Attachment 14-1
Amendments for the TxDOT's Traffic Operations Manual, Railroad Operations Volume, February 2000

AMENDMENTS FOR THE:
TxDOT Traffic Operations Manual – Railroad Operations Volume, February 2000

Manual Notices
Delete

Chapter 1 – Introduction

Section	Subheading	Modification
3	Operations Involving Railroads	Replace text with "The Developer and TxDOT will jointly enter into agreements with railroad companies. The Developer shall be responsible for all costs related to force account work for construction or maintenance requirements during the term of project. Where the Manual refers to actions the state normally takes, Developer shall perform those actions."

Chapter 2 – Railroad Agreements – General

Section	Subheading	Modification
1	Overview	Replace text with "Developer shall be responsible for all costs normally assigned to TxDOT."
2	Railroad Force Account Work	Replace text with "Developer and TxDOT will jointly enter into agreements with railroad companies. The Developer shall be responsible for all costs related to force account work for construction or maintenance requirements during the term of project. Where the Manual refers to actions the state normally takes, Developer shall perform those actions."
3	District Responsibilities	For reference only
3	District Responsibilities	In all subsequent subheadings, where the text includes work to be performed by the District or TRF, Developer shall perform.
4	TRF Responsibilities	Replace all text with the following: "The Developer shall provide all documents, estimates, and other information required by the TxDOT Traffic Operations Division (TRF) to prepare railroad agreements for the project."

Chapter 3 – Highway-Rail Grade Crossing Surfaces (Construction and Reconstruction)

Section	Subheading	Modification
1	Overview	Delete
2	Plan Layout	Replace "District" and "TxDOT" with "Developer". Under **Instruction**, delete "to be performed by TxDOT, TxDOT's contractor".
3	Agreement and Negotiating	Replace references to "Traffic Operations Division", "TRF", and "TxDOT" with the word "Developer". Delete **Construction and Maintenance** except for the 1st sentence. Under **Insurance Claims** delete all except the 1st sentence. Replace the word "contractor with the word "Developer". Delete "Payment Clause", "Solicitations of Bids" clause and "Conditions". Delete "Negotiating" and "After Execution".
4	Project Execution	Replace the words "District", "TxDOT's Contractor" and "TxDOT" with the word "Developer". Delete the section **Completion Letter**.

Chapter 4 – Grade Crossing Replanking Program
Delete

Chapter 5 – Spur Tracks
Delete

Chapter 6 – Warning Signals and Devices
Delete

Chapter 7 – Traffic Signal Preemption
Delete

Chapter 8 – Grade Separation
Delete

Chapter 9 – Drainage Structures and Common Ditches
Delete

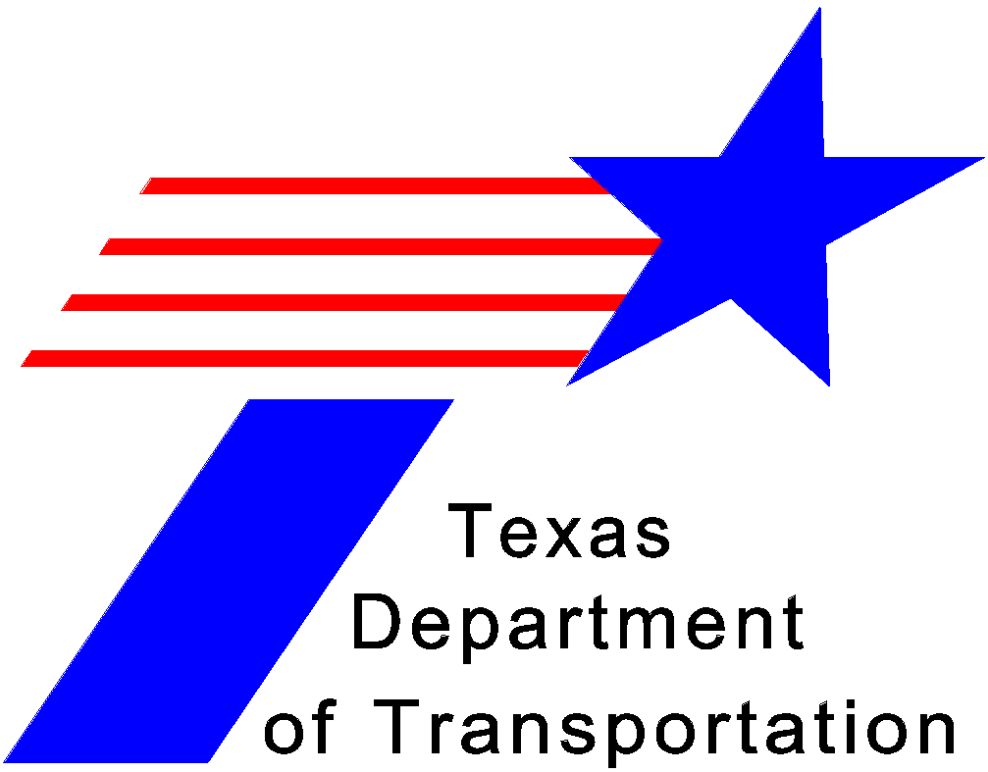
Chapter 10 – Other Railroad Agreements
Delete

Chapter 11 – Crossing Closure, Relocation, and Consolidation
Delete

Appendix A – Forms
Delete

Traffic Operations Manual

Railroad Operations Volume



February 2000

Railroad Operations Volume
February 2000

Manual Notices

Manual Notice 98-1

To: Recipients of Subject Manual

From: Charles W. Heald
Executive Director

Manual: *Railroad Operations Volume*
of the *Traffic Operations Manual*

Date: May 18, 1998

Purpose

This volume of the *Traffic Operations Manual* provides information on and internal procedures and practices related to TxDOT's operations involving railroads.

Supersedes

This volume supersedes:

- Part VI of the *Bridge Division Operation and Planning Manual*: "Operations Involving Railroad Companies"
- Administrative Circular No. 99-83, "Common Ditch Agreement with Railroad Companies"
- Administrative Circular No. 99-82, "1983 Railroad Replanking Program"
- Administrative Circular No. 74-75, "Railroad Advance Warning Sign and Signal"
- Administrative Circular No. 139-70 "Railroad Grade Crossing Subgrade."

Contents

This distribution of the *Railroad Operations Volume* contains:

- this manual notice
- Table of Contents
- Chapters 1 through 11
- Appendix A
- Index
- divider tabs
- a front cover insert
- a spine insert.

Instructions

This is a new volume. Insert these chapters and related matter with tabs into a three-ring binder.

Effective Date

This manual notice is effective as of July 1, 1998.

Contact

Address questions concerning information contained in this manual notice to Darin Kosmak, Traffic Operations Division (TRF), 512/416-2200 or fax 512/416-3206.

Copyright Notice

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Chapter 1
Introduction

Contents:

Section 1
General

Introduction

Highway-railroad grade crossings represent the physical intersection of two distinctly different modes of transportation, which vary considerably in their equipment, traveled ways, and methods of control and operation. Proper design and construction of new grade crossings helps ensure safe and efficient operation. This includes proper selection, design, and location of signs, pavement markings, and warning devices. Proper maintenance of existing crossings and associated warning devices helps to achieve continued safety and efficiency.

Since 1917 it has been necessary to make arrangements with the railroad companies to cross their privately owned right-of-way with roadways. After a series of condemnation lawsuits both parties realized it would be unproductive to continue disputing over the state's right to cross the rights-of-way. Also as spur tracks were built, railroad companies realized they had to cross public roadways to reach their customers. It became mutually advantageous to develop guidelines about grade crossings and grade separations so that lawsuits between the state and railroad companies could be avoided.

Purpose

This volume addresses highway-railroad grade crossing safety, replanking, and agreements. This volume outlines the procedures used by TxDOT employees in operations involving railroad companies, work on railroad right-of-way, and the development and execution of railroad programs managed by the Traffic Operations Division (TRF).

Users of this Volume

This volume is intended for use by Texas Department of Transportation (TxDOT) personnel.

Section 2
Authority and Policy

Introduction

This section lists statutes and policy instruments pertaining to operations between TxDOT and railroad companies at highway-railroad grade crossings. Copies of these documents (except for the statutes) and other historical information on the origin of these programs may be obtained from the Traffic Operations Division (TRF).

Governing Statutes (summaries)

The following state laws (codified in Vernon's Texas Civil Statues [V.T.C.S.]) pertain to operations between TxDOT and a railroad company at highway-railroad grade crossings. Brief summaries of each article are provided.

- ***Art. 6320, V.T.C.S. Streams of Water.*** When a railroad company approaches TxDOT proposing to cross an existing roadway on the designated state highway system, all costs associated with the proposed crossing shall be paid by the railroad company. This normally only occurs when a railroad company desires to construct a spur track across an existing roadway on the state highway system. (See Chapter 4 of this volume for information on spur track permit agreements.)
- ***Art. 6327, V.T.C.S. Crossings of Public Roads.*** When TxDOT approaches a railroad company proposing to cross an existing rail line or modify an existing crossing, all costs associated with the crossing shall be paid by TxDOT from state or federal funds or both. This statute also requires a railroad company to maintain crossings in a reasonable state to permit the passage of vehicles.
- ***Transportation Code, Section 471.002: "Signs at Cross-roads."*** Requires railroad companies to erect a sign (crossbuck signs) with large, distinct letters giving notice to the proximity of the railroad and warning persons of the necessity to look out for the railroad trains.
- ***Transportation Code, Section 471.004: "Warning Sign Visibility at Railroad Grade Crossings."*** Requires TxDOT to place retroreflectorized material on the back of each crossbuck sign and around the support post at each public railroad grade crossing to improve nighttime visibility. See also Texas Administrative Code (TAC), 43 TAC, Sections 25.70 – 25.73.

(continued...)

Governing Statutes (summaries) *(continued)*

- ***Transportation Code, Section 471.005: "Dismantling of Railroad Grade Crossing Warning Signals Located on an Active Rail Line."*** Requires operators of short line railroad companies to obtain a permit from the responsible road authority prior to dismantling railroad grade crossing warning signals located on an active rail line. For more information, see Texas Administrative Code (TAC), 43 TAC Sections 25.70 – 25.73.
- ***Transportation Code, Section 545.252.*** Gives TxDOT and local governments specific statutory authority to place traffic control devices at grade crossings on the roads they maintain, but no duty or minimum standards are imposed.
- ***Transportation Code, Section 471.003: "Telephone Service to Report Malfunctions of Mechanical Safety Devices at Crossings."*** Requires TxDOT to furnish and install railroad signal malfunction signs providing the telephone number, explanation of its purpose, and the crossing number at each intersection of a railroad track and a public road maintained by the state or a municipality. At each intersection of a railroad track and a public road not maintained by the state or a municipality (county roads), TxDOT shall furnish the political subdivision the sign to affix to the railroad signal device. A railway company shall permit personnel to affix the sign to the railroad warning device located on the company's property.

Policy Instruments

The following policy instruments pertain to railroad grade crossings:

- Texas Transportation Commission Minute Order No. 74227, dated March 27, 1978, (canceled Minute Order No. 60140). Re-authorized the annual state funded grade crossing protection program and increased the unit cost of the railroad signal maintenance payment program.
- Texas Transportation Commission Minute Order No. 106784, dated March 28, 1996. Authorized use of federal railroad signal program funds to make roadway and operational improvements to address changed traffic flow patterns resulting from closings of railroad grade crossings rather than installing active warning devices.
- Texas Transportation Commission Minute Order No. 107279, dated September 25, 1997. Established goals for TxDOT's railroad safety program and all projects involving the upgrade of highway-rail intersections.
- The *Texas Manual on Uniform Traffic Control Devices (TMUTCD).* Applicable portions include (but are not limited to) Part VIII, "Grade Crossings."

Texas Attorney General Opinions

The following Texas Attorney General opinions pertain to railroad grade crossings:

- Texas Attorney General Opinion No. M-525. Re: Authority of State Highway Department [now TxDOT] to make expenditures request to qualify for projects under 23 U.S.C. Section 405, dated February 13, 1976. TxDOT authority to expend state matching funds for federal-aid railroad grade crossing warning signal projects off the state highway system.
- Texas Attorney General Opinion No. M-108. Re: Validity of appropriation to the Texas Highway Department [now TxDOT] to construct and maintain railroad protective devices, dated July 24, 1967. Authority to expend state funds on railroad grade crossing projects on the designated state highway system (non-federal-aid projects).

Federal Policy

The *Federal-Aid Policy Guide (FAPG)* Title 23, CFR Part 140, Subpart I and 23 CFR, Part 646, Subpart A & B. All projects undertaken by TxDOT and agreements with railroads where federal funds will be used shall meet the requirements of the *FAPG*.

Railroad Practices

TxDOT complies with the following railroad practices pertaining to railroad grade crossings:

- TxDOT complies with the practices found in the *Association of American Railroads, Communication and Signal Division, Signal Manual of Recommended Practice,* Volume 1, Section 3, "Highway Grade Crossing Warning Systems."
- The *Railroad-Highway Grade Crossing Handbook — Second Edition,* published by the U.S. Department of Transportation, Federal Highway Administration, provides general information on highway-rail grade crossing characteristics and the physical and operational improvements that can be made to enhance safety and operation of both highway and rail traffic over crossing intersections. The guidelines and alternative improvements presented in the handbook have proven to be effective and are accepted nationwide.

Section 3
Operations Involving Railroads

Maintenance Responsibilities

In Texas, the road authority and railroad company assume both separate and joint maintenance responsibilities at highway-rail grade crossings. The track and signals are always maintained by the rail operator, because they are located within railroad right-of-way and are intrinsic to the safe operation and passage of trains. While local, state, and federal governmental entities may provide funds for the replacement or upgrade of crossing surfaces and crossing signals, the railroad operator is generally responsible for performing the work within railroad right-of-way.

Railroad companies are responsible for maintaining crossing surfaces between the cross ties of the track structure. Crossties typically extend two feet outside of each rail. The road authority is responsible for maintaining the roadway approaches up to the edge of the crossing surface, advanced signing, and pavement markings. Maintenance of crossbuck signs and warning signal devices located within railroad right-of-way is the responsibility of the railroad operator.

Working on Railroad Right-of-Way

An agreement between TxDOT and the operating railroad company must be in place giving TxDOT permission to enter into and perform work on railroad right-of-way. The state's contractor must have railroad protective liability insurance in place with the operating railroad company prior to entering into and performing work on railroad right-of-way.

Any work performed by state forces on railroad right-of-way should be closely coordinated with the operating railroad company.

Railroad Payment

The state normally reimburses the railroad for force account work, except where an existing highway is crossed by a new railroad. For new railroads, most crossing agreements provide for the railroad to assume the entire cost. Reimbursement is limited to the work detailed in the state-railroad agreement and attached exhibits. Cost related to the improvement or maintenance of railroad property will not be reimbursed. The railroad bears the expense and responsibility of maintaining crossing warning signal systems, crossbuck signs, and crossing surfaces.

(continued...)

Railroad Payment *(continued)*

Reimbursable (Funded)Work. Railroad force account work (work performed by the railroad company) is funded and work is performed in conjunction with an approved highway construction project.

The state normally reimburses the railroad for force account work, except where an existing highway is crossed by a new railroad. In this case, most crossing agreements provide for the railroad to assume the entire cost. Reimbursement is limited to the work detailed in the state-railroad agreement and attached exhibits.

The railroad normally sends their bills to Finance Division (FIN) for payment.

Non-Reimbursable (Unfunded) Work. Cost related to the improvement or maintenance of railroad property is not reimbursed. The railroad bears the expense and responsibility of maintaining crossing warning signal systems, crossbuck signs, and crossing surfaces.

Section 4
Terminology

Types of Railroad Tracks

Like highways, railroad track is categorized according to function. These categories include the following:

main tracks — Tracks that handle through train movements between and through stations and terminals, as opposed to switching or terminal movements. (This definition applies for the purposes of highway-rail safety programs.)

NOTE: The majority of highway-rail intersection collisions occur at main track crossings. This can be attributed to the fact that there are more main track intersections with highways than there are side track (or switching track) intersections. Also, main tracks typically experience higher train volumes and train speeds.

branch line — A railroad line that typically carries freight from its origin to a main line.

passing track (or siding) — A track used for meeting and passing trains.

side track, **switching track**, and **industrial track** — Track used for the loading, unloading, and storage of rail cars.

Track Gauge

Railroad track gauge (the distance between the two rails) has been standardized in the United States since the late 1800s. The U.S. standard track gauge is four feet, eight and one-half inches (4' 8½").

Sight Distance

The number of tracks and the length of the roadway between multiple sets of tracks are important considerations in determining sight distance requirements for highway-rail intersections.

Joint Use

When TxDOT obtains a "license to cross" railroad right-of-way with its highway facilities, a "joint use" highway-rail intersection is created.

Preemption

"Preemption" refers to the interconnection of railroad signal devices with traffic signals at adjacent highway-highway intersections. When an approaching train activates the railroad signal devices, a relay in the railroad signal cabinet preempts the normal traffic signal phasing with special phasing sequence.

Section 5
DOT/AAR Grade Crossing Inventory

Background

The United States Department of Transportation (DOT) and the Association of American Railroads (AAR) developed the National Rail-Highway Crossing Inventory in the early 1970s. It was developed with the cooperative effort of the Federal Highway Administration, the Federal Railroad Administration (FRA), individual states, and individual railroads. All at-grade and grade-separated crossings, both public and private, in the United States were surveyed, and data were recorded on inventory forms. The inventory contains data on the location of each crossing, the amount and type of train traffic, traffic control devices, and other physical elements of the highway-rail intersection.

NOTE: TxDOT maintains its own inventory as well, with many of the same types of data found in the national inventory.

Identification Numbering System

Each crossing listed in the national inventory is assigned a unique identification number consisting of six numeric characters and an alphabetic character.

EXAMPLE: 123456A

The crossing identification number (DOT No.) was originally installed at each crossing by nailing or strapping a temporary tag to a crossbuck or flashing light post. Today, the more common practice with the railroads is to stencil the number on the warning device support post.

Maintenance of the Inventory System

The FRA voluntarily serves as custodian of the national inventory file. Data in the inventory are kept current through the voluntary submission of information by the states and railroads. Numerous states and railroads update the national inventory. Systematic and uniform procedures are required to assist the FRA in processing the data.

The data contained in the national inventory and state inventory should be verified in the field by appropriate engineering studies. The national inventory is used not only by the states and railroads in conducting their crossing improvement programs, but also by national and federal agencies in assessing crossing improvement needs and conducting research. Thus, it is vital that this valuable information be kept up-to-date.

(continued...)

Maintenance of the Inventory System *(continued)*

Districts should make periodic reviews of all public crossings in their districts to ensure that information reported in the inventory is reasonably accurate. Districts should recommend deletions or additions based on discrepancies or changes in vehicle traffic, rail traffic, type of warning device in place, or accident data reported in the inventory. Railroad companies also have the opportunity to make recommendations and corrections.

Railroad companies and local governments should coordinate updates to the crossing inventory through the district offices. Local governmental entities may request that traffic counts be conducted by the district offices at any public highway-rail grade crossing. All updates to the crossing inventory should be forwarded to TxDOT's Transportation Planning and Programming Division (TPP) and to the Traffic Operations Division (TRF) in Austin. TPP is the office of record for all updates to the DOT/AAR Grade Crossing Inventory and is responsible for coordinating these updates with the railroad companies and the FRA.

Chapter 2
Railroad Agreements -- General

Contents:

Section 1
Overview

Financial Responsibility

Responsibility for undertaking work at highway-railroad grade crossings is defined in the Texas Administrative Code (43 TAC 25.76). Financial responsibility for costs associated with new crossings, or improvements or adjustments to existing crossings, depends on whose property is being crossed. If TxDOT needs to cross or originally crossed an existing railroad, TxDOT pays for any necessary warning signals, crossing surfaces, and other work. If the railroad wants to cross or originally crossed an existing highway on the state system, the railroad pays for any necessary warning signals, crossing surfaces, or other work.

In the more common situation where TxDOT approaches the railroad to cross their tracks, a "license to cross," rather than an easement, is granted by formal agreement and without cost to either party. The agreement specifies the construction and maintenance responsibilities of the two parties at the crossing. Since railroads are most often not required to bear any of the costs of federal-aid and state funded projects, their contribution to state projects should be the license to cross them and, if necessary, occupy small portions of their right-of-way for the state's structure or roadway. This arrangement is of particular benefit to the railroad for work involving the elimination of hazards at highway-rail grade crossings.

Agreements Required

An agreement between TxDOT and the railroad must be executed before any work on railroad right-of-way is done. The type of agreement necessary depends on the nature of the work and the source of funding. The following chapters of this volume explain the specific types of work and circumstances under which various agreements are required.

Section 2
Railroad Force Account Work

Program Overview

Railroad force account work is work performed by railroad forces or the railroad's contractor. Generally, railroad force account work is funded and work is performed in conjunction with an approved highway construction project. This work may involve:

- planking (road crossing surfaces)
- track adjustments
- installation of warning devices
- relocation of existing warning devices
- installation or extension of drainage structures under tracks
- wire line adjustments
- flagging for train operations
- other related work.

Financing

All railroad force account work necessary to accomplish a highway construction project let to contract by the state must be funded and paid under that project. Construction funds should not be mixed with railroad safety or maintenance dedicated program funds.

NOTE: The railroad force account work is funded through the construction budget activity, and any state force account work is funded through budgeted district Activity 202.

Implementation

Implementation of railroad force account work normally proceeds as follows:

1. The district submits a request for the crossing work to the Traffic Operations Division (TRF) along with an 11 x 17 inch plan layout, marked "Exhibit A." (See Section 3 of this chapter.)
2. TRF prepares an agreement and submits it to the railroad.
3. After the agreement is executed and an estimate for railroad force account work is approved by TRF, railroad forces perform the work upon receipt of a work order from the district office

Reimbursement

The state normally reimburses the railroad for force account work, except where an existing highway is crossed by a new railroad. Reimbursable force account work is limited to the work detailed in the state-railroad agreement and attached exhibits. *Cost related to the improvement or maintenance of railroad property cannot be reimbursed*. The railroad bears the expense and responsibility of maintaining crossing warning signal systems, crossbuck signs, and crossing surfaces, because these appurtenances are located on railroad right-of-way.

Section 3
District Responsibilities

Project Lead Time

The district should coordinate the timing of the railroad crossing work with the approved highway program. Since securing an agreement from a railroad company normally requires six to twelve months, or longer, the district's letter of request, exhibits, and other necessary data must be submitted to the Traffic Operations Division (TRF) as early as possible.

As examples, pavement overlay and stripping work are usually handled by a letter agreement and can be approved by the railroad more quickly because they involve little or no railroad force account work. More complex projects (new crossings, widening existing crossings, or constructing grade separations) require more time — not just for the railroad — but also for TRF and Design Division (DES) review and approval. Underpass projects require the most detailed review by the railroad because the structure will be carrying trains and shoofly tracks are usually necessary during construction. The following table shows minimum lead times for these types of projects.

Minimum Project Lead Times

Project Type	Minimum Lead Time
Road Jobs	6 months
New Crossings, Complex Road Jobs, and Overpasses	9 months
Underpasses and Projects Involving Track Construction or Relocation.	12 months

These lead time requirements mean that all plan layouts and agreements must be completed so they can be submitted to the railroad in advance of the contract letting date.

