Manual Notice  2012-1

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Purpose

This manual provides guidance and outlines uniform procedures for administering and developing projects involving bridges.

Contents

This version updates departmental organization information in Chapter 1. It revises the Highway Bridge Program selection process in Chapter 2; revises bicycle and pedestrian policy, as well as updating the design exception process in Chapter 3; updates policies on required condition surveys for bridge rehabilitations, asbestos abatement and state funded historic bridge projects in Chapter 4; revises bridge layout submission requirements in Chapter 5; and revises PS & E submissions to include the Bridge Cost Information screen requirements for DCIS in Chapter 6. This version also corrects other minor editorial errors throughout.

Contact

For more information about any portion of this manual, please contact the TxDOT Bridge Division.

Archives

Past manual notices are available in a pdf archive.
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Chapter 1 — Organizational Overview

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**Section 1 — This Manual**

**Overview**

This manual was developed to provide bridge project developers and designers with the policies and guidelines set forth by the Texas Department of Transportation (TxDOT) regarding the following:

- bridge programming and funding
- preliminary planning of bridge structures
- preparation and review of bridge layouts
- preparation and review of plans, specifications, and estimates (PS&E) for bridge projects

This manual is subject to revision as conditions, experience, or research data warrant.

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<td>2002-1</td>
<td>April 2002</td>
<td>Revision clarifying information on curbs, adding information on overhead sign supports, correcting minor errors, and adding hyperlinks to recently published TxDOT online manuals.</td>
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<tr>
<td>2003-1</td>
<td>June 2003</td>
<td>Revision updating terminology related to Unified Transportation Program (UTP) categories, clarifying approach-roadway eligibility requirements for HBRRP, expanding structure design criteria to include Load Resistance Factor Design (LRFD) recommendations, expanding and clarifying preliminary layout requirements, and correcting minor editorial errors.</td>
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<tr>
<td>2005-1</td>
<td>January 2005</td>
<td>Revision updating departmental organization information and correcting minor editorial errors.</td>
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<tr>
<td>2006-1</td>
<td>February 2006</td>
<td>Revision changing the name of the federally funded Highway Bridge Replacement and Rehabilitation Program to Highway Bridge Program, adding information on load and resistance factor design (LRFD), updating a procedure for appraising an existing structure, and adding an index to the manual.</td>
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<td>2007-1</td>
<td>July 2007</td>
<td>Revision updating departmental organization information in Chapter 1. Revising Chapter 3 to include the membership of the Roadway Design Exception Committee, the Bridge Design Exception Committee and a joint subcommittee, the Roadway/Bridge Design Exception Committee. Updating Chapter 4 to include the mandate by the Federal Highway Administration that Load Resistance Factor Design be used on all bridges for which preliminary engineering is initiated after October 2007. Correcting errors in the Chapter 5, Section 4 table on submission schedules and also correcting other minor editorial errors.</td>
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The manual is not a substitute for engineering experience, knowledge, or judgment. Special situations may call for variation from these policy requirements.

**Manual Organization**

The manual is organized to reflect the chronology of a bridge project from bridge funding to PS&E:

- Chapter 1 identifies departmental organizations that may be involved in bridge project development.
- **Chapter 2** presents bridge programming and funding policies, focusing on the factors involved with the funding and prioritizing, or programming, of bridge projects.
- **Chapter 3** identifies basic considerations during advanced planning of bridge projects, including general and location specific planning considerations.
- **Chapter 4** presents preliminary design features required during early design development for general practice and location-specific requirements to aid planners/designers in preparing an appropriate preliminary design.
- **Chapter 5** describes preliminary layout requirements and the approval process.
- **Chapter 6** discusses the specific requirements of PS&E concerning bridge projects.

**Feedback**

You may direct any questions or comments on the content of this manual to the Director of the Bridge Division, Texas Department of Transportation.
Section 2 — Coordinating with Other Divisions and Sections

Overview

The development and design of a bridge project may involve several divisions within TxDOT:

- Bridge Division
- Design Division
- Finance Division
- Transportation Planning and Programming Division
- Rail Division
- Environmental Affairs Division
- Construction Division
- Maintenance Division

Bridge Division (BRG)

The Bridge Division provides in-house expertise and assistance to the districts in all aspects of structural project development, design, construction, maintenance, and inspection. The division is involved in research, value engineering studies, partnering, and general support to TxDOT districts and other divisions. The division assists the districts with the implementation of innovative methods and materials to reduce the impact of construction on the public, improve long-term performance and durability, and develop aesthetically attractive structures.

Bridges are the most visible elements of the transportation system, and they create an emotional impact on the user. The Bridge Division develops aesthetically appropriate bridges as required for the districts, creating custom designs that consider site, local architecture, span length, structural safety, durability, and maintenance on a case-by-case basis.

The Bridge Division speeds up rehabilitation or replacement of structurally deficient or functionally obsolete bridges on public highways, roads, and streets both on and off the state system, making optimum use of federal, state, and local funding and assisting local governments in accelerating the reduction of deficient bridges.

The Bridge Division also reduces design and construction time and cost by standardizing bridge elements and by using standard design drawings for bridge construction where possible. These standard drawings are available to the public, including cities and counties.
Historic bridges are also a priority for the Bridge Division. The division works with the districts, the Texas Historical Commission (THC), the Federal Highway Administration (FHWA), the Environmental Affairs Division (ENV), and local entities to preserve this valuable heritage.

The division strongly supports and is represented on many state, national, and international engineering organizations including the American Association of State Highway and Transportation Officials (AASHTO), National Cooperative Highway Research Program (NCHRP), Transportation Research Board (TRB), American Concrete Institute (ACI), American Society of Civil Engineers (ASCE), Prestressed Concrete Institute (PCI), American Segmental Bridge Institute (ASBI), American Railway Engineers and Maintenance of Way Association (AREMA), National Steel Bridge Alliance (NSBA), Highway Innovative Technology Evaluation Center (HITEC), American Welding Society (AWS), and American Institute of Steel Construction (AISC).

The Bridge Division is composed of four sections: Project Development, Field Operations, Design and Administration.

**Project Development Section**

- Provides the primary contact with the district on all bridge project development issues.
- Determines critical bridge replacement and rehabilitation needs.
- Administers the Highway Bridge Program.
- Programs work based on funding and eligibility.
- Administers the federal Railroad Grade Separation Program.
- Performs preliminary planning of structures.
- Determines average bridge cost.
- Coordinates plans, specifications, and estimates (PS&E); bridge plan preparation; and review of final PS&E.
- Coordinates federal discretionary bridge applications.
- Negotiates and drafts various types of agreements.
- Maintains the [Historic Bridge Manual](#).
- Maintains the [Bridge Project Development Manual](#).
- Provides content for the Bridge Division’s internal and external Project Development web pages.

**Field Operations Section**

- Inspects bridges during construction.
- Inspects bridges after construction.
Consults with districts on bridge construction/maintenance problems.
Reviews PS&E for construction-related issues.
Performs bridge load rating and condition surveys prior to widening or replacement.
Inspects structures damaged by impact, flood, fire, or failures and makes remediation recommendations.
Designs emergency shoring to prevent collapse of a damaged structure.
Reviews form, falsework, and erection plans.
Reviews structural field welding and bolted splice construction.
Instructs maintenance forces in welding practices.
Certifies field welders for structural welding.
Coordinates and makes recommendations on change orders involving bridge items.
Develops, reviews, and maintains the standard construction specifications and special provisions.
Acts as a liaison with the Construction Division’s Materials and Pavements Section, Maintenance Division, and Federal Highway Administration.
Provides inspection and training for post-tensioning operations.
Reviews shop drawings.
Conducts structural reviews for fabrication issues.
Reviews large proposed overloads.
Prepares designs and details or checking designs submitted for structural foundations and retaining walls.
Designs geotechnical structures.
Oversees geotechnical construction and maintenance support operations.
Performs subsurface soil exploration.
Collects, analyzes, and reports bridge data.

**Design Section**

Reviews preliminary bridge layouts.
Consults with bridge project managers in the preliminary phase to determine the proper bridge type.
Prepares designs and details for all types of bridges and culverts used on the highway system.
Chapter 1 — Organizational Overview

Section 2 — Coordinating with Other Divisions and Sections

- Prepares designs and sketches for widening, repairing, and reconstructing bridges for detailing by the districts.
- Assists the districts by reviewing and monitoring consultant bridge designs.
- Manages design work by the statewide evergreen bridge design consultant pool.
- Studies major bridges for best and most economical construction.
- Recommends to the Construction Division and the Maintenance Division needed repairs for damaged structures.
- Reviews PS&E for bridge design issues.
- Prepares designs for historic, railroad, and unique structures.
- Issues all bridge standard drawings and maintains up-to-date electronic standard drawing sheets.
- Prepares designs and details or checks alternate designs submitted for sign support structures, light poles, traffic signal supports, and other traffic structures.
- Provides technical oversight of computer-aided design and drafting (CADD) software needs.
- Provides expertise on bridge rail technology.

Administration Section

- Administers personnel activities including those related to payroll, benefits, training, records management safety, service awards, leave accounting, and classification.
- Coordinates and monitors the division’s budget, travel requests, equipment inventory, records retention, legislation, and public information requests.
- Supports information resource users with equipment, software, and automation services.
- Maintains the division web pages.
- Coordinates technical training.
- Maintains all manuals concerning bridges.

Design Division (DES)

The Design Division guides development of all highway projects through preliminary engineering stages on interstate, state, rural, and urban highway systems.

The Field Sections of the Design Division:

- Act as the receiving point for PS&E from the districts.
Coordinate with the Bridge Division’s Project Development Section and the districts at preliminary and planning stages.

Ensure proper documentation is provided with PS&E.

Identify and resolve discrepancies and make necessary changes to PS&E.

The Hydraulics Branch of the Design Division:

- Provides hydrologic and hydraulic review and consultation for environmental issues and drainage complaint resolution and litigation.
- Prepares and checks designs submitted for hydrologic and hydraulic studies.

Finance Division (FIN)

The Bridge Division's Project Development Section coordinates with the Finance Division's Letting Section in selecting Highway Bridge Program projects according to statewide prioritization for authorization under the yearly Unified Transportation Program (UTP). Similar coordination must occur between the Bridge Division and the Finance Division in identifying, prioritizing, and selecting projects for the Railroad Grade Separation Program discussed in Chapter 2.

Transportation Planning and Programming Division (TPP)

The Bridge Division coordinates with the Transportation Planning and Programming Division’s (TPP) Statewide Planning and Program Management Section and Traffic Analysis Section. Statewide average daily traffic (ADT) data are gathered, summarized, and reported by the TPP Traffic Analysis Section. These ADT data for bridges are then made a part of the bridge inspection database that is maintained by the Bridge Division Inspection Branch. The annual UTP is published by the TPP Planning and Program Management Section.

Rail Division (RRD)

The Railroad Division’s responsibilities, as they pertain to bridge projects, include the following:

- Coordinates with the railroad company and the bridge project managers during the bridge project.
- Prepares railroad agreements for highway-rail grade separations.
- Plans review of projects involving highway-rail grade separations.
The Bridge Division’s Project Development Section coordinates with RRD to obtain information and data on highway-rail grade crossings in order to identify and prioritize projects for the Railroad Grade Separation Program discussed in Chapter 2.

Environmental Affairs Division (ENV)

- Ensures all projects comply with applicable federal, state, and local environmental laws.
- Acts as consultant to the districts, offering expertise on likely impacts caused by a project and required considerations and permits. Projects that require involvement from the Environmental Division include:
  - Work over navigable waters
  - Dredge and fill operations
  - Lead-based paint removal
  - Asbestos removal
  - Work involving historically significant bridges

For additional information, refer to the Environment Manual.

Construction Division (CST), Materials and Pavements Section

- Provides assistance in the development and review of structural material specifications.
- Analyses concrete core and powder samples taken from bridge components for chloride content for condition survey purposes.
- Provides mill test reports to the Field Operations Section for load rating analysis.
- Analyses paint samples from existing bridges to determine lead content so that appropriate general notes and special provisions can be included in the PS&E for bridge rehabilitation projects.

Maintenance Division (MNT), Maintenance Operations Section

Routine maintenance by the districts often uncovers problems such as deterioration, cracking, warping, and accidental damage due to vehicle collision. These problems are relayed through the Maintenance Division - Maintenance Operations Section to the Bridge Division’s Project Development Section or directly to the Project Development Section from the district. The severity of the problem dictates whether the Field Operations Section will perform an inspection or condition survey.

The Maintenance Division also becomes involved when a district receives a request to place an unusual attachment on a highway structure. The Maintenance Division reviews the request from a
maintenance perspective and, if acceptable, forwards the proposal to the Bridge Division’s Project Development Section. See Chapter 4 for additional information.
Chapter 2 — Bridge Programming and Funding

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Section 1 — Bridge Division’s Role

Overview

Bridge work administered by Texas Department of Transportation (TxDOT) includes projects for construction of new bridges and replacement, rehabilitation, repair, and maintenance of existing bridges on the public highways, roads, and streets.

The public highways, roads, and streets may either be on- or off-system. On-system routes are on the designated state highway system, while off-system routes are not part of the designated state highway system and are under the direct jurisdiction of a local government. A local government may be a county, city, other political subdivision of the state, or special district that has the authority to finance a highway improvement project.

On-system bridge projects are typically funded with a combination of federal-state funds or 100% state funds, while off-system bridge projects administered by TxDOT are typically funded with a combination of federal-state-local or a combination of federal-local funds.

The Texas Transportation Commission (Commission) and TxDOT use the Unified Transportation Program (UTP) as TxDOT’s ten-year plan for transportation project development and construction in preserving and enhancing the statewide transportation system. The UTP is normally updated and re-issued yearly, listing un-let projects that were authorized in the previous edition of the UTP plus newly programmed projects. Categories in the UTP reflect the various systems outlined by the current federal surface transportation program reauthorization bill. The National Highway System (NHS) and the Surface Transportation Program (STP) are examples of such funding categories. Another funding category is the Highway Bridge Program (HBP or Category 6 ON/OFF), which addresses the specific purpose of replacing or rehabilitating structurally deficient or functionally obsolete bridges. TxDOT administers the Highway Bridge Program in separate sub-categories for on- and off-system projects, Categories 6 ON and 6 OFF, respectively. Additional information on the UTP and funding categories is available in the Transportation Planning Manual and the Transportation Programming and Scheduling Manual.

Still another funding category is the Railroad Grade Separation Program (see Chapter 2, Section 3), established for the purpose of constructing new on-system highway-rail grade separation structures at existing highway-rail grade crossings and replacing existing deficient on-system highway underpasses of railroads. This program is administered through UTP Category 6 RGS.

The on- and off-system Highway Bridge Program (Category 6 ON/OFF) and the Railroad Grade Separation Program (Category 6 RGS) are the only programs of the UTP that are administered by the Bridge Division. However, for all TxDOT administered construction projects that include bridges, regardless of UTP funding category, matters of bridge planning, structural design,
plan development, and plans, specifications, and estimates (PS&E) review are under the purview of the Bridge Division.
Section 2 — Highway Bridge Program

Overview

From the federal funds appropriated to the state, a certain amount is set aside in the UTP under the Highway Bridge Program (Category 6 ON/OFF) for the specific purpose of replacing or rehabilitating structurally deficient or functionally obsolete bridges on public highways, roads, and streets. The program applies to deficient existing structures of bridge definition and classification that carry highway vehicular traffic. HBP funds can be used on both on-system and off-system bridges.

In administering the HBP, TxDOT typically operates under the definition of “bridge” as provided in Title 23, Code of Federal Regulations (CFR), Section 650.403(a). The CFR definition of a bridge is:

...a structure including supports erected over a depression or an obstruction, such as water, highway or railway, and having a track or passageway for carrying traffic or other moving loads, and having an opening measured along the center of the roadway of more than 20 feet between undercopings of abutments or spring lines of arches, or extreme ends of openings for multiple boxes; it may also include multiple pipes where the clear distance between openings is less than half of the smaller contiguous opening.

The CFR definition of a bridge includes multiple pipe structures. However, because multiple pipe structures are usually subject only to gradual and very localized collapse, TxDOT normally does not inventory or include such structures in the bridge inspection database or address them under the HBP unless the multiple pipes are 60 inches or more in diameter and where the clear distance between openings is less than half the smallest pipe diameter.

In appropriating funds to the states, federal law requires that at least 15% of the bridge replacement funds be used on projects located on non-federal-aid highways. Non-federal-aid highways are those classified as local or rural minor collectors within the overall highway functional classification system. Federal-aid highways are those classified as rural major or urban collectors, arterials, urban freeways/expressways or interstate highways. Most but not all on-system routes are classified as federal-aid highways while most but not all off-system routes are classified as non-federal-aid highways. TxDOT allocates the HBP funds between on- and off-system projects in such a way as to assure the 15% minimum requirement for the funding of non-federal-aid highway projects is met.

Projects for the on- and off-system HBP are selected according to eligibility requirements specified by TxDOT and prioritized on a statewide basis by the Bridge Division, which uses data from the bridge inspection database.
The Bridge Division and the Finance Division typically coordinate to prioritize on- and off-system bridge projects into respective work programs to meet available fiscal funding levels. The Texas Transportation Commission approves annual fiscal funding amounts for Category 6 ON/OFF for inclusion in the annual Unified Transportation Program (UTP) update.

The UTP does not normally authorize individual Category 6 ON/OFF or RGS projects, only yearly fiscal funding limits. This allows the Bridge Division additional flexibility in moving eligible projects between years due to plan development issues.

Eligibility Requirements

To be eligible for the Highway Bridge Program, (HBP or Category 6 ON/OFF), a proposed project must be consistent with the intent and purpose of the program as covered in the overview of this section. Existing bridges to be remedied under the program must be classified as deficient (structurally deficient or functionally obsolete). Collectively, bridges that are classified as structurally deficient or functionally obsolete are simply referred to as being “deficient.” For a deficient-classified bridge, a sufficiency rating then determines if a bridge is eligible for rehabilitation or replacement. The interval of time, generally 10 years, since a structure’s construction or reconstruction or rehabilitation, and the type of structure also aid in determining a structure’s eligibility. The following points further discuss eligibility requirements as well as work considered to be ineligible.

Deficiency Classification. Deficiency Classification. FHWA criteria determine whether a bridge is classified deficient (structurally deficient or functionally obsolete). A structurally deficient bridge is one with routine maintenance concerns that do not pose a safety risk or one that is frequently flooded. To remain open to traffic, structurally deficient bridges are often posted with reduced weight limits that restrict the gross weight of vehicles using the bridges. A functionally obsolete bridge is one in which the deck width, vertical clearance, or waterway is not adequate to accommodate the traffic demand on the bridge or the volume of water under the bridge. Specific definitions of deficiency classification are in the Bridge Inspection Manual.

Sufficiency Rating. The sufficiency rating of a bridge is a single numerical representation of the sufficiency of the bridge that ranges from 0 to 100. In calculating the rating, consideration is given to the structural adequacy and safety, serviceability and functional obsolescence, and essentiality of traffic service. The higher the number the greater the sufficiency rating. The sufficiency rating serves as a basis for establishing eligibility for replacement or rehabilitation of deficient-classified bridges on the program. If the bridge is deficient and the rating is less than 50, the bridge is eligible for replacement or rehabilitation. If the bridge is deficient and the rating is between 50 and 80, the bridge is eligible for rehabilitation only unless replacement can be justified by eco-
nomic analysis. For ratings higher than 80, the bridge is not eligible for remedy under the program. For specific definitions of sufficiency ratings, see the Bridge Inspection Manual.

**Bridge Replacement and Rehabilitation Projects.** Bridge replacement means total replacement of a deficient-classified bridge with a facility constructed in the same general traffic corridor. The replacement structure should meet the current geometric, construction, and structural standards required for the type and volume of traffic expected on the facility over its design life. Applicable American Association of State Highway and Transportation Officials (AASHTO) design standards should be used.

Bridge rehabilitation refers to project requirements necessary to perform the major work of restoring the structural integrity of a bridge as well as work necessary to correct major safety defects. Related costs are eligible except as noted under the Ineligible Work paragraph below.

Bridges to be replaced or rehabilitated both on and off the federal-aid highways should, as a minimum, conform to the Design Standards for Federal-Aid Highways contained in the Code of Federal Regulations, Title 23, Part 625.

Highway Bridge Program funding for bridge replacement and rehabilitation projects is restricted by Bridge Division directives as follows:

- It will cover the structural cost of the bridge and an approach roadway length of 300 ft. total.
- Roadway costs for approach roadways greater than 300 ft. are limited to no more than 25% of bridge costs plus detour costs.
- At least 50% of the funds are dedicated to bridge costs alone.

Highway Bridge Program funding for bridge replacement and rehabilitation projects is determined as follows:

- The entire project cost excluding items not eligible for federal funding is allowed for bridges with 150-ft.-or-less average approach roadways (300 ft. total).
- The following formula applies to bridges with more than 150-ft. approach roadways (300 ft. total): \((\text{Bridge Costs} + \text{Detour Costs}) \times 1.25 + (\text{Mobilization} + \text{SW3P} + \text{Traffic Handling and Barricades} + \text{Removal of the Old Structure} + \text{Approach Rail} + \text{Bridge Approach Slabs})\), not to exceed \((\text{Bridge Costs}) \times 2\).
- Bridge costs are the structural items (mostly Texas Standard Specifications 400 Items) listed separately for bridges in the project estimate. The approach roadway is the actual approach roadway called for in the plans.
- Detour costs used in this formula must be based on either actual or theoretical costs. If a bridge is built on an alternate alignment to facilitate phased construction, then a theoretical cost for a detour that would have otherwise been required may be included in the calculation. The Bridge Division must approve the design and...
extent of any actual or theoretical detour for Category 6 ON/OFF funding before acquisition of right-of-way or other expenditure contingent on detour approval.

- Funding limitations are based on the project estimate submitted with the final PS&E package sent to the Design Division before letting. Any funding over the eligible Category 6 ON/OFF funding limit required for the project must come from other available funding categories.

- In special circumstances roadway costs over the eligible Category 6 ON/OFF funding limit required for the project are considered for Category 6 ON/OFF funding if they have no other category of funding available. Funding justifications must be submitted and approved by the Bridge Division.

**Outcome of Project.** Replacement or rehabilitation projects under the HBP should result in the removal of the bridge from structurally deficient and/or functionally obsolete classification. Exceptions to this requirement are off-system historic structures that meet the guidelines of the Historic Bridge Manual.

**Multiple Bridges on Same Control-Section-Job (CSJ).** For programming purposes, two or more bridges may be combined into a single CSJ, provided the bridges are located on the same route within the same floodplain or otherwise on the same route in reasonable proximity.

**Clustered Projects.** For improved efficiency and cost, multiple projects, typically in the same county, may be let for construction in the same contract. The Project Development Section is available to assist as needed in the development of clustered bridge projects. Projects should, however, be able to stand alone in case unexpected delays occur.

**Other Projects Possibly Eligible for Federal Fund Participation.** The governing federal statute provides that the state may apply federal funds to replacement of the following:

- Public highway/road bridges rendered obsolete as a result of federal flood control or channelization projects
- Public highway/road traffic ferries in existence on January 1, 1984
- Public highway/road bridges destroyed prior to 1965
- Public highway/road, non-bridge structures classified as low-water crossings

Proceeding with a replacement project under any of these special instances usually occurs outside the established statewide prioritization process. Projects should demonstrate compelling needs, and planners should document circumstances thoroughly.

Bridge projects for replacement of bridges destroyed prior to 1965 should be limited to those destroyed bridges that had significant importance. The responsible highway/road jurisdiction should evidence this importance by making reasonable progress in scheduling the needed rehabilitation or replacement of the facility.
Deficiencies of non-bridge low-water crossings are predominantly functional with any collapse typically gradual and localized. Therefore, replacement should be strictly on a case by case basis, considering the type and volume of traffic and the needs of the users. Also, apply only in instances of year-round water flow through the crossing with at least 6-ft. average depth and/or at least one flood closure with one-day duration during each four-year period.

Before pursuing federal funding in any of these four special instances, contact should be made with the Bridge Division project manager.

Ten-Year Rule for New Construction and Major Reconstruction. Bridges identified in the bridge inspection database as having a date of construction or major reconstruction within the past ten years are ineligible for the HBP regardless of the source of funding (local, state, or federal).

Disposition/Use of Existing Bridge. Whenever a deficient bridge is replaced or its deficiency otherwise alleviated under the bridge program, the bridge should either be dismantled or demolished or its use limited to the type and volume of traffic that the structure can safely service over its remaining life.

Bridges replaced with federal funds that are identified as historically significant may be preserved for adaptive reuse with federal fund participation up to the estimated demolition cost. The Historic Bridge Manual has additional information.

Funding of Environmental Mitigation Work. Work for the required mitigation of environmental impact in bridge projects is eligible for HBP participation.

Ineligible Work. The costs of long approach fills, causeways, connecting roadways, interchanges, ramps, and other extensive earth structures, when constructed beyond the attainable touchdown point, are not eligible under the HBP.

Toll Bridges. If they meet all other eligibility requirements, existing bridges on toll highways may be eligible for the HBP under certain conditions. These conditions include the following:

- The highway is publicly owned.
- Tolls are being collected to finance necessary maintenance of the facility and to pay off construction bonds (that is, tolls are not being collected in any part for profit).

Statewide Prioritization

Safety is TxDOT's main focus in prioritizing projects including bridge projects being considered for replacement or rehabilitation using HBP funds. Structurally deficient and functionally obsolete bridges are prioritized for the program in order of lowest sufficiency rating to highest. Projects are programmed for four years at a time. The first two years of projects are included in the depart-
ment's 24-month letting schedule with the following two years in a plan development stage. All of these projects are authorized for construction letting for their respective years. All project letting dates are subject to change based on changing conditions, fiscal funding levels, or emergency projects.

Each year, the Bridge Division reviews the list of programmed bridges using HBP funds and coordinates with districts and Finance Division to verify the projects within the 24-month letting schedule as well as the projects in plan development. The Bridge Division also develops a list of eligible bridges for the districts to review and submit for consideration for HBP funds. The Bridge Division prioritizes the newly submitted bridges and ranks them according to their deficiency status: from lowest sufficiency rating to highest. Bridges are selected in this order until funding is exhausted within the year(s) that have available funding. Bridges not selected for a requested fiscal year due to funding limits being reached, are added to the following year for consideration and prioritized until funds are exhausted. This process is repeated for each year of the four-year HBP program listing until funds for all fiscal programming years have been exhausted.

Districts are given the opportunity to request special consideration projects for any of the project development years. Due to the funding constraints, however, districts should be prepared to delay one or more of their previously approved projects in that fiscal year.

Funding not used in the current fiscal year is rolled over to the next fiscal year (subject to Transportation Commission approval), however, the goal is to use all of the available funding to ensure deficient bridges are replaced as soon as possible and to assist the department in meeting its goals and priorities. To accomplish this, the Bridge Division encourages bridge projects selected within the first four years be developed and ready to go to letting within the first two years of the program. This allows projects to be moved into the current fiscal year and be let for construction should another project be delayed. The Bridge Division's goals are to use all of the funding for each year of the program and reduce the number of deficient structures in the state.
Administration of Off-System Highway Bridge Program Projects

When planning involves an off-system bridge project, particularly those under the Highway Bridge Program, coordination with the local government is essential.

- Prior to a project gaining CONSTRUCT authorization, the appropriate local government should be contacted, and its interest in participating in the project established.

- If the local government expresses interest in the project and the project has CONSTRUCT authorization, an appropriate Advance Funding Agreement must be executed between the state and local government before any work, either preliminary engineering or construction, can be performed. In addition to specifying the responsibilities of the parties in the performance and funding of the work, the agreement provides for advance payments (escrow payments) or performance of equivalent-match-funded work by the local government for its share of the project funding responsibilities. Questions about the standard agreement form should be directed to the appropriate Bridge Division Project Manager.

- Funding is typically 80-10-10, federal-state-local, with the local match fund participation requirement based on the estimate of project costs made at the time of agreement or agreement amendment execution.

- For Category 6 OFF projects that are not yet CONSTRUCT-authorized, exercise judgment in communication with the local government. Avoid expectations of imminent project construction. A project must be CONSTRUCT-authorized to be let for construction. A project cannot be let until a local government either remits escrow payments for its required participation in the project or provides a written agreement on how it will meet its participation requirement.

- The usual 10% participation of the local government may be adjusted where the project is located within a county that meets the statutory definition of being an “economically disadvantaged county” (EDC). Such adjustments of local government participation due to EDC classification are based on applications submitted by the local government through the district office, to the Transportation Planning and Programming Division.

- The local match requirement on off-system bridge program projects may be waived. For waiving of the required local participation to be considered, the local government must agree to use local funds to perform structural or other safety improvement work on other load-carrying deficient bridges or cross-drainage structures in its jurisdiction. Such work must have a dollar value at least equivalent to the required local match participation or local participation as adjusted under the EDC provision.

The requirements of 43 TAC Section 15.55(d) must be fully met in initiating and processing such a waiver. Adhere to the following sequence of events for inviting, reviewing and approving the waiver on an authorized federal off-system bridge program project:
The district notifies the Local Government of the availability of waivers subject to specified conditions and invites submission of requests.

The Local Government makes such a request.

The District receives and considers the completed request for waiver from the Local Government according to requirements of 43 TAC Section 15.55(d).

If the request for waiver meets all requirements and approval is appropriate, the district advises the Local Government in writing of approval.

If the request for waiver does not meet all requirements of 43 TAC Section 15.55(d) or approval is otherwise not appropriate, the district informs the Local Government, stating the reason(s) for disapproval of the waiver request.

Execute an appropriate agreement for the project.

The district keeps a file of all correspondence and documentation pertaining to the waiver and related equivalent-match project(s). Include in this file the subsequent documentation received from the Local Government pertaining to completion of the equivalent-match project work.

If the district has not been notified by the Local Government that the equivalent-match work has been completed within the specified three-year period, the district inquires as to the status of the work. If it is determined that the work has not been accomplished and no significant progress has or is being made toward such accomplishment, then the five-year period for exclusion of the Local Government from such waivers may be invoked, or an extension requested from the Bridge Division.

Requests for Remedial Work on Completed Off-System Highway Bridge Program Projects (UTP Category 6 OFF)

During its post-construction service life, all bridge will eventually require maintenance. Thus, one of the provisions of the usual advanced funding agreement executed between the state and local government on these projects states that...” After the project has been completed, the local government shall accept full ownership and operate and maintain the facility authorized by the agreement for the benefit of and no charge of toll to the public.”
However, there may be instances where a local government will approach the district requesting repair or other remedial action by TxDOT on a completed off-system bridge project with the local government requesting the remedial action due to poor design or design error.

The suggestion of design deficiency should be determined by a thorough review of all the pertinent information and facts.
Section 3 — Railroad Grade Separation Program

Overview

This program addresses:

- construction of new grade separation structures at existing at-grade highway-rail crossings
- rehabilitation or replacement of deficient highway underpasses of railroads on the state highway system

The eligible state highway system routes must be of a classification greater than local road or rural minor collector on the functional classification scale, i.e., they must be classified as federal-aid highways.

Selected and prioritized highway-rail grade separation projects are in some instances authorized in funding Category 6 RGS of the yearly Unified Transportation Program (UTP) under the CONSTRUCT level of authorization. Category 6 RGS funding is targeted for each of the following:

- new grade separation structures
- remedy of deficient railroad underpasses

Candidate projects for construction of new grade separation structures are prioritized using a cost-benefit index, and projects for railroad underpass replacement/rehabilitation are prioritized using a priority rating.

Work Limitations

Funding from Category 6 RGS in these projects should be limited to the actual structure and other work necessary to make the structure serviceable and consistent with good design. This limits Category 6 RGS-funded approach roadway work to that sufficient to transition the gradeline of the structure to an attainable touchdown with the existing or new approaching roadway that is at or near level grade. Roadway and other work that is outside these limitations should be funded from other categories.

These limitations should particularly control when the new or replacement structure will be constructed on new alignment or new location.

Except in extraordinary situations, the existing at-grade highway-rail crossing should be eliminated.
Prioritization of New Highway-Rail Grade Separation Projects

The cost-benefit index used in prioritizing new highway-rail grade separation projects is the estimated cost in millions of dollars that would be saved in highway user cost over a 50-year design life of the new grade separation structure constructed at the existing highway-rail crossing. The higher the estimated user cost, the higher the priority. The estimated user cost includes costs due to casualties (fatalities and injuries) and personnel and traffic equipment delay.

Factors used in calculating a cost-benefit index are as follows:

- Average daily traffic
- Number of train movements
- Number of highway fatalities, injuries, and property damage only crashes
- Period (range) in years for which casualty data are available
- Estimated yearly costs for personnel and equipment delays (due to waiting for trains to pass)

The data described for cost-benefit index calculation are provided from the Roadway Information System (RIS) compiled by the Transportation Planning and Programming Division.

Prioritization of Railroad Underpass Replacement/Rehabilitation Projects

Projects for railroad underpass replacement/rehabilitation are prioritized using a priority rating or score on a numerical scale of 0 through 100. The higher the number, the less sufficient the structure for underpassing highway traffic, and thus the higher the priority for replacement/rehabilitation.

The attributes and relative weights used in calculating a priority rating score are as follows:

- Underpassing roadway width - 20%
- Vertical underclearance - 20%
- Right lateral underclearance - 20%
- Average daily traffic (underpassing) per lane - 20%
- Estimated construction cost per Average Daily Traffic - 20%

This rating calculation uses the bridge inspection database appraisal ratings (0 through 9) for the underpassing roadway width, vertical underclearance, and right lateral underclearance features. The bridge inspection database provides average daily traffic and number of underpassing lanes items.
Chapter 3 — Preliminary Design Features

Contents:

Section 1 — General Features

Section 2 — Features Based on Bridge Location
Section 1 — General Features

Bridge Standard Drawings

Bridge standard drawings are available for many structure types, skews, and common bridge widths. These standard drawings contain systems and details that can be used in bridge plans without modification.

Many standard drawings are available on the Texas Department of Transportation (TxDOT) main website (Use the browser’s “Edit-->Find” menu to locate individual drawings.) The website also contains instructions about the use of these graphics files.

Bridge Widths

For all new and replacement projects (4R) including freeway rehabilitation, carry the full usable shoulder width of the approach roadway across the structure. Conform bridge widths to the requirements in Chapter 3 of the Roadway Design Manual, in which the design criteria for 4R projects are represented for various roadway functional classifications and traffic volumes. Construct bridge widths for structures in complex interchanges containing flares, gores, etc. to full width of the approach roadway, as well.

For non-freeway rehabilitation projects (3R) where the bridge structures are to be modified, meet bridge widths with the approach roadway width as a minimum. Otherwise, conform bridge widths to the requirements in Chapter 4 of the Roadway Design Manual in which the design criteria for 3R projects are represented for various roadway functional classifications and traffic volumes.

Minimum bridge width requirements for special facilities, such as off-system bridge replacement and rehabilitation projects, Texas Parks and Wildlife Department projects, and bicycle facilities can be found in Chapter 6 of the Roadway Design Manual. Minimum bridge width requirements for off-system historically significant bridge projects, can be found in the Historic Bridge Manual.

Bridge and Span Lengths

Every project is unique. Thus, in planning stages, the length of the bridge is an approximation based on available preliminary information. As the project progresses the actual design length becomes more apparent. The length of a bridge generally depends on the existing topographical conditions at the site, the width of the obstruction being crossed (other roads, waterway, railroad tracks, etc.), roadway alignment, highway design criteria (sight distance, maximum grades, etc.), and economics. The future plans of the area also have an impact on the structure length. If possible, the “begin bridge” point and “end bridge” point should be located at whole station numbers and on
a tangent alignment. This can be accomplished by moving the point of curvature (PC) or the point of tangency (PT) off the bridge, if allowable.

Once the bridge length is determined, the number of spans, bent locations, and span lengths can be determined. Existing site conditions, economy, and aesthetics are usually controlling factors. If location of the bents is arbitrary and site conditions allow the bents to be placed anywhere along the length of the bridge, make the interior span lengths equal. If possible, place the bent locations at whole station numbers.

The span length requirements limit available options for superstructure type. Economy and aesthetics often govern at this point. Recommended span lengths and approximate depths for various superstructure types can be found on the TxDOT website. Bridge costs for various superstructure types also are posted on the TxDOT website.

This entire process, like many tasks in engineering, consists of iterative steps that take place during development of preliminary bridge layouts. The district, the Bridge Division project manager, the Bridge Division Field Operations Section, the Bridge Division Design Section consultants, and others discuss options until they develop a plan for an economically feasible, aesthetically pleasing structure that serves its design purpose.

**Vertical Curvature**

Conform vertical curvature of structures to curvatures permitted on sections of roadway for the same conditions of traffic and terrain. Basic design criteria for vertical alignment can be found in Chapter 2 of the *Roadway Design Manual*.

Be aware of the following important factors when determining the vertical alignment of a structure:

- On controlled-access highways where crossover roads intersect frontage roads near the main lanes, set the vertical curvature of the crossover structure to allow adequate sight distance for crossover and frontage road traffic. It may be necessary to locate intersections farther away from bridges to provide adequate sight distance on steep crossover grades.

- In areas where icing is prevalent, design structures with a somewhat flatter grade than comparable sections of roadway because they are more susceptible to icing and likely to present a traffic hazard in the early stages of an ice storm.

- On long flat grades, use a small crest vertical curve throughout the bridge length to prevent an illusion of sag and to improve deck drainage.

**Horizontal Alignment**

Place a bridge structure on tangent alignment if this can be accomplished without sacrificing the overall geometric design of the highway. Tangent alignment affords easier plan preparation and easier bridge construction, thereby resulting in lower structure costs. In urban areas where high
right-of-way costs prevail and in some rural areas, it is not always feasible to build structures on a tangent alignment. Build curved structures where their geometry fits the curve geometry for the roadway sections. Tightly curved alignments can significantly restrict the type of superstructure. Basic design criteria for horizontal alignment can be found in Chapter 2 of the Roadway Design Manual.

Skew

Build structures on a skew if necessary to match alignment of roadways, railroad tracks, or stream flow. If a skew is required, consider the following:

- Skews should normally be limited to the minimum angle practicable. Standards for several beam types and roadway widths are available in skews of 30 degrees and 15 degrees. Skews in excess of 30 degrees usually will require special design considerations.
- For railroad overpasses, place bents parallel to railroad track alignment, if possible.
- For railroad underpasses, each railroad company may have its own limitations on acceptable skew angle.
- Skewed structures that have horizontal curvature require special geometric and structural design, and additional time will be required for plan preparation.
- Slab breakbacks and special slab reinforcing details may be required. Refer to the Bridge Detailing Manual.

Superelevation, Transitions, and Cross Slopes

Several factors can affect the allowable rate of superelevation (e) including climate, terrain, type of traffic, design speed, and alignment, among others. Thus, no single maximum superelevation rate (emax) is applicable to all situations. Ranges of emax are necessary. Hold the maximum superelevation rate on structures to 8% regardless of the degree of curvature due to the tendency of vehicles to slide toward the inside of the curve when icing conditions exist. Otherwise, make the amounts of superelevation and transition rates on structures the same as those specified for the sections of roadway. Basic design criteria on superelevation can be found in Chapter 2 of the Roadway Design Manual.

Do not use spiral transitions on bridges. The same effect as a spiral curve can be achieved by compounding smaller degree curves into the principle curve. On preliminary bridge layouts the rate of transition from full superelevation to normal crown should be specified in enough detail to enable the designer to define the roadway surface.

The cross slopes on bridges may be set to match the approach roadway. Usual crown is 1.5% or 2%. In some cases 1% is used on bridge standards. In this case, transition the approach roadway slope to fit the bridge.
Bridge Medians

In urbanized settings on new construction projects and where practical on reconstruction projects, when constructing a raised median, use a 6 foot median width for pedestrian refuge in accordance with Public Rights-of-Way Accessibility Guidelines (PROWAG).

Median widths are measured between the inside edges of opposing travel lanes. Where narrow medians (4 ft. to 16 ft.) are used, carry the median uninterrupted across the bridge structure.

When the median width is 30 ft. or less and a median barrier is used on the approaches, use a single structure with a closed flush median and a median barrier extended uninterrupted throughout the structure length. When the median width exceeds 30 ft., construct dual structures with an open median and suitable guardrail connected to the bridge railing.

Additional design considerations for determining median width can be found in Chapter 2 of the Roadway Design Manual.

Sidewalks and Curbs on Bridges

Take into consideration pedestrian and driver safety when sidewalks are provided on bridges. Make pedestrian facilities accessible to all persons and design them in accordance with the Americans with Disabilities Act (ADA) and the Texas Accessibility Standards (TAS). Information on ADA and TAS, including general concerns and basic design criteria, can be found in Advanced Planning -- General Considerations in Chapter 4, Section 1 of this manual and Chapter 2 of the Roadway Design Manual.

Sidewalks on Bridges. Sidewalks on Bridges. When pedestrians need to be accommodated, provide suitable sidewalks to ensure a continuous ADA-compliant pedestrian route. Make the minimum clear sidewalk width 5 ft. In no case should a sidewalk not protected by a traffic railing be less than 3 ft. 6 in. wide. Refer to Chapter 2 of the Roadway Design Manual for other appropriate design criteria.

The need for sidewalks usually occurs in an urban area where a depressed highway crosses under a city street or on frontage road bridges. In urbanized areas, consider placing sidewalks on both sides of any new construction or reconstruction bridge project. Provide a suitable barrier rail or combination railing, if required. The use of barrier rail to separate vehicle from pedestrian traffic is governed by the following criteria:

- Appropriate barrier rail is required when the design speed equals or exceeds 50 mph.
- If the design speed equals or exceeds 40 mph but less than 50 mph, appropriate barrier rail may be considered where bridge site specific conditions allow without interference to pedestrian movements, intersecting roadways, or other features.
Additional features of sidewalk and rail include:

- American Association of State Highway and Transportation Officials (AASHTO) height requirements for pedestrian railing do not apply to the traffic barrier rail. However, engineering judgment should be exercised.
- Properly protect ends of barrier rail.
- A light pedestrian rail or chain link fence may be used on the outside of the sidewalk when a barrier rail is provided on the inside of the sidewalk.

**Curbs on Bridges.** Do not use curbs on bridges except in conjunction with sidewalks. Do not use curbs directly in front of guard fence, barrier rail, or traffic rail.

If curbs are used:

- Make curb height meet or exceed height of the approach roadway.
- Do not make curb height less than 5-3/4 in. or greater than 8 in.

Refer to Chapter 2 of the Roadway Design Manual for curb types and considerations.

**Bike Paths**

If a bike path is provided on a bridge, the design is governed by the current AASHTO Guide for the Development of Bicycle Facilities.

Additionally, TxDOT has designated the following minimum design criteria:

- For new shared lanes on a signed, designated bicycle route, the minimum lane width is 14 ft.
- The 14 ft. usable lane width for shared use in a wide curb lane is measured from the edge stripe to the lane stripe or from the longitudinal joint of the gutter pan to the lane stripe (the gutter pan should not be included in the usable width). Do not include the curb offset as part of the usable lane width for a shared use in a wide curb lane.
- Widths less than 14 ft. require design exception.
- For projects in a rural setting on off-system roadways with greater than 400 ADT and all on-system roadways, where bridges are being replaced or bridge decks are being replaced or rehabilitated, provide a 5 ft. shoulder (4 ft. shoulder and 1 ft. barrier offset) on the structure and along the adjacent barrier.
Illumination

Coordinate lighting of bridge structures with lighting of approach roadways. Space the location of suitable brackets for mounting light standards in cooperation with the roadway design engineer. Suitable conduit and brackets can be provided in the bridge plans to serve those light standards to be mounted on the structure.

Railings

The selection of bridge railing is based on its adequacy to accommodate the design vehicle under design impact conditions. The rail must meet the requirements of the AASHTO Manual for Assessing Safety Hardware (MASH) or the National Cooperative Highway Research Program (NCHRP) 350.

TxDOT has developed many railing types and created standard drawings for use in different situations. These standard drawings are readily available for use on highway bridge projects. Include them in the bridge details. The Bridge Railing Manual also discusses using TxDOT railing types.

Under certain conditions, barriers or combination rails must separate sidewalks from vehicular traffic. Refer to Sidewalks and Curbs on Bridges in this section for guidance.

Refer to Chapter 2 of the Roadway Design Manual concerning using railings on bridge class culverts.

Beginning and End of Bridges

For stream crossing structures, make slopes of embankments at bridge ends 2:1 in a direction normal to the abutment cap, and the side slopes normal to the roadway no steeper than 3:1. Use riprap under the bridge and wrapped around the embankment, terminating when the slope becomes 3:1 or flatter. Steeper slopes may be used for special conditions but should be avoided where possible to allow for easier placement of riprap and greater slope stability. Customary practice calls for 5 in., Class B concrete riprap. For structures in reservoirs make the riprap at bridge ends the same as that used to protect the roadway embankment, which is usually rock riprap with granular bedding or soil cement riprap.

The slopes indicated above are satisfactory for highway separation structures, except that a 3:1 slope may be used in a direction normal to the abutment cap. Use a flatter slope where greater sight distance under a structure is needed. When the 3:1 slope is used, use only a shadow type riprap, extending no more than 2 ft. beyond the horizontal projection of the structure. For skewed structures the construct the acute side normal to the abutment cap to prevent erosion at edge of riprap. Curbs may also be used at the edges of riprap to prevent erosion. Use 4 in. Class B concrete riprap for highway interchange structures.
Do not use U-type abutments because they have proven more expensive and are difficult to widen; however, in cases of restricted right of way, the U-type abutment may be indicated. Use bridge approach slabs at bridge ends for vehicular structures on all major highways. The approach slab covers an area behind the abutment backwall where good compaction of base and sub-base is difficult to obtain. The approach slab will reduce maintenance due to settlement adjacent to abutment backwalls. Such settlement causes increased impact and roughness at bridge ends, subsequent horizontal movement, and cracking of abutment. The approach slab standards are available from the Design Division.

**Design Exceptions, Waivers, and Variances**

A design that complies with the department’s design manuals is based on documented engineering research or practice. Any design that is an exception to usual standards requires a documented, logical, evaluation process explaining why the standards are not met. The design exception, design waiver, and design variance procedures establish this documentation.

**Design Exceptions**

Design exceptions are required whenever certain controlling criteria for the different types of construction projects (i.e., 4R, 3R, 2R, Special Facilities, Off-system, Historically Significant Bridge Projects, Park Road Projects, and on-street Bicycle Facilities) are not met. When less than the recommended guidelines for these controlling criteria are anticipated in the design phase, a formal design exception should be processed. The determination of whether a design exception exists rests with either the district engineer or the Bridge Design Exception Committee (BDEC), depending on the controlling criteria in question.

The Chair of the BDEC is the Director of the Bridge Division and the membership is composed of:

- Director, Project Development Section, Bridge Division
- Director, Design Section, Bridge Division
- Director, Field Operations Section, Bridge Division
- Project Manager, Project Development Section, Bridge Division- serves a two-year term
- Member from a district bridge office recommended by the Director of the Bridge Division and appointed by the District Engineer - serves a two-year term

The district engineer or BDEC will serve as the final arbiter on all design exception requests on projects with state oversight. Design exceptions on projects with federal oversight or on the interstate system will be submitted to the Federal Highway Administration.
(FHWA) for approval. The Bridge Division project manager is the district point of contact when requesting design exceptions that are the responsibility of BDEC.

The following construction project types will have controlling criteria that dictate a design exception. The responsible party for determining design exception approval is listed after each criterion.

**New Location and Reconstruction Projects (4R).** The list below gives the controlling criteria that will require a design exception:

- Design speed (District)
- Lane width (District)
- Shoulder width (District)
- Bridge width (BDEC)
- Structural capacity (BDEC)
- Horizontal alignment (District)
- Vertical alignment (District)
- Grades (District)
- Stopping sight distance (District)
- Cross slope (District)
- Superelevation (District)
- Vertical clearance (District)

**Resurfacing, Restoration or Rehabilitation Projects (3R).** The list below gives the controlling criteria that will require a design exception:

- Deficient bridge rails (for high volume roadways) (BDEC)
- Design speed (for high volume roadways) (District)
- Horizontal alignment (for high volume roadways) (District)
- Vertical alignment (for high volume roadways) (District)
- Lane width (District)
- Shoulder width (District)
- Bridge width (BDEC)
- Structural capacity (BDEC)

**Resurfacing or Restoration Projects (2R).** Design exceptions are required for 2R projects any time the existing geometric features (district) or bridge features (BDEC) for the proposed project will be reduced.
**Low Volume Off-System Bridges.** For off-system bridge replacement and rehabilitation projects with current average daily traffic (ADT) of 400 or less, the following design elements must meet or improve conditions that are typical on the remainder of the roadway or a design exception will be necessary:

- Design speed (District)
- Lane width (District)
- Shoulder width (District)
- Structural capacity (BDEC)
- Horizontal alignment (District)
- Vertical alignment (District)
- Grades (District)
- Cross slope (District)
- Superelevation (District)
- Minimum structure width, face to face of rail: 24 ft. (BDEC)

**Off-System Historically Significant Bridge Projects.** The list below gives the controlling criteria that will require a design exception if the minimum design criteria listed in the Historic Bridge Manual cannot be met:

- Roadway width (BDEC)
- Load carrying capacity (operating rating) (BDEC)

**Bicycle Facilities.** Design exceptions are necessary when the minimum requirements given in the AASHTO Guide for the Development of Bicycle Facilities for bicycle lanes cannot be met.

**Hydraulic Design Criteria.** The Hydraulic Design Manual outlines recommended and required design procedures, criteria, and documentation. If the required design procedures and criteria are not met, a design exception is required. A departure from recommended procedures or criteria will not require a design exception. However, consult the Design Division's Hydraulics Branch to ensure that alternate procedures are appropriate.

**Design Waivers**

When criteria are not met in a non-controlling category, a design exception is not required. In these cases design waivers at the district level will handle the variations from the recommended design criteria. Design waivers will be granted as the district authorizes. Permanently retain the complete documentation in the district project files and furnish a copy to the Design Division. For a listing of
the types of non-controlling criteria that will require a design waiver, see Design Exceptions in the Roadway Design Manual.

Design Variances

Request a design variance whenever the design guidelines specified in the Americans with Disabilities Act Accessibility Guidelines (ADAAG) and the Texas Accessibility Standards are not met. Send design variances to the Design Division to be forwarded to the Texas Department of Licensing and Regulation for approval.

Corrosion Protection Systems

Protecting reinforcing steel is critical to the design life of a concrete structure. The following methods of inhibiting corrosion, either in combination or alone, are currently used by TxDOT:

- Additional concrete cover
- Low permeable concrete (with slag or pozzolans such as fly ash)
- Epoxy coated rebar
- Linseed oil treatment
- Corrosion inhibitors
- Cathodic protection
- Concrete class specification

Climatic conditions determine which structures to protect. Guidelines for the appropriate use of corrosion protection systems within the state can be found on the TxDOT website.

Loads on Bridge Decks

Design all new bridges for a minimum of HL93 loading. Use this load in the design of a bridge as specified in the latest edition of the AASHTO Load and Resistance Factor Design Bridge Specifications.

Excavation Protection Requirements

In accordance with state law, whenever a project involves trench excavations deeper than 5 ft., include a bid item in the contract to compensate the contractor for determining or providing the specified safety precaution system. If the excavation is for linear installations such as pipe and conduit, then use Standard Specification Item 402, "Trench Excavation Protection".
However, if there are special shoring requirements, use Standard Specification Item 403, "Temporary Special Shoring." Clearly show the limits of the temporary special shoring on the plans. Design the special shoring in accordance with Item 403.

**Bridge Joints**

Bridge deck joints have proven to be both a construction and a maintenance problem and, as such, should be used only as required by design. Where they are necessary, determine the type and size of the joint by the type of superstructure, the length of structure that is contributing to the expansion to be handled at the joint location, and the need to seal the joint against water leakage.

Use bridge deck continuity, which minimizes the number of expansion joints, when possible. Seal or drain all expansion joints in deicing zones. Use open joints in most stream crossing structures; however, environmental concerns may necessitate sealed joints for some structures. Seal joints for all grade separation structures.

For new construction requiring sealed joints, use the following joint types for various superstructures:

- Pan Form Girder Units: SEJ-A, sealed elastomeric concrete, or sealed armor joints
- Prestressed Box Beam Units: SEJ-A, sealed elastomeric concrete, or sealed armor joints
- Prestressed Concrete Beam Units: SEJ-A, or SEJ-P for structures with heavy truck traffic
- Steel Girder Units: SEJ-P for required movement of 5 in. or less, or SEJ-A (Mod) Finger joints with drainage troughs for larger movements

For new construction not requiring sealed joints, use the following joint types for various superstructures:

- Slab Spans and Units: Type “A” Joint with preformed expansion joint material and poured top. Use 1 in. thickness for continuous units; 1 1/2 in. for simple spans.
- Pan Form Girder Units: Open steel plate armor joints
- Prestressed Box Beam Units: Open steel plate armor joints
- Prestressed Concrete Beam Units: Open steel plate armor joints
- Steel Girder Units: Open steel plate armor joints or finger joints

For the retrofit or repair of existing expansion joints that are leaking or otherwise malfunctioning, the following methods have been successfully employed:

- Asphaltic Plug. A slab of rubberized asphaltic concrete is placed over a 1/8 in. plate attached to the open joint. Total movement of 1 1/2 in. has been accommodated.
◆ Elastomeric Concrete or Polymer Nosing. A specially designed and constructed material is used to rebuild spalled joints. It can be used with various sealing systems to waterproof the joint.

◆ Class 7 Silicone. A rapid curing sealing material is placed on a foam backer rod in the sand blasted armor joints. This should be limited to 3 in. opening and 1/2 in. total movement.

Utilize the latest standard drawings for expansion joints for armor joints and sealed expansion joints (SEJ). Contact the Bridge Division Construction/Maintenance Branch for details of polymer nosing and other retrofit type joint systems.

In addition to transverse bridge deck joints, occasionally the design parameters require a longitudinal joint in the bridge deck. This can be the result of extreme bridge width, jumps in elevation across the width of the deck, or construction phasing requirements. In all cases, place these longitudinal joints next to a bridge rail or concrete traffic barrier (CTB). Do not place them in traffic lanes due to the potential hazard to motorcyclists. If needed, seal longitudinal joints against leakage in a manner similar to transverse joints.

Stage Construction—Existing Structure Removal

The removal of the existing structure is in accordance with Standard Specifications Item 496, “Removing Old Structures.”

The partial removal of an existing structure begins with cutting and removing the slab. The location of the cut is called the breakback. The approximate location of the breakback is determined through coordination with the traffic and highway engineer and is based on lane width requirements of both the new structure and the partial structure to remain in place. The bridge designer should determine the exact breakback point and base it on the structural capacity of the existing structure.

The breakback is generally located over a beam and must be supported by a stable substructure. After the slab is cut and removed, the beams are removed and the substructure, or a portion thereof, is demolished. If necessary, footings are removed and drilled shafts and piles are cut and removed to a distance a minimum of 2 ft., or as specified in the plans, below the proposed ground.

Stage Construction—New Substructure

The following are guidelines for the design of the new substructure.
Foundations. Observe minimum drilling and pile driving clearances. They are as follows.

<table>
<thead>
<tr>
<th></th>
<th>Minimum Vertical Clearance</th>
<th>Minimum Horizontal Clearance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drilling</td>
<td>12 ft.</td>
<td>2 ft.</td>
</tr>
<tr>
<td>Pile Driving</td>
<td>20 ft.</td>
<td>2 ft.</td>
</tr>
</tbody>
</table>

If possible, avoid locations of existing foundations. For widenings, use a similar type of foundation as those remaining in use.

Abutments. At the stage construction joint, it is difficult to leave reinforcing steel projecting from the abutments for splicing because of the conflicts with temporary shoring that must retain the fill. Instead, locate foundations (drilled shafts or piling) close to the stage construction joint and dowel the two sides of the cap together, or provide a sealed expansion joint.

Interior Bents. If possible, use independent bents. If a single structure is required, the reinforcing steel can be spliced together using a lap, a mechanical coupler, or butt weld. If splicing is used, provide adequate horizontal and vertical clearances to account for the projecting reinforcement. Protect the exposed reinforcement. If available clearances are limited, use mechanical couplers or butt welds. Due to the complexity of couplers and welds, accurate details and proper structural detail notes are essential.

Stage Construction—New Superstructure

The location of the stage construction joint in the slab and the available clear distance for splicing the mat reinforcing are critical factors in the slab design.

The stage construction joint can be placed over a supporting beam or in a bay between beams. The preferred method is placing the stage construction joint over a supporting beam. When placing the joint over a supporting beam, locate the joint 2 in. beyond the centerline of the beam. When placing the joint between beams, locate the joint at the quarter point of the beam spacing. Do not utilize prestressed concrete panels in the bay containing the joint.

The available construction clear distance may limit the available length required for adequate lap length. If the clear distance is inadequate, utilize mechanical couplers. However, there are concerns about the performance of a construction joint using couplers in both mats, particularly in areas susceptible to salt contamination. In such instances, consider raising the grade a few inches to allow lapping the top mat bars to clear above the existing deck. If couplers are used, supply the appropriate specifications.

Give additional attention to the design of the beam nearest to the stage construction joint. At first an exterior beam, this beam becomes an interior beam once the adjacent stage is constructed. The
beam spacing between stages may also be different. Given these considerations, account for the worst case live load distribution factor in the design of the beam.

**Temporary Railing**

For guidelines on selection and placement of temporary railing, refer to the [Bridge Railing Manual](#).
Section 2 — Features Based on Bridge Location

Highway Grade Separation

Vertical Clearance. Provide 16 ft. 6-in. minimum vertical clearance over the roadway, including usable shoulders on all new highway grade separation structures, including railroad underpasses.

No exceptions will be made to this policy for structures over main lanes of interstate or controlled access highways except within cities where the 16 ft. 6 in. vertical clearance is provided on an interstate loop around the particular city. On all other systems of highways with separations involving interchange facilities, other highways, public roads, or city streets vertical clearance should be provided in accordance with the Roadway Design Manual. Where these minimum clearances are impractical or excessively expensive to provide, pursue a design exception. Such exception requires approval from Bridge Division and Design Division (DES) with the Federal Highway Administration (FHWA) and/or the Military Traffic Management Command Transportation Engineering Agency (MTMCTEA) of the Department of Defense. In such cases, vertical clearance will be held as near as practicable to 16 ft. 6 in. Vertical clearance may never be less than 14 ft. 6 in.

The above-specified clearances apply over the entire width of roadway including usable shoulders and include an allowance of 6 in. for future pavement overlays. Where a sag vertical curve exists on the roadway underneath the structure, vertical clearance should be calculated above the mid-point of a 50-ft. chord.

Horizontal Clearance. Information on horizontal clearance can be found in Table 2-11 of the Roadway Design Manual.

Airway-Highway Clearances. Where grade separation structures or multilevel interchange structures extend above ground level in the vicinity of airports, obtain clearance in accordance with the Roadway Design Manual.

Structures over Streams

Information in the following section provides general reference on common design features of structures over streams. When planning a structure over stream, however, always refer to the Hydraulic Design Manual for additional and more detailed information.

For new locations crossing a stream, conduct a minimum investigation to establish an approximate design highwater elevation. This high-water elevation should aid in the determination of any complication concerning the crossing while the location of the route is flexible enough to be shifted.

For existing locations, determine the hydraulic adequacy of the existing structure. If the runoff from a storm of documented design intensity has not actually been carried through the structure, the
declaration of past adequacy is meaningless. If reliable flood control devices such as National Resources Conservation Service (NRCS) dams have been constructed upstream, an existing structure may be entirely adequate but may also be too large.

Basically, there are only two ways to verify the hydraulic adequacy of an existing structure:

- documentation that the structure actually has accommodated a flood of at least the approximate design frequency
- hydrologic and hydraulic investigation similar to that necessary to design new drainage structures

If investigation is necessary, information from old plans can be helpful but information should be verified and, if necessary, updated. Runoff factors especially should be given close attention. If no documentable design flood has occurred and old design data are not available, hydrologic and hydraulic information must be furnished with the plans, specifications, and estimates (PS&E) or with preliminary layout submissions, keeping the extent of the investigation in line with the importance of the structure.

When an existing structure is determined to be inadequate or oversized, one of two actions may be taken. Either adjust the size of the facility as appropriate, or give the structure a new capacity rating with a corresponding increase or decrease in the hydraulic standards that were previously established. Either action must be documented in the plans.

The flood frequency used to determine the size of the waterway openings and the desired roadway profile is very important to the design. Base the minimum frequency on economics and risk except on interstate highways, which require a minimum 50-year flood frequency. Do not automatically select the frequency based upon highway classification because other factors can create a need for a higher type hydraulic facility. These factors include land use (both upstream and downstream of the highway), safety to traveling public, debris, environmental concerns, and others. Estimate land use for 20 years into the future.

In addition, apply the 100-year flood event (base flood) on certain proposed highway/stream crossing facilities to determine whether a proposed crossing will cause a flood to damage the highway or any other property over and above damage which would have occurred without the proposed facility. One important fact is that the flood may be conveyed both over the roadway and through the openings. The test is whether significant damage occurs to the highway or other property.

Analyze the flood for all highway/stream crossings with one or more of the following:

- bridge classification type structures,
- some feature within the influence of the 100 year flood plain to which significant damage could occur, or
- federally established 100-year flood plain boundaries.
Bridge Class Culverts. Follow the procedure for the hydraulic design of bridge class culverts in accordance with the Hydraulic Design Manual. Additional information on bridge class culverts such as length, cover, safety treatment, and headwalls can also be found in the manual.

Railing and safety-end treatment requirements for bridge class culverts can be found in Chapter 2, Section 7 of the Roadway Design Manual.

Existing Bridge Class Culverts. Follow the procedure for analyzing the hydraulic capacity of existing bridge class culverts in accordance with the Hydraulic Design Manual.

Railroad Overpasses

Clearances. Highway structures over railroads are referred to as railroad overpasses. Vertical clearance for new structures over railroad tracks must be 23 ft. minimum. In cases where electric powered trains are involved, a vertical clearance of 24 ft. 3 in. or 26 ft. may be required. For widening of existing structures, it is usually satisfactory to provide no more clearance than is provided by the existing structure. By law the minimum vertical clearance is 22 ft. 0 in. from the centerline of the track, and the minimum horizontal clearance is 8 ft. 6 in. from centerline of tracks to face of pier or other obstruction. These legal minimums include temporary construction clearances as well. However, the desired minimum horizontal clearance is 12 ft. Some railroad companies require greater horizontal clearance. Current American Railway Engineers and Maintenance of Way Association (AREMA) specifications require pier protection or crash walls where the clearance between centerline of tracks and face of pier is less than 25 ft. Place all piers so as not to interfere with drainage. If requested by the railroad company, horizontal clearance will be provided to allow the railroad use of off-track maintenance equipment. All clearances required because of future plans of the railroad company must be substantiated by documented plans and appropriated funding by the railroad company to do the work within the next five years.

Railroad Underpasses

Railroad underpasses involve structures carrying rail traffic over highways. Plan and design railroad underpasses in close cooperation with the railroad company or companies involved. Most railroad companies do not employ sufficient engineering staff to prepare the detailed plans for such structures. The Bridge Division will prepare the detailed plans for railroad underpass structures when requested by the district and agreed to by the railroad company.

An underpass imposes an added maintenance burden and restricts expansion of the railroad line. An underpass also may result in restricted horizontal or vertical clearance and presents a drainage problem for the roadway underneath. Explore all options before resorting to expensive pump stations. For single-track separations an underpass may be more economical than an overpass, but for multiple track separation an overpass will usually be more economical. For certain conditions an underpass is the only workable solution for highway-rail separation. In any case, where an under-
pass is proposed, the district should prepare comparative estimates of an underpass versus overpass and furnish these to the Bridge Division project manager with reasons for proposing the underpass.

**Clearances.** Follow the clearances for the highway underneath a railroad structure outlined for Highway Grade Separations ([Chapter 3, Section 2](#)) except as follows:

- For the usual conditions, use the minimum horizontal clearances from the edge of the traffic lane to the face of pier permitted in Table 2-11 of the Roadway Design Manual. Provide greater clearance where the overall cost of the structure will not be materially increased.
- Because the railroad live load can appreciably increase the cost of longer spans use shoulder widths with introduction of guardrail on the approaches to and through the structure. Place the face of the pier or abutment 2 ft. to 6 ft. outside the face of the guardrail.

**Structure Types.** Selection of a suitable structure type involves consideration of all facets of an underpass project, but some determination of type must be made early in the preliminary stage of project development. The following provides general guidance for this determination:

- Decks of underpasses may be either concrete or metal deck plate. While metal deck plate is most expensive, it usually affords the minimum distance from top of rail to lowest point on superstructure and may be necessary where tight clearance conditions exist.
- Through-plate girders with floor beam and knee brace system offer the shallowest depth of section below rail. Required grade differential from rail profile to highway profile is not appreciably affected by an increase in span length. Certain railroads object to this type of structure because of its vulnerability to damage by shifting freight loads or derailments. In cases where vertical clearances are critical, the through-plate girder, although expensive, is sometimes the only logical solution. Do not use this type of structure for more than two tracks.
- Deck-type structures may employ simple steel I-beams or plate girders, prestressed concrete I-beams, or prestressed concrete box beams. Continuous steel I-beams or post tension concrete beams may be used in unusual circumstances. Such structures increase in depth as the span length increases. Railroad companies have differing requirements for structures and arriving at an acceptable structure type is a matter of design as well as negotiation.

The Bridge Division project manager will assist in specific details for each individual project.

**Handling Rail Traffic.** The method of handling rail traffic during construction usually affects the type of structure that is to be built. Coordinate this closely with the railroad company through the Railroad Division, assisted by the Bridge Division project manager. Consider the following ways of addressing this issue:

- A railroad detour or shoofly track may be constructed. This facility should be as near as practicable to the underpass construction site and as short as acceptable to the railroad company to minimize costs. Where an existing underpass structure is present, the shoofly will require a temporary structure over highway lanes unless highway traffic can be temporarily rerouted.
Avoiding a shoofly track eliminates unnecessary bridge costs. The railroad company and TxDOT, working together, can drop a preconstructed bridge into place with little or no interruption of train traffic. Both parties would share the construction work involved in the project. TxDOT prefers this method and some railroad companies endorse it, but the concept should be addressed very early with the railroad company to ensure the project is a candidate for this type of construction.

It is sometimes possible to construct the new underpass near the present track and to later relocate the track over the new structure. Always explore this possibility because it offers the minimum construction cost for the underpass structure. However, a permanent realignment of the railroad may be excessively costly or unacceptable to the railroad company.

Stage construction may be possible where part of the new structure is built to carry rail traffic while the remainder of the bridge is completed.

Consider raising the track if drainage of the underpass section is critical or an increase in vertical clearance is required.

Investigate items such as joint operations between two railroad companies, abandonment of a line, and similar changes in rail facilities in the planning stage of a railroad underpass.

Pedestrian Bridges

**ADA and TAS Considerations.** Design all pedestrian facilities so they are accessible to all persons and in accordance with the American with Disabilities Act (ADA) and the Texas Accessibility Standards (TAS). Always refer to the Americans with Disabilities Act Accessibility Guidelines (ADAAG) and the TAS for complete design requirements.

**Structure Width.** Make the decks on pedestrian crossings 8 ft. wide or wider where pedestrian volumes indicate.

**Clearances for Pedestrian Structures.** Pedestrian crossover structures are subject to severe damage or collapse when hit by a high load or a loaded truck out of control. The probability of loss of life is great under such conditions. These structures have more vertical and horizontal clearance than required for vehicular overpasses. Provide pedestrian crossovers with 17 ft. 6 in. vertical clearance over the travel lanes and shoulders.

**Railing and Fencing.** Provide a 1-ft. high parapet on either side of a pedestrian crossover with a 5 ft. to 6 ft. woven wire fabric type fence mounted on top. In the interest of safety for children using such structures and also to protect the highway traffic beneath, cover portions of the walkway over the highway lanes and shoulders to entirely enclose the walkway. Where such overpasses are near schools or will be used by a substantial number of children, extend the covering to near the grade point at each end of the structure, if feasible.
**Ramp Approaches.** Ramp approaches may be tangent extensions of the main structure or may be right angles to the structure forming an L, U, or Z shape. Spiral ramps or stairs may also be used. Do not use stairs due to limited accessibility.

**Illumination.** Pedestrian crossovers normally are lighted by street or highway lighting standards placed in the vicinity.

**Overhead Sign Supports**

Use TxDOT design standards where applicable. The Bridge Division is available to assist in the design of sign bridges not covered by the standards.

**Federally Funded Off-System Bridges**

Design off-system bridges that are replaced with federal funds in accordance with the design criteria in **Chapter 3** of the *Roadway Design Manual* for the appropriate roadway classification.

Design off-system bridges that are rehabilitated with federal in accordance with the design criteria in **Chapter 4** of the Roadway Design Manual for the appropriate roadway classification. However, if the current average daily traffic (ADT) is 400 or less on an off-system bridge to be rehabilitated or replaced and the facility is not likely to be added to the designated state highway system, then use the design criteria presented in **Chapter 6** of the Roadway Design Manual.

For hydraulic criteria, refer to the *Hydraulic Design Manual*. Also see Chapter 2, **Section 2** of this manual.

**Historic Bridges**

Historic bridges frequently cannot be cost-effectively upgraded to meet the usual design standard for roadway width, load carrying capacity, or traffic railing without significantly altering the aspects that make the bridge historically significant. Governments regulatory entities realize the importance of historic structures and have created guidelines that ease some constraints.

The design criteria for on-system historically significant bridges must comply with the design criteria presented in **Chapter 4** of the *Roadway Design Manual*. However, federal law allows flexibility in design criteria on a case-by-case basis when approved as a design exception.

TxDOT and FHWA have developed design criteria for off-system historically significant bridges in order to eliminate the need for some design exceptions. These design criteria can be found in **Chapter 2** of the Historic Bridge Manual. Historic off-system bridges that cannot be upgraded to meet or exceed these minimum criteria may be considered for preservation projects on a case-by-case basis when approved as a design exception.
Some important planning considerations concerning historic bridge projects, including coordination with outside divisions and agencies as well as the project letting schedule, are discussed in the Advanced Planning -- Considerations Based on Bridge Location in Chapter 4, Section 2 section of this manual. Moreover, TxDOT has developed specific procedures for the coordination of projects concerning historic bridges. These procedures can be found in the Historic Bridge Manual.

Bridges Not Funded by TxDOT

Bridges not funded by TxDOT but crossing TxDOT right-of-way must meet TxDOT design criteria. The Bridge Division negotiates agreements between the State and the owner. The bridge project manager, in conjunction with the district, will coordinate a satisfactory agreement setting forth the financial responsibility and commitments, including maintenance and liability, of each party involved. Submit the PS&E to the Design Division in accordance with the usual PS&E and construction letting processes.
Chapter 4 — Advanced Planning

Contents:

Section 1 — General Considerations
Section 2 — Considerations Based on Bridge Location
Section 3 — Agreements and Permits
Section 4 — Utility Attachments
Section 1 — General Considerations

New Bridges

Follow the Bridge Division standard drawings in the planning of all structures when applicable.

A bridge consists of a superstructure and a substructure. The superstructure includes the bridge deck and beams. The substructure includes the cap and foundations of the abutments and the cap, columns, and foundations of the interior bents. Review the guidelines for selecting an appropriate superstructure and a discussion of substructures on the TxDOT website.

Superstructure. The superstructure is critical in the performance and cost effectiveness of a bridge. Many types of superstructure are used by TxDOT. Choosing an appropriate superstructure depends on factors such as:

- Span length
- Vertical clearance
- Hydraulics (freeboard)
- Speed of construction
- Economics
- Aesthetics

Span length requirements and vertical clearance are generally the controlling criteria when choosing the superstructure. Span lengths are determined based on bridge location, geography, and structural limitations. Vertical clearance is based on bridge location and federal and state requirements. General design criteria concerning span lengths, clearances, and other design features are discussed in Chapter 3, Preliminary Design Features, of this manual.

Speed of construction, economics, and aesthetics also influence the choice of superstructure. Construction times and costs vary for superstructures. The location of the bridge often influences use of aesthetics. (For more information, see the Landscape and Aesthetics Design Manual). Generally, the more aesthetically pleasing the bridge, the more it costs.

Substructure. The structural elements used in the superstructure often influence the design of the substructure. Substructure caps can be either steel or concrete. Generally the bent cap material is concrete. Concrete bent caps are rectangular or inverted tees. Steel is used for integral caps and box caps of straddle bents that span a large distance.

Also, the substructure generally consists of either single or multiple reinforced concrete columns. Available construction space, right-of-way limitations, bridge width, stage construction, and aesthetics are often factors in this decision. Consider use of three column bents.
where appropriate, such as for bridges over a body of water where there is a potential for scour or significant drift, and for bridges over roadways where there is a potential for vehicular impact with the columns.

The bent configuration and subsurface conditions determine an appropriate foundation type. Abutment foundations can be prestressed concrete piles, steel piles, or drilled shafts. Foundations for multiple-column bents generally consist of concrete drilled shafts at each column. Single-column bent foundations consist of rectangular footings supported by drilled shafts or piles. Make the choice of foundation type as flexible as possible in preliminary planning to allow an economic design in the detailed plan preparation stage.

Chapter 4 of the LRFD Bridge Design Manual discusses the use and design of substructures used by TxDOT.

**Design Loads and Design Specifications.** Load and Resistance Factor Design (LRFD) is a design methodology that makes use of load and resistance factors based on the known variability of applied loads and material properties. In 1994, the American Association of State Highway and Transportation Officials (AASHTO) published the first AASHTO Load and Resistance Factor Design Bridge Specifications. The Federal Highway Administration (FHWA) has mandated the use of LRFD for all bridges on which preliminary engineering is initiated after October 2007.

Use HL-93 design live load as described in the AASHTO LRFD Bridge Specifications unless design for a special vehicle is specified or warranted. Design widenings for existing structures using HL-93. Rate existing structures using AASHTO Standard Specifications and HS20 loading. Show load rating and design loads on the bridge plan, for example HS-21.5 (Existing) and HL-93 (New).

For routes where heavy truck traffic is expected, such as on North American Free Trade Agreement (NAFTA) routes, use a design load of HL-93. LRFD and HL-93 provide a more rational design and a better model of live loads expected along NAFTA routes than previously used loadings such as HS-25.

Currently, not all structure types can be designed by LRFD. If considering using LRFD, contact the Bridge Division for the latest status on LRFD implementation. The Bridge Division has developed many standard drawings for HL-93.

**Modification of Existing Structures**

Modifications such as widening, strengthening, or raising a structure are often required to meet increasing traffic demands at existing bridges. Modifications of bridge projects funded by any category of funding may occur only after an analysis of the following:

- An appraisal of the structural adequacy and condition of the existing structure
An economic study of replacement versus modification

A study of the method and handling of traffic during construction

**Appraising the Existing Structure.** Use the following procedure to determine the structural adequacy and condition of the existing structure:

1. Inspect the as-built plans to determine the load capacity.

2. Perform a load rating if plans indicate a design less than H20. A load rating is not required if plans indicate a design of H20 or greater unless the bridge was designed using Supplement No. 1 to 1944 AASHO Design Specifications for Texas Bridges (THD No. 1). For bridge-class culverts, a load rating is required only if the culvert carries direct traffic (2 ft. of fill or less). At a minimum, the bridge must be able to carry or be improved to carry an HS20 operating loading and must have condition ratings as follows:
   - Item 58 (Deck). Rating greater than or equal to 4.
   - Item 59 (Superstructure). Rating greater than or equal to 5.
   - Item 60 (Substructure). Rating greater than or equal to 5.
   - Item 62 (Bridge-class Culvert). Rating greater than or equal to 5.

   These criteria are minimum load rating criteria for an on-system bridge that does not require load posting. Do not widen and/or rehabilitate a bridge if load posting would still be required after work is completed, with the exception of historically significant bridges discussed later in this chapter.

3. Submit the load rating report to the Bridge Division project manager. Include the load rating calculations in the report, signed and sealed by a licensed professional engineer. Planning can continue only if the Bridge Division approves the load rating for the bridge.

4. Perform a condition survey if the Bridge Division approves the load rating. Contact the Bridge Division project manager if division services are required.

5. Submit the condition survey report to the Bridge Division project manager. The condition survey report must be signed and sealed by a professional engineer. The Bridge Division Design Section director will also consider the following factors in determining whether to rehabilitate or replace a structure:
   - HS inventory loading
   - Condition of the bridge as determined by the condition survey
   - Type of structure
   - Intended use (for example, average daily traffic, percent of truck traffic, location, etc.)

Plan development can continue only if the Bridge Division concurs with the condition survey recommendations. These criteria apply to all bridge types, including bridge-class culverts. Replace bridges with a load capacity that cannot be economically strengthened to an HS20 operating loading. Contact the Bridge Division project manager if division services are required.
The Load Rating. The load rating represents the heaviest loads that can safely use the bridge for an indefinite period of time. Use the load rating to determine if the structures can be considered a candidate for widening (rehabilitation pending a satisfactory condition survey). The district may perform the load rating or request the Bridge Division to perform the load rating.

Provide the following information to the Bridge Division project manager when requesting the Bridge Division to perform the load rating:

- Job number of the original bridge project
- Job numbers for any subsequent work performed on the structure
- Indication of existing and proposed overlay thickness
- National Bridge Inventory (NBI) structure number
- Map of bridge location
- Description of proposed work
- Project contact person and phone number

Include the following in the load rating:

- A review of the as-built bridge details, bridge details from subsequent work at the bridge, and bridge inspection database records. Assume the load rating to equal the design loading indicated on the as-built bridge details under the following conditions:
  - As-built bridge details accurately represent the bridge
  - Damage or deterioration has not weakened the bridge
  - Overlay does not exceed 2 in.
  - Bridge was not designed using Supplement No. 1 to 1944 AASHO Design Specifications for Texas Bridges (THD No. 1)

- A signed and sealed report by the engineer of record. The report will include the following:
  - The load rating
  - Rating calculations; note method (load factor/working stress) used in the calculations

The Condition Survey. The condition survey identifies structural deficiencies that prohibit a reasonable service life with normal maintenance. Note conditions of the foundation, substructure, and components of the superstructure in this survey. The Bridge Division or qualified and experienced representatives of the district will conduct the condition survey.

Include the following in the condition survey:

- If the condition survey suggests that bridge elements are contaminated with salt, further analyzed the deck to determine the degree of contamination and internal deterioration of the concrete. For decks, take two random cores from within a 2 ft. radius circle from each span of the structure and send to the TxDOT Construction Division (CST)-Materials and Pavements
Section. CST-Materials and Pavements Section uses one core for chemical analysis to determine the chloride content and the other to determine the compressive strength of the concrete.

- Test the substructure if it exhibits signs of corrosion damage. Take samples from caps and columns by collecting the cuttings from holes drilled in the concrete. Contact CST-Materials and Pavements Section, Concrete Pavement and Structures branch or Bridge Division’s Construction and Maintenance branch for sample procedures.

- Send all samples to the CST-Materials and Pavements Section. They will issue a report showing concrete strength and chloride content. All available information is then reviewed and a recommendation is made by the Bridge Division whether or not the concrete needs to be replaced. Generally, a chloride content of 2 pounds per cubic yard near the reinforcing steel is considered to be a high level of salt contamination.

- Visually examine the structure for the following:
  - Settlement of the foundation
  - Spalling, cracking, or deterioration of the concrete and corrosion of the reinforcing steel in the substructure
  - Any damage or defects of the beams or girders and shoes
  - Unsound concrete, cracking, delaminations, or efflorescence indicating salt contamination and depth and corrosion of the reinforcing steel in the top and bottom of the deck
  - Deterioration of the overlay due to defects or damage in the underlying concrete

- Take photographs to include the following:
  - Bridge ends
  - Bridge elevations
  - Bridge approaches
  - Problem areas
  - Views upstream and downstream, if applicable

- Review and analyze of the extent of the deficiencies and the feasibility of repair. The structure should probably be replaced if a 20-year service life cannot be predicted

- Review the hydraulic adequacy, if applicable

Where the condition survey indicates that restoration of the bridge deck is warranted, a more detailed field appraisal to further define the deficiencies may be recommended by the Bridge Division. This more detailed appraisal may require one or more of the following:

- Delamination detection to determine the extent of internal fractures of the concrete
- Determination of the extent of reinforcing steel corrosion
- Determination of areas with inadequate concrete cover over the reinforcing steel
- Chemical analysis to determine extent of chloride contamination
Important Considerations. Additional considerations include the following:

- **Superstructure** -- Bridge widenings should be of similar type construction to that of the existing structure. Prestressed beams are satisfactory for use in widening some common structures.

- **Substructure** -- The proposed foundation should be similar to that of the existing structure. This is particularly necessary where differential vertical movement in the foundation material can damage the widened facility.

- **Bridge railing** -- Replace or retrofit the railing on both sides to meet AASHTO Manual for Assessing Safety Hardware or National Cooperative Highway Research Program (NCHRP) 350 standards. This is required even if widening is to be done on one side only.

- **Minimum design criteria such as vertical and horizontal clearances** -- Modifications should normally not encroach on the waterway, highway, or railway clearances beneath the existing structure. Make every effort to maintain or improve the existing clearances; however, a design exception may be requested if the minimum clearances are not met.

- **The effects of widening one side only versus widening both sides.**

- **Establish the proposed roadway centerline** -- Consult with the Bridge Division to determine an appropriate centerline. Factors that affect the location of the proposed centerline include: existing roadway alignment, embankment widening, and traffic control.

- **Removing existing structures** -- When an existing structure is replaced, the district determines if the state will retain salvageable material such as structural steel, railing, or timber. If the district elects not to retain salvageable material, transfer the material to the contractor in accordance with Texas Standard Specifications, Item 497, Salvageable Material.

- **Removing paint** - Follow the procedures for determining whether the paint should be considered hazardous. If hazardous paint is identified, let a painting contract in a separate contract from the structural work required. Contact the Construction Division in the early stages of the planning process if the presence of hazardous paint is suspected or if there are any questions concerning the necessity of a separate painting contract.

- **Abating asbestos** - Follow the procedures for the identification, notification, and abatement of asbestos. If asbestos is identified, make proper notification to the Texas Department of State Health Services. Perform asbestos abatement separately from the prime contract wherever possible. If possible, abate asbestos-containing material before construction begins. Contact the Construction/Maintenance Branch of the Field Operations Section in the early stages of the planning process if the presence of asbestos containing material is suspected or if there are any questions concerning the proper procedures to be employed.
Stage Construction

Replacing an existing bridge with a new bridge or widening an existing bridge often requires stage construction. Keeping lanes of the existing bridge open while the first phase of the construction of the new bridge takes place maintains minimum traffic needs. Each project may require unique solutions or have individual needs. These unknowns make the planning and design of stage construction a challenging process. The uniqueness of each project requires engineering judgment and experience in developing the bridge plans. Resolve any uncertainties early in the preliminary plan preparation stages.

The guidelines below on early planning, bridge layout and structural details, and design assist planners and designers with some aspects common to most stage construction projects.

Early Planning. Consider the following early factors:

- Determine the need for stage construction early in the planning stages. Due to the complexity of stage construction, other solutions may be preferable.

- Identify the traffic control needs of the project prior to the development of the bridge layouts. Communication between the engineer responsible for traffic control and the design engineer is critical during the preparation of the bridge layouts and construction sequence process. Temporary single lane crossings over a structure are used occasionally. Refer to Traffic Control Plan TCP (2-8)-12 standards.

- Leave exact breakback locations up to the designer, if possible.

The Bridge Layout and Structural Details. Proper plan preparation is essential in both producing a quality product and adhering to the letting schedule.

- The individuality of each project necessitates the need for greater detail in the structural details. Do not leave decisions up to the contractor unless as specified in the structural detail notes. Fully detail complex construction or unique solutions to avoid any confusion.

- Delays often result due to the lack of information in the layouts. The Preliminary Layout Approval Process -- Layout Considerations and Requirements (see Chapter 5, Section 2) section of this manual contains guidelines for preparing bridge layouts for projects that include staged construction.

Design Guidelines. Design guidelines can be found in the Preliminary Design Features -- General Features (see Chapter 3, Section 1) section of this manual.

Detour/Temporary Crossing Structures

If a project must maintain traffic during bridge replacement and staged construction is not feasible, provide a temporary structure to handle traffic during construction of the new structure.
Temporary bridge structures are not a common element in most bridge projects. Careful coordination between the bridge designer, the traffic control engineer, the environmental coordinator, and the bridge project manager should occur early in the process to properly design these structures.

A common type of temporary structure is the pre-engineered, pre-manufactured, modular structure. Pre-manufactured bridges come in a variety of span lengths, widths, and load carrying capabilities. Depending on the size involved, they can usually be erected with a minimum of heavy construction equipment and a minimal amount of labor. Due to their modular nature, they are usually easy to transport and erect. TxDOT owns several of these bridges that are stored at various maintenance warehouses around the state. Contact the Maintenance Division for more information on the availability of these bridges.

Temporary structures are sometimes constructed of the same types of structural elements found in permanent bridges, for example, prestressed box beams as well as steel I-beams. It is almost impossible to determine in advance what type of structure will be most economical in a particular situation. It is, therefore, best not to design a particular type of temporary structure but to allow the contractor to provide the temporary structure needed.

If the project allows the contractor to provide the temporary bridge for a project, the plans must include certain items:

- Provide the required number and width of traffic lanes and the required design loading.
- The alignment of the temporary structure.
- Any special requirements, such as limits on fill or other environmental restrictions.

Economic Comparisons and Alternate Designs

A cost comparison among structure types during the initial planning stages of a project will assist in determining the most economical structure type. A cost per square foot comparison is a simple and quick way to compare structure types. The Bridge Division may assist in furnishing current structure costs.

Providing alternate bid items is sometimes warranted. This allows the contractor to bid the most economical design. This may require multiple designs of an item to be shown on the plans. Examples include drilled shafts versus piles and double tee beams versus pan form girders. Alternate foundation designs are suggested for structures over $2 million unless experience has shown a particular foundation is warranted.

State versus Federal Oversight

Each year the Federal Highway Administration (FHWA) and TxDOT select a list of projects for which FHWA will have oversight through plan review and approval. All other projects will be
TxDOT’s responsibility. A list of each year’s project selection can be found in the current FHWA oversight agreement.

If FHWA has oversight, submit the preliminary bridge layouts to the FHWA through the Bridge Division project managers. Add one month to the total lead time for projects including major bridges or unusual structures requiring FHWA headquarters approval.

Environmental Concerns

FHWA is responsible for assuring that the projects it funds do not have significant environmental impacts or, if they do, that appropriate action is taken. The following Environmental Affairs Division assessments, listed in order of investigative detail from least to most, may be requested:

- Categorical Exclusion (CE)
- Environmental Assessment (EA)
- Finding of No Significant Impacts (FONSI)
- Environmental Impact Statement (EIS)

For more information, see the Environmental Manual.

The Environmental Affairs Division (ENV) supports the district environmental coordinator. The environmental coordinator conducts assessments and works closely with the Bridge Division project manager when evaluating environmental concerns. This coordination should occur as early as possible in the project development process. The Environmental Issues, Permits, and Commitments (EIPC) sheet is initiated in the district in the preliminary project development stage to ensure that all environmental issues are addressed. To obtain information concerning access to the Texas Environmental Oversight System (Texas ECOS) and EIPC, contact ENV. Such concerns may include the following:

Proximity to Hazardous Sites. An assessment of all potential right-of-way properties that could be contaminated with hazardous substances, as well as adjacent properties from which contamination could migrate. Do this early in the planning stages when time and options remain to address these critical problems.

Hazardous Paint. Many of the early paint formulations used to paint bridges contained lead and chromium. Blast-cleaning operations may create hazardous waste according to federal and state regulations. For all projects for cleaning and painting bridges, identify the type of paint on the structure prior to plans, specifications, and estimates (PS&E) submittal to the Bridge Division for review. If complete painting records, including any spot-painting dating back to initial construction and painting, are not available to identify the type of paint on the structure, submit a sample (approx. 50 grams) to the CST-Materials and Pavements Section to determine the potential for hazardous waste.
Asbestos. Identify and address asbestos issues early in the project development to minimize impacts to construction and project costs. Many TxDOT projects are regulated under the National Emission Standards for Hazardous Air Pollutants (NESHAP) found in 40 CFR 61 Subpart M. These Federal standards were originally developed to address asbestos found in buildings, but have been expanded to include demolition and renovation work on bridges. The Department of State Health Services is responsible for administering these regulations in Texas. Asbestos Containing Material (ACM) is defined as any material that contains greater than one percent asbestos based on examination by an approved laboratory method. Regulated Asbestos Containing Material (RACM) is ACM that is found in the following quantities: 260 linear feet of pipe, 160 square feet on other components (coatings), or 35 cubic feet where length or area could not previously be measured. Special specifications and special provisions are available for typical asbestos abatement work.

**Hydraulic Impacts.** In order to comply with 23 CFR Part 650 Subpart A, perform complete hydraulic studies at the time of environmental documents.

**Wetlands Impact.** Under Section 404 of the Clean Water Act, the U.S. Army Corps of Engineers (COE) regulates the discharges of dredged or fill material into “waters of the U.S., including wetlands.” Prior authorization is required from the COE to deposit dredged or fill material into wetlands or any “waters of the U.S.” Refer to Advanced Planning -- Agreements and Permits in Chapter 4, Section 3 of this manual for additional information concerning COE requirements and Section 404 permits.

**Storm Water Runoff.** Bridge projects may be subject to storm water abatement requirements. The TxDOT publication Storm Water Management Guidelines for Construction Activities (TxDOT, 1993) details the department’s procedures and recommended best management practices to be included in a Stormwater Pollution Prevention Plan for proposed projects. The Hydraulic Design Manual contains useful information as well. Federal requirements can be found in 23 CFR Part 650 Subpart B.

**Mitigation of Environmental Impacts.** Bridge projects may require mitigation of environmental impacts by replacement of trees and other vegetation. This mitigation is eligible for federal funding under the same category of work as the original bridge project.

Because mitigation projects are usually let sometime after the bridge contract has been let or completed, it may be necessary to separate the mitigation contract and the bridge contract. Mitigation contracts are typically kept open for a period of about two years after planting to ensure that the
plants take root and become established. Link the mitigation contract to the bridge project in order to receive reimbursement from FHWA.

The mitigation portion of the project will have its own FHWA project number and its own control-section-job (CSJ) number. FHWA form Federal Project Authorization and Agreement (FPAA) ties the bridge and mitigation contracts together. This form has a comment field to indicate that both contracts are connected to the same project. When the FPAA form is sent to the FHWA, explain in the cover letter that the mitigation contract is part of the bridge contract.

Although the mitigation project can be let in a different fiscal year than the bridge project, let the mitigation contract for construction as soon as it is reasonably practical in order to maintain continuity with the bridge project.

**Historically Significant Bridges, Property, and Archeological Coordination.** With the exception of most of the interstate system, federally funded projects involving historic bridges must comply with Section 4(f) of the United States Department of Transportation (U.S.DOT) Act of 1966 and with Section 106 of the National Historic Preservation Act of 1966. Therefore, TxDOT must coordinate with the State Historic Preservation Officer (SHPO) of the Texas Historical Commission and the FHWA to assess the effects of federally funded projects on historic resources. In addition, for state funded (non-federal) projects involving bridges that have been designated State Archeological Landmarks, coordinate efforts with the SHPO to assess the impact of the project on the landmark structure in accordance with the State Antiquities Act. Additional information concerning the requirements of Section 4(f) of the U.S.DOT Act of 1966, Section 106 of the National Historic Preservation Act of 1966 and the State Antiquities Act can be found in the [Historic Bridge Manual](#).

**Accessibility/ADA Considerations**

Pedestrian bridges, bridges with sidewalks, and highway rest and picnic areas are the most common highway facilities that require Americans with Disabilities Act (ADA) and Texas Accessibility Standards (TAS) compliance. Features that must meet specific requirements include the following:

- Maximum curb ramp slope
- Cross slope and grade on sidewalks
- Minimum sidewalk clear width
- Sidewalk passing space
- Objects protruding into the sidewalk
- Location of curb ramps and sloped areas
- Diagonal curbed ramps
- Raised curbed islands
Drop-offs (or curb heights) greater than 9 in.

Handrails

Additional information on ADA and TAS requirements can be found in Chapter 2 of the Roadway Design Manual. However, always refer to the current Americans with Disabilities Act Accessibility Guidelines and Texas Accessibility Standards for complete ADA and TAS requirements.
Section 2 — Considerations Based on Bridge Location

Highway Grade Separations

A highway grade separation is a bridge that carries vehicular traffic over vehicular traffic. This type of structure is often referred to as an overpass or an underpass. For proper nomenclature of an overpass or underpass refer to the Bridge Detailing Manual. These structures allow the highway to safely accommodate high volumes of traffic through intersections. Some controlling factors in the planning of a highway grade separation include highway geometry and the available right of way.

Visual distractions on a highway are hazards. For this reason, the grade separation structure should conform to the highway alignment and cross section. Limit its profile to grades that allow sufficient stopping sight distance. The transition from roadway to grade separation should be designed such that the driver’s behavior is not altered by erratic changes.

The availability of adequate right-of-way may limit the possible structure types and increase costs. Moreover, the construction process can also be adversely affected by the lack of right-of-way and require stage construction.

Additionally, considerations such as span lengths, soil characteristics, and skew may also affect the structure’s design.

Structures over Streams

Structures over streams carry vehicular traffic over a body of water. These structures are considered hydraulic highway facilities and are bridges and culverts. When planning a structure over a body of water, concurrently consider other related hydraulic facilities such as open channels, storm sewers, pump stations, and possibly reservoirs. Consider each hydraulic facility in the project as a part of a total system that conveys water. The Hydraulic Design Manual contains discussions of the following hydraulic facilities: open channels, culverts, bridges, storm drains, pump stations, and reservoirs.

Plan hydraulic facilities early in project development to uncover unusual problems that may become much more difficult to address at later stages. This is particularly important with respect to highway location. Navigable stream and wetland crossings require permits from the U.S. Army Corps of Engineers and the U.S. Coast Guard. Often there are agreements to be executed for storm sewer projects, and facilities associated with reservoirs also require special attention.

Culverts are closed conduits, usually with fixed flow lines, that can operate either under pressure or with a free surface flow. Bridges, as opposed to culverts, are not considered closed conduits. The flow line of a bridge is rarely fixed and the material along the flow line of a bridge is usually the same as the stream it crosses. Hydraulic considerations for bridges are discussed in Chapter 8 of the...
Hydraulic Design Manual. Preliminary design criteria for bridges over streams are discussed in Preliminary Design Features -- Features Based on Bridge Location in Chapter 3, Section 2 of this manual.

Design culverts as culverts regardless of whether they exceed the 20-ft. length along the roadway centerline that causes them to be classified as bridges. Hydraulic considerations for culverts are discussed in Chapter 7 of the Hydraulic Design Manual. Acceptable types of culverts include the following: cast-in-place concrete box, precast concrete box, full-circle or elliptical pipe, pipe arch, structural plate, or approved long span culverts. Material for pipe, pipe arch, and elliptical shapes include steel, aluminum, aluminized steel, and concrete. Materials for structural plate and long span culverts may be galvanized steel or aluminum. General design criteria for culverts are discussed in Preliminary Design --Features Based on Bridge Location in Chapter 3, Section 2 of this manual.

Bridges and culverts are vulnerable to damage from flood related causes. To minimize the risk of damage, recognize and consider the hydraulic requirements of a stream crossing in all phases of project development, construction, and maintenance. Hydrologic and hydraulic analyses are required for all new bridges over waterways, bridge widening, bridge replacement, and roadway profile modifications that may adversely affect the flood plain, even if no structural modifications are necessary.

Typically the hydrologic and hydraulic analyses should include an estimate of peak discharge (sometimes complete runoff hydrographs), existing and proposed condition water surface profiles for design, flood conditions, and potential for stream stability problems and maximum predicted scour depth.

The thoroughness of a hydrologic and hydraulic study will depend upon the nature of the stream. After the study is completed, each district maintains the complete hydrologic and hydraulic design data for all waterway crossings. This complete file could include the following:

- location
- structure data
- photos
- cost estimates
- runoff investigations
- general statements concerning historical high water
- vicinity maps
- United States Geologic Survey quadrangles
- history of performance of existing structures
- information on upstream control structures
- pump station design, etc.
Show pertinent hydrologic and hydraulic design data for bridges, culverts, and storm sewers in the plans rather than on separate calculation sheets submitted with the plans, specifications, and estimates (PS&E). This not only facilitates review of the PS&E, but also assures a permanent record. Minimum requirements for these data can be found in the Hydraulic Design Manual. Bridge layout requirements of hydrologic and hydraulic design information can be found in the Preliminary Layout Approval Process in Chapter 5 of this manual.

Highway-Rail Grade Separations

Highway structures that carry vehicular traffic over railroad traffic are referred to as railroad overpasses. Conversely, railroad underpasses are structures that pass vehicular traffic under railroads. Some concerns when planning a railroad overpass or underpass include the selection of the structure type, the horizontal and vertical clearance to the centerline of the track, the available right-of-way, drainage, train movements, skew angle, and the time required in coordinating with the railroad company.

The selection of the type of structure, either overpass or underpass, usually depends on the existing topographical conditions. Railroad underpasses present drainage problems, sometimes requiring the use of pump stations. Pump stations are very expensive and require maintenance for the life of the facility. Accordingly, avoid pump stations unless absolutely necessary.

Proper clearances are an important consideration in the early planning phase. In order to determine vertical clearance, it is important to determine the top of high rail elevation for approximately 1,000 ft. in each direction from the roadway and for a greater distance if a change in railroad grade is proposed. If the railroad is on a curve, take the profile along the high rail for overpasses and along low rail for underpasses. This information should be included in the Railroad Exhibit A described below.

The Railroad Exhibit A is included in the agreement that must be negotiated between TxDOT and the railroad company. Requirements for the preparation of Railroad Exhibit A, as well as the policy and practices concerning highway-rail grade separation structures, can be found in the Guide to Railroad Project Development on the Rail Division’s internal web pages and Chapter 8 of the Railroad Operations Volume. Some railroad companies may have additional requirements for the Railroad Exhibit A as well. The railroad company reviews the Railroad Exhibit A for their preliminary review of the bridge project. The Rail Division is the sole point of contact and Office of Primary Responsibility for all matters relating to agreements with the railroad companies. This includes the submittal of all Exhibits needed in the execution of the various types of railroad agreements, including Exhibit A drawings for structures. The district office submits Railroad Exhibit A drawings to the Rail Division's Rail Highway Section at
least 12 months prior to the scheduled contract letting date to allow adequate time for negotiations and processing with the railroad company.

Railroad companies may object to the use of their right-of-way if it adversely affects train movements. This can cause difficulties in project design. The spans may have to be longer than originally anticipated thus altering the structure’s design. Moreover, stage construction may be necessary due to the lack of usable right of way. Train movements can also affect the construction process. Address construction schedule and construction crew safety during the preliminary design phase. Railroad companies object to runoff draining on to their right of way. Special design requirements to alleviate this concern may be necessary. When possible, span the entire railroad right-of-way.

**Pedestrian Bridges**

Pedestrian bridges carry pedestrian traffic over an obstacle, usually vehicular traffic. The need for a pedestrian crossing is the major preliminary consideration. Consider preliminary design features such as vertical and horizontal clearance as well as pedestrian ramp approaches. Pedestrian bridges may be constructed of structural steel, reinforced concrete, prestressed concrete, or other suitable materials. Aesthetics are especially important in these structures because they are subject to public view from all sides and are usually unique within a neighborhood area.

Pedestrian structures under the roadway are discouraged unless the highway lanes are on a fill of 15 ft. or more. This type of structure presents problems of drainage and lighting and creates a condition where policing is difficult.

Additional information on Americans with Disabilities Act (ADA) and Texas Accessibilities Standards (TAS) requirements can be found in Chapter 2 of the Roadway Design Manual. However, always refer to the current Americans with Disabilities Act Accessibility Guidelines (ADAAG) and Texas Accessibility Standards for complete ADA and TAS requirements.

**International Bridges**

Consider the following aspects when planning an international bridge:

- The Texas Transportation Commission must approve an international bridge application.
- A Presidential Permit must be acquired.
- The International Boundary and Water Commission must approve the project.
- Coordination is necessary with Mexican governmental agencies, designers, and contractors.

Section 201.612 of the Transportation Code requires an entity authorized to construct or finance the construction of an international bridge over the Rio Grande to obtain approval from the Texas Transportation Commission (Commission) prior to seeking a Presidential Permit for construction.
Title 43 TAC, Sections 15.70-15.76 specifies the process by which applicants submit an application.

**Departmental Procedures.** In order to comply with the rules requiring approval by the Texas Transportation Commission of an international bridge prior to requesting a Presidential Permit and to provide the 120-day response time required by legislation, TxDOT has designated the Transportation Planning and Programming Division (TPP) as the department liaison for international bridge applications. TPP has responsibility for providing findings and recommendations to the Commission. Aiding TPP in this responsibility will be the Bridge Division, the Environmental Affairs Division, the Finance Division, the Right-of-Way Division, and the International Relations Office. They will assist TPP in determining if an application is complete and provide subject matter expertise in analyzing the applications and providing recommendations to the Commission.

TPP provides the application form to applicants when requested. TPP then, immediately upon receipt of an application and the requisite 20 copies, date stamps the application and copies; forwards one copy of the application to the designated points of contact in the Bridge Division, Environmental Affairs Division, Finance Division, Right of Way, and International Relations Office; and sets a ten working day deadline from the date stamp for the division points of contact to determine if the application is complete.

**NOTE:** All subsequent references to “the date stamp” refer to the TPP date stamp specified in the preceding sentence.

If the application is incomplete, TPP will return all copies with a written response specifying deficiencies. When it determines that an application is complete or that a resubmitted application is no longer deficient, TPP will notify the applicant and the Governor’s Office in writing that the application meets the requirements of Title 43 TAC, Section 15.74 and begins the analysis.

**Division Responsibilities.** TPP will take the following actions:

- Send a copy of the application to the Department of Public Safety, the Texas Commission on Environmental Quality (TCEQ), the Department of Agriculture, the Historical Commission, the Alcohol Beverage Commission, the Department of Commerce, and local government entities (county and municipal) where applicable, requesting comments be returned within 20 working days from receipt at the Governor’s Office.

- Send a copy of the application to the Governor’s Office, requesting comments be returned within 20 working days from receipt at the Governor’s Office.

- Request analysis and the written results of that analysis from each division and special office named above within 45 days of the date stamp.

- Send an application and request analysis and the written results of the analysis to appropriate district(s) and metropolitan planning organization(s) (MPOs). Application and results of analysis must be returned to TPP within 20 working days of receipt at the district or organization.
Coordinate with the Office of General Counsel (OGC) to schedule, advertise, and conduct public hearings within 45 days of the date stamp.

Compile and summarize public hearing comments within 65 days of the date stamp.

Analyze compliance with the state transportation plan and, if appropriate, with the regional transportation plan developed by the MPO having jurisdiction over the project within 65 days of the date stamp.

Compile and summarize responses from state agencies, divisions, district(s), MPOs, and local government entities within 65 days of the date stamp.

Prepare and send staff response, along with recommendation for the Transportation Commission action, to the executive director through the deputy executive director/chief engineer.

Coordinate with OGC to prepare documents and include on the Transportation Commission meeting agenda recommended action no later than 120 days from the date stamp (the Commission must act within 120 days of the date stamp).

Notify the applicant and Governor’s Office in writing of the Transportation Commission action within two working days after the Commission meeting.

The Bridge Division will:

Provide a primary and an alternate point of contact for analyzing international bridge applications.

Upon receipt of an application from TPP, screen applicable sections for completeness and respond in writing to TPP not later than ten working days from the date stamp.

Upon receipt of TPP request, analyze the design portion of the application to ensure bridge and roadway are designed to accepted standards and specifications.

Provide written analysis and recommendations to TPP not later than 45 days from the date stamp.

Assist TPP in preparing for the Transportation Commission meeting.

Coordinate with the Design Division.

The Finance Division will:

Provide a primary and an alternate point of contact for analyzing international bridge applications.

Upon receipt of an application from TPP, screen applicable sections for completeness and respond in writing to TPP not later than ten working days from the date stamp.

Upon receipt of TPP request, analyze the financial portion of the application.
◆ Provide written analysis and recommendations to TPP not later than 45 days from the date stamp.

◆ Assist TPP with preparing the Transportation Commission meeting.

The Environmental Division will:

◆ Provide a primary and an alternate point of contact for analyzing international bridge applications.

◆ Upon receipt of an application from TPP, screen applicable sections for completeness and respond in writing to TPP not later than ten working days from the date stamp.

◆ Upon receipt of TPP request, analyze the environmental portion of the application to ensure environmental considerations have been addressed or mitigated.

◆ Provide written analysis and recommendations to TPP not later than 45 days from the date stamp.

◆ Assist TPP with preparing for the Transportation Commission meeting.

The Right of Way Division will take the following actions:

◆ Provide a primary and an alternate point of contact for analyzing international bridge applications.

◆ Upon receipt of an application from TPP, screen applicable sections for completeness and respond in writing to TPP not later than ten working days from the date stamp.

◆ Upon receipt of TPP request, analyze the design portion of the application to insure right-of-way issues have been adequately addressed.

◆ Provide written analysis and recommendations to TPP not later than 45 days from the date stamp.

◆ Assist TPP with preparing for the Transportation Commission meeting.

The International Relations Office will:

◆ Provide a primary and an alternate point of contact for administrative and protocol coordination with Mexican officials and entities concerning international bridges and for analyzing international bridge applications.

◆ Provide to divisions the review, comment, and analysis of any politically sensitive issues, protocol considerations, or other factors related to any Mexican documents or data submitted as part of an application.

◆ Upon receipt of TPP request, analyze the written commitments from Mexican federal, state, and local jurisdictions concerning their abilities to provide necessary transportation infrastructure.
● Provide a written analysis and recommendations to TPP not later than 45 days from the date stamp.

● Assist TPP with preparing for the Transportation Commission meeting.

**Historically Significant Bridges**

Historically significant bridges are listed or eligible to be listed in the National Register of Historic Places. These bridges can be either on-system or off-system. Projects involving historic bridges involve many issues that must be resolved. These issues are discussed in further detail in the [Historic Bridge Manual](#).

Contact the Bridge Division project manager as early as possible when historic bridge projects are involved. Some important considerations concerning historic bridge projects include coordination with other divisions, coordination with federal and state agencies, and the project letting schedule. TxDOT is required to allow the State Historic Preservation Officer (SHPO) of the Texas Historical Commission 30 days to review the final plans, specifications and estimates (PS&E) for all projects involving historic structures. Therefore, allow additional processing time for historic preservation projects. Contact the Environmental Affairs Division early in the process to give architectural historians time to schedule and perform surveys. Keep in mind that these projects can be environmentally cleared and approved for letting only after all SHPO comments have been addressed and incorporated into the final PS&E package.

TxDOT has developed minimum design criteria for off-system historically significant bridges. TxDOT also has developed specific procedures for the coordination of projects concerning historic bridges. These procedures can be found in the [Historic Bridge Manual](#).

**On-System Bridges with Adjacent States**

In crossings of the Red River and the Sabine River where they form the boundaries between Texas and Oklahoma, Arkansas, or Louisiana, the Bridge Division project manager serves as negotiator for necessary agreements between the states.

The design, construction, and maintenance of each bridge are the responsibility of Texas or the bordering state. The responsible state for each bridge is shown in Table 4.1.

<table>
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<tr>
<th>Responsible State</th>
<th>Location</th>
<th>Highway</th>
<th>TX District</th>
<th>AR District</th>
<th>LA District</th>
<th>OK District</th>
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Although each state is responsible for a specific bridge, the costs for design, construction, and maintenance are shared between the two states. The cost of the bridge approaches, however, is the responsibility of the state in which they are located.

Planning a bridge project with an adjacent state requires the following:

- A Commission minute order authorizing the State of Texas to enter into an agreement with another state is necessary whenever a bridge is constructed on new location, when a bridge is

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<th>Responsible State</th>
<th>Location</th>
<th>Highway</th>
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<th>AR District</th>
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NB = Northbound
SB = Southbound

Table 4-1: Responsibility for Bridges with Adjacent States

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being replaced, or when a major rehabilitation project (such as redecking or widening) is planned.

• An agreement between states is necessary when a bridge is constructed on new location, when a bridge is being replaced, or when a major rehabilitation project (such as redecking or widening) is planned. An agreement is not necessary for routine maintenance projects.

• The project must meet federal requirements if federal funds are used to finance the project.

• Any prospective bidder who is qualified under the requirements of either state will be considered by the other state as being qualified and eligible to bid on the project and will be furnished proposals upon request.

• Both the Texas Transportation Commission and the highway authority of the other state must approve award of the contract.

• For federally funded projects with state oversight, a Federal Project Authorization and Agreement (FPAA) must be signed before obligation of project funds. In addition, a state Letter of Authority (LOA) must be signed before letting. For federally funded projects with federal oversight, each state must obtain its own LOA from Federal Highway Administration (FHWA) and provide participating adjacent states with a copy at least three weeks before letting.

• The project must be advertised in accordance with federal requirements as well as the laws of both states.

• A separate control-section-job (CSJ) number for the bridge and each approach (three total) is required. If the project will be let by the adjacent state, only two CSJ’s are required.

• The project must be on the State Transportation Improvement Plan (STIP) of each state.

• The project must be environmentally cleared.

• The project must be on the Unified Transportation Program (UTP).

The agreement for a bridge with an adjacent state requires the following:

• The responsible state for each bridge located on the border between Texas and another state is shown on Table 4-1.

• The responsible state prepares the PS&E, processes the letting of the project for construction, and provides routine and major maintenance for the bridge after it is constructed. Each state shares in 50% of the cost of design, construction, and major maintenance expenses, except that each state is 100% responsible for costs associated with design, construction, and maintenance of the respective bridge approaches of each state. The responsible state provides routine maintenance at no cost to the other state. Routine maintenance is defined as that maintenance cost that is less than $5,000. Major maintenance is defined as maintenance cost that is $5,000 or more. The responsible state must contact the other state for its concurrence before performing any major maintenance work.

NOTE: An agreement is not required for maintenance contracts but is required for major repairs.
Each state will, at no cost to the other state, secure necessary right of way, relocate all utilities, and identify and remove all known hazardous materials to accommodate that portion of the project on the respective side of each state.

Bank protection, jetties, or similar work required to protect the bridge or its approaches or to hold the river channel to its present course will be considered as a part of maintenance of each bridge, whether such work may be located wholly in one state or the other.

The governor of Texas must execute all bridge project agreements between Texas and another state.

The Bridge Division project managers coordinates the negotiations with the other state and prepares and processes the agreement for execution when Texas is the responsible state.

Federally Funded Off-System Bridges

As a rule, off-system bridge projects administered by TxDOT have federal fund participation. Most of these projects consist of replacement or rehabilitation of structurally or functionally obsolete deficient bridges funded with a combination of federal-local or federal-state-local funds, with the federal funds from the Highway Bridge Program. However, TxDOT does administer a relatively small number of other off-system bridge construction projects with federal funding from the Surface Transportation Program (STP).

When planning involves an off-system bridge project, particularly one under the Highway Bridge Program, coordinate with the local government. For off-system Highway Bridge Program projects an appropriate agreement with the local government must be executed between the State and the local government before any work can be performed. In addition to specifying the responsibilities of the two parties in the performance and funding of the work, the agreement provides for advance payments by the local government of its share of the project funding responsibilities. The agreement also allows a local government to use equivalent-match projects as payment toward its share of project funding. Standard forms for this agreement may be obtained from the Project Development Section of the Bridge Division.

Off-system bridges with adjacent states are funded 100% by a combination of federal and state funds, or 100% by state funds. No local government contribution is required.

Interchanges

An interchange is a system of connecting roadways, including one or more grade separation structures, that allows uninterrupted movement of traffic between two or more roadways, generally highways.
Planning considerations concerning interchanges include those considered for highway grade separation structures. Additionally, the type of interchange to use is a major consideration. This is a matter of roadway design and is influenced by factors such as the existing terrain, availability of right of way, cost, and roadway classification among others. Common types of interchanges, as well as suggestions on their use, are covered in Chapter 3 of the Roadway Design Manual. AASHTO’s A Policy on Geometric Design of Highways and Streets also discusses interchanges thoroughly.

Because of the complicated features, including aesthetics, inherent with interchanges additional time is required to review plans. In order to assure that the preliminary bridge layout contains the appropriate level of detail, and to maintain the letting schedule, always refer to the Preliminary Layout Approval Process in Chapter 5, Section 1 for bridge layout information and the Submission Schedule in Chapter 5, Section 4 for appropriate lead times.

**Overhead Sign Supports**

Do not locate overhead sign supports on bridges if possible. If such location is required, indicate on the bridge layouts a cantilever-type overhead sign support (COSS) founded on a bent cap or on an isolated concrete column on drilled shaft, or an overhead sign bridge (OSB) attached directly to the bridge superstructure. The location of any overhead sign support on bridges requires special design by the Bridge Division.

If overhead support for a dynamic message sign (DMS) is required, determine the appropriate DMS type and its attachment details before completing the detailed project design. Consider whether walkways or light fixtures are required. Configure the DMS on the truss to minimize the horizontal offset between the DMS and the truss. Mount the DMS on a Balanced Tee-type COSS or on an OSB. Do not mount the DMS on a single cantilever-type COSS. Mounting a DMS on an OSB requires a special OSB design by the Bridge Division in addition to the attachment design required if the DMS is to extend over a bridge.

Position sign support brackets for retrofit of signs along existing rails at bridge overpasses such that the bottom edge of the sign panel and support bracket do not encroach on the existing vertical clearance of the bridge.

Do not mount a closed circuit television (CCTV) on a tube protruding from an OSB or a COSS because of wind or traffic-induced vibrations. These vibrations may be more pronounced when the OSB or COSS is mounted directly to a bridge superstructure.

**Utility Structures**

**Interstate Highways.** Where it would be more economical to carry utility lines across a freeway in a tunnel or on a bridge rather than in separately trenched and encased crossings, provide a separate structure for the utility crossing. Such a structure may serve a joint purpose as a utility and pedes-
trian facility and/or sign support. In providing a utility tunnel or bridge, the following conditions should be met:

- Isolate mutually hazardous transmittants, such as fuels and electric energy, by compartmentalizing or by auxiliary encasement of incompatible carriers.
- Conform the utility tunnel or utility bridge structure design, appearance, location, bury, earthwork, and markings to the culvert and bridge practices of the department.
- Where a pipeline on or in a utility structure is encased, the casing must be effectively opened or vented at each end to prevent possible build-up of pressure and to detect leakage of gases or fluids.
- Take additional protective measures where a casing is not provided for a pipeline on or in a utility structure, such as employing a higher factor of safety in the design, construction, and testing of the pipeline, than would normally be required for cased construction.
- Communication and electric power lines must be suitably insulated, grounded, and preferably carried to a manhole located beyond the backwall of the structure. Insulate carrier and casing pipe from electric power line attachments.
- Install shut-off valves, preferably automatic, in lines at or near ends of utility structures unless segments of the lines can be insulated by other sectionalizing devices within a reasonable distance.
- Utility companies must agree that any maintenance, servicing, or repair of the utility lines will be their responsibility.

**Non-interstate Highways.** If utility lines have their own easement and it would be more economical to the department, adjust the lines across a highway by use of a utility tunnel or bridge. Where the utility lines are on a public right-of-way by sufferance and the adjustment of the utility is the sole responsibility of the private or public utility company, the department may permit the provision of a utility structure without cost to the department provided the same conditions outlined for Interstate Highways and all other pertinent requirements are met. If a structure is to serve as a joint utility-pedestrian crossing or a joint utility-sign support structure, the department will participate to the extent necessary for accommodation of pedestrians and highway signs only.
Section 3 — Agreements and Permits

U.S. Army Corps of Engineers

Section 10 of the Rivers and Harbors Act of 1899 (33 USC 403) empowers the Corps of Engineers (COE) to regulate all work on structures other than bridges or causeways that affect the course, condition, or capacity of navigable waters of the United States. This term includes those waters defined as navigable by the U.S. Coast Guard (USCG) but may also include rivers that were historically navigable or that with modification may be available for future use to transport interstate commerce. The determination of navigability has been made by each COE district engineer and is available upon request.

Typical activities for which a project might require authorization under this law include the following:

- Stream modifications to achieve better bridge alignment
- Dredging
- Bank stabilization
- Spur dikes
- Piling
- Dolphins
- Piers
- Haul roads

Additionally, other structures not directly associated with a bridge but affecting a navigable waterway as defined by the Corps of Engineers may also require authorization under this law.

The Corps of Engineers also regulates the discharge of dredged or fill material into all waters of the United States including adjacent wetlands under Section 404 of the Clean Water Act (33 USC Section 1344). The term “waters of the United States” includes all components of a surface tributary system as well as any additional waters or wetlands the loss or degradation of which could affect interstate commerce. For waters or wetlands not part of a tributary system, determination of jurisdiction by the appropriate COE district engineer may be needed. The Corps of Engineers may also provide the location and limits of any wetland affect by planned projects. Note that bridges, even though approved by the Coast Guard, require authorization under Section 404 if dredged or fill material is to be discharged in their construction. Some Section 404 permits that are commonly required include Nationwide Permits, General Permits, and Individual Permits.

Certain federal-aid projects may be classified as categorical exclusions and permitted by a special Nationwide Section 404 Permit issued to the Federal Highway Administration (FHWA). These per-
mits are subject to special conditions and management practices. Further information can be obtained from Bridge Division project managers. Most bridge projects, including rehabilitation and replacement projects, fall into this classification.

Normally TxDOT obtains the Section 404 Permit for the bridge itself. The contractor may also need a permit depending on the method of construction. On projects where it is anticipated that the contractor’s construction method may require a permit, it may be desirable to include the work in TxDOT’s application. For example, fill required for a temporary construction road can be included as part of the individual permit. This procedure may save both time and expense during construction.

The Environmental Affairs Division coordinates the Navigable Waterway and Section 404 Permit application processes as required by the COE. Thus, it is crucial to have Environmental Affairs Division involved in the early planning stages to identify the necessary permits and begin the application process. The Environmental Manual contains further information on permits including permit requirements and procedures.

U.S. Coast Guard

Section 9 of the Rivers and Harbors Act of 1899 empowers the United States Coast Guard (USCG) to regulate the construction of bridges and causeways within or across navigable waterways as determined by that agency. This regulation includes the approval of plans and the issuance of permits. FHWA, however, has the authority to determine if a USCG permit is not required.

In the state of Texas the principal navigable waterways involved include:

- Gulf of Mexico bays
- Gulf Intracoastal Waterway
- Trinity River from the Gulf of Mexico to Fort Worth
- Several ship channels serving the Gulf of Mexico

Most rivers and streams entering the Gulf of Mexico are technically navigable for a specified distance inland from their mouth. If a project is planned for any of these principal waterways, it is important to have both FHWA and the USCG involved early in the planning process.

For all crossings of these navigable waterways, observe the following procedures:

- Determine clearances and general features affecting the waterway for both new structures and modifications to existing structures with USCG.
- Obtain a formal permit to construct a highway facility from the proper USCG district.
- The TxDOT district will prepare permit applications and transmit the original tracings of these applications to the Environmental Affairs Division for handling with the USCG.
The USCG webpage has vertical and horizontal clearances for specific waterways. Contact the Environmental Affairs Division for further information on US Coast Guard permits, including permit requirements and procedures.

Environmental Protection Agency

The Environmental Protection Agency (EPA) administers and issues permits for non-point source pollutants associated with industrial activities (construction) and Municipal Separate Storm Sewer Systems (MS4) permits. For further information refer to the Stormwater Management Guidelines for Construction Activities (TxDOT, 1993) for details on requirements for permits and contact ENV for details on the most current agreements.

Railroad

The Rail Division (RRD) is the department’s office of primary responsibility for railroad issues, and it works closely with the district and Bridge Division project manager in preparation of state-railroad agreements involving structures.

RRD works closely with the Bridge Division project manager regarding negotiations with the railroad companies in connection with the preparation of agreements and securing force account estimates often required with the following types of projects and agreements:

- Highway-rail grade separation agreements
- Spur track agreements
- Automatic warning system agreements
- Agreements for relocation of existing highway-rail protective devices
- Construction and reconstruction of culverts under railroad tracks and other drainage improvements
- Drainage system agreements and common ditch agreements
- Agreements or permits for the interconnection of highway traffic signals with railroad flashing light signals
- Agreement for replacement of highway-rail grade crossing, including any adjustment of track grade
- Railroad force account agreements for new highway or highway reconstruction projects including planking, pole line adjustments, relocation of existing highway-rail warning systems, and State’s right to cross railroad property
- Agreement to enter railroad company right of way for surveying and/or drilling soil borings
International Boundary and Water Commission

The International Boundary and Water Commission (IBWC) has jurisdiction along the boundary between the United States and Mexico. Submit work proposed within the flood plain and adjacent to the main channel of the Rio Grande where it forms the international boundary between the United States and Mexico to IBWC for its review and approval before any work is done. Submit preliminary notifications and plans of proposed work and facilities at appropriate times to the Bridge Division project manager for processing with the IBWC. Licenses or agreements will be prepared when appropriate for highways crossing or encroaching upon the IBWC flood control facilities along the Rio Grande.

Natural Resources Conservation Service

The Natural Resources Conservation Service (NRCS) can construct reservoirs that may affect our highways. The NRCS always operates with a local sponsor, and where the flood-retarding structures built by this agency affect our highways, the local sponsor bears the cost of raising, relocating, or protecting our highways in accordance with the following policy:

◆ If a highway or road operated by TxDOT will be inundated at less than the calculated fifty-year frequencies by construction of a floodwater-retarding structure, NCRS or one of its cooperating agencies usually provides funds necessary to raise or relocate the road above the water surface elevation that might be expected at fifty-year frequency intervals.

◆ If a highway or road operated by TxDOT will not be inundated by floods of less than a fifty-year calculated frequency, TxDOT will underwrite this hazard for the general welfare of the state and continue to operate the road at its existing elevation until such time as interruption and inconvenience to highway travel necessitates raising the grade.

The Bridge Division project manager, assisted by the district, will negotiate for a satisfactory settlement.

Navigation Districts, Water Districts, Irrigation Districts, Water and River Authorities

Where the State, Navigation District, Water District, Irrigation District, or Water and River Authority undertake construction that affects the rights of another, the Bridge Division project manager negotiates a satisfactory agreement setting forth the financial responsibility and commitments of each party involved.

Local Government Agencies

For bridges within the boundaries of a local government yet under the jurisdiction of TxDOT (on-state system), the two entities must negotiate a Municipal Maintenance Agreement to determine and fix the respective responsibilities of the department and the local government for maintenance,
control, supervision, and regulation of these designated state highways. Municipal Maintenance Agreements are coordinated through the Maintenance Division. If the project has an advanced funding agreement (AFA) addressing these issues, a Municipal Maintenance Agreement is not necessary.

When a local government is responsible for providing financial assistance for a highway improvement project, TxDOT and the local government will enter into an agreement. Standard forms can be obtained from the Contract Services Office).

Contact the Finance Division Letting Section, and request a control-section-job (CSJ) number prior to the initiation of any agreement. The Contract Management Manual establishes procedures for negotiating, preparing, executing, administering, and closing out the agreement for the bridge project and describes the responsibilities of the districts and the divisions involved in the project.

Agreements between the State and a local government are also necessary when dealing with historically significant bridges. Examples of such agreements can be found in the Historic Bridge Manual.

Louisiana, Arkansas, Oklahoma, New Mexico

Where either Texas or an adjoining state undertakes construction along the Texas border that affects the rights of the other, the Bridge Division project manager negotiates a satisfactory agreement setting forth the financial responsibility and commitments, including maintenance and liability, of each party involved. Additional information can be found in the Advanced Planning -- Considerations Based on Bridge Location in Chapter 4, Section 2 of this manual.

Mexico

Presidential Permits are required to convey permission for construction and maintenance of facilities connecting the United States with Mexico. Although TxDOT has no direct interaction with Mexico that involves agreement negotiation, several TxDOT divisions are involved in the Presidential Permit process. Further information on Presidential Permits, and the application process, can be found in the paragraph titled Advanced Planning -- Considerations Based on Bridge Location in Chapter 4, Section 2 of this manual.

Interaction and coordination with the International Boundary and Water Commission occurs when proposed work falls within the flood plain and adjacent to the main channel of the Rio Grande, where it forms the international boundary between the United States and Mexico.
Section 4 — Utility Attachments

Overview

To every extent possible, do not attach utility lines to bridges and separation structures because the proliferation of such lines and their maintenance constitutes a hazard to traffic and complicates widening or repair. Attaching utility lines to a highway structure can materially affect the structure, the safe operation of traffic, the efficiency of maintenance, and the overall appearance.

Where other arrangements for a utility line to span an obstruction are not feasible, the department may consider the attachment of such line to a bridge structure. Any exceptions that are permitted will be handled in accordance with the conditions set forth in Title 43 TAC, Section 21.35 and 21.37 (relating to utility structures) and other pertinent requirements contained therein. Each such attachment will be considered on an individual basis and permission to attach will not be considered as establishing a precedent for granting of subsequent requests for attachment.

Guidelines

The following guidelines govern attachment of utilities to bridges.

Communication Lines. When it is impractical to carry a self-supporting communication line across a stream or other obstruction, department policy permits the attachment of the line to its bridges. On existing bridges the State generally requires that the line be enclosed in conduits and located on structures such that it does not interfere with stream flow, traffic, or routine maintenance operations. When a request is made prior to construction of a bridge, suitable conduits will be provided in the structure if the utility company bears the cost of all additional work and materials involved.

When a line is attached to a bridge, the State will enter into an agreement with the utility company.

In urban areas where it is the State's responsibility to provide for the adjustment of communication lines or conduits to accommodate the construction of a highway and the adjustment provides for the placement of communication conduits in a highway grade separation structure, the department will allow a reasonable number of spare communication conduits in the structure provided the spares are placed at the time of construction and the communication company bears the cost of these spare conduits.

Where highway construction makes it necessary to relocate communication conduits and the proper adjustment, in the opinion of the department, provides for the placement of communication conduits in the highway grade separation structure, the department will permit the communications company to install replacement conduits and a reasonable number of spares in
the structure provided such conduits are placed at the time of construction and provided the company bears any extra structure cost occasioned by the presence of the communication conduits.

**Gas or Fuel Lines.** No gas or liquid fuel lines may be attached to a bridge or grade separation structure without the specific approval of the TxDOT Executive Director.

**Power Lines.** Power lines are not permitted on bridges under any condition with the exception of low-voltage distribution lines where the cost of independent facilities to carry these lines would be prohibitive. For this requirement, low-voltage lines carry 600 volts or less.

**Utility Pipelines.** When a municipality or utility company requests permission to attach a pipeline to a proposed bridge prior to construction, and the added load is sufficient to require an increase in the strength of the structure or use of more costly materials or type of construction, the utility owner is required to pay for the increase in cost.

When a utility company requests permission to attach a pipeline to an existing bridge, sufficient information should be furnished to allow a stress analysis to determine the effect of the added load on the structure. Other details of the proposed attachment as they affect safety and maintenance should also be presented. If the bridge structure is not of adequate strength to carry the increased weight or forces with safety, permission will not be granted.

**Requests for Attachments.** All requests for attachments to bridges or structures should originate with the utility company with an application to the appropriate district engineer.

For attachments to structures within active projects, the district engineer should forward requests for attachment along with recommendations to the Bridge Division project manager for review and concurrence. Adequate justification, including details and an estimate for an independent utility crossing, should accompany the submission. If the attachment is allowed, the Bridge Division project manager will prepare a suitable agreement and forward it to the district for execution with the utility company. Modification of the structural details to accommodate the utility and the responsibility of cost will be developed by the utility’s engineer. Where applicable, the Bridge Division project manager will coordinate the submission with the district. In addition, use and occupancy agreement forms will be required as cited in **Title 43 TAC, Section 21.52** (relating to Forms–General) and **Title 43 TAC, Section 21.54** (relating to Use and Occupancy Agreement Forms).

**Attachment Locations.** Recommended attachment locations are on the overhang, as close as possible to the outside beam, or behind the outside beam. Behind the outside beam is preferred. Hanging lines on the outside of the beams is not aesthetically pleasing and may be subject to vandalism. Attachments to water crossing structures should be placed on the downstream side where exposure to high water is less likely.

Bridge attachments should not be made to any bridge rail or rail hardware, including anchor bolts. This will eliminate the need to get the owner of the attachment involved when bridge rail repair is performed.
Do not hang lines from the bottom of beams. This decreases freeboard and increases the likelihood of damage.

It may be beneficial to carry lines across an obstruction using a utility structure rather than an attachment to a structure.

**Coordinating the Agreement**

The district engineer can approve a utility attachment without Maintenance Division review and submit the request, with district recommendation, directly to the Bridge Division project manager. The Bridge Division project manager coordinates the request with assistance from the Design Section, the Right of Way Division, and the Maintenance Division. The Design Section conducts a structural review and a review of the details. The Bridge Division project manager handles the negotiations and prepares the agreement.

The Federal Highway Administration (FHWA) has specified that on-system projects must adhere to the Utility Accommodation Policy (UAP) codified as Title 43 TAC Sections 21.31-21.56. Sometimes full compliance with the UAP is unattainable. In such cases an exception must be certified by the district director of Transportation Planning and Development and authorized by the Right of Way Division director using the form entitled Certification for Utility Accommodation. Requests for exceptions will be considered only when it is shown that extreme hardship or unusual conditions provide justification and when compensating or alternative measures can be taken in keeping with the intent of these sections. All exception requests made to the districts must be fully documented with design data, cost comparisons, and other pertinent information. Off-system projects should comply with the UAP when possible; however, off-system projects may utilize local codes, policies, and customary practices when representing the public’s best interests. If local codes, policies, or practices are used instead of the UAP, a Utility Accommodation Policy Declaration form must be completed and included with the utility agreement.

Although there is no initial fee or rental charge, attachments will be made at no cost to the state. All expenses will be responsibility of the utilities. Any additional cost due to modification of the bridge structure to accommodate the attachment must be borne by the utilities. This cost or method of determining the cost will be established in advance and shown in the agreement.

Exhibits attached to the request should include drawings showing location, type, size, and weight of the line, attachment details, and safety features. Exposed portions of an attachment must be of non-corrosive material or must be protected from corrosion by an acceptable method such as hot-dipped galvanizing, if appropriate. Pipelines and conduits must not impede the flow of water through a structure or the movement of traffic, either pedestrian or vehicular, