signs) at the grade crossings.
- Retroreflective tape on crossbuck signs.
- Timing settings and maintenance of preempted traffic signals.
- Inspection and maintenance of overpass structures, including drainage, fencing and DOT number stenciling.
- Lighting and energy charges for lighting over a railroad track on an overpass.
- Substructure (columns), guardrail, barriers, all roadway and sidewalk features and vertical clearance signs at underpasses.
- Any pavement, curb and gutter, signs, lighting, or other features on railroad right of way not at an at-grade crossing.

District railroad coordinators should visit on system at-grade crossings to inspect the applicable items above as time permits. Typical issues may include:

- Missing stop bars and approach striping.
- Missing or incorrect railroad crossing pavement markings (should be adjacent to W10-1 Grade Crossing Advance Warning Sign).
- Missing railroad crossing warning signs on both approaches and on parallel streets within 100 feet of rail.
- Nonreflective signs and pavement markings (must be inspected at night).
- Pavement cracking due to truck loadings or humped crossing.
- Broken or missing raised pavement markers, delineators, and object markers.

Joint Responsibility

Areas of maintenance that generally require either a joint effort by TxDOT and the railroad company or may be governed by a specific agreement include:

- Common ditches.
- Pipes, culverts and conduits on railroad right of way or under tracks.

- Traffic signal preemption and associated interconnection with the railroad cabin (see Section 2 for details).

Any sight inspections of crossing locations should be verified against existing inventory in TRIMS and corrected as needed. `Pictures` of the crossing should also be taken and uploaded as the most current photos of the crossing.

Section 2 — Preempted Traffic Signals

Maintenance and Operations

Various settings in the traffic signal controller must be verified for compliance with the operation of the traffic signal controller and the preemption form (TxDOT Form 2304) for which the circuit was designed. The following checks are recommended when inspecting a traffic signal for preemption:

- Controller delay time matches what is shown on preemption form (line 1).
- If delay time is used, memory must be set to non-locking, so controller does not accept false calls from the railroad company.
- Minimum green time during preemption right of way transfer matches what is shown on preemption form (line 5).
- Yellow change and red clearance times during preemption right of way transfer after track clearance green and after transitioning out of preemption cannot be less than what is programmed for normal operation of the signal for any phase (when signal is not under preemption) per Section 4D.27 of the TMUTCD.
- Yellow change and red clearance times during preemption right of way transfer match what is shown on the preemption form (lines 7 and 8).
- Pedestrian walk time matches preemption form (line 11).
- Pedestrian clearance time matches preemption form (line 12).
- Track clearance green time matches preemption form (line 51).
- Track clearance, dwell/limited cycle and exit phases programmed properly in controller.
- If train passes through crossing, verify that track clearance green does not terminate prior to the gates going down.
- If gate down circuit is used and train passes through crossing, confirm that track clearance green terminates when gates go down and gate down preempt becomes active.
- Any changes made to signal timings are documented in logbook in traffic signal controller.
- Preemption form and traffic signal layout design sheets are available in the cabinet.
- A warning label is present in the housing indicating the presence of the interconnection and that the cabling shall not be tampered with or disconnected.
- Battery back-up system is connected and functioning properly.
- Interconnection conductor and conduit functional.

Railroad companies are required to test preemption circuits monthly. Although the district railroad coordinator would not typically be present with the railroad company to verify the advanced preemption time is correctly functioning from the railroad company, the timing settings in the controller should be verified from time to time to verify the preemption is functioning as designed on the preemption form. This can occur on an as-needed basis or as part of the annual joint preemption test outlined in Chapter 7.

Traffic Signal Design Changes

Another common concern involves traffic signal timing modifications due to changes in speed limits or lane configurations. Ultimately, if changes are made, the yellow change and red clearance times during preemption cannot be less than what is programmed for normal operation of the signal for any phase. If the yellow change and red clearance times increase under normal operation, the times must also increase under preemption and other time during preemption must be sacrificed. This could typically occur by reducing delay time, minimum green time during right of way transfer, pedestrian timing during right of way transfer, or separation time and would require the preemption form be updated by the district railroad coordinator.

If a traffic signal is upgraded to accommodate pedestrian movements, the preemption setup should also be evaluated to see if pedestrians should be considered during preemption.

Finally, any changes to a roadway intersection adjacent to a railroad crossing should be coordinated with the affected railroad company. This includes work performed off railroad right of way to ensure no traffic impacts to the railroad crossing or preemption setup.

Chapter 14 — Policy

Contents:

Section 1 — References

Manuals

The following manuals are commonly referenced for rail-highway projects:

- **Texas Manual on Uniform Traffic Control Devices (TMUTCD).** Published by TxDOT, the TMUTCD provides legally enforceable design standards for pavement markings, signs, traffic signals and work zone setups. Applicable sections include Section 4C.10 (Warrant 9, Intersection Near a Grade Crossing), which describes a warrant that may be used for installing a traffic signal with preemption, and Part 8 (Railroad), which provides design standards for signing, striping and grade crossing warning devices.
- **Railroad-Highway Grade Crossing Handbook.** Published by the FHWA, the Railroad-Highway Grade Crossing Handbook presents a comprehensive set of design guidelines for at-grade crossings.
- **The American Railway Engineering and Maintenance-of-Way Association (AREMA) Communications & Signals Manual.** The AREMA Communications & Signals Manual provides standards for various signaling equipment used by railroad companies. Of particular use is Section 3 (Highway-Rail Grade Crossing Warning Systems) which provides design guidelines for warning systems and preemption at grade crossings, and Section 1.3 (Recommended Contracts & Agreements) which provides guidelines for provisions and cost estimates in agreements between railroad companies and public agencies.
- **The American Railway Engineering and Maintenance-of-Way Association (AREMA) `2022 Manual` for Railway Engineering.** The AREMA `2022 Manual` for Railway Engineering provides design guidelines for railroad projects. Although the majority of this Manual is not generally applicable to highway projects, Chapter 5 Track, Section 8 Highway/Railway Grade Crossings, provides guidelines for at-grade crossings.
- **Preemption of Traffic Signals Near Railroad Crossings.** Published by the Institute of Transportation Engineers, this report describes various recommended best practices for traffic signal preemption.
- **A Policy on Geometric Design of Highways and Streets.** Published by AASHTO, this Policy describes various aspects of highway design. Of particular importance is Chapter 9.12, Railroad-Highway Grade Crossings, which provides guidelines for roadway elevations for at-grade crossings to eliminate vehicle hang-ups and a procedure to determine proper sight distance at an at-grade crossing.
- **TxDOT Roadway Design Manual.** The TxDOT Roadway Design Manual provides guidelines on roadway design including roadway alignment, lane widths, medians, drainage facilities, shoulder design, roadway grades, superelevation, and use of guardrail.

- **TxDOT Bridge Project Development Manual.** The TxDOT Bridge Project Development Manual describes design criteria and processes for bridge projects, including the RGS Program.

Section 2 — Laws Impacting Rail-Highway Projects

State Laws Applicable to Rail-Highway Projects

- **Texas Administrative Code (TAC), Title 43 (Transportation), Part 1 (Texas Department of Transportation), Chapter 7 (Rail Facilities).** 43 TAC 7 establishes requirements and responsibilities for at-grade crossings.
- **Texas Transportation Code, Title 6 (Roadways), Subtitle Z (Miscellaneous Roadway Provisions), Chapter 471 (Railroad and Roadway Crossings).** Chapter 471 establishes requirements and responsibilities for at-grade crossings.

Federal Laws Applicable to Rail-Highway Projects

- **Code of Federal Regulations (CFR), Title 23 (Highways), Chapter 1 (FHWA, DOT), Subchapter G (Engineering and Traffic Operations), Part 646 (Railroads).** 23 CFR Part 646 includes various regulations related to contractors providing insurance when working on railroad rights of way and executing agreements between states and railroad companies.
- **Code of Federal Regulations, Title 23 (Highways), Chapter 1 (FHWA, DOT), Subchapter B (Payment Procedures), Part 140 (Reimbursement), Subpart I (Reimbursement for Railroad Work).** 23 CFR Part 140 provides policies and procedures for reimbursement to the states for railroad company work on projects.
- **Code of Federal Regulations, Title 23 (Highways), Chapter 1 (FHWA, DOT), Subchapter J (Highway Safety), Part 924 (Highway Safety Improvement Program).** 23 CFR Part 924 provides regulations for the HSIP program, including at-grade crossings.
- **Code of Federal Regulations, Title 49 (Transportation), Subtitle B (Other Regulations Relating to Transportation), Chapter 2 (FHWA, DOT), Part 234 (Grade Crossing Safety, Including Signal Systems, State Action Plans, and Emergency Notification Systems).** 49 CFR Part 234 provides regulations for grade crossing safety, including maintenance and testing requirements by railroad companies.
- **United States Code (USC), Title 23 (Highways), Chapter 1 (Federal-Aid Highways), Section 130 (Railway-highway crossings).** 23 USC 130 establishes provisions for the elimination of hazards at at-grade crossings and provisions for funding. This is the funding source for FSP projects.
- **United States Code, Title 49 (Transportation), Subtitle 5 (Rail Programs), Part B (Assistance), Chapter 225 (Federal Grants to States for Highway-Rail Grade Crossing Safety).** 49 USC Chapter 225 establishes provisions for federal grants on grade crossing programs including safety improvements, state action plans and Operation Lifesaver.

Tabular List of Laws

The table below lists various state and federal laws related to specific issues commonly encountered with rail-highway projects and operations. Refer to the specific code for clarification.

State and Federal Laws Related to Rail-Highway Projects and Operations

Code	Issue
49 CFR Part 222	Laws requiring railroad companies to sound horn at at-grade crossings and provisions for Quiet Zones
23 CFR § 646.210	Requirement that railroad companies participate 5% on grade separation projects of existing active crossings when federal funds are used.
23 USC § 130(i)	Requirement that railroad companies must match at least $7500 for crossing closure projects for locations not on a prioritized list of crossings for FSP upgrades
Tex. Transp. Code § 471.009	Pavement marking standards for local governments for at-grade crossings not on the state highway system when state or federal funds are used for the pavement markings
49 CFR §§ 234.309-234.311	Laws and standards regarding ENS signs
49 CFR Part 840. 49 CFR § 234.7. 49 CFR Part 225. 43 TAC § 7.33. 43 TAC § 7.86	Reporting requirements by railroad companies for crashes at at-grade crossings
Tex. Transp. Code Ch. 191. 23 CFR Part 646B 43 TAC § 7.36	Minimum requirements for vertical and horizontal clearance for structures and bridges over railroads
49 CFR § 213.37. 49 CFR § 213.321. 43 TAC § 7.37	Railroad company responsibilities for trimming vegetation and reducing visual obstructions near at-grade crossings
Tex. Transp. Code §§ 471.002 and 471.004. 43 TAC § 7.102	Crossbuck maintenance and state requirements for affixing retroreflective tape on crossbuck signs
43 TAC § 7.103. Tex. Transp. Code § 471.005	Requirements for railroad companies dismantling warning devices on active rail lines
43 TAC § 7.104	Division of maintenance responsibilities at a railroad underpass
43 TAC § 7.105	Requirements for `permitted crossings` when railroad company spur tracks cross existing state highways
43 TAC § 7.106. Tex. Transp. Code §§ 112.058, 112.059, and 471.001	Law that railroad companies shall not charge fees for at-grade crossings; requirements for maintenance of railroad crossing surfaces
Tex. Transp. Code § 545.251	Law clarifying it is illegal to drive around, though, or under a descending gate or go through an at-grade crossing if a train `could` clearly be seen

State and Federal Laws Related to Rail-Highway Projects and Operations

Code	Issue
43 TAC § 7.41	Requirement that railroad companies operating in Texas pay an annual rail safety program fee
Tex. Transp. Code § 545.252	Law providing authority for state to install stop signs at at-grade crossings
49 CFR § 234.261	Requirement that traffic signal preemption circuits are tested at least once per month by railroad company
49 CFR § 1152	Procedures for abandoning a rail line
Tex. Transp. Code § 545.302	Illegal to stop on an at-grade crossing or park within 50 feet of crossing
Tex. Transp. Code § 544.005	Illegal for individual to interfere with railroad sign or device
Tex. Transp. Code § 544.006	Illegal to place device that blocks view of railroad sign or signal
Tex. Penal Code § 28.07	Illegal to trespass on railroad right of way or interfere with railroad operations
23 CFR § 646.214	Requirement that all access-controlled facilities be grade separated from railroad crossings
23 CFR § 646.214	Requirement that all traffic control devices proposed at at-grade crossings are compliant with the MUTCD
23 CFR § 646.214	Conditions where gates must be installed at at-grade crossings on construction projects with federal aid
49 CFR § 213.347	At-grade crossings not allowed on Class 8 or Class 9 railroad tracks (160 or 200 mph train speed)
49 CFR § 234.11 49 USC § 22501	Requirement that the 10 states with the most grade crossing crashes, on average, from calendar years 2006-2008, produce a grade crossing action plan
49 CFR § 234.9	Requirement for railroad companies reporting malfunctioning active grade crossing warning systems within 15 days of failure
49 CFR § 234.223. 49 CFR § 234.225	Requirements that: ◆ Flashing lights must flash for 3 seconds before a gate arm descends ◆ Flashing lights must activate at least 20 seconds prior to arrival of train at an at-grade crossing ◆ Gates must be horizontal for at least 5 seconds prior to arriving train
Tex. Transp. Code §§ 545.253, 545.2535, 545.254, 545.255, and 647.010	Laws requiring various types of vehicles to stop at at-grade crossings unless exempt
23 USC § 407	Reports, surveys, lists or data for evaluating railroad crossings shall not be admitted for evidence in a federal or state court
TMUTCD Section 8B.10	Requirements that: ◆ Gate arms shall be removed, and signal heads removed or hooded or turned from view if a track is placed out of service ◆ Traffic control devices must be relocated or modified if a track is closed at a multiple track crossing