TRF normally notifies the district if a project is in jeopardy of meeting the letting date and advises the district of the consequences.

Plan Layout (Exhibit A) Preparation

The district performs all studies and surveys necessary to prepare the plan layout, title sheet, and supporting information required for Exhibit A of the agreement.

To minimize revisions, Exhibit A should be as complete as possible. Revisions increase the time needed to obtain an agreement and could delay letting if the railroad objects to the revisions.

NOTE: All plan layouts prepared by the district must be signed, sealed, and dated by a registered professional engineer.

Work Order

The district issues the work order to the railroad for all projects except those involving the installation of new warning signal devices. TRF issues work orders for the installation of new warning signal devices contracted under terms of a signal agreement separate from the agreement for the crossing work.

Pre-construction Meeting

For overpass, underpass, and road construction projects of a critical nature, the district or its contractor should host a pre-construction meeting. Representatives from the railroad, TxDOT's contractor, and TxDOT should attend the meeting. The construction schedule and individual points of contact are discussed.

Construction Inspection

The district advises the railroad on the status of construction work on a regular basis and provides construction inspection while railroad forces are performing work.

The district issues the completion letter for the project.

Section 4
TRF Responsibilities

Securing Agreements

TRF is responsible for preparing, negotiating, and obtaining the agreement before the contract letting, based on the plan layouts and information submitted by the districts.

Liaison Role

TRF serves as the liaison between the districts and railroad companies. In this role, TRF is responsible for negotiations with the railroad companies in connection with the preparation of agreements and the securing and approval of force account estimates based on the information furnished by the districts.

Coordination with DES

TRF also coordinates agreements for railroad grade separations and spur track permits through the Design Division (DES) during the preliminary plan layout and PS&E review stages of project development.

Work Order

TRF issues the work order to the railroad company for all projects involving the installation of new warning signal devices contracted for under terms of a separate agreement.

Chapter 3
Highway-Rail Grade Crossing Surfaces (Construction and Reconstruction)

Contents:

Section 1
Overview

Introduction

When the limits of a highway construction project involve the construction or reconstruction of a highway-rail grade crossing, TxDOT must execute an agreement with the operating railroad company prior to entering or performing any work on the railroad right-of-way. The agreement gives TxDOT license and permission to cross railroad right-of-way and establishes the rights and responsibilities of each party in the construction, maintenance, and operation of the highway-rail intersection. Most railroad rights-of-way are owned by a privately held company and TxDOT must act accordingly.

Importance of Timing

Timing and coordination between the district, divisions, and railroad company are essential to meet contract letting schedules and avoid delays or conflicts during construction.

On projects requiring a significant amount of railroad force account work, the railroad should be contacted during the advance stages of project development. Contact with the railroad should be coordinated through the district railroad coordinator and the Traffic Operations Division (TRF).

Project Financing

Highway construction projects involving any of the following are financed under the construction budget for each particular highway construction project:

- new highway-rail grade crossings
- the extension or re-construction of existing highway-rail grade crossings
- any other adjustments to a highway facility located within railroad right-of-way.

Replanking Program. Stand-alone projects for the replanking (resurfacing) of existing highway-rail grade crossing surfaces on the state highway system are considered under the state Grade Crossing Replanking Program (see Chapter 4 of this volume).

Project Process Overview

Projects involving highway-rail grade crossings normally proceed as follows:

1. The district furnishes to the Traffic Operations Division (TRF) complete plan layout (known as "Exhibit A") showing the critical details for the modification of the existing roadway or construction of new roadway. (See Section 2 of this chapter for critical details to be included in Exhibit A.)

   NOTE: Exhibit A should be submitted *at least* nine months before letting.

2. TRF prepares the agreements necessary for the license to cross railroad right-of-way, which covers construction and maintenance of the work to be performed. TRF also negotiates with the railroad companies involved. The railroad furnishes an estimate to TRF showing all reimbursable work, as indicated in the agreement, to be performed by the railroad. TRF reviews and approves the estimate, attaches it to the executed copies of the agreement, and forwards the railroad's copy back to them. The district and the Finance Division (FIN) also receive a copy of the executed agreement and estimate. (See Section 3 of this chapter for details on the agreement and negotiations.)

3. After the agreement is signed, the district issues a work order to the railroad. This may occur after the project is let or when requested by the railroad. The district also conducts pre-construction meetings, inspects the work, and issues completion letters. (See Section 4 of this chapter for more information on these activities.)

   NOTE: TRF issues work orders for warning signal work contracted under terms of a signal agreement separate from the agreement for the crossing work. See Chapter 6 of this volume.)

Sub-base Work

Materials. TxDOT or its contractor may provide materials needed for the sub-base work under the new crossing or the widened portion of the roadway, when widening is needed.

Timing of Work. On new railroad crossings construction projects, sub-base work performed by TxDOT or its contractor is usually completed *before* the railroad performs its work. On projects involving the reconstruction, widening, or replanking of existing crossings, sub-base work performed by TxDOT or its contractor is done *during* the railroad's work and, therefore, must be carefully coordinated to avoid delays.

Section 2
Plan Layout (Exhibit A)

Introduction

The district prepares the plan layout (known as Exhibit A) for the project in sufficient detail to show all work to be performed by TxDOT, TxDOT's contractor, and the railroad. Exhibit A includes:

- project data
- a title block
- right-of-way requirements
- a work list
- general notes
- warning signal device location.

Discussions of each of these items follow.

NOTE: All plan layouts prepared by the district must be signed, sealed, and dated by a registered professional engineer.

Project Data

Project data include:

- the county
- county number
- project description
- project number
- control-section-job (CSJ)
- railroad mile post (RRMP)
- highway station
- highway number or road name.

Title Block

The title block includes:

- the railroad company name and DOT No. (if available)
- crossing location
- railroad milepost and highway station at each location
- the words "Exhibit A."

Right-of-Way Requirements

If the roadway is being widened, the plan layout should indicate if additional railroad right-of-way will be required. This is necessary for preparation of a new "license to cross" article in the agreement.

Work List

The work list provides a breakdown of all work to be performed by TxDOT, TxDOT's contractor, and the railroad. The type of work to be performed on the railroad's ROW should also be listed. When coring is involved, it is important to show where the coring will be performed in relation to the railroad tracks.

General Notes

General notes should include:

- number and speed of "through" trains per day
- number and speed of switching moves per day
- average daily traffic (ADT)
- posted speed limit of vehicle traffic.

Warning Signal Device Location

On roadway modification projects, if railroad warning signal devices exist, their existing location and the proposed new location of the warning signals and appurtenances must be shown.

NOTE: If widening of the roadway involves relocating or upgrading the existing railroad warning signal devices, it is important to include pictures of the location.

On new road construction projects, the railroad warning signal devices are installed under terms of a separate agreement with the railroad company prepared by the Traffic Operations Division (TRF). The district should submit one additional copy of the Exhibit A to TRF for preparing the signal agreement and developing the railroad warning signal device portion of the project. A diagnostic inspection is normally conducted prior to determining the type and location of the railroad warning signal devices to be installed (see Chapter 6, Section 6, of this volume for details). TRF schedules the diagnostic inspection, which involves representatives from the district, the railroad company, and local government (as necessary).

Section 3
Agreement and Negotiations

Introduction

Using the Exhibit A plan layout furnished by the district, the Traffic Operations Division (TRF) prepares the necessary agreement and forwards it to the railroad company. TRF coordinates any questions or revisions resulting from the railroad company review with the district.

Agreement Contents

The agreement contains:

- project data
- a license clause
- scope of work
- construction and maintenance conditions
- insurance clauses
- payment clause
- solicitation of bids clause
- conditions
- fiber optic clause.

Discussions of each of these items follow.

Project Data

Project data include:

- the county
- control-section-job (CSJ)
- highway
- project number
- DOT No. (if available)
- the city.

License Clause

The license clause gives TxDOT license and permission to construct, maintain, and use the new roadway across railroad ROW. If the roadway is being widened and no additional railroad ROW is required, the license clause does not need to be included.

Scope of Work

The scope of work includes all work to be performed by TxDOT, TxDOT's contractor, and the railroad. It spells out the responsibilities of both the railroad and TxDOT.

Construction and Maintenance

The construction and maintenance clause describes to the railroad the conditions of work. The railroad must begin work within 30 days after having been issued a work order from TxDOT and must proceed without delay to completion. (See Section 4 of this chapter for more information on the work order.) The railroad will not be paid for any work performed at the job site prior to the work order date. The railroad company is given the authority to assemble all materials for the project sufficiently in advance to assure prompt delivery to the job site.

Insurance Clauses

The insurance clauses specifies the type of insurance the contractor will need to purchase on behalf of the state and railroad. All work performed on the railroad right-of-way by the TxDOT contractor requires railroad protective liability insurance in an amount of not less than two million dollars for bodily injury and property damage and not less than six million dollars aggregate for all occurrences. The railroad protective liability insurance must be carried until all work on the railroad property is completed. Insurance requirements are included in a Special Provision to Item 007 of TxDOT's contractor's bid specifications. If state forces perform the work, no insurance provisions are required in the agreement because TxDOT is self-insured.

Payment Clause

The payment clause specifies when and under which conditions TxDOT will reimburse the railroad. Reimbursement is made to the railroad only if a work order has been issued to begin work. The railroad is reimbursed for work performed and materials furnished in accordance with the provisions of the *Federal Aid Policy Guide (FAPG)*, Subchapter B, Part 140, Subpart I, as last issued by the Federal Highway Administration on April 7, 1992. The railroad is reimbursed the actual total cost of all railroad force account work performed and materials used or installed. However, upon final audit by the Audit Office of TxDOT, the railroad may be required to reimburse TxDOT any over payment that cannot be justified.

Solicitation of Bids Clause

The solicitation of bids clause is *only* included in the agreement for railroad companies that do not have their own forces to perform railroad work and must hire a contractor to perform railroad force account work. This clause notifies the railroad that they must solicit a minimum of three bids from qualified contractors to perform the railroad force account work. The railroad is also allowed to submit an estimate for administrative costs and construction inspection, which is reimbursed on an actual cost basis upon receipt of an itemized bill. Upon receipt of the bids, the railroad reviews the bids and forwards them to TRF for approval with a recommendation of the contractor they would prefer. TRF reviews the bids and awards the contract. Under state contracting policy, the contract is normally awarded to the lowest bidder, unless other mitigating factors prevail. TRF advises the railroad in writing as to which contractor was awarded the project and the cost of the work. The approved bid will be the *exact lump sum amount* paid to the railroad for the work performed. The railroad is responsible for reimbursing its contractor.

Conditions

The conditions clause describes how the agreement can be canceled at any time prior to actual letting of the contract by TxDOT. Also, any cost participation by the railroad is identified in accordance with *FAPG* requirements.

Fiber Optic Clause

Most of the major railroads have fiber optic cable buried on their right-of-way. Therefore, it is important that the railroad be contacted at a 1-800 number (which is identified in the agreement) prior to any work being performed, to determine if fiber optic cable is buried on the right-of-way. Also, the location of the fiber optic cable and who it belongs to can be identified. It is the district's responsibility to contact the fiber optic company to advise them of the proposed work and to determine if the cable will be affected by the work. This clause is important to the railroad companies, because of the very high costs associated with broken or damaged fiber optic cable.

Negotiations

TRF coordinates all negotiations concerning the agreement, including any revisions. These negotiations are coordinated with the district when corrections or revisions to the plan layout are involved.

After Execution

Upon receipt of the signed agreements, TRF forwards a copy of the executed agreement along with the railroad estimate (if available) or the approved bid to the district, the Finance Division (FIN), and the Federal Highway Administration (if it is a federal-aid project).

Section 4
Project Execution

Work Order

The district is responsible for issuing the work order to the railroad for any railroad force account work not involving installation of new railroad signal devices and coordinating work in progress on railroad right-of-way. The work order should be issued soon after the contract has been awarded to allow the railroad sufficient time to order materials and schedule work. A copy of the work order should also be sent to TRF and FIN. The work order authorizes payment to the railroad.

Pre-construction Meeting

A pre-construction meeting is recommended and is the district's responsibility. Representatives from the railroad, TxDOT's contractor, and TxDOT should attend the meeting so that work can be coordinated. The construction schedule and individual points of concern and coordination are discussed.

Inspection

The district inspects the work performed by the railroad and verifies that the work complies with the approved plan layout and specifications.

Completion Letter

The district issues the completion letter to the railroad when the project is complete. A copy of the completion letter should be sent to TRF and FIN. The completion letter authorizes final payment to the railroad.

Chapter 4
Grade Crossing Replanking Program

Contents:

Section 1
Overview

Program Background

The State Railroad Grade Crossing Replanking Program was originally authorized by the Texas Legislature in 1979 to provide dedicated State Highway Funds for replacing worn-out grade crossings located on the state highway system. The Traffic Operations Division (TRF) manages the program.

Annual Reauthorization. TRF requests program reauthorization on an annual basis through the Transportation Planning and Programming Division's (TPP) annual authorization of bank balance allocation programs. The Texas Transportation Commission reauthorizes and approves the program by minute order.

Program Funding

The Replanking Program is managed as a bank balance allocation program. Bank balance allocation means that the 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.

Program funds are used to reimburse the railroad force account portion of the projects. State force account work is financed out of the district's maintenance budget.

Eligible Crossings

Every railroad operating in Texas can participate in the Replanking Program.

Program funds can only be used on state highway system crossings where the state highway originally crossed the railroad. Grade crossings located on city streets and county roads and most spur track crossings cannot be replanked under this program. Spur tracks not eligible for the program are those that originally crossed an existing state highway. Eligible spur tracks are those that were originally crossed by the state highway.

Crossing Surface Materials for Replanking

The standard surface materials for the replanking of railroad grade crossings are precast concrete panels with rubber headers along the rails. Timber is seldom used, as concrete has proven more durable and cost-effective. Rubber surfaces are occasionally used. Asphalt crossings are generally unacceptable and should be used only on a temporary basis. Most of the major railroad companies have adopted the use of concrete panel crossing surfaces with rubber inserts in the rail flangeway as a company standard (see Figure 4-1).

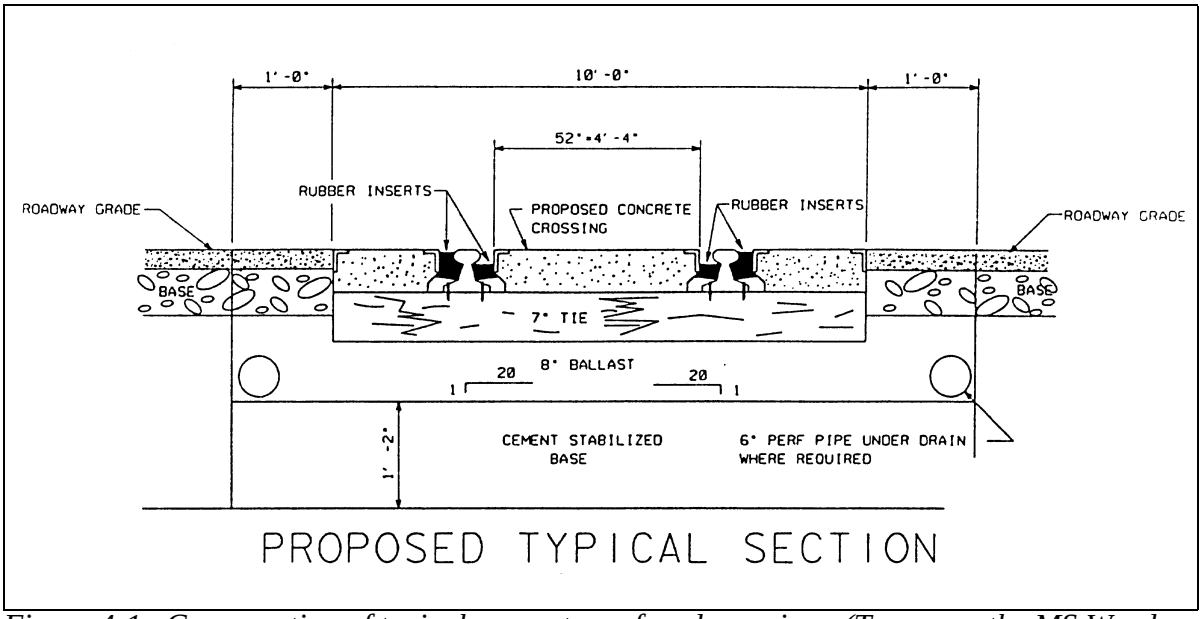


Figure 4-1. Cross section of typical concrete surfaced crossing. (To access the MS Word version of this figure from on line, click this file name: TFEG4-1.)

Section 2
Project Selection

Introduction

The Traffic Operations Division (TRF) selects projects for the Replanking Program on a statewide basis. Generally, each district is guaranteed funding for its two highest priority ranked projects. The other eligible projects are included in the program according to their priority rankings. The priority ranking is based on the project's estimated cost-per-vehicle.

Project Submission

Each year TRF sends Railroad Grade Crossing Replanking Project Submission Forms (TxDOT Form 1876) to the districts.

The district completes *one form for each crossing submitted*, ranking them according to district priority. Crossings in the worst condition should be assigned highest priority rankings. TRF strives (within funding limitations) to include each district's top two priority ranked submissions in the current year's program.

After receiving all project submissions from every district, TRF ranks the projects in order of estimated cost per vehicle.

Form Available. A sample of the Railroad Grade Crossing Replanking Project Submission Form is provided in Appendix A of the hard copy print version of this volume. This sample form may be photocopied as necessary. Copies may also be obtained from TRF. In the on-line version of this volume, an MS Word version of this form may be opened and printed out by clicking on the following file name: TFE-1876.

Figuring Estimated Cost per Vehicle

The estimated cost per vehicle for a project is derived from the total estimated cost of the project. The total estimated cost of the project is obtained by multiplying the estimated cost of materials, labor, and other associated expenses per track foot times 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 0.914 m (3 feet) beyond edge of the pavement or curb line on either side. The estimated cost per vehicle is the total estimated cost of the project divided by the average daily traffic (ADT) at the crossing.

If there are multiple tracks at the crossing, the total combined width across the roadway of *both* tracks is used to determine the total estimated cost of the project.

(continued...)

Figuring Estimated Cost per Vehicle *(continued)*

The formulas are:

$$Total\ Project\ Cost = Cost\ per\ Track\ Foot \times Number\ of\ Tracks\ (Length\ of\ Tracks)$$

$$Cost\ per\ Vehicle = \frac{Total\ Project\ Cost}{ADT}$$

EXAMPLE: Concrete replanking is proposed at a crossing with two tracks across the roadway. Each track is 40 feet long. The ADT is 1300 vehicles per day (VPD). The current cost of concrete replanking is $457 per track foot.

$$\$457 \times 2(40) = \$36{,}560\ Total\ Project\ Cost$$

$$\frac{\$36{,}560}{1300\ VPD} = \$28.12\ per\ Vehicle$$

Project Selection

TRF pulls out each district's first and second priority ranked projects and calculates a total estimated cost for all the districts' top two priority submissions. This establishes a program subtotal. All of the other project submissions are then sorted in order of cost per vehicle These projects are added to the statewide priority list, beginning with those having the lowest cost per vehicle, until the program funding amount is expended. TRF then furnishes a list of the selected projects to each district and railroad company.

Project Cancellation

If projects are canceled for any reason (RR abandoned tracks, RR already replanked crossing, crossing is a spur track, etc.) the district from which the project was canceled can recommend another project (of equal or lesser value). This replacement project is then chosen from the submitted projects that did not previously make the program within that district. If the district in question cannot replace the canceled project, then the funds for the canceled project are used on the next highest rated project statewide that did not originally make the program.

Section 3
Plan Layout (Exhibit A)

Introduction

The district prepares complete project plan layout (known as Exhibit A), showing critical details for the proposed replanking project. The district then submits Exhibit A to the Traffic Operations Division (TRF). These exhibits should be submitted within the deadline set annually by TRF.

NOTE: All plan layouts must be signed, sealed, and dated by a registered professional engineer.

Contents of Exhibit A

Exhibit A should include:

- the plan layout (to scale with scale labeled on the layout)
- a typical section of road
- a typical section of railroad crossing
- work to be done by railroad
- work to be done by TxDOT
- general notes, including:
  - number of through trains per day
  - number of train switching moves per day
  - ADT
  - average speed of traffic at crossing
  - existing warning devices
- a title block on each sheet containing all project information
- a traffic control plan based on the *Texas Manual on Uniform Traffic Control Devices (TMUTCD)*, including any necessary detours.

All pages of the Exhibit A plan layout should be on 11×17 inch paper with a one inch margin at the top.

The Exhibit A plan layout should be stamped: "Exhibit A."

Figure 4-2 (a–c) at the end of this section shows an example Exhibit A plan layout.

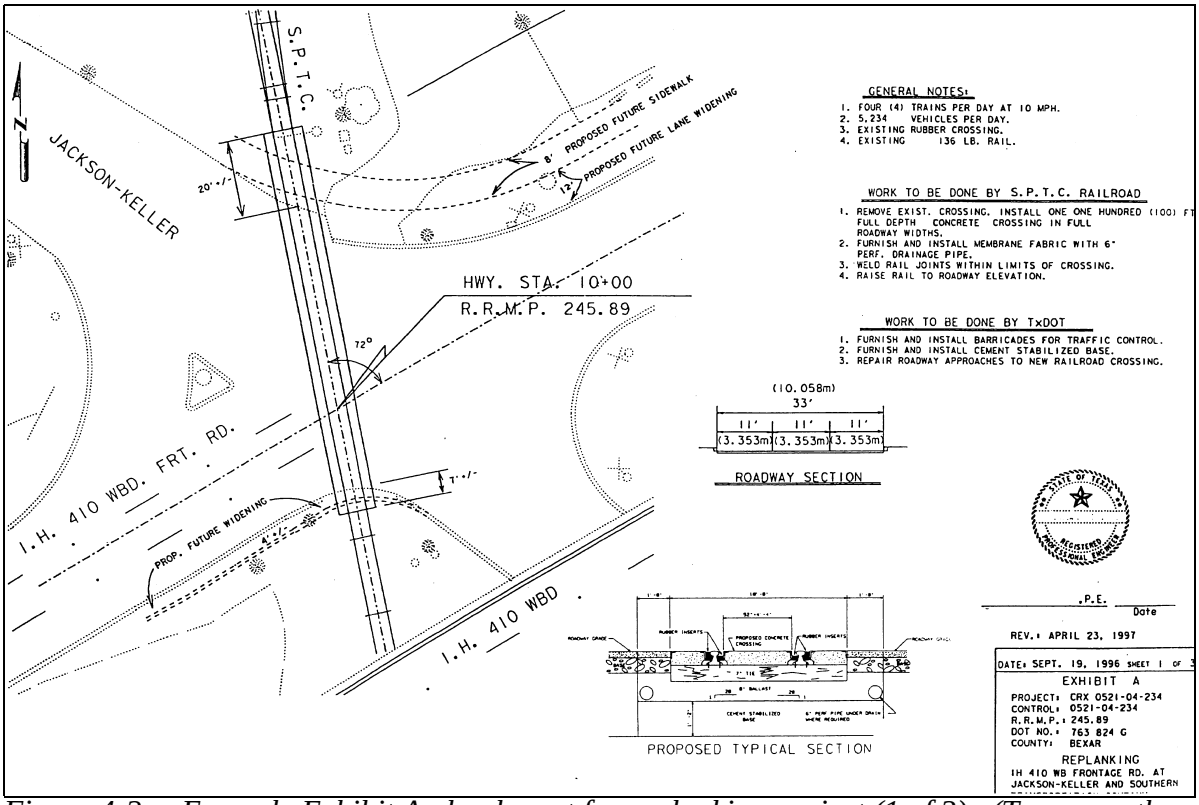


Figure 4-2a. Example Exhibit A plan layout for replanking project (1 of 3). (To access the MS Word version of all 3 panels of this figure from on line, click this file name: TFEG4-2.)

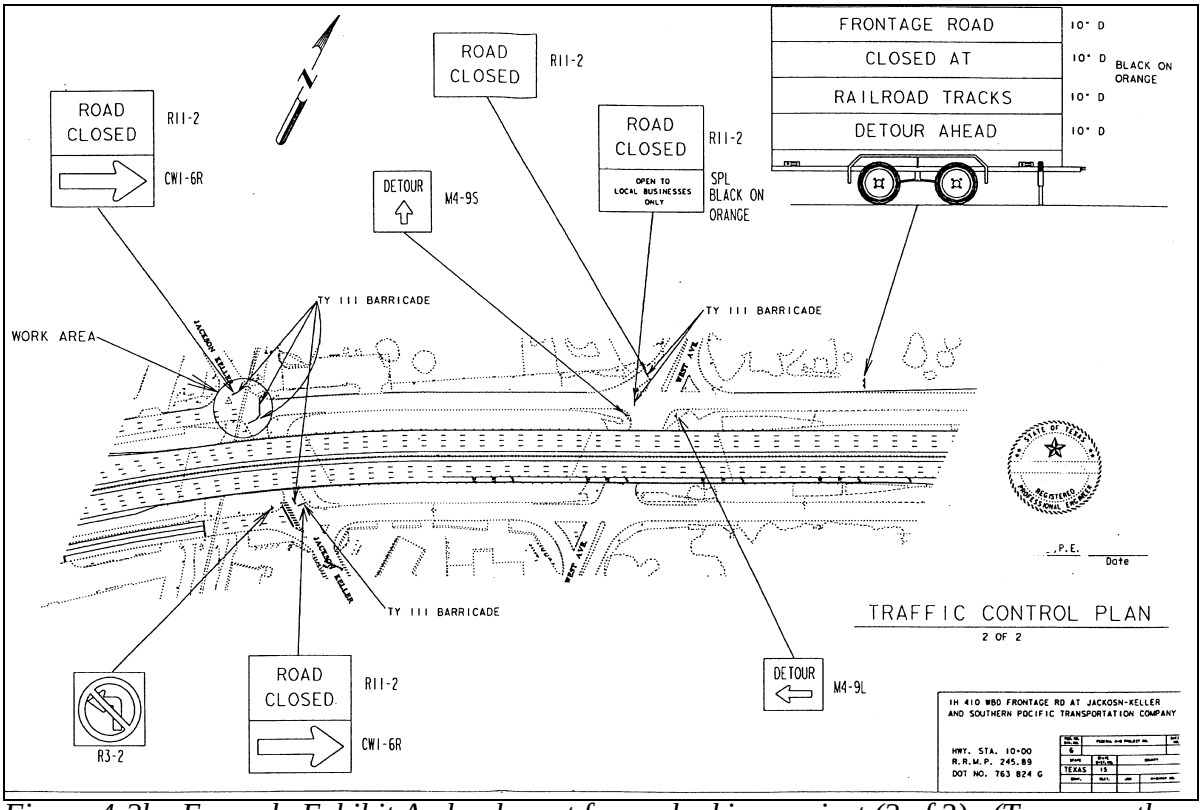


Figure 4-2b. Example Exhibit A plan layout for replanking project (2 of 3). (To access the MS Word version of all 3 panels of this figure from online, click this file name: TFEG4-2.)

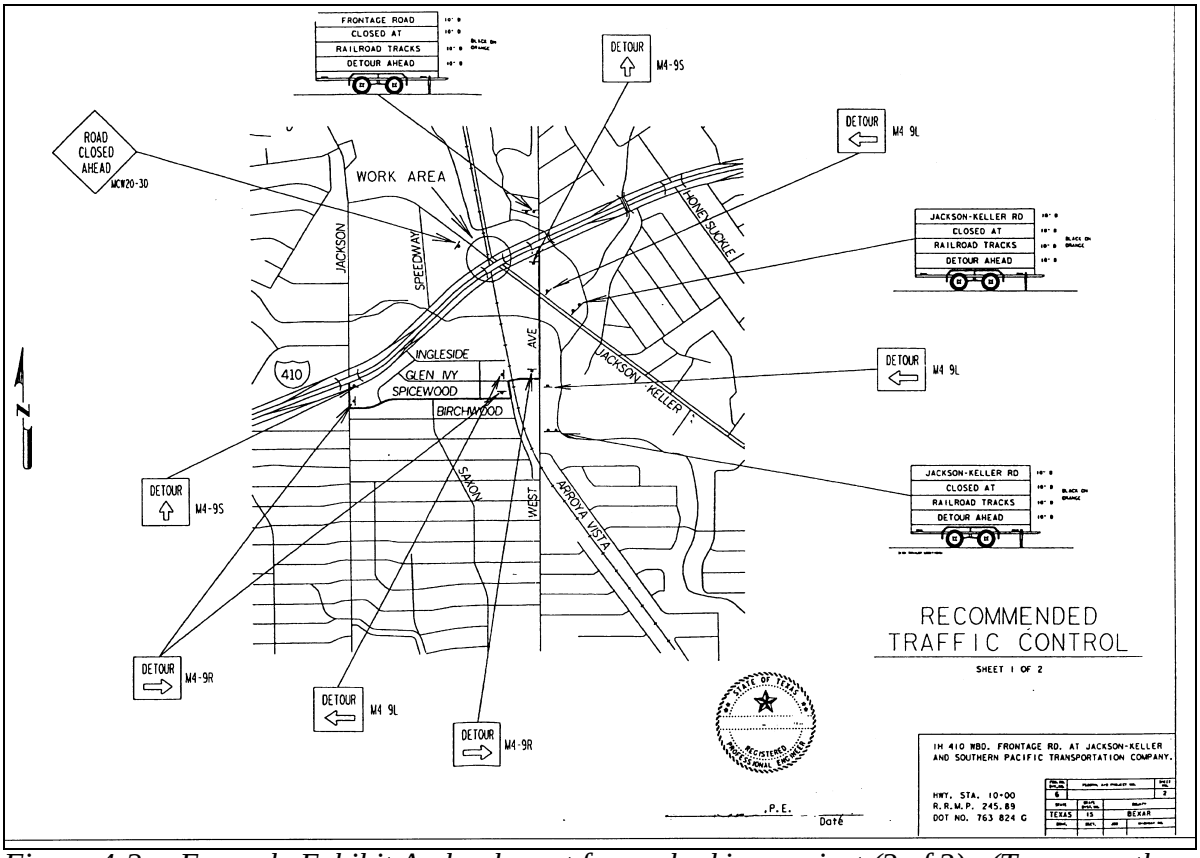


Figure 4-2c. Example Exhibit A plan layout for replanking project (3 of 3). (To access the MS Word version of all 3 panels of this figure from online, click this file name: TFEG4-2.)

Section 4
Agreements and Negotiations

Introduction

Railroads may participate in the Replanking Program by negotiating a contract with the state called a "master agreement" or by executing separate agreements for each project.

Master Agreements

Master agreements are in place with each railroad company that receives new projects on a regular basis and are the preferred contracting instrument under the railroad dedicated fund programs. Master agreements are updated each year by adding an Exhibit L (List of Projects) to the original master agreement. This eliminates the need for a separate agreement each year or for each project, saving administrative time and resources.

Master agreements contain:

- ***scope of work***, including:
  - the responsibilities of the railroad and the state
  - the quality of materials
  - the inspection of materials
  - requirement that all rail joints be welded
  - requirements for subgrade stabilization work (if necessary)
  - materials the state will not pay for (rails, tie plates, rail anchors, track spikes, and other material or labor intrinsic to maintenance of the railroad tracks)
  - railroad maintenance responsibilities
  - reference to the Exhibit A
- ***a work order clause***, explaining the requests, issuance, and receipt of work orders
- ***a payment clause***, covering:
  - conditions and guidelines for reimbursement
  - railroad submission of final bills

(continued...)

Master Agreements *(continued)*

- ***solicitation of bids clause (optional)***:
  - requiring that the railroad submit sufficiently detailed uniform proposals to qualified contractors using the Detailed Estimate for Railroad Solicitation of Bids (TxDOT Form 1891) (see "Form Available" following this list)
  - requiring the submission of at least three qualified contractors to the state for approval
  - requiring that approval of bids be contingent on sufficiency of detail, uniformity, and cost.
  - including information concerning the railroad's recommendation
  - limiting the time frame of the project notice.

Form Available. A sample Form 1891, Detailed Estimate for Railroad Solicitation of Bids, is provided in Appendix A of the hard copy print version of this volume. This sample form may be photocopied as necessary. Copies may also be obtained from the Traffic Operations Division (TRF). In the on-line version of this volume, an MS Word version of the form may be opened and printed out by clicking on the following file name: TFE-1891.

Individual Project Agreements

The railroad may also participate in the Replanking Program by negotiating a separate agreement for each project on the program. In addition to the items required in a master agreement, individual project agreements should include:

- ***project data***, including:
  - location of the project
  - county
  - control-section-job (CSJ)
  - highway number or street name
  - project number
  - DOT number (if available)
  - city
- ***a construction and maintenance clause***, specifying:
  - details relating to the request, issuance, and receipt of work orders
  - materials for which the state will not reimburse the railroad (rails, tie plates, rail anchors, track spikes, and other material or labor related to the improvement or maintenance of the railroad tracks)
  - the railroads future responsibility for maintenance after the project is complete

(continued...)

Individual Project Agreements *(continued)*

- ***conditions***, including:
  - the conditions under which the agreement may be canceled.
  - a requirement that the railroad retain adequate cost accounting records
  - provision for state inspection of construction.

Negotiations

TRF coordinates all comments from participating parties (districts, railroad companies, industries, counties, cities, etc.) and prepares all necessary agreements. TRF also acts as liaison in negotiations with all parties involved.

TRF reviews the Exhibit A plan layout and traffic control plans, and prepares and sends project notices to the railroad companies.

Section 5
Project Execution

Work Order

After all materials are assembled, delivered to the job site, and a crew is scheduled, the district issues the work order to the railroad at the railroad's request.

The district should send a copy of the work order to the Traffic Operations Division (TRF) and the Finance Division (FIN). The work order authorizes payment to the railroad.

Pre-construction Meeting

A pre-construction meeting is recommended and is the district's responsibility. Representatives from TxDOT, the railroad, and their respective contractors should attend the meeting so that work can be coordinated. The construction schedule and individual points of concern should be discussed and any scheduling conflicts identified and resolved.

Inspection

The district inspects the work performed by the railroad and verifies that the work complies with the approved plans and specifications.

Completion Letter

The district issues the completion letter to the railroad when the project is complete. A copy of the completion letter should be sent to TRF and FIN. The completion letter authorizes final payment to the railroad.

Chapter 5
Spur Tracks

Contents:

Section 1
Overview

Introduction

Spur track crossings are generally discouraged. However, under certain circumstances, TxDOT may allow both grade-separated and at-grade spur track crossings on conventional highways. On interstate and other controlled access highways, *only* grade-separated crossings may be allowed.

Grade-separated Crossings

TxDOT may allow a grade-separated crossing if the industry or railroad desiring the crossing agrees to finance and construct it.

The district, in conjunction with the Design Division (DES) and the Traffic Operations Division (TRF), determines the need for a grade separation based on the following factors:

- average daily traffic volume
- volume, type, and time of train movements
- location of proposed crossing
- safety of the traveling public
- other pertinent considerations.

Cost. The Texas Administrative Code (43 TAC §25.75) requires that the total cost of constructing a grade separation be borne by the party applying for the spur permit. (See Chapter 7 of this volume for more information on grade separations.)

At-grade Crossings

A spur track at-grade crossing may be allowed on non-interstate and non-controlled access highways if, in the opinion of the district and DES, the anticipated volumes of train and vehicular traffic and other factors indicate that the crossing will not be overly hazardous to the traveling public.

Costs. If a spur track grade crossing is allowed, all costs of the crossing pavement, highway adjustments, warning devices, and maintenance is borne by the party requesting the spur track.

Conditions may be specified whereby a change in traffic or train conditions or volumes will require a future separation of grades at no expense to TxDOT.

Request for Crossing

A railroad company, an industry, or both can request a spur track crossing. If a railroad company plans to provide rail service to the industry making the request, then both the railroad and industry should become a party to the request and agreement executed with TxDOT for the spur track permit.

Requests to cross TxDOT's right-of-way with a spur track must be submitted in writing to the district involved.

Processing a Request

Upon receiving a request for a spur track crossing, a district proceeds as follows:

1. The district investigates the possibility of the applicant (railroad or industry or both) obtaining rail service by alternate means that will not require an additional highway crossing. These means could be servicing through a different railroad company or through joint use of a nearby existing spur track crossing.
2. If an alternate plan is impracticable, the district should forward the spur track request to TRF, along with a report and recommendations. The report should include:
   - a map showing the location of the proposed spur track crossing
   - average daily traffic at this location
   - applicant's estimate of the number and length of trains anticipated to cross the highway during each 24-hour period.

Upon receiving a request and recommendations concerning a proposed spur track from the district, TRF:

1. reviews the request
2. prepares a memorandum to TxDOT administration requesting approval of the spur track permit.

Upon administrative approval, TRF:

1. forwards a copy of the approval to the district
2. prepares the necessary agreement
3. works with the district and railroad company or industry or both in preparing, negotiating, and executing the agreement.

Section 2
Plan Layout (Exhibit A)

Introduction

The applicant, with guidance from the district, should prepare plan layouts to serve as Exhibit A in the agreement. These layouts are similar to the preliminary layouts the district prepares for a diagnostic inspection (see Chapter 6, Section 6 of this volume).

Site Inspection

The Traffic Operations Division (TRF) arranges a site inspection with representatives from the district, TRF, and the applicant (railroad, industry, or both) involved to determine:

- type of traffic control devices to use
- location of signals and other appurtenances
- length and type of crossing pavement to be installed
- location and size of drainage structures, if needed
- any other features to be located in the plan layout.

Finalization of Exhibit

The applicant or district (depending on who is doing the work) adds the agreed upon features to the exhibit. If the applicant finalizes the exhibit, the applicant then furnishes a reproducible tracing to the district for review. The district then forwards it to TRF for inclusion in the agreement.

Section 3
Agreement and Negotiations

Contents

Using the plan layout furnished by the applicant through the district as Exhibit A, TRF prepares the necessary agreement and forwards it to the railroad or industry or both for their approval.

Agreement Contents

The agreement contains the following:

- project data
- permission
- scope of work
- insurance clause
- other applicable considerations.

Discussions of each of these items follow.

Project Data

Project data include the location of the project: county, highway, and city.

Permission

The permission clause gives the railroad or industry permission to construct, maintain, and operate, at its sole expense, a spur track across TxDOT's right-of-way. The clause states that the railroad or industry will perform or have performed all work pertaining to the crossing and that it will be done at no expense to and to the satisfaction of TxDOT. Also, the crossing will be maintained to TxDOT's satisfaction.

Scope of Work

The scope of work lists all work to be performed by the railroad or industry in constructing the spur track. If TxDOT performs any work, the railroad or industry will reimburse TxDOT.

Insurance Clause

The insurance clause specifies the type of insurance the railroad or industry or both must purchase on behalf of TxDOT.

Other Considerations

Other considerations that may apply to the agreement follow.

Modifications to the Highway. If TxDOT elects to modify the highway in any way that will affect the spur track grade crossing , TxDOT will have the right to make such modifications, and the railroad or industry will make the necessary changes at its own expense.

Liability. TxDOT does not assume any liability for suits, claims, or damage of any kind arising out of or incidental to the construction, maintenance, or operation of the flashing light signals or crossing.

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 (5 minutes is the maximum time a crossing can be blocked under Texas Transportation Code). If more than the normal time is needed, the railroad or 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 that a grade separation is required, the railroad or industry or both will finance and construct the structure. The terms of the grade separation structure will be handled under a separate agreement.

Section 4
Construction Inspection and Project Completion

Inspection

The district inspects the work performed by the railroad or industry to assure that the it meets approved plan layouts and specifications.

Upon completion of the spur track crossing, the district notifies TRF so that a joint final inspection can be conducted on both the signal and crossing installations.

Obtaining DOT Inventory Number

The railroad or industry must obtain a U.S. Department of Transportation crossing inventory number (DOT No.) for the crossing and advise the district when it is assigned. The district then advises TRF and the Transportation Planning and Programming Division (TPP).

Chapter 6
Warning Signals and Devices

Contents:

Section 1
Overview

Introduction

This chapter covers projects involving the installation and upgrading of warning signals and devices used at highway-rail crossings.

General Guidelines

The *Railroad-Highway Grade Crossing Handbook*, second edition, published by the U.S. Department of Transportation, Federal Highway Administration, provides general information on highway-rail grade crossing characteristics, and the physical and operational improvements that can be made to enhance safety and operation of both highway and rail traffic over crossing intersections. The guidelines and alternative improvements presented in the handbook have been proven effective and are accepted nationwide.

The *Texas Highway-Rail Intersection Field Reference Guide*, Research Report 1273-F, dated May 1994, provides further information. Copies are available through TxDOT's Research and Technology Transfer Office.

The type of warning system to be installed is determined during a site inspection by a diagnostic team as described in Section 6 of this chapter.

Federal Funding Requirements

All agreements between TxDOT and railroad companies involving federal funds for grade crossing warning signal projects must meet the requirements of the *Federal-Aid Policy Guide (FAPG)*, Title 23, CFR Part 140, Subpart I, and 23 CFR, Part 646, Subpart A & B.

TRF's Role

The Traffic Operations Division (TRF) handles all negotiations with the railroad companies and coordinates with the districts for installation of grade crossing warning signals and devices or upgrading of existing signals at grade crossings.

Section 2
Programs and Finances

Highway Construction Projects

Individual signal projects may be proposed for highway or street crossings on the Federal-Aid Urban Systems in cities, although these projects are generally in conjunction with roadway construction projects. These projects are *not* subject to the statewide priority system and are financed from district construction allocations.

Automatic warning devices generally should be installed or upgraded for crossings within the limits or near the terminus of a construction project. The *FAPG* Title CFR 23, Part 646B, Section 646.214 design requires the installation of automatic warning devices where one or more of the following conditions exist:

- multiple main line railroad tracks
- multiple tracks at or in the vicinity of the crossing which may be occupied by a train or locomotive so as to obscure the movement of another train approaching the crossing
- high speed train operation combined with limited sight distance at either single or multiple track crossings
- a combination of high speeds and moderately high volumes of highway and railroad traffic
- any combination of:
  - a high vehicular traffic volume
  - high number of train movements
  - substantial number of school buses or trucks carrying hazardous materials
  - unusually restricted sight distance
  - continuing crash occurrences
- a diagnostic team's recommendation.

Financing. Financing for the devices is included in construction projects at the programming stage.

Coordination. As roadway planning advances, the district should furnish TRF a letter-size location map for advancing the project with the Design Division (DES) and the Federal Highway Administration (FHWA). TRF should be advised which construction project the crossing project applies to, the project letting date, and furnished a preliminary layout showing the existing and proposed roadway.

Federal Programs

The Federal Railroad Signal Program is funded under the Surface Transportation Program (STP), Federal Section 130 of the current federal transportation act. Highway-rail grade crossing warning devices and grade crossing hazard elimination projects are funded by the safety set-aside portion of the STP. Railroad crossing hazard elimination projects may include improving roadway alignment, consolidating and closing redundant, non-essential grade crossings, removing sight distance obstructions, etc. All public highway-rail grade crossings are eligible for the Federal Railroad Signal Program, except for industry spur track crossings located on the state highway system where the spur track crossed an existing highway. (See Section 3 of this chapter for detailed information on the Federal Railroad Signal Program.)

School Bus Program. The Federal Railroad School Bus Signal Program is included as a part of the federal program of work funded by STP. All unsignalized public highway-rail grade crossings used by school buses carrying students are eligible for this program, with the exception of industry spur track crossings located on the state highway system where the spur track crossed an existing highway. Districts are responsible for furnishing updated school bus moves over public crossings to TRF for updating in the state crossing inventory. Districts should obtain this information from the school districts on an annual basis. (See Section 3 of this chapter for detailed information on the Federal Railroad School Bus Signal Program.)

Railroad Signal Maintenance Payment Program

The Railroad Signal Maintenance Payment Program is a state funded program to provide a fixed annual unit payment to the railroads for maintenance of railroad signals on the state highway system only. This program is managed under the bank balance allocation procedures and submitted for approval by Transportation Commission Minute Order in the annual Project Development Plan (PDP).

Payment is based on the type of warning device in place as of August 31st of each program year. Payment is provided based on the following schedule.

State Railroad Signal Maintenance Payment Program Schedule

Type of Warning Device	Annual Payment per DOT Numbered Location
Mast Flashers	$300
Cantilever Flashers	$400
Gates and Flashers	$800

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. TRF coordinates these verifications through the districts, the Transportation Planning and Programming Division (TPP), and the railroad companies. TRF normally requests that the districts verify the type of warning device in place at each crossing located on the state highway system between December and March, following the August 31 cut-off date to verify payment is warranted.

The district is responsible for verifying the type of warning device in place and forwarding any corrections to TRF for verification and coordination with TPP and the railroads companies.

TRF is then responsible for issuing a recommended payment amount to the railroad and requesting their concurrence in the payment amount. After the railroad acknowledges the agreed upon amount and any discrepancies are reconciled, TRF sends the approved Form 132 Billing Statement to the Finance Division (FIN) to process payment to the railroad company.

TRF furnishes corrections to the crossing inventory to TPP for updating with the Federal Railroad Administration.

Section 3
Federal Railroad Signal Program

Introduction

This section describes eligibility, funding, selection, and processing for projects under the Federal Railroad Signal Program. (For a basic description of the program, see Section 2 of this chapter.)

Eligibility

Project Eligibility. All public highway-rail grade crossings are eligible for the Federal Railroad Signal Program, except for industry spur track crossings located on the state highway system where the spur track crossed an existing highway. For more information on spur tracks, see Chapter 4 of this volume.

Eligible Work. Under the federal program, project work may include:

- improvement of roadway alignment
- consolidation and closing of redundant, non-essential grade crossings
- removal of sight distance obstructions, etc.
- upgrade of railroad warning devices.

Funding

Funding participation is 90 percent federal and 10 percent state. TxDOT does not require a local funding match for projects off the state highway system. However, local participation in these projects is encouraged and can include:

- utility adjustments
- placement or adjustment of curb and gutter sections
- drainage improvements
- roadway alignment improvements
- removing sight distance obstructions located off railroad right-of-way (for example, trimming or removing vegetation)
- maintaining pavement markings and advance warning signs.

Project Selection and Prioritization

Statewide selection and priority ranking of projects is based on the Texas Priority Index (described in Section 4 of this chapter). The formula used to calculate the index (also described in Section 4) relies on data contained in the state railroad crossing inventory. (See Chapter 1 of this volume for information on the crossing inventory.) Crossings having the highest relative priority are selected for railroad crossing signal warning devices or upgrading, as funds become available under the federal signal program.

Tentative Project List. Initially, TRF develops a tentative project list and distributes it to the districts for review and comment. The list contains projects meeting the program criteria making them eligible for modification in the next fiscal year. The districts are encouraged to make on-site investigations of all crossings on the list to determine the accuracy of the information.

After the on-site investigations, the districts should recommend deletions or additions of projects based on discrepancies or changes in vehicle traffic, rail traffic, type of warning device in place, school bus information, or crash data reported in the inventory. Railroad companies are also furnished this list and have the opportunity to make recommendations or corrections to the information.

NOTE: Districts are encouraged to make periodic reviews of all public crossings under their jurisdiction to ensure that the information reported in the inventory and used to calculate the priority indexes is reasonably accurate.

Project Processing Overview

Projects selected under the federal railroad signal programs are processed as follows:

1. The Texas Transportation Commission approves bank balance allocation program funding amount and method of project selection.
2. TRF coordinates with the districts and railroads to prioritize projects and allocate funds until the established funding is expended.
3. The FHWA obligates the funds.
4. District performs a topographic survey of location, prepares preliminary layouts, and submits them to TRF. (See Section 5 of this chapter for details on project layout preparation.)
5. TRF schedules diagnostic inspection. Diagnostic team agrees on and recommends safety improvements to be accomplished. (See Section 6 of this chapter for details of the diagnostic inspection.)

(continued...)

Project Processing Overview *(continued)*

6. District develops project layouts (to be used as Exhibit A) from diagnostic team field notes and sketches and submits them on 11×17 inch sheets with signed, sealed, and dated title and layout sheets to TRF. (See Section 5 of this chapter for details on layout sheet preparation.)
7. TRF reviews project layouts (Exhibit A) and transmits it to the railroad, requesting approval of plans, estimate, and wiring diagrams. (See Section 7 of this chapter for details.)
8. Railroad approves project layouts and prepares estimate and wiring diagrams and sends them to TRF. (See Section 7 of this chapter for details.)
9. TRF reviews estimate and wiring diagrams; prepares and approves Exhibit B set of approved plans, specifications, and estimates; and sends items to railroad and district as approved and ready for construction, following issuance of work order. (See Section 7 of this chapter for details.)
10. TRF issues work order upon request from railroad.
11. District coordinates any work to be done by the state, city, or county; stakes the project; provides fill material, signing, pavement markings, and construction inspection; and advises TRF when project is complete. (See Section 8 of this chapter for details.)
12. Railroad coordinates with district and performs the installation, then advises the district and TRF when signals are in service. (See Section 8 of this chapter for details.)
13. TRF schedules final inspection with district, city or county, and railroad and provides certification that project is complete to FHWA. (See Section 8 of this chapter for details.)
14. Railroad bills TxDOT.
15. TxDOT pays railroad.
16. FHWA reimburses TxDOT.

Section 4
The Texas Priority Index

Introduction

The Texas Priority Index is used to prioritize projects qualifying for the Federal Railroad Signal Program. This section describes the index and the formulas used to calculate it.

The Texas Priority Index is re-calculated at least once per year for every public highway-rail grade crossing eligible for federal-aid program funds. TRF is responsible for calculating the index using data maintained and furnished by the Transportation Planning and Programming Division (TPP). These data include DOT crossing inventory information, vehicle and rail traffic, types of rail service, roadway information, school bus information, and crash data provided to TPP from the Department of Public Safety. The data are used in a formula to calculate the index rating for each crossing.

Priority Index Formula

The Priority Index (PI) formula is

$$PI = V \times T \times (S \times 0.10) \times P_f \times A^{1.15} \times 0.01$$

where:

V = average daily traffic — number of vehicles per day

T = number of trains in a 24-hour period

S = speed — maximum speed of the trains

P_f = protection factor — a factor weighted according to the type of existing traffic control device as shown in the following table:

Protection Factors

Existing Traffic Control Device	Protection Factor
Gates	0.10
Cantilever Flashers	0.15
Mast Flashers	0.70
Crossbucks or Other	1.00

A = number of crashes in the last five years to the 1.15 power (when $A = 0$ or $A = 1$, then $A = 1$)

(continued...)

Priority Index Formula *(continued)*

EXAMPLE COMPUTATION:
V = 5000 v.p.d.
T = 12 trains/day
S × 0.10 = 6.0 (*S* = 60 mph)
P_f = 0.70 (mast flashers)
A = 4.92 (4 crashes in last five years to the 1.15 power)
PI = 5000 (12) (6.0) (0.70) (4.92) (0.01)
PI = 12,398

More Than One Track. At locations with more than one track where main line and switching movements occur over the same crossing and at different speeds, a priority index is calculated for both the main line traffic and switching traffic, then added together to equal the total priority index for the crossing.

School Bus Priority Index Formula

Priority ratings for unsignalized public crossings eligible for the Federal Railroad School Bus Signal Program are calculated using a special formula. (For a basic description of the program, see Section 2 of this chapter.)

The School Bus Priority Index (SBPI) formula is

$$SBPI = V \times T \times S \times A^{1.15} \times 0.01$$

where:

V = average daily school bus traffic

T = number of trains in a 24-hour period

S = speed — maximum speed of the trains

A = number of crashes in the last five years to the 1.15 power (when *A* = 0 or *A* = 1, then *A* = 1)

EXAMPLE COMPUTATION:
V = 5 SB/day
T = 12 trains/day
S = 60 mph
A = 4.92 (4 crashes in last five years to the 1.15 power)
SBPI = 5 (12) (60) (4.92) (0.01)
SBPI = 1,771

(continued...)

School Bus Priority Index Formula *(continued)*

More Than One Track. At locations with more than one track where main line and switching movements occur over the same crossing and at different speeds, a priority index is calculated for both the main line traffic and switching traffic, then added together to equal the total priority index for the crossing.

NOTE: The existing protection factor has been omitted from the school bus formula because only unsignalized crossings (crossings with crossbuck signs only) are eligible for this program.

Section 5
Project Layout (Exhibit A)

Preliminary Layout

After program approval of a warning signal project, the district prepares and submits to the Traffic Operations Division (TRF) an 11×17 inch preliminary plan layout using a 1:20 inch scale and large lettering (see Figure 6-1a & b for example title sheet and layout). This layout will become Exhibit A of the agreement. The preliminary layout should show the following information (with the numbers here corresponding to the large circled numbers on the example layout provided in Figure 6-1a & b):

(1) Project Data, including:

- county
- project
- control-section-job (CSJ)
- highway number or road name.

(2) Title Block, including:

- railroad company name
- crossing location
- crossing DOT number.

(3) Railroad milepost and highway station number at the crossing intersection.

(4) Angle between the highway and railroad.

(5) Drainage structures, utility poles, wire lines and clearances, and topography that may affect the placement of signals or the instrument case.

(6) Typical section of the highway showing

- number and width of each travel lane
- shoulders or curb (or both) and gutter
- sidewalks
- entire right of way width, if known.

(continued...)

Preliminary Layout *(continued)*

(7) Enlarged layout of approximately 30.48 m (100 feet) on either side of the crossing along the roadway and along the railroad tracks, including:

- same items listed for typical section (6).
- highways and roads within the area labeled by name (for example: Ave. K, private road, etc.)
- directional traffic arrows
- railroad tracks labeled by company and type (for example: ATSF RR – mainline, siding, etc.).

(8) Vicinity schematic layout using a scale of 1 inch = 200 feet of approximately 914.40 m (3,000 feet) of track on each side of crossing with approximate dimensions from the project location and showing all:

- tracks, switches, block signals, and railroad mile post markers
- adjacent roads that cross the tracks identified by road name, DOT number, and existing warning devices.

NOTE: In high density urban areas where numerous switches are present or in and near railroad yards, an approximate line track diagram is acceptable.

This information is needed for possible upgrade of existing railroad circuits or recommending closure of adjacent crossings.

Items to Exclude. Do not show existing or proposed signals, lens spread, instrument cabin, conduit, circuit lengths, general notes, or description of project. These things will be identified during the diagnostic inspection. Reserve a blank area for the "General Notes" (9) and for the "Description of Project" (10) to be added after the inspection.

County Base Map. Include an 8½×11 inch county base map showing the project location with the preliminary layout. Figure 6-2 shows an example county base map.

After the layout is submitted to TRF, the diagnostic inspection is scheduled. For more information on the diagnostic inspection see Section 6 of this chapter.

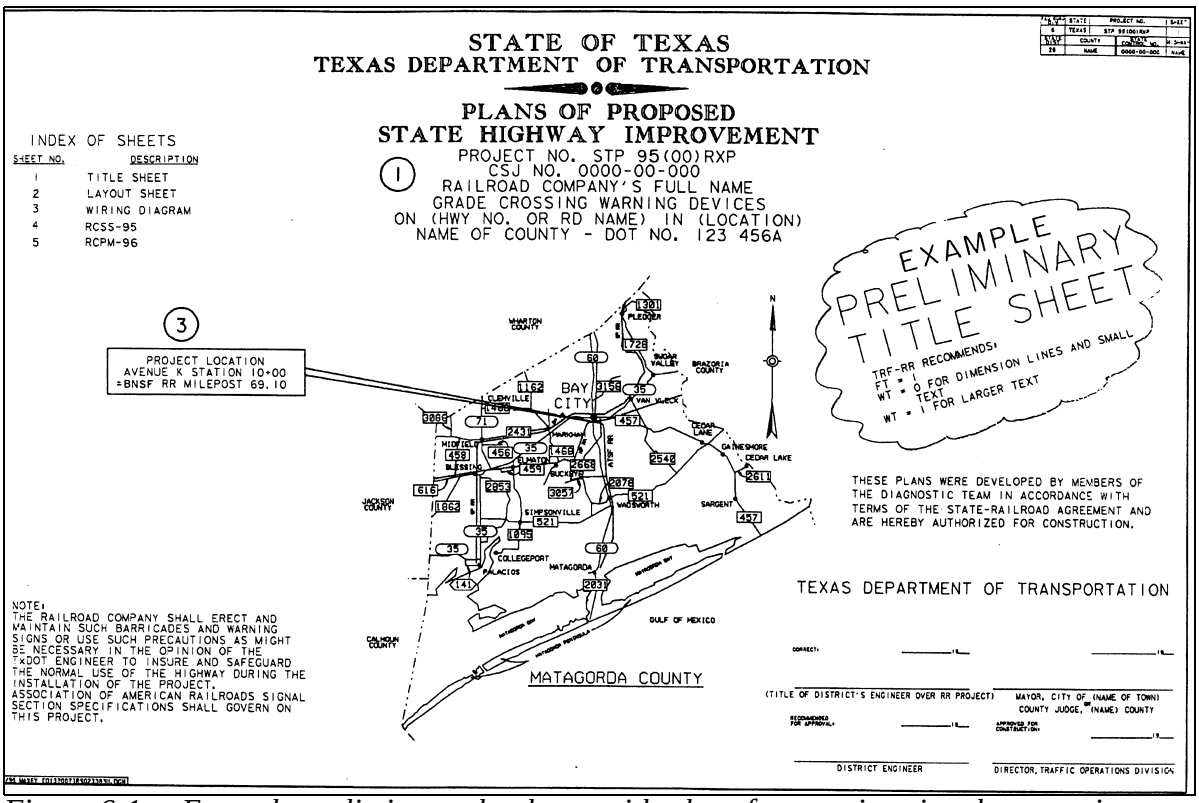


Figure 6-1a. Example preliminary plan layout title sheet for warning signal or warning device project (1 of 2). (Circled numbers explained in text.) (To access the MS Word version of both panels of this figure from on line, click this file name: TFEG6-1.)

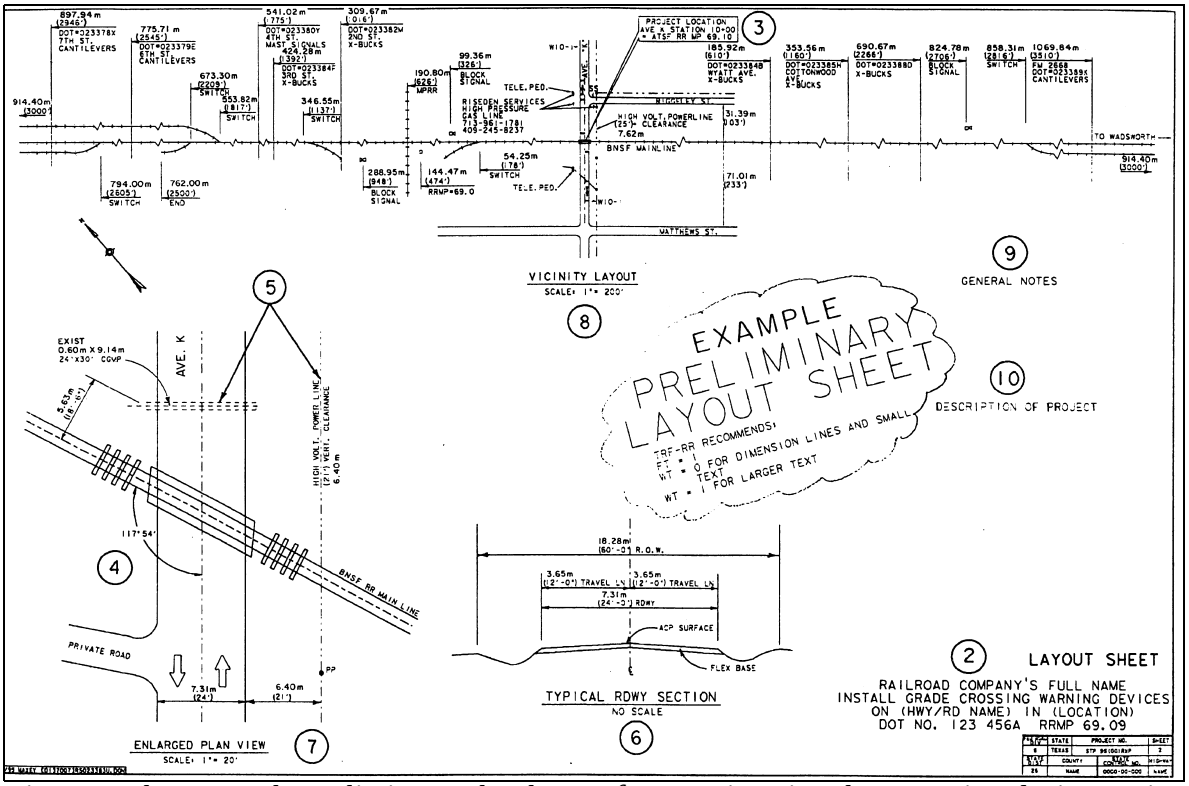


Figure 6-1b. Example preliminary plan layout for warning signal or warning device project (2 of 2). (Circled numbers explained in text.) (To access the MS Word version of both panels of this figure from on line, click this file name: TFEG6-1.)

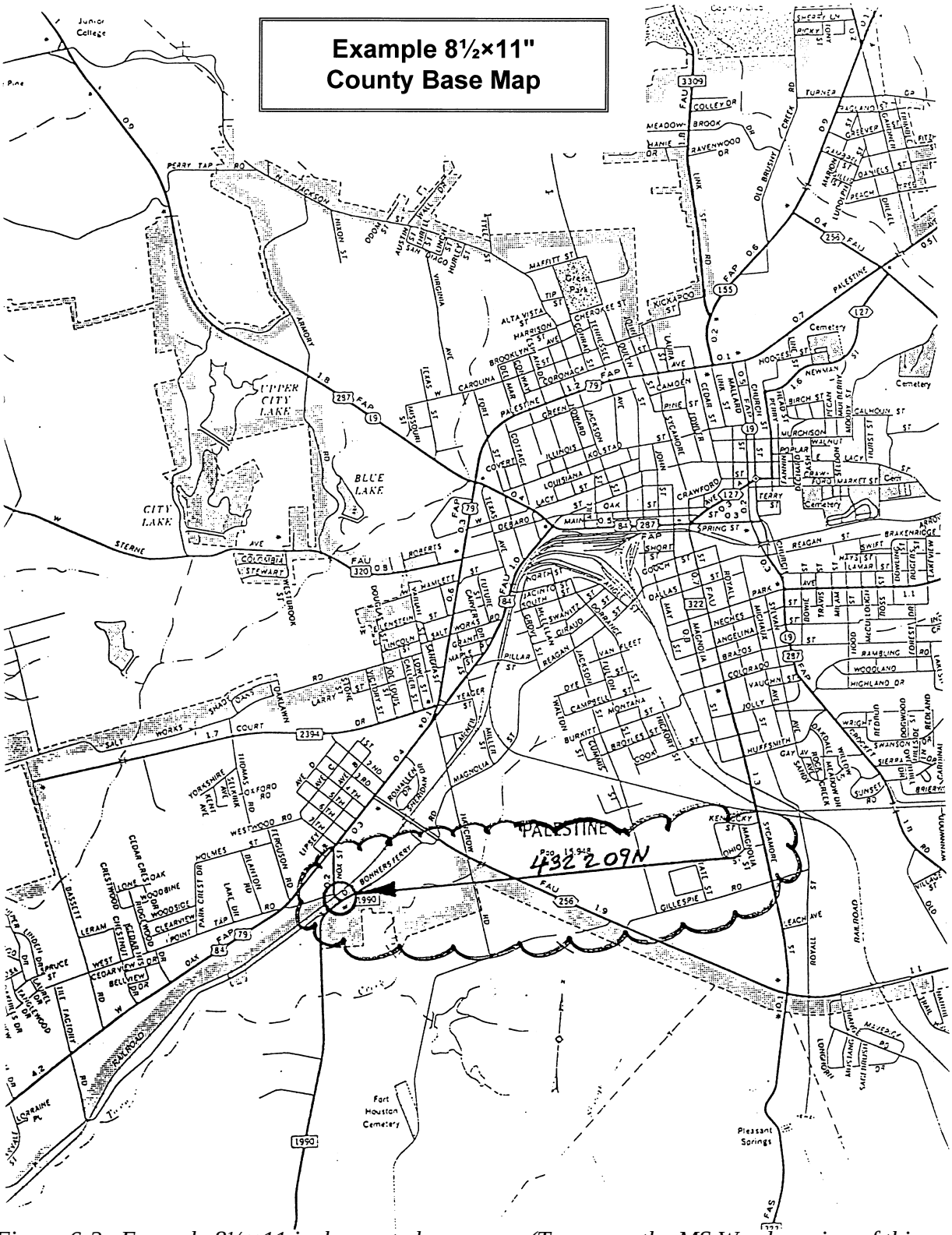


Figure 6-2. Example 8½×11 inch county base map. (To access the MS Word version of this figure from on line, click this file name: TFEG6-2.)

Post Diagnostic Inspection Additions

Following the diagnostic inspection, the district adds the following items to the layout (with the numbers here corresponding to the large circled numbers on the example layout provided in Figure 6-1b):

(9) general notes

(10) description of the project

- symbols for and locations of warning devices, instrument cabin, type and length of circuits, and other items related to the installation (not included in the preliminary layout shown in Figure 6-1b).

NOTE: All layout sheets must be signed, sealed, and dated by the registered professional engineer supervising preparation of the project layouts.

Itemized Estimate

An itemized estimate of costs showing state force account work to be done and materials to be furnished by the district for the project should be included with the completed plan layout. An example follows.

Example Itemized Cost Estimate

Item	Cost
Install stop lines, pavement markings (including RXR) and centerline striping, advance warning and malfunction signs	$2,400.00
Furnish and place fill and crushed cover rock for instrument case and signal foundations (if required)	2,000.00
Furnish and place rip-rap	2,500.00
Furnish and place reinforced concrete pipe	1,000.00
Reshape ditch	300.00
Inspection and construction engineering	1,000.00
TOTAL ESTIMATED COST:	$9,200.00

NOTE: No work should be performed by the railroad until TRF issues a work order.

After Layout Completion

The district forwards the completed project layout, title sheet, and cost estimate to TRF. For projects off the state highway system, the title sheet must be signed by the city or county or both (if more than one is involved) and signed, sealed, and dated by the professional engineer supervising preparation of the project layouts.

Section 6
Diagnostics Inspection

Purpose

The diagnostic inspection is made to determine the type of warning devices and the design of features that need to be installed at a particular location before work begins. It is also made to determine who will be responsible for the maintenance of the railroad pavement markings and signs when the project is complete.

Inspection Team Composition

The diagnostic inspection team is typically comprised of representatives from the following entities:

- the district
- the Traffic Operations Division (TRF)
- the railroad company
- city or county representatives or both (as appropriate)
- school district representatives (if applicable)
- Federal Highway Administration (FHWA) or Federal Railroad Administration (FRA) (if applicable).

District Responsibilities

Before the inspection, the district prepares the project layout used to sketch in team decisions.

The district normally contacts city, county, and school district officials as needed for the inspection and makes arrangements for their attendance.

Inspection Activities

Typically the diagnostic inspection team assembles in the field at the project location.

The diagnostic team performs the following activities:

1. considers possible elimination of the crossing
2. decides on appropriate safety enhancements
3. prepares initial project layouts
4. prepares general notes
5. determines which items of work are eligible for federal and state cost participation and reimbursement to the railroad.

Discussions of each of these items follow.

All team decisions are sketched on the project layouts prepared by the district.

Elimination of the Crossing

The diagnostic team should first consider the possibility of crossing consolidation or elimination. Closure, highway relocation, railroad relocation, and grade separation are all options for crossing elimination.

Abandoned or inactive grade crossings should be removed or appropriate signs should be placed in accordance with the *Texas Manual on Uniform Traffic Control Devices (TMUTCD)*. Warning signal devices in place at an abandoned or inactive grade crossings should be removed, covered, or turned away from the roadway.

See Chapter 11 of this volume for information on crossing closure, relocation, and consolidation and on the dismantling of warning signals.

Safety Enhancements

If the crossing is not a candidate for closure, then the diagnostic team discusses appropriate safety enhancements, such as:

- active warning devices — in most cases, train activated flashing light signals, bells, and gate arms (see *Traffic Control Standard Sheets*, "Railroad Crossing Signs and Signals")
- advance warning signs and pavement markings
- active advance warning flashers and signs, if sight distance is a factor on the crossing approach (see *Traffic Control Standard Sheets*, "Railroad Crossing Advance Warning Sign & Signal")

(continued...)

Safety Enhancements *(continued)*

- ♦ preemption of nearby traffic signals

  NOTE: Preemption is required if the intersection is within 60.96 m (200 feet) of a railroad crossing. Preemption should be considered anywhere traffic may back up over the crossing due to traffic signals or other congestion (see Chapter 7 of this volume).

- ♦ other safety enhancements, such as:
  - identifying and recommending improvements to roadway approaches and crossing surfaces
  - trimming or removing trees and vegetation, etc.
- ♦ adjustments, such as:
  - installing or modifying curb and gutter sections
  - modifying, installing, or replacing drainage structures, utility adjustments, etc.

The team determines which enhancements or combination of enhancements comprise the best solution for the safety of the traveling public at that crossing location.

Temporary STOP or YIELD Signs. The team also determines if the installation of STOP or YIELD signs would be appropriate on an interim basis until warning signal devices are in place. This recommendation is based on *TMUTCD* guidelines and an engineering study.

Initial Project Layout Preparation

After reaching a consensus on what type of safety enhancements should be implemented, the diagnostic team prepares the initial project layouts. The team decides placement locations and distances of signals, signal cabinets, signs, and other enhancements, including adjustments to existing drainage facilities and utilities. General notes are completed in the field also.

General Notes

The general notes:

- ♦ describe the type of circuitry for train activation of the warning devices
- ♦ describe upgrading of signal circuitry at adjacent signalized crossings for circuit compatibility
- ♦ assign responsibility for the specific items of work to be performed
- ♦ address the treatment of any parallel roadways.

Preliminary fill material quantities and drainage are also calculated in the field and included in the general notes.

Cost Participation and Reimbursement Eligibility

The TRF diagnostic team member is responsible for making the final determination of the items of work involved in the project eligible for federal and state cost participation and reimbursement to the railroad.

Reimbursement Methods

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

Railroad Uses Its own Forces. If the railroad uses its own forces to perform the work, reimbursement is usually made on an actual cost basis. However, if the state and railroad agree, reimbursement can be based on a lump sum cost estimate. The lump sum payment method is more like the state accepting a bid from a contractor. Fixed costs and rates are agreed to prior to project approval. Variable costs and a total lump sum cost are approved with the Exhibit B. The lump sum cost method is only used on less complex single projects.

Railroad Uses a Contractor. If the railroad uses a contractor to perform railroad force account work, they can solicit bids from a minimum of three qualified contractors or use a contractor under a continuous agreement. The continuous agreement must be for a minimum of three years to perform all warning signal installations contracted with the state.

The agreement between the state and railroad includes the necessary contractual arrangements, as outlined in Section 7 of this chapter.

Final Project Layout Preparation

The district diagnostic team member is responsible for converting all notes and decisions made at the project inspection into a final set of construction project layouts. The district must have the title sheet signed by the appropriate district officials, as well as the city or county officials as appropriate.

Section 7
Agreement Preparation and Coordination

Overview

The Traffic Operations Division (TRF) prepares the agreement, using the completed layout prepared by the district as Exhibit A. TRF requests cost estimates and a wiring diagram from the railroad. TRF then prepares the project plans (Exhibit B) and coordinates the approval of the agreement. TRF distributes copies of the signed agreement and approved plans and estimates as appropriate.

Exhibit B Plan Preparation

TRF prepares Exhibit B of the agreement. Exhibit B normally consist of:

- a title sheet
- layout sheets (Exhibit A)
- wiring diagrams
- railroad crossing warning signal device standard and railroad crossing pavement marking standard.

The district furnishes the title sheet and layouts. The title sheet and layouts must be signed, sealed, and dated by a registered professional engineer.

The railroad furnishes the wiring diagram.

TRF adds the standard design sheets.

Distribution

TRF distributes copies of the signed agreement and approved plans and estimates (Exhibit B) to:

- the district
- the Finance Division (FIN)
- the Design Division (DES)
- the railroad
- FHWA (if required — see following subheading).

FHWA Approval

FHWA approval may be required if unusual or unique work (such as crossing consolidation or elimination of safety hazards and sight obstructions in lieu of installing warning devices)is called for.

Master Agreements

Master agreements are in place with each railroad company that receives new projects on a regular basis and are the preferred contracting instrument under the railroad dedicated fund programs. Master agreements are updated each year by adding an Exhibit L (List of Projects) to the original master agreement. This eliminates the need for a separate agreement each year or for each project, saving administrative time and resources.

The agreement covers construction and maintenance details for preparing and approving plans, specifications, and estimates; issuance of work order; sub contracting requirements; federal-aid policy guide requirements; methods of payment; and conditions for reimbursement.

Individual Project Agreements

For railroads or projects not under a master agreement, TRF prepares and negotiates a separate project agreement. In addition to the items required in a master agreement, individual project agreements should include project data (location, county, control-section-job number, highway name, project number, and DOT number). Additional condition clauses in the event the project is canceled prior to letting, etc. may also be necessary.

Negotiations

TRF coordinates all comments from participating parties (districts, railroad companies, industries, counties, cities, etc.) and prepares all necessary agreements. TRF also acts as liaison in negotiations with all parties involved.

TRF reviews the Exhibit A project layouts and traffic control plans, and prepares and sends the approved Exhibit B project plans and work order to the railroad companies.

Section 8
Project Execution

Work Order

TRF issues the work order for railroad warning signal device projects upon request by the railroad company.

Project Coordination

The district coordinates any work done by the city or county with the railroad. Such work may include:

- staking the project for placement of signals and appurtenances
- providing fill and cover material
- installation of curbing, drain pipes, culverts, etc.
- inspection during construction
- notifying TRF when work is completed.

Routine Project Inspection

The district should keep a general record of the railroad's daily labor and equipment rental. The railroad notify the district if any delays occur during construction.

Final Inspection

Unless the district is approved to do final inspections, TRF schedules and conducts the final inspection of each project upon notification by the district and railroad.

The purpose of the final inspection is to verify that all safety enhancements involved in the project have been made and all traffic control devices, signs, pavement markings, railroad appurtenances, and other items of work listed in the general notes have been installed in accordance with the approved plans. All equipment and material installed by the railroad is checked against an inventory of materials furnished by the railroad. Any discrepancies from the approved plans are noted.

Project Certification

Prior to project certification, the responsible party must correct all items noted during final inspection that were not in accordance with the approved plans. The district then furnishes a memo to TRF certifying that the project has been installed in accordance with the approved plans (see Figure 6-3 for example). TRF then certifies the project to the FHWA.

MEMORANDUM

Texas Department of Transportation

TO: Mr. Thomas D. Beeman, P.E.
Traffic Operations Division

DATE: _____

FROM: _____, P.E.

ORIGINATING OFFICE:
_____

SUBJECT: Project Certification
_____ County – DOT No. _____
CSJ _____
Project _____
Location _____ (20___)

This is to certify that all work has been completed in accordance with terms of the agreement for the above referenced railroad grade crossing location. Work, consisting of installation and/or modification of automatic warning devices and all signing and pavement markings is acceptable and in accordance with the *Texas Manual on Uniform Traffic Control Devices (TMUTCD)*. All materials installed are in compliance with the plans and specifications. A final on-site inspection was made on _____.

Attached please find the original list used to inventory materials furnished and installed by the railroad company for this project. Also, included are photographs depicting the roadway approaches and railroad track approaches for this intersection.

If you have any questions, please contact _____, telephone number _____.

__/__

Attachments

Figure 6-3. Example project certification memo. (To access the MS Word version of this figure from on line, click this file name: TFEG6-3.)

Section 9
STOP and YIELD Signs at Grade Crossings

Background

Recent legislation has made it easier to install STOP and YIELD signs. Nevertheless, the responsible authority should ensure that such installations are justified, and that they are in conformance with all applicable standards.

National and State Provisions

National* MUTCD *Revision. Section 1077 of the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) granted states and local governments discretionary authority to install STOP or YIELD signs at highway-rail grade crossings that have two or more trains per day and are without automatic traffic control devices. This required the following revision of Section 8B-9 of the *National Manual on Uniform Traffic Control Devices (MUTCD)*:

> STOP or YIELD signs may be used at highway-rail grade crossings, at the discretion of the responsible state or local jurisdiction, for crossings that have two or more trains per day and are without automatic traffic control devices.

Texas MUTCD *Provisions.* The *Texas Manual on Uniform Traffic Control Devices (TMUTCD)* limits use of the STOP sign at railroad-highway grade crossings to those crossings selected after need is established by a detailed traffic engineering study. Such crossings should have the following characteristics:

- The highway should be secondary in character with low traffic counts.
- Train traffic should be substantial.
- Line of sight to an approaching train is restricted by physical features such that approaching traffic is required to reduce speed to 10 mph or less in order to stop safely.
- At the stop bar, there must be sufficient sight distance down the track to afford ample time for a vehicle to cross the track before the arrival of the train.

The engineering study may determine other compelling reasons for the need to install a STOP sign; however, such an installation should only be an interim measure until active traffic control devices can be installed. STOP signs cannot be used on primary through highways or at grade crossings with active traffic control devices.

Whenever a STOP sign is installed at a grade crossing, a STOP AHEAD sign must be installed in advance of the STOP sign.

Crossings with Passive Warning Signs

For other crossings with passive protection, STOP or YIELD signs may be used after need is established by a traffic engineering study. The study should take into consideration such factors as:

- volume and character of highway and train traffic
- adequacy of stopping sight distance
- crossing crash history
- need for active control devices.

Sign Placement

For all highway-rail grade crossings where STOP or YIELD signs are installed, the placement must conform to the requirements of *MUTCD*, Section 2B-9, "Location of STOP Sign and YIELD Sign." STOP AHEAD or YIELD AHEAD advance warning signs must also be installed.

Assessing Need for Signs

The Federal Highway Administration (FHWA) and the Federal Railroad Administration (FRA) have cooperatively developed guidelines titled "Considerations to Apply in Assessing the Need for STOP or YIELD Signs at Highway-Railroad Grade Crossings." The following guidelines are taken from these considerations.

General Factors

The FHWA and FRA recommend that the following general factors be considered when reviewing a crossing for possible STOP or YIELD sign installation:

- volume, type, and speed of highway traffic
- frequency, type, and speed of trains
- number of tracks
- intersection angles
- adequacy of stopping sight distances
- need for automated warning devices
- crossing crash history.

Specific Factors

The FHWA and FRA recommend that specific factors be applied in determining first priority with respect to new STOP sign installations. The following considerations should be met in *every* case before a STOP sign is installed:

- Local or state police and judicial officials will commit to a program of enforcement no less vigorous than would apply at a highway intersection equipped with STOP signs.
- Installation of a STOP sign would not occasion a more dangerous situation (taking into consideration both the likelihood and severity of highway-rail collisions and other highway traffic risks) than would exist with a YIELD sign.

Positive Indications

Any one of the following conditions indicate that use of STOP signs would tend to reduce risk of a highway-rail collision. These considerations should be weighed against the following opposing factors:

- Maximum train speeds equal or exceed 30 mph (a factor strongly correlated with highway-rail crash severity).
- Highway traffic mix include buses, hazardous materials carriers, or large (trash or earth moving) equipment.
- Train movements are 10 or more per day during 5 or more days of the week.
- The rail line is used by passenger trains.
- The rail line is regularly used to transport a significant quantity of hazardous material.
- The highway crosses two or more tracks, particularly where both tracks are main tracks or one track is a passing siding that is frequently used. (Note: If federal-aid funds are used for a highway-rail grade crossing improvement project with multiple main line tracks, gates and flashing lights are required.)
- The angle of approach to the crossing is skewed.
- The line of sight from an approaching highway vehicle to an approaching train is restricted such that approaching traffic is required to substantially reduce speed.

Opposing Factors

Factors to be weighed in opposition to STOP signs include:

- The highway is other than secondary in character and has an average daily traffic (ADT) count of 400 or less in rural areas or 1,500 or less in urban areas. (If any of the positive indications apply to a crossing with traffic counts in excess of these levels, strong consideration should be given to installation of automated warning devices.)
- The roadway is a steep ascending grade to or through the crossing, sight distance in both directions is unrestricted in relation to maximum closing speed, and the crossing is used by heavy vehicles. (Note: A crossing where there is insufficient time for any vehicle, proceeding from a complete stop, to safely traverse the crossing within the time allowed by maximum train speed is an inherently unsafe crossing that should be closed.)

Chapter 7
Traffic Signal Preemption

Contents:

Section 1
Overview

Introduction

Traffic signal preemption involves the interruption of the normal signal controller sequence with a special sequence (usually flashing operation) activated through an interface with nearby railroad grade crossing warning devices. Preemption may be either "simultaneous" or "advance."

Simultaneous preemption means that the traffic signal controller sequence is preempted at the same time the crossing warning devices begin to operate. Warning times and approach lengths are calculated as normal, unless more than the minimum 20 seconds is required between preemption and train arrival at the crossing. Simultaneous preemption does not provide a clear-out time for vehicles traversing the crossing prior to activation of the railroad warning signals.

Advance preemption means that the traffic signal controller sequence is preempted a set amount of time before the warning devices begin to operate. Advance preemption provides a clear-out traffic signal sequence time for traffic traversing the railroad grade crossing before activation of the railroad warning signals. The time required for the traffic signal clear-out sequence is in addition to the minimum 20-second railroad warning signal activation time prior to train arrival.

Need for Preemption

Preemption of a traffic signal by the railroad signals is required if the traffic signal is at an intersection that is within 60.96 m (200 feet) of a railroad crossing. Preemption should be considered where traffic may back up over the crossing due to traffic signals or other traffic congestion.

Project Process Overview

The following is an overview of a typical preemption project. See the referenced sections of this chapter for more information.

1. The district inspects the intersection to determine the extent of the work required. The district also coordinates with the railroad on the details of circuitry and project timing. (See Section 2 of this chapter for more information.)
2. The district prepares:
   - complete plan layouts (known as an "Exhibit A") showing the critical details for the project
   - a railroad Application for Underground Wireline Crossing form, if necessary
   - a preemption worksheet.

   (See Section 3 of this chapter for descriptions of these items and more information on plan layout preparation.)
3. The district submits the prepared plan layouts (Exhibit A) and the preemption worksheet to the Traffic Operations Division (TRF). (See Section 3 of this chapter for more information.)
4. TRF approves preemption timing and prepares the agreement using the layouts furnished by the district as Exhibit A. TRF then forwards the agreement and exhibit to the railroad company and handles all negotiations concerning the agreement, including any revisions.
5. Upon receipt of the signed agreements, TRF forwards a copy of the executed agreement along with the railroad estimate (if available) or the approved bid to the district and the Finance Division (FIN). TRF also supplies the district with a copy of the letter transmitting the agreement to the railroad for their approval and a copy of the TRF transmittal letter returning the approved agreement to the railroad.
6. After the agreement is signed, the district issues a work order to the railroad for any force account work, conducts the pre-construction meeting, inspects the work, and issues the completion letter. (See Section 4 of this chapter for more information on these activities.)

Section 2
Preliminary Inspection and Coordination

Introduction

Prior to preparing the plan layout, the district should conduct a preliminary inspection of the intersection being considered for traffic signal preemption. This inspection should address specific questions related to the intersection and the adjacent crossing. The district should also coordinate with the railroad at this time to determine the type of circuitry available and other technical details.

NOTE: If preemption for the intersection in question was considered as part of a diagnostic inspection for the nearby crossing (as described in Chapter 6 of this volume), then these considerations should be addressed at that time.

Intersection Characteristics

Several considerations relate to the specific characteristics of the intersection. The preliminary inspection should answer the following questions:

- Will simultaneous or advance preemption be required?
- Will any adjacent crossings or intersections require upgrading?
- Will there be pedestrian walkways?
- Are DO NOT STOP ON TRACKS signs needed?
- Where will loop detectors be placed? (They should be away from stop bars.)

Equipment and Circuitry

The type and compatibility of traffic signal equipment, warning signals, and the related circuitry are important considerations. The preliminary inspection and coordination with the railroad should answer the following questions:

- Are the active circuitry and warning devices compatible with the proposed traffic signals?
- Do the devices and circuitry meet current federal requirements? What year was the existing circuitry installed?
- Is there an existing relay set up in the railroad instrument cabin to hook up the signal preemption? If so, then what kind?
- Will any track shunts need to be readjusted? If so, at what distance are they currently set, and what how far out is the proposed shunt?

NOTE: The installation of traffic signals requiring preemption may require the railroad to install "constant warning circuitry." To determine if the signal circuitry needs upgrading to provide the preemption, contact the railroad company.

Cost

Estimate the cost of the project. Be sure to consider the cost of the specific type of equipment needed. Make sure there is enough money in the construction budget.

Section 3
Plan Layout (Exhibit A)

Overview

The district prepares the plan layout (known as Exhibit A) for the traffic signal preemption project to show all work to be performed by TxDOT, TxDOT's contractor, and the railroad.

NOTE: All plan layouts must be signed, sealed, and dated by a registered professional engineer.

Figure 7-1 (a–c) at the end of this section shows an example Exhibit A plan layout.

Project Data

Exhibit A project data include:

- the county
- the project
- control-section-job (CSJ)
- highway number or road name.

Title Block

The Exhibit A title block includes:

- the railroad company name and DOT No. (if available)
- milepost and highway station
- the words "Exhibit A."

Work List

The Exhibit A work list includes a breakdown of all work to be performed by TxDOT, TxDOT's contractor, and the railroad company.

If Conduit Installation is Involved

Normally conduit is installed with traffic signal preemption. This requires that a railroad Application for Underground Wireline Crossing form be filled out (along with a cover application form) and submitted as part of the railroad agreement package. The district completes the forms and submits them to the Traffic Operations Division (TRF) when requesting preparation and execution of the agreement. (Samples of these forms are provided in Appendix A of the hard copy print version of this volume. These sample forms may be photocopied as necessary. Copies may also be obtained from the Traffic Operations Division.)

The plan layouts should include a 1 inch to 200 foot vicinity layout, a 1 inch to 20 foot layout, and a typical section.

Exhibit A and the PS&E drawings should include a note indicating that TxDOT's contractor will run conduit to the proposed instrument cabin, and that TxDOT or its contractor will contact the railroad 48 hours prior to any construction in railroad right-of-way to determine the location of fiber optic cables with reference to an assigned ticket number. The railroad ticket number is assigned when the Application for Underground Wireline Crossing form is processed.

If Railroad Signals Require Upgrading

If the railroad signals require upgrading, a preliminary layout drawing should be done on the 1 inch to 20 foot layout.

Preemption Worksheet

The district also completes the preemption worksheet to determine if additional time (advance preemption) is required for the traffic signal to clear out before the railroad warning devices are activated. A sample preemption worksheet (titled "Guide for Determining Time Requirements for Traffic Signal Preemption at Highway-Rail Grade Crossings") is provided in Appendix A of the hard copy print version of this volume. This sample worksheet may be photocopied as necessary. Copies of the worksheet and detailed printed instructions on calculating preemptions may also be obtained from the Traffic Operations Division.

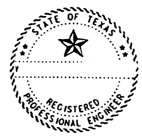
Accompanying Information

A vicinity layout sheet and pictures of the intersection and other intersections requiring upgrading (views looking north, south, east, and west) should also accompany the preemption package sent to TRF.

NOTES FOR RAILROAD:

1. EXISTING SIGNAL CIRCUITS ARE DESIGNED TO GIVE 25 SECONDS WARNING TIME PLUS 5 SECONDS ADDED FOR INSTRUMENT LAG PRIOR TO ARRIVAL OF THE FASTEST TRAIN AT THIS CROSSING.
2. EXISTING CONSTANT WARNING CONTROL CIRCUITS ARE TO BE USED ON THIS PROJECT.
3. TRAFFIC DATA 200 ADT MOVES PER DAY AT 48 KM/H (30 MPH) AND 3 THROUGH TRAINS PER DAY AT 80 KM/H (50 MPH).
4. THE TXDOT'S CONTRACTOR WILL FURNISH AND INSTALL THE APPROPRIATE PAVEMENT MARKINGS AS OUTLINED ON THE ATTACHED STANDARD AND IN ACCORDANCE WITH THE TXMUTCD AS NEEDED.
5. TXDOT'S CONTRACTOR WILL FURNISH AND INSTALL THE FOLLOWING SIGNS: (2, R15-4), (1, W 10-1), AND (2, W10-3) AS OUTLINED ON THE ATTACHED STANDARD AND IN ACCORDANCE WITH THE TXMUTCD.
6. TXDOT'S CONTRACTOR WILL INSTALL 1 (R8-8) ("DO NOT STOP ON TRACKS", SIGN) ON NORTH BOUND LANE.
7. THE RAILROAD COMPANY SHALL STENCIL THE DOT- AAR NUMBERS ON THE SIGNAL MASTS FACING ROADWAY USING 2 INCH BLACK LETTERING.
8. EXISTING RELAY AT THIS CROSSING FOR PREEMPTION IS A CLOSED CIRCUIT AND ALREADY EXIST BETWEEN THE CONTROL RELAY OF THE GRADE CROSSING WARNING SYSTEM AND THE TRAFFIC SIGNAL CONTROLLER AS STATED ON PAGE 8C-7 IN THE TXMUTCD.
9. EXISTING H X PI CONSTANT WARNING CONTROL CIRCUITS ARE TO BE USED ON THIS PROJECT W/ NO ADDITIONAL CARDS REQUIRED. H X PI INSTALLED IN 1986.
10. RAILROAD EXISTING SHUNTS TO REMAIN IN PLACE. SHUNTS ARE LOCATED AT 2070 FEET FROM ℄ OF HARLEM. SHUNTS AT HARLEM RD DOT (743382A) AND FM 1464 (743381T) OVERLAP WITH WESTMOORE SHUNTS.
11. NO ADJUSTMENTS NECESSARY AT WESTMOOR CROSSING DOT UNASSIGNED. EXISTING CIRCUITS WILL PROVIDE NO ADDITIONAL SECONDS OF TRAFFIC SIGNAL PREEMPTION PRIOR TO ARRIVAL OF THE FASTES TRAIN AT THIS CROSSING.
12. TXDOT'S CONTRACTOR WILL INSTALL WIRE TO RAILROAD'S EXISTING SIMULTANEOUS PREEMPTION RELAY.
13. NO PEDESTRIAN SIGNALS TO BE USED ON THIS PROJECT.
14. LOOP DETECTORS WILL BE INSTALLED AWAY FROM EXISTING STOP BARS.
15. TxDOT's contractor will furnish and install conduit, as shown on section E-E.

RAILROAD SIGNAL CIRCUITS FOR THIS PROJECT WERE NOT DESIGNED BY THE UNDERSIGNED ENGINEER.



The seal appearing on this document was authorized by

P.E. on

DOT NO. 176 310G

TEXAS DEPARTMENT OF TRANSPORTATION
HOUSTON DISTRICT
EXHIBIT "A"

NOTES FOR RAILROAD
FM 1093 AT WESTMOOR DR
NORTH WEST OF SUGARLAND

SCALE	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY
N.T.S.	6	TEXAS	C 1258-3-33			FM 1093
REVISIONS	STATE DISTRICT	COUNTY	CONTROL	SECTION	JOB	SHEET NO.
	HOU	FORT BEND	1258	03	033	11

REVISED BY
HOUSTON DISTRICT (1-26-98)

Figure 7-1a. Example Exhibit A plan layout for traffic signal preemption (1 of 3). (To access the MS Word version of all three panels of this figure from on line, click this file name: TFEG7-1.)

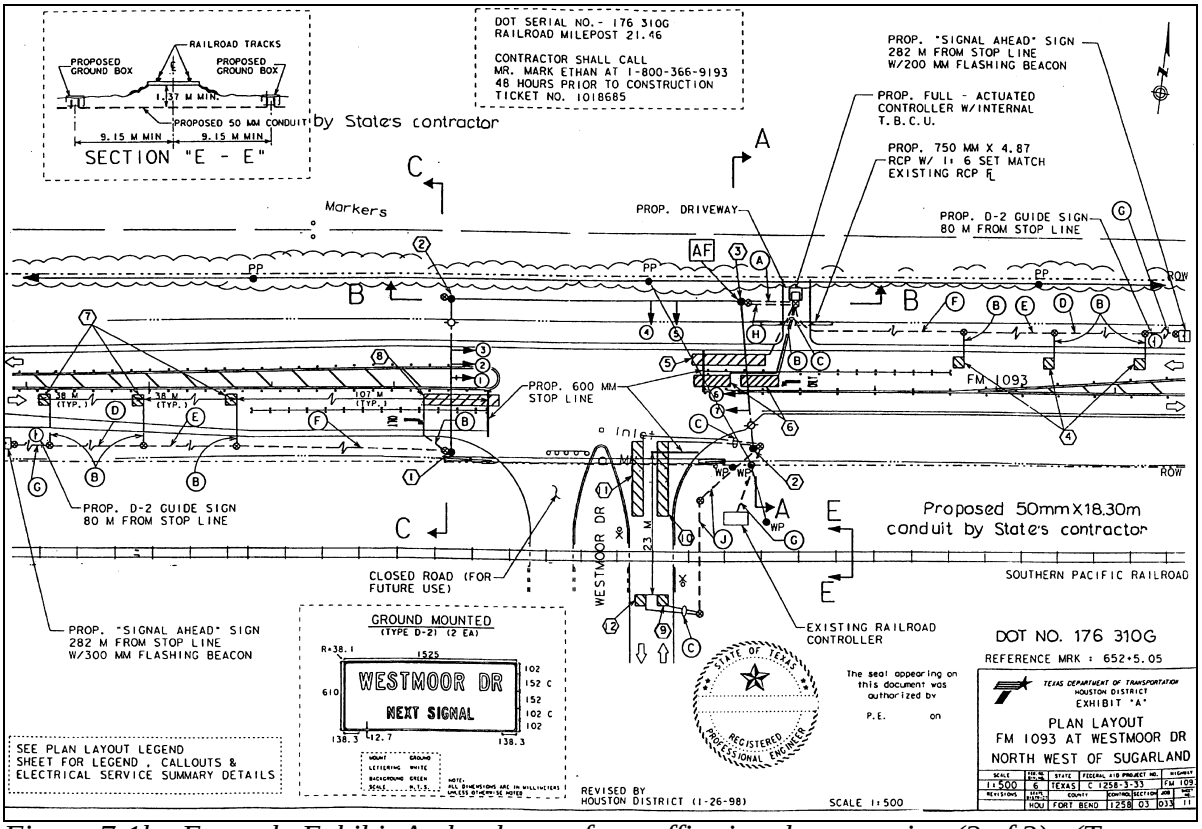


Figure 7-1b. Example Exhibit A plan layout for traffic signal preemption (2 of 3). (To access the MS Word version of all three panels of this figure from on line, click this file name: TFEG7-1.)

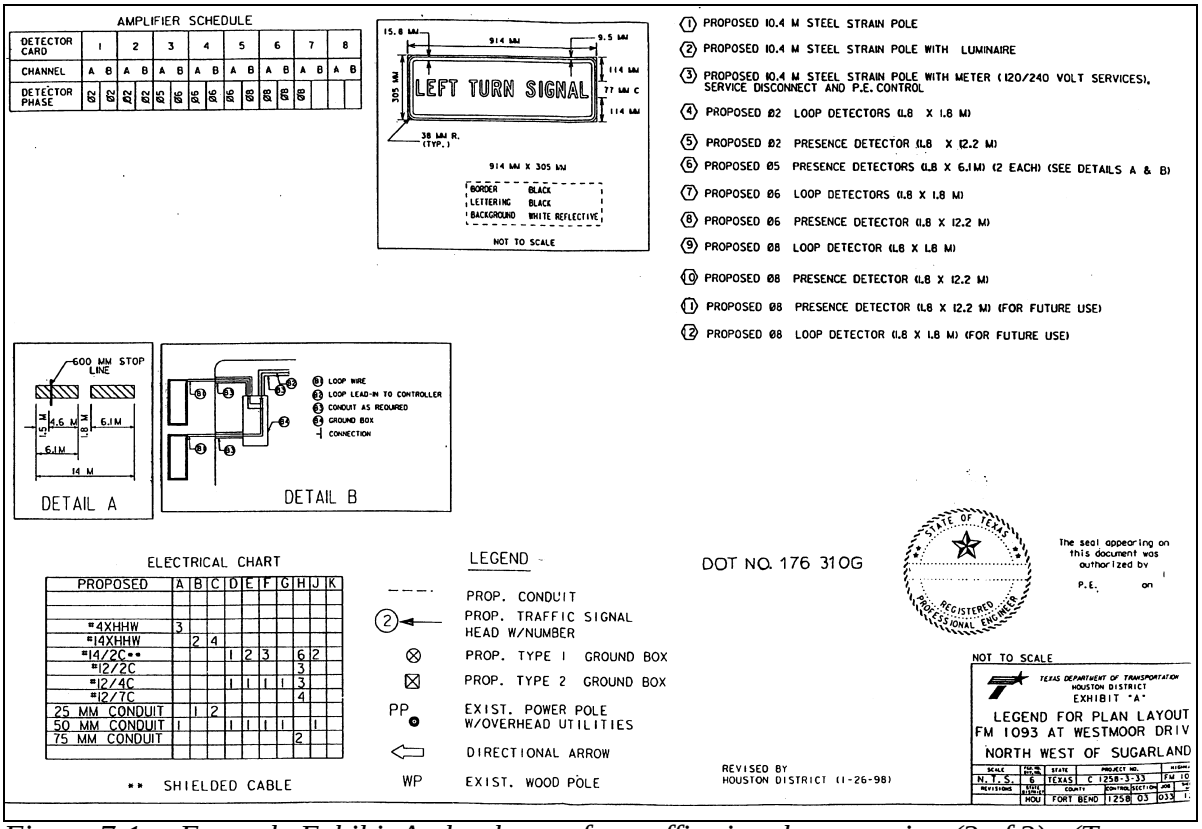


Figure 7-1c. Example Exhibit A plan layout for traffic signal preemption (3 of 3). (To access the MS Word version of all three panels of this figure from on line, click this file name: TFEG7-1.)

Section 4
Project Execution

Work Order

The district issues the work order to the railroad for any railroad force account work and keeps the railroad advised of the work in progress on their property. The work order should be issued soon after the contract has been awarded to allow the railroad sufficient time to order any necessary materials and schedule work.

The district should send a copy of the work order to the Traffic Operations Division (TRF) and the Finance Division (FIN). The work order also authorizes payment to the railroad.

Pre-construction Meeting

A pre-construction meeting is recommended so that work can be coordinated. Arranging the meeting is the district's responsibility. The following individuals should attend:

- a railroad project manager
- a city or county traffic signal representative
- a TxDOT traffic signal representative
- the TxDOT railroad liaison
- a representatives of TxDOT's contractor.

During the meeting the names of contact persons should be exchanged. The general notes, construction schedule, and any other matters of concern should be discussed.

Inspection

The district inspects the work performed by the railroad to verify that it complies to TxDOT standards and the approved plans and specifications.

Completion Letter

The district issues the completion letter to the railroad when the project is complete. A copy of the completion letter should be sent to TRF and FIN. The completion letter authorizes final payment to the railroad.

Chapter 8
Grade Separations

Contents:

Section 1
Overview

Introduction

This chapter covers agreements between TxDOT and railroad companies involving grade separation construction and reconstruction projects.

Project Process Overview

A grade separation construction or reconstruction project typically proceeds as follows:

1. Project is scheduled and funded. (See Section 2 of this chapter for information on programs and financing.)
2. The district or consultant (or both), with support from the Design Division (DES), designs the proposed structure and prepares the preliminary plan layout (including plan-profile) to be used in the agreement as Exhibit A. (See Section 3 of this chapter for details on content and preparation of Exhibit A.) The district then submits the layout to DES.

   NOTE: This submission should occur 12 months prior to the scheduled contract letting date to allow the railroad company sufficient time to review the project, address any revisions, prepare force account estimates, and sign the agreement. For railroad underpasses, design calculations should be submitted as soon as preliminary details are available. Also any details of required shoring must be accompanied by design calculations.
3. DES reviews the plan layout sheets, makes prints, and submits them to:
   - Federal Highway Administration (FHWA), if federal funds are involved
   - railroad company or companies involved, along with a request to submit the number of regular train and switching movements at the grade separation location (This information is used to prepare Addendum I to Special Provision to Item 007. Addendum I is used by TxDOT's contractor to obtain Railroad Protective Liability Insurance for work performed on railroad right-of-way.)
   - Traffic Operations Division (TRF), along with a request to develop an agreement with the railroad.

   To reduce the time needed for approval, the most current revisions should be included. (See Section 4 of this chapter for details.)
4. The FHWA, the railroad company, and TRF forward comments on and approval of the plan layout sheets to DES. (See Section 4 of this chapter for details.)

(continued...)

Project Process Overview *(continued)*

5. DES coordinates the resolution of the comments. (See Section 4 of this chapter for details.)

   NOTE: Revisions that occur after approval of the plan layout sheets increase the time needed to obtain a signed agreement from the railroad.

   NOTE: Any revisions made to the plan layouts after the district submits them to DES should immediately be sent to DES for coordination with the railroad.

6. DES and TRF coordinate the plan layout and plan-profile modifications, as necessary. The revised and approved plan layout sheets become Exhibit A of the agreement. (See Section 3 of this chapter for details.)

7. TRF prepares the agreement and negotiates with the railroad company or companies involved. (See Section 4 of this chapter for details.)

8. DES, the district, or a consultant develops bridge detail plans after all comments and changes to the geometric features of the overpass or underpass have been resolved.

9. The district prepares a complete PS&E (plans, specifications, and estimates) package and forwards it to DES for review prior to contract letting. (See Section 3 of this chapter for details.)

10. DES prepares and assembles the approved plans, specifications, and estimates (PS&E) for the portion of the project involving the railroad (this becomes Exhibit B of the agreement). DES also prepares an Addendum I to Special Provision to Item 007, which is used by the TxDOT contractor to obtain railroad protective liability insurance. (See Section 3 of this chapter for details.)

11. TRF transmits the Exhibit B approved by DES to the railroad company or companies for their approval. (See Section 5 of this chapter for details.)

12. The railroad approves the Exhibit B and returns the signed title sheet to TRF. (See Section 5 of this chapter for details.)

13. The district issues the work order to the railroad shortly after the project is let to contract. The district conducts all pre-construction meetings, inspects the work, and issues the completion letter to the railroad when the project is complete. (See Section 6 of this chapter for details.)

Section 2
Program and Finances

Federal Railroad Grade Separation Program

The Federal Railroad Grade Separation Program is financed under the Surface Transportation Program (STP) safety funds. Projects eligible for the program must be on the state highway system. The program is divided into two program areas:

- Installation of Grade Separations at Existing Highway-Rail Grade Crossings
- Replacement of Functionally Deficient Highway Underpasses.

Projects under both program areas are selected on a statewide priority basis by the Design Division (DES).

Funding. The program is managed by the Design Division (DES) under the bank balance allocation procedure. Each program receives approximately half the available funds.

Installation of Grade Separations at Existing Highway-Rail Grade Crossings

Under the Federal Railroad Grade Separation Program, projects for the construction of grade separations at an existing highway-rail grade crossings are selected on a statewide basis 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 separation structures. The formula used to calculate CBI rankings considers:

- current average daily traffic (ADT)
- number of trains per day
- number of train-involved crashes
- casualty costs
- personnel delay costs
- highway traffic equipment delay costs.

A CBI ranking is calculated for each existing highway-rail grade crossing eligible for consideration under the program. The higher the CBI ranking, the higher the priority for selection and funding.

Replacement of Functionally Deficient Highway Underpasses

Under the Federal Railroad Grade Separation Program, selection and funding for the replacement of functionally deficient highway underpasses is also determined by a priority ranking. The ranking is based on:

- average daily traffic passing under the railroad
- relative deficiencies of the underpassing roadway width, vertical under-clearance, and lateral under-clearance.

Most data items used in the underpass replacement ranking process are available from the Bridge Inventory, Inspection, and Appraisal Program (BRINSAP) file. (Contact DES for further information.)

Other Funding Sources

All other grade separation projects are funded under road construction projects using state or federal funds or both. TxDOT adheres to the *Federal-Aid Policy Guide (FAPG)*, under 23 CFR 646, "Railroads," Subpart B, "Railroad-Highway Projects."

Shared Cost of Structures. The railroad is required to share the cost of the structure when an at-grade crossing is eliminated by the grade separation (*FAPG* 23 CFR 646B, §646.210). The railroad company's cost cannot exceed five percent of the cost of the portion of the structure that goes over the railroad tracks. If more than one railroad is involved, then the five percent cost is shared among them.

Reimbursement for Force Account Work. The railroad can be reimbursed for force account work performed on a highway-railroad grade separation. Upon completion of its part of the work, the railroad is reimbursed for up to 95 percent of the total cost of work performed. The remaining 5 percent is reimbursed upon final audit by TxDOT.

Section 3
Plan Layout (Exhibit A)

Preliminary Plan Layout

The district prepares a full-size, preliminary plan layout sheet (including the plan-profile) showing critical details proposed for the grade separation. Additional sheets may be used, if necessary. Critical details should include:

- project geometry
- layout
- vertical & horizontal clearances
- crash walls
- position of track
- any existing features and other pertinent information.
- work to be done by TxDOT
- work to be done by TxDOT's contractor
- work to be done by railroad
- general notes
- train data
- typical section
- fiber optics note
- appropriate drainage features.

The district submits the preliminary plan layout sheet to the Design Division (DES) for processing with the railroad company. It should be submitted 12 months prior to the scheduled contract letting date. The information provided on the preliminary plan layout eventually goes into Exhibit A of the agreement.

Complete Exhibit A

Following the approval of the preliminary bridge layout by the railroad, the district prepares the complete Exhibit A plan layout to show all worked performed by TxDOT, TxDOT's contractor, and the railroad. The complete Exhibit A should include:

- project data
- a title block
- design layout sheets
- a work list
- clearances and crash walls
- other pertinent information.

Discussions of each of these items follow. Figure 8-1 at the end of this section shows an example of Exhibit A plan layout.

Project Data

Project data include:

- the county and county number
- project
- project number
- control-section-job (CSJ)
- railroad mile post (RRMP)
- highway station
- highway number or road name.

Title Block

The title block includes:

- the railroad company name and DOT No. (if available)
- crossing location
- railroad milepost and highway station at each location
- the words "Exhibit A."

Design Layout Sheets

Explanations of the elements shown in the design layout sheets follow.

Alignment of Highway and Railroad. The alignment of the highway and railroad and angle of their intersection should be shown.

Fences and ROW Lines. The location of railroad fences or right-of-way lines with respect to the centerline of the main track should be shown.

Poles and Lines. The location of each pole and pole line, the number of cross arms and wires, owner of each line, and elevation of the low wires should be shown. For underpasses, it is important to show the location of poles in and near the proposed underpass in the area where a temporary shoofly track might be located.

Top-of-rail Profile. The top-of-rail profile for approximately 500 feet in each direction from the highway and for a greater distance if a change in railroad grade is proposed should be shown. If the railroad is on a curve, the profile should be taken along the high rail for overpasses and along the low rail for underpasses.

Drainage Features. Drainage features should be shown.

Overpass Drawings. For overpasses, roadway grades, line drawings, and cross section of the structure should be shown. Minimum vertical clearance together with the horizontal clearances should be shown. (See the *Bridge Design Manual* for standard clearances for railroad overpasses.)

Underpass Drawings. For underpasses, a cross section through the structure should be shown, along with a section at the underpass indicating vertical and horizontal clearances, types of curbs or medians (if required), and side slopes of roadway cuts. (See the *Bridge Design Manual* for standard clearances for underpasses.)

Railroad Facilities Requiring Adjustment. The location and description of any railroad facility that might require adjustment, including any proposed revision of railroad grade, should be shown.

Boring Data. Boring data should be plotted on the plan-profile sheet.

Roadway Geometric Features. Typical roadway geometric features, including pavement widths, shoulder widths, and embankment slopes should be indicated. For underpasses, the method for handling surface drainage should be indicated.

Shoofly Track Location. The proposed location of any shoofly track for routing rail traffic during construction of an underpass should be shown. Include a typical section through the shoofly embankment with a clear designation of what work is the responsibility of the state and which is the responsibility of the railroad company.

Work List

The work list provides a breakdown of all work to be performed by TxDOT, TxDOT's contractor, and the railroad company. The type of work to be performed on the railroad's right-of-way should be listed. The work list should include a typical section. When coring is involved, it is important to show where the coring will be performed in connection to the railroad tracks.

Clearances and Crash Walls

All vertical clearances from the top of rail and horizontal clearances from the centerline of the tracks must be clearly shown. Crash walls should also be shown.

Grade Crossings

If grade crossings are to be constructed in conjunction with an overpass or underpass, all information required for the grade crossing work should be shown on the overpass layout. For proposed automatic warning devices, a separate exhibit illustrating the grade crossing should also be supplied.

Other

Any other pertinent information, such as the cross section or plan profile of drainage structures or any pertinent information from the approval process.

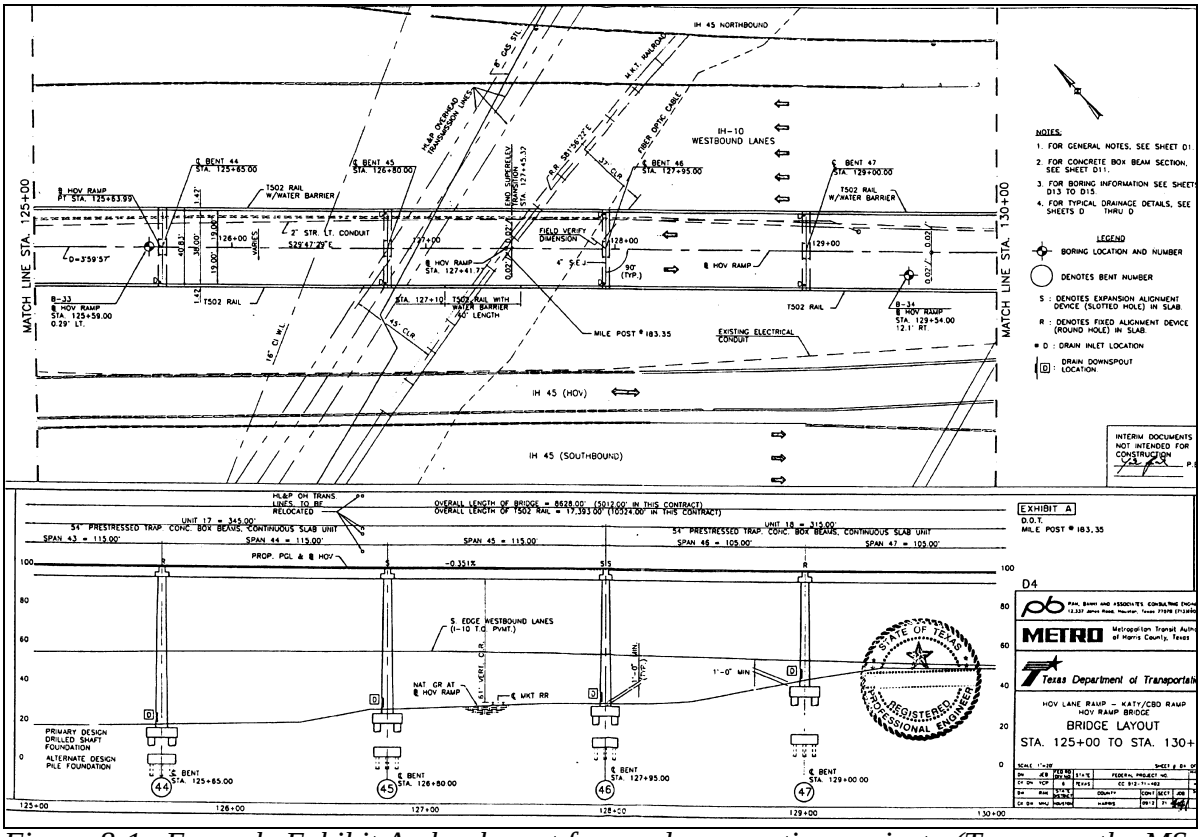


Figure 8-1. Example Exhibit A plan layout for grade separation project. (To access the MS Word version of this figure from on line, click this file name: TFEG8-1.)

Section 4
Agreements and Negotiations

Introduction

After coordinating the necessary design modifications for the construction or reconstruction of a highway-railroad grade separation, the Traffic Operations Division (TRF) and the Design Division (DES) negotiate an agreement with the railroad for all necessary force account work, including temporary adjustment of railroad fences and cattle guards and temporary and permanent pole line adjustments at the proposed structure.

The railroad performs, at state expense, any work necessary for adjustment of facilities located on railroad right of way to accommodate the construction of a grade separation.

Agreement Preparation

TRF prepares the agreement, using the plan layout furnished by the district as Exhibit A, and forwards it to the railroad.

Agreement Contents

The agreement contains:

- project data
- a license clause
- plans, estimates, construction, and maintenance
- insurance clauses
- payment clause
- conditions
- fiber optic clause.

Discussions of each of these items follow.

Project Data

Project data include the location of the project: county, CSJ, highway, project number, DOT number, and city.

License Clause

The license clause gives the state permission to construct, maintain, and use the grade separations across the railroad property.

Plans, Estimates, Construction, and Maintenance

"Plans, estimates, construction, and maintenance" includes all work to be performed by TxDOT, TxDOT's contractor, and the railroad. It spells out the responsibilities of both the railroad and the state.

Insurance Clauses

The insurance clauses specify the type of insurance the contractor will need to purchase on behalf of the state and railroad. All work performed on the railroad right-of-way by TxDOT's contractor requires railroad protective liability insurance in the amount of at least two million dollars for bodily injury and property damage; and six million dollars aggregate for all occurrences. The railroad protective liability insurance must be carried until all work on railroad property is completed. Insurance requirements are spelled out in the Special Provision to Item 007.

Payment

The payment clause specifies the conditions under which the state will reimburse the railroad and when this will occur. Reimbursement is made to railroad only if a work order has been issued to the railroad to begin work. The railroad is reimbursed for work performed and materials furnished, in accordance with the provisions of the *FAPG* Subchapter B, part 140, subpart I, issued by the Federal Highway Administration on April 7, 1992. The railroad can be reimbursed for up to 95 percent of the total cost of all railroad work through progressive billings as the work is performed. The complete balance due the railroad is paid, upon final audit by TxDOT's Audit Office.

Conditions

The conditions clause provides that the agreement can be canceled at any time prior to actual letting of the contract by TxDOT. It specifies whether the railroad is required to participate in the cost of the project.

Fiber Optic Clause

All Class I (major) railroad companies may have fiber optic cable buried on their ROW, it is important that the railroad be contacted at a 1-800 number, as shown in the agreement, prior to any work being performed to determine if fiber optic cable is buried on the ROW. By calling the 1-800 number, any fiber optic cable in the area will be identified and who the cable belongs to. It is the District's responsibility to contact that fiber optic company to advise them of the proposed work and to determine if the cable will be affected by the work. This clause is important to the railroad companies because of the very high costs associated with broken or damaged fiber optic cable.

Negotiations

TRF coordinates all negotiations concerning the agreement, including any revisions in the scope of work, with the district and railroad.

After Execution

Upon receipt of the signed agreements, the TRF forwards a copy of the executed agreement, along with the railroad estimate (if available), to the district, the Finance Division (FIN), and the Federal Highway Administration (FHWA) if required. TRF also advises DES of receipt of the executed agreement.

Section 5
Plans, Specifications, and Estimates (Exhibit B)

Introduction

The approved plans, specifications, and estimates (PS&E) for that portion of the project involving the railroad company is called Exhibit B and is part of the agreement between TxDOT and the railroad. Exhibit B is typically prepared *after* the agreement is signed.

Preparation

The district prepares the PS&E package and submits it to the Design Division (DES) for review and processing for contract letting.

NOTE: The PS&E Submission Data form (TxDOT Form 1002) should include railroad information on page 2.

NOTE: The Special Provision to Item 007 for Railroad Protective Liability Insurance should be included in the specification list.

Review and Approval

DES reviews and approves the PS&E and prepares the Exhibit B for submission to the railroad. If the fiber optics note is not shown in the plans, the note should be added to the general notes.

DES furnishes the approved Exhibit B to the Traffic Operations Division (TRF) for transmittal to the railroad company for their final approval.

Upon approval by the railroad, TRF forwards a copy of the approved Exhibit B to DES and FHWA (if required).

Section 6
Project Execution

Work Order

The work order authorizes the railroad to begin work and provides for reimbursement to the railroad. The district issues the work order to the railroad for any railroad force account work and advises the railroad of work on their property.

The work order should be issued soon after the contract has been awarded to allow the railroad sufficient time to order necessary materials and schedule work.

The district should send a copy of the work order to:

- the Traffic Operations Division (TRF)
- the Design Division (DES)
- the Finance Division (FIN).

Pre-construction Meeting

A pre-construction meeting is recommended and is a district responsibility.

Representatives from the railroad, TxDOT's contractor, and TxDOT attend the meeting. The construction schedule, inspection, and individual points of contact are discussed. Any conflicts in the work schedule should be identified and resolved prior to beginning work.

Inspection

The district inspects the work performed by the railroad and verifies that the work complies with state standards and the approved plans and specifications.

Completion Letter

The district issues the completion letter to the railroad when the project is complete. A copy of the completion letter should be sent to TRF, DES, and FIN. The completion letter authorizes final payment to the railroad, less retainage pending final audit.

Chapter 9
Drainage Structures and Common Ditches

Contents:

Section 1
Overview

Policy and Practice

When a drainage channel or some type of drainage structure on railroad right-of-way is needed, an agreement obtaining permission and concurrence from the railroad to perform such work is required. This includes grading, cleaning, and reshaping of common ditches and culverts between highway and railroad right-of-way.

Drainage Structures Under or Near Railroad

Railroad companies require that concrete box culverts or drainage pipes installed under the tracks be class V and E-80 loading. Also, the Union Pacific Railroad requires that TxDOT complete their Application for Encased Non-flammable Pipeline Crossing form and include it (along with a cover application form) as part of the agreement. The district completes the forms and submits them to the Traffic Operations Division (TRF) when requesting preparation and execution of the agreement. (Samples of the forms are provided in Appendix A of the hard copy print version of this volume. These sample forms may be photocopied as necessary. Copies may also be obtained from the Traffic Operations Division.)

When box culverts are installed under the tracks, the railroads require that hydraulic design calculations be submitted for their approval. The district develops these calculations and submits them to the Design Division (DES). DES then forwards them to TRF to be included as part of the agreement.

Common Ditch and Joint Drainage

Railroads typically require plan profiles and cross sections of common ditch projects. Plan profiles should be included with the plan layout (Exhibit A).

Preliminary Engineering and Coordination

Preliminary engineering and coordination with any local governmental entity, adjacent landowners, and the railroad is normally the responsibility of the district.

Drainage outfall into common ditch facilities or under railroad tracks should be designed to prevent any possible undermining of railroad facilities in the event of flooding.

Section 2
Plan Layout (Exhibit A)

Overview

The district prepares the plan layout (to be used in the agreement as Exhibit A) in sufficient detail to show all work to be performed by TxDOT, TxDOT's contractor, the railroad, and the railroad's contractor.

The layout includes detail plans showing proposed drainage structures, grading, and slope of ditch work. Any other pertinent information, such as the cross section or plan profile of the drainage structures, should be included in the plan layout.

Figure 9-1 (a-d) at the end of this section shows an example Exhibit A plan Layout.

Project Data

The project data included in the plan layout identify the project by:

- county
- project number
- control-section-job (CSJ)
- highway number or road name.

Title Block

The title block includes:

- the railroad name and DOT No. (if available)
- milepost and highway station
- The words "Exhibit A."

General Notes

The general notes lists all work to be performed by TxDOT, TxDOT's contractor, the railroad, and railroad's contractor.

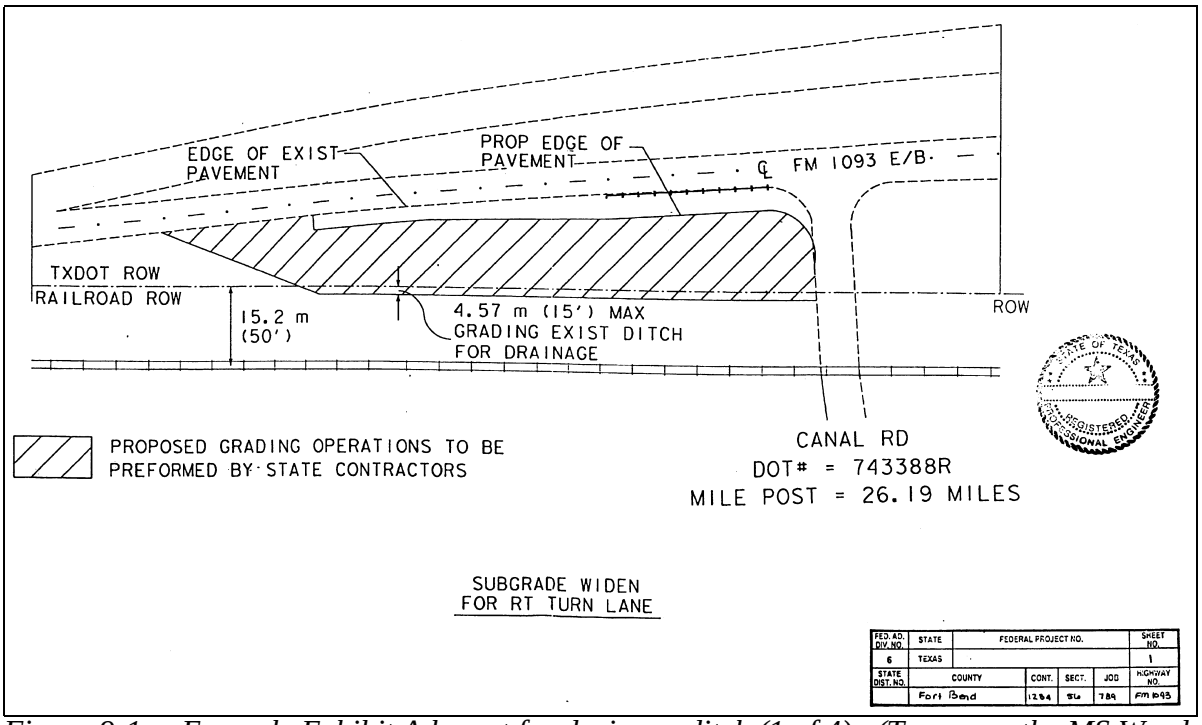


Figure 9-1a. Example Exhibit A layout for drainage ditch (1 of 4). (To access the MS Word version of all four panels of this figure from on line, click this file name: TFEG9-1.)

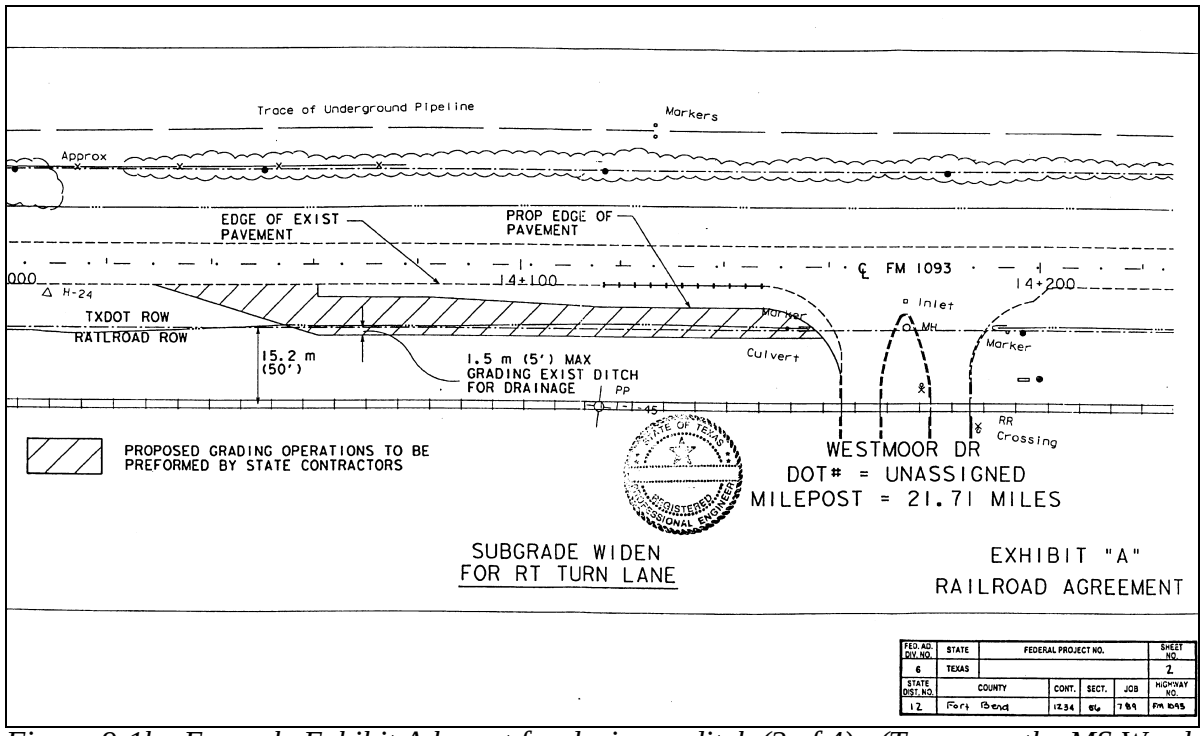


Figure 9-1b. Example Exhibit A layout for drainage ditch (2 of 4). (To access the MS Word version of all four panels of this figure from on line, click this file name: TFEG9-1.)

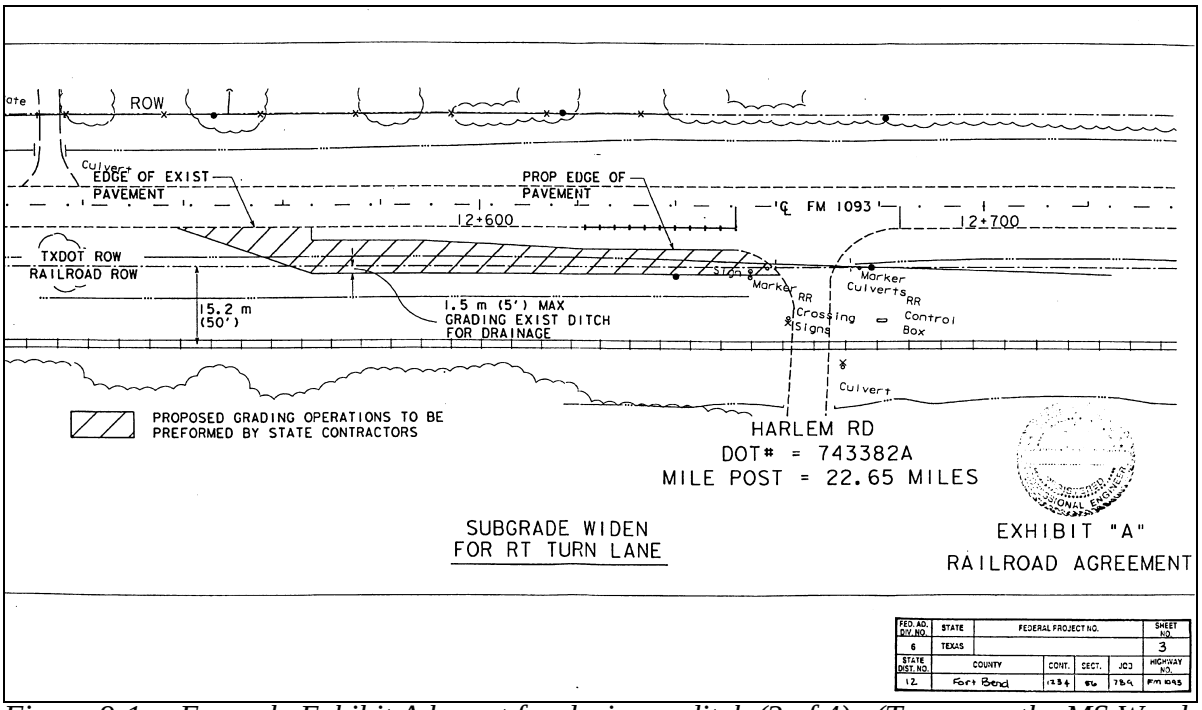


Figure 9-1c. Example Exhibit A layout for drainage ditch (3 of 4). (To access the MS Word version of all four panels of this figure from on line, click this file name: TFEG9-1.)

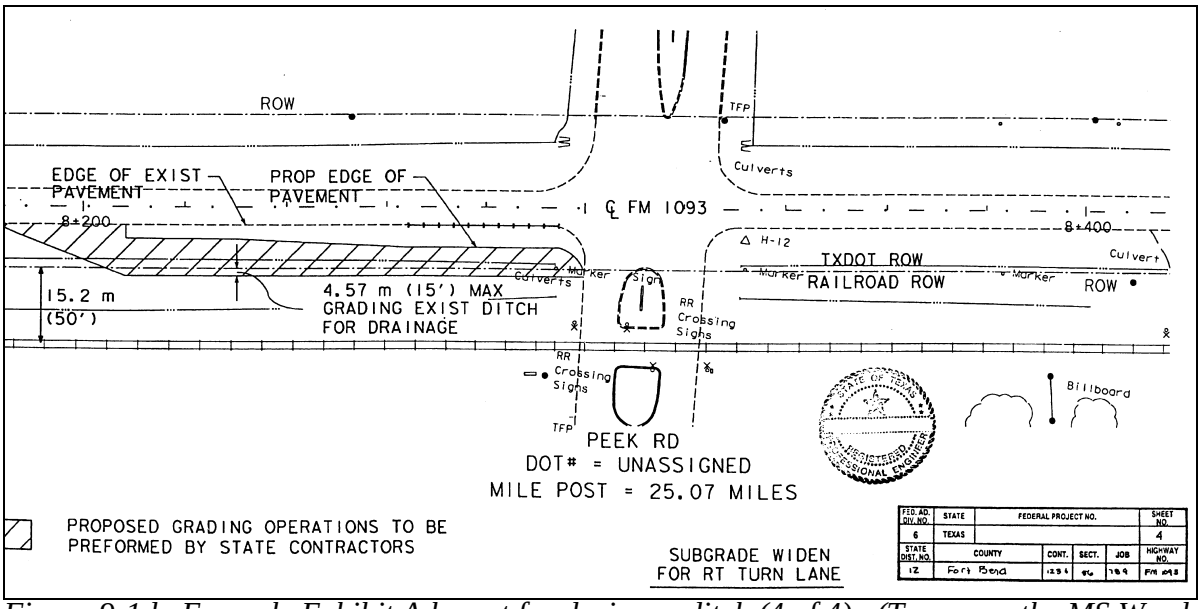


Figure 9-1d. Example Exhibit A layout for drainage ditch (4 of 4). (To access the MS Word version of all four panels of this figure from on line, click this file name: TFEG9-1.)

Section 3
Agreements and Negotiations

Introduction

Using the plan layout furnished by the district as Exhibit A, the Traffic Operations Division (TRF) prepares the necessary agreement and forwards it to the railroad company.

Negotiations and Processing

TRF coordinates all negotiations concerning the agreement, including any revisions made by the district or railroad.

The railroad furnishes an estimate (or bids solicited by the railroad) to TRF showing all reimbursable work to be performed by the railroad. TRF approves the estimate, attaches it to the executed copies of the agreement, and forwards the railroad's copy back to them. The district, the Finance Division (FIN), and FHWA (if required) each receive a copy of the executed agreement and estimate.

Agreement Contents

The agreement contains:

- project data
- a license clause
- insurance clauses
- a payment clause
- conditions
- a fiber optic cable clause.

Discussions of each of these items follow.

Project Data

The project data identifies the project by:

- county
- control-section-job (CSJ)
- highway
- project number
- DOT No. (if available)
- the city or nearest city.

License Clause

The license clause gives TxDOT license and permission to perform the necessary drainage work on the railroad right-of-way. The clause also describes the work to be performed by all parties, including flagging of trains by the railroad, if required.

Insurance Clauses

The insurance clauses specify the type of insurance the contractor needs to purchase on behalf of the state and railroad. All work performed on the railroad right-of-way by TxDOT's contractor requires railroad protective liability insurance in the amount of at least two million dollars for bodily injury and property damage six million dollars aggregate for all occurrences. The railroad protective liability insurance must be carried until all work on the railroad property is completed. Insurance requirements are spelled out in the Special Provision to Item 007.

Payment Clause

The payment clause specifies when and under which conditions TxDOT will reimburse the railroad. Reimbursement is made to the railroad only if a work order has been issued to begin work. The railroad is reimbursed for work performed and materials furnished in accordance with the provisions of the Federal Aid Policy Guide (FAPG), Subchapter B, Part 140, Subpart I, as last issued by the Federal Highway Administration on April 7, 1992. The railroad is reimbursed the actual total cost of all railroad force account work performed and materials used or installed. However, upon final audit by the Audit Office of TxDOT, the railroad may be required to reimburse TxDOT any over payment that cannot be justified.

Conditions

The conditions clause explains that the agreement can be canceled at any time prior to actual letting of the contract by TxDOT. It also details any FAPG requirements for cost participation in the project by the railroad.

Fiber Optic Clause

All Class I (major) railroad companies have fiber optic cable buried on their rights-of-way. Therefore, it is important that the railroad be contacted at a 1-800 number (which is identified in the agreement) prior to any work being performed to determine if fiber optic cable is buried on the right-of-way. Also, the location of the fiber optic cable and who it belongs to can be identified. It is the district's responsibility to contact the fiber optic cable company to advise them of the proposed work and to determine if the cable will be affected by the work. This clause is important to the railroad companies, because of the very high costs associated with broken or damaged fiber optic cable.

Section 4
Project Execution

Work Orders

The district issues the work order to the railroad for any railroad force account work and keeps the railroad advised of the work in progress on their property. The work order should be issued soon after the contract has been awarded to allow the railroad sufficient time to order materials and schedule work. A copy of the work order should also be sent to the Traffic Operations Division (TRF) and the Finance Division (FIN). The work order authorizes the railroad to go to work and to be reimbursed by the state.

Pre-construction Meeting

A pre-construction meeting is recommended and is the district's responsibility. Representatives from TxDOT, the railroad, and TxDOT and railroad contractors should attend the meeting so that work can be coordinated. The construction schedule and individual points of concern should be discussed and any scheduling conflicts identified and resolved.

Inspections

The district inspects the work performed by the railroad and verifies that it complies with TxDOT standards and approved plans and specifications.

Project Completion

The district issues the completion letter to the railroad when the project is complete. A copy of the completion letter should be sent to TRF and FIN. The completion letter authorizes final payment to the railroad.

Chapter 10
Other Railroad Agreements

Contents:

Section 1
Letter Agreements

Policy and Practices

A letter agreement is used on projects requiring minimal work on railroad right-of-way where the only thing the railroad is doing is providing flaggers. Flaggers are needed for safe operation and work conditions.

Examples of projects using letter agreements are:

- seal coat and asphaltic concrete pavement (ACP) overlay
- installation of overhead wire lines
- installation of conduit under track
- minor pavement rehabilitation
- minor maintenance
- installation of computerized traffic management system.

Discussions of these types of projects follow.

Seal Coat and ACP Overlay Projects

TRF prepares a project-specific letter agreement for each crossing affected by a seal coat and asphaltic concrete pavement (ACP) overlay project, whereby the railroad gives TxDOT permission to perform the seal coat or ACP overlay work up to the edge of the crossing. The letter agreement provides the following information:

- project data
- statement of the work
- provision for flagging
- letting date
- notification.

Installation of Overhead Wire Lines

When an overhead wire line is installed over the track, the Union Pacific Railroad requires that TxDOT complete their Application for Overhead Wireline Crossing and include it (along with a cover application form) as part of the agreement. The district completes the forms and submits them to the Traffic Operations Division (TRF) when requesting preparation and execution of the agreement. Samples of these forms are provided in Appendix A of the hard copy print version of this volume. These sample forms may be photocopied as necessary. Copies may also be obtained from the Traffic Operations Division.

Installation of Conduit Under Track

As with overhead wire lines, when conduit is installed under the track, the Union Pacific Railroad requires that TxDOT complete their Application for Underground Wireline Crossing and include it (along with a cover application form) as part of the agreement. The district completes the forms and submits them to the Traffic Operations Division (TRF) when requesting preparation and execution of the agreement. Samples of these forms are provided in Appendix A of the hard copy print version of this volume. These sample forms may be photocopied as necessary. Copies may also be obtained from the Traffic Operations Division.

Minor Pavement Rehabilitation

Minor pavement rehabilitation includes such work as:

- repair of pot holes in the roadway
- crack sealing
- seal coats
- ACP overlays.

Minor Maintenance

Minor maintenance projects can include such work as performing minor repairs on a grade separation and drainage ditches where a fully executed agreement exists requiring TxDOT to maintain the structure or drainage ditches or both.

Plan Layout (Exhibit A)

On all types of projects involving letter agreements, except seal coat projects (see following discussion), the district prepares a plan layout (Exhibit A) in sufficient detail to show all work to be performed by TxDOT, TxDOT's contractor, and the railroad. Exhibit A must be signed, sealed, and dated by a registered professional engineer and must include:

- ***project data*** include:
  - county
  - control-section-job (CSJ)
  - project
  - highway number or road name
- ***work description*** — the work to be performed by TxDOT and its contractor
- ***title block*** includes:
  - the railroad company name and DOT No. (if available)
  - crossing location
  - railroad milepost and highway station at each location
  - the words "Exhibit A."

Required Railroad Forms. Railroad application forms for overhead or underground wire lines (if required) should be attached to Exhibit A. These forms do not need to be sealed.

Seal Coat Projects. On seal coat projects, the district should provide the following as part of Exhibit A:

- location of each project including the DOT No.
- a location map of each project
- name of the railroads involved
- project data.

For seal coat projects, the Exhibit A does not need to be signed, sealed, and dated by a registered professional engineer.

The district submits Exhibit A to the Traffic Operations Division (TRF).

Agreement Preparation and Negotiations

Using the layout furnished by the district as Exhibit A, TRF prepares the letter agreement and forwards the agreements to the railroad company.

The letter agreement contains:

- ***project data*** include:
  - county
  - project
  - control-section-job (CSJ)
  - highway number or road name
- ***work description*** — the work to be performed by TxDOT and its contractor
- ***flagging clause*** — gives the railroad authority to provide flaggers and gives an estimated cost for the flagging.
- ***fiber optic clauses*** — provides the 1-800 number that TxDOT's contractor must call before any work is performed on railroad property
- ***insurance clause*** — requires TxDOT's contractor to provide railroad protective liability insurance.

TRF handles all negotiations concerning the agreement, including revisions. Upon receipt of the signed letter agreement, TRF forwards a copy of the executed agreement to the district and the Finance Division (FIN).

Work Order

The district issues the work order to the railroad for flaggers. The work order should be issued at least five days before any work is performed, so that the railroad has time to provide flaggers. A copy of the work order should also be sent to TRF and FIN. The work order authorizes payment to the railroad.

Completion Letter

The district issues the completion letter to the railroad when the project is complete and the flagger is no longer needed. A copy of the completion letter should also be sent to TRF and FIN. This letter authorizes final payment to the railroad.

Section 2
Right of Entry and Survey Agreements

Policy and Practice

When TxDOT needs to enter the railroad's right-of-way to perform core drilling, survey, or other related work, a Right of Entry Agreement or Survey Agreement with the railroad is necessary. These agreements are usually needed at the very beginning of a project, typically before plan layouts are drawn. These agreements should be negotiated as far in advance as possible so as not to delay the project.

Insurance Considerations

When TxDOT forces perform surveying or core drilling work, railroads *do not* require railroad protective liability insurance. If TxDOT's contractor performs the work, then railroad liability protective insurance *is* required. Since the cost of the insurance could exceed the cost of the survey or coring project, TxDOT forces should perform this type work.

Layout (Exhibit A)

The district prepares the layout (Exhibit A) in sufficient detail to show all work to be performed by TxDOT, TxDOT's contractor, and the railroad. Exhibit A must include:

- ***project data*** include:
  - county
  - project
  - control-section-job (CSJ)
  - highway number or road name
- ***title block*** includes:
  - control-section-job (CSJ)
  - DOT No.
  - railroad mile post
  - project number
  - county number.
  - the words "Exhibit A"
- ***work list*** — the work to be performed by TxDOT or its contractor, including the type of work to be performed on the railroad's right-of-way and, when coring is involved, where the coring will be performed in connection to the railroad tracks.

(continued...)

Layout (Exhibit A) *(continued)*

Exhibit A must be signed, sealed, and dated by a registered professional engineer.

The district submits Exhibit A to the Traffic Operations Division (TRF).

Agreement Preparation

Agreement Preparation. Using the layout furnished by the district as Exhibit A, the Traffic Operations Division (TRF) prepares the Right of Entry or Survey Agreement and forwards it to the railroad company.

The agreement contains:

- project data, which includes:
  - county
  - control-section-job (CSJ)
  - highway number or road name
  - project number
  - DOT No. (if available)
  - the city
- scope of work (description follows)
- conditions clause (description follows)
- a fiber optic clause (description follows)
- insurance clauses (description follows)
- a payment clause (description follows)
- a termination clause (description follows).

Scope of Work. The scope of work includes all work to be performed by TxDOT, TxDOT's contractor, and the railroad. It specifies the responsibilities of both the railroad and TxDOT.

Conditions Clause. The conditions clause gives TxDOT permission from the railroad to perform the necessary work. It specifies conditions that apply to TxDOT while on the railroad right-of-way.

(continued...)

Agreement Preparation *(continued)*

Fiber Optic Clause. Most of the major railroads may have fiber optic cable buried on their rights-of-way. Therefore, it is important that the railroad be contacted at a 1-800 number (which is identified in the agreement) prior to any work being performed to determine if fiber optic cable is buried on the right-of-way. Also, the location of the fiber optic cable and who it belongs to can be identified. It is the district's responsibility to contact the fiber optic cable company to advise them of the proposed work and to determine if the cable will be affected by the work. This clause is important to the railroad companies, because of the very high costs associated with broken or damaged fiber optic cable.

Insurance Clauses. If TxDOT's contractor will perform the survey or coring work, then the contractor must purchase railroad protective liability insurance in the amount of at least two million dollars for bodily injury and property damage and six million dollars aggregate for all occurrences. The railroad protective liability insurance must be carried until all work on railroad property is completed. Insurance requirements are included in a Special Provision to Item 007.

Payment Clause. The payment clause specifies the conditions under which TxDOT will reimburse the railroad and when reimbursement will be made. Reimbursement to the railroad must be in accordance with *Federal-Aid Policy Guide (FAPG)* subchapter B, part 140, subpart I, issued by the Federal Highway Administration on April 7, 1992.

Termination Clause. Some railroad companies require that a one-year termination clause be included in the agreement. This clause specifies that the agreement, after execution by all parties involved, be good for one year from the execution date. It also states that TxDOT must notify the railroad in writing at least five days prior to starting any work on railroad right-of-way.

Agreement Negotiations

TRF handles all negotiations concerning the agreement, including revisions. Upon receipt of the signed agreement, TRF forwards a copy of the executed agreement to the district and the Finance Division (FIN).

Work Order

The district issues the work order to the railroad for any flagging of trains that may be required. The work order should be issued as soon as possible after the agreement has been executed by all parties. A copy of the work order should also be sent to TRF and FIN.

Completion Letter

Upon completion of the survey or coring work, the district issues a completion letter to the railroad. This letter advises the railroad that all work on their right-of-way is complete and that they may now bill TxDOT the cost of any flagging performed in connection with the project. A copy of the completion letter should also be sent to TRF and FIN.

Chapter 11
Crossing Closure, Relocation, and Consolidation

Contents:

Section 1
Overview

Policy

The *Texas Manual on Uniform Traffic Control Devices (TMUTCD)* states:

> Any highway grade crossing for which there is not a demonstrated need should be closed. Where a railroad track has been abandoned or its use discontinued, all related traffic control devices shall be removed, and the tracks should be removed or covered.

General Considerations

Several considerations may influence the decision to eliminate a highway-rail crossing.

Railroad Use of Track. Each railroad company operating over a candidate crossing should indicate its intent for future use of that section of track. If track abandonment is anticipated, roadway closure or any crossing improvements should be held in abeyance pending resolution of the track abandonment proposal.

Effect on Roadway System. A roadway closure should not negatively affect the local transportation system. Alternative public crossings should be within a reasonable travel time and distance. The alternative crossings and connecting roadways should have sufficient capacity to accommodate the diverted traffic safely and efficiently.

Emergency Vehicle Routing. The closing of roadway crossings that serve as a direct route for vital traffic, such as ambulances, fire trucks, or other emergency vehicles, should be avoided.

Economic Consequences. The economic consequences for nearby existing or planned businesses should be considered.

Crash History and Hazard Potential. The crash history and hazard potential of the crossing should be carefully evaluated. Items to review include:

- number and severity of crashes
- type and number of trains
- train speed range
- time periods during which trains block the crossing.

Section 2
Crossing Closure

Introduction

Closure of highway-rail intersections is normally accomplished by closing the highway. Many characteristics of the community influence the number of crossings needed to carry highway traffic over a railroad. A study of highway traffic flow should be conducted to determine origin and destination points and needed highway capacity. Highway operation over several crossings may be consolidated to move over a nearby crossing with flashing lights and gates, or via a nearby grade separation. Alternative routes should be within reasonable travel time and distance from a closed crossing. The alternate routes should have sufficient capacity to accommodate the diverted traffic safely and efficiently.

Obstacles to Crossing Closure

Negative community attitudes, funding problems, or a lack of forceful state laws authorizing closure are common obstacles to crossing closure. Local opposition may sometimes be overcome through emphasis on the benefits resulting from closure, such as improved traffic flow and safety as traffic is redirected to grade separations or crossings with active traffic control devices.

Railroads often support closure, not only because of safety concerns, but also because closure eliminates maintenance costs associated with the crossings.

Systems Approach

The systems approach is useful in identifying closure candidates. This method improves several crossings in a community or rail corridor by the installation of traffic control devices at some locations while closing other crossings. A study of traffic flow in the area should be conducted beforehand to assure continued access across the railroad. Installation of more sophisticated traffic control systems at the remaining crossings and perhaps the construction of a grade separation at one of the remaining crossings may improve traffic flow in some instances.

Emergency Vehicle Routing

Access over the railroad by emergency vehicles, ambulances, fire trucks, and police must be considered in deciding whether or not to close a crossing. Crossings used frequently by emergency vehicles should not be closed. These crossings should be candidates for grade separation or the installation of active traffic control devices.

Identifying Closure Candidates

Criteria for identifying candidate crossings for closure must relate directly to existing operational and geometric characteristics. Specific criteria are difficult to establish. The number of vehicles using the crossing and the accessibility of alternate crossings are significant criteria in determining whether the elimination of a particular crossing is practical. Existing criteria and values differ among agencies. The *Traffic Control Devices Handbook* suggests the following criteria.

Criteria for Closing of Grade Crossings

Type of Track	Criteria
Branch Line	♦ less than 2,000 ADT (average daily traffic ♦ more than two trains per day ♦ alternate crossing within 0.25 miles with less than 5,000 ADT if two-lane, or less than 15,000 ADT if four-lane
Spur Track	♦ less than 2,000 ADT ♦ more than 15 trains per day ♦ alternate crossing within 0.25 miles with less than 5,000 ADT if two-lane, or less than 15,000 ADT if four-lane
Main Line	any main line section with more than five crossings within a 1.6 km (1.0 mile) segment

It is important to avoid using these criteria without objective engineering and economic assessments of the positive and negative consequences of the closure.

Removal of Devices

When a crossing is permanently closed to highway traffic, the crossing surface, pavement markings, and all traffic control devices both at the crossing and approaching the crossing should be removed. Generally, the railroad is responsible for removing the crossing surface and traffic control devices located at the crossing. The highway authority is responsible for removing traffic control devices in advance of and approaching the crossing. Nearby highway traffic signals interconnected with crossing signals located at the closed crossing should have their phasing and timing readjusted. (See Section 4 of this chapter for information on the permit required for dismantling warning signals.)

Erection of Warning and Regulatory Devices

The highway authority is also responsible for alerting motorists to the closed roadway. A Type III barricade conforming to the design criteria of Section 6C-8 of the *Texas Manual on Uniform Traffic Control Devices (TMUTCD)* may be erected, except the colors of the stripes must be reflectorized white and reflectorized red. Warning and regulatory signing may also be an appropriate means of alerting motorists to the closed roadway. These may include the ROAD CLOSED (R11-2) sign, the LOCAL TRAFFIC ONLY (R11-3) sign, or the ROAD CLOSED TO THRU TRAFFIC (R11-4) sign, plus appropriate advance warning signs applicable to the circumstances.

Notification of Alternate Routes

Consideration should also be given to advising motorists of alternate routes across the railroad. If trucks use the closed crossing, they should be given advance information of the closure at points where they can conveniently alter their route.

Section 3
Relocation and Consolidation

Introduction

Alternatives to the closing of a grade crossing are

- relocation of either the highway or the railroad track
- consolidation of two or more railroad lines into a single route.

Planning

Planning for such relocation or consolidation is complex and often controversial. These projects are also some of the most expensive options available, necessitating careful study to ensure the expenses involved are reasonably justified.

Prior to making any decisions relating to crossing improvement by either grade separation or traffic control systems, long-range plans for relocation and consolidation of railroads in urbanized areas should be reviewed. Urbanized area transportation plans and railroad studies for mergers and consolidation are two sources of information.

Railroad Relocation

Railroad relocation to the outer limits of the community may be a viable alternative for alleviating operational, safety, and environmental concerns, while retaining the economic benefits of railroad service to the community. Relocation generally involves the complete rebuilding of railroad facilities, including acquisition of new right of way and construction of track, drainage structures, signals and communications, crossings and separations, station facilities, and utilities.

Benefits. Benefits of railroad relocation extend beyond those associated with crossing safety and operations. Possible additional benefits may include:

- improved environmental quality resulting from decreased noise and air pollution
- improved land use and appearance
- improvements in the railroad's operational efficiency.
- elimination of obstructions to emergency vehicles
- safer routes for hazardous materials movement.

(continued...)

Railroad Relocation *(continued)*

Planning. Many factors exist in planning for railroad relocation. The new route should provide good alignment, minimum grades, and adequate drainage. Sufficient right of way should be available to provide the necessary horizontal clearances, additional rail facilities as service grows, and a buffer for abating noise and vibrations. The number of new highway-rail intersections should be minimal.

Zoning the property adjacent to the railroad as light and heavy industrial further isolates the railroad corridor from residential and commercial activity. Businesses and industry desiring rail service can locate in this area.

Highway Relocation

Highway relocations are implemented to provide improved traffic flow around communities and other developed areas. Planning for highway relocations should consider routes that would eliminate highway-rail intersections by avoiding the need for access over railroad tracks or by providing grade separations.

Section 4
Dismantling of Warning Signals

Introduction

A person or railroad desiring to dismantle a warning signal at a grade crossing of a railway and a state-maintained road or highway must first apply to TxDOT to determine if a permit is required under 43 TAC §25.70 – 25.73. This contains requirements and procedures for issuing such a permit. Figure 11-1 at the end of this section provides a flow chart overview of the permit process.

NOTE: A permit is also required for dismantling warning signals at a grade crossing of a railway with a road or highway maintained by an authority other than TxDOT. Consult 43 TAC §25.70 – 25.73 for details.

Application

A person or railroad company desiring to dismantle warning signals at a railroad grade crossing must make application to the Texas Department of Transportation.

Form Available. Applicants may obtain a Permit Application Form for Dismantling of Railroad Crossing Warning Signal Device (TxDOT Form 1930) from any TxDOT district office. A sample Form 1930 is provided in Appendix A of the hard copy print version of this volume. This sample form may be photocopied as necessary. Copies may also be obtained from the Traffic Operations Division. In the on-line version of this volume, an MS Word version of this form may be opened and printed out by clicking on the following file name: TFE-1930.

Application Submittal. The applicant must return the completed application form to the district office in which the warning signal is located. The application must be accompanied by a resolution from the board of directors of the entity owning the railroad certifying the reason and justification for the request for removal of the warning signal.

Determining if a Permit Is Required

Upon receiving an application, the district determines if a permit is required to remove the signal. A permit is required when all of the following conditions exist:

- the rail line is not defined as a Class I or Class II railroad by the Interstate Commerce Commission
- the rail line is active (an "active rail line" is defined as any railroad tracks which are classified by the Interstate Commerce Commission to carry freight or passenger trains and are currently being operated and maintained by a railroad company or rail carrier.)
- the cost of the signals was originally paid either entirely or partly from public funds.

The district must notify the applicant of its finding within 30 calendar days following receipt of the application.

If a Permit Is Not Required

If a permit is not required for removal of the signals the district office informs the applicant that they may dispose of the signals at their discretion.

If a Permit is Required

If a permit is required, the district proceeds according to who the entity is who maintains the roadway.

If a governmental entity other than TxDOT maintains the road or highway intersecting the rail line, the district office forwards the application to that governmental entity for further processing in accordance with 43 TAC §25.70 – 25.73. The district also informs the applicant of its findings and the forwarding.

If TxDOT maintains the road or highway intersecting the rail line, then the district informs the applicant of its findings and processes the application.

Processing the Application

The district determines whether or not removal of the warning signals would adversely affect public safety. Factors determining whether or not removal of the warning signals would adversely affect public safety include:

- vehicle traffic
- train traffic and operations
- train-involved accident history
- crossing geometrics
- other considerations as noted on the application.

If removal would adversely affect public safety, then the district informs the applicant within 90 calendar days that the application is denied.

If removal would not adversely affect public safety, then the district determines the salvage value of the warning signals and informs the applicant within 90 calendar days of its finding that the application is approved pending payment of the signals' salvage value and reimbursement of expenses incurred by TxDOT in processing the application.

Salvage Value

Salvage value is defined as any monetary value which may be derived from the signal equipment being retired or removed or from any material necessary for its operation. This may include, but is not limited to, the depreciated value of:

- any reusable electrical equipment (signal controllers, relays, rectifiers, batteries, etc.)
- signal equipment (signal heads, lenses, signal hoods and backgrounds, light bulbs, crossbuck signs, gate arm mechanisms, gate arms, lights, counterweights, etc.)
- track circuit equipment (termination shunts, capacitors, chokes, tuned joint couplers, insulated joints, etc.)
- the scrap value of these components, including all material or aluminum components (signal masts or cantilevers, gate mechanisms, counterweights, signal cabins, or signal cases).

Receipt of Payment and Permit Issuance

Upon receipt of payment for the salvage value of the signals, the district issues a permit to the applicant for dismantling the warning signals. Governmental entities other than TxDOT that collect such payment, transfer the salvage value paid for signals to the appropriate district office. The district office deposits the salvage value paid for signals into a special fund in the State Treasury known as the "Railroad Crossing Warning Signal Fund" under the State Highway Fund to be used for the maintenance and improvement of warning signals at grade crossings.

Permit Process Flow Chart

The flow chart shown in Figure 11-1 provides an overview of the permit process for dismantling warning signals at railroad crossings.

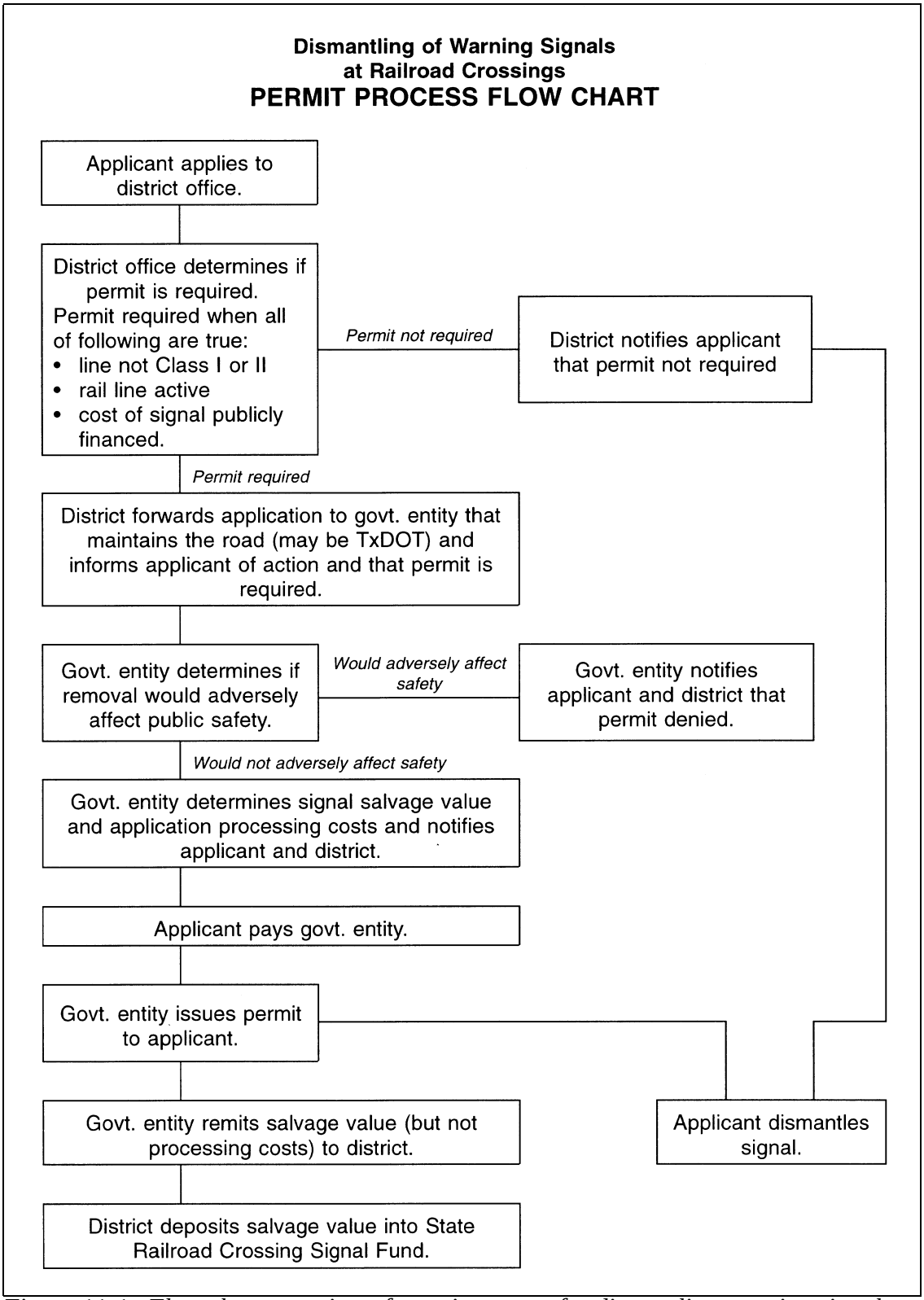


Figure 11-1. Flow chart overview of permit process for dismantling warning signals at railroad crossings. (To access the MS Word version of this figure from on line, click this file name: TFEG11-1.)

Appendix A
Forms

Introduction

This appendix lists the forms described in this volume. In the hard copy print version of this volume, this appendix contains samples of each form. These samples may be photocopied as necessary. Copies may also be obtained from the Traffic Operations Division (TRF).

MS Word versions of some of the forms are accessible through hypertext links in the on-line version of this volume, as indicated in the following list.

List of Forms

Appendix A of the hard copy print version of this volume contains the following forms in the following order:

TxDOT Forms Pertaining to Railroad Operations

TxDOT Form Number/Name		Hypertext Link (on line only)	# of Pgs.	Described in Chap.
1876	Railroad Grade Crossing Replanking Project Submission Form*	TFE-1876	2	4
1891	Detailed Estimate for Railroad Solicitation of Bids*	TFE-1891	1	4
	Preemption Worksheet (Guide for Determining Time Requirements for Traffic Signal Preemption at Highway-Rail Grade Crossings)		1	7
1930	Permit Application for Dismantling of Railroad Crossing Warning Signal Device*	TFE-1930	1	11
* Indicates that an MS Word version is available through the on-line version of this manual.				

Union Pacific Forms

Form Number/Form Name		# of Pgs.	Described in Chap.
PLX.APP	Application (used as a cover for all of the following forms)	2	–
DR-0404-F	Application for Underground Wireline Crossing — 600 Volts or Less	1	7 & 10
DR-0404-G	Application for Underground Wireline Crossing — Over 600 Volts	1	7 & 10
DR-0404-B	Application for Encased Non-flammable Pipeline Crossing	1	9
DR-0404-D	Application for Overhead Wireline Crossing — 600 Volts or Less	1	10
DR-0404-H	Application for Overhead Wireline Crossing — Over 600 Volts	1	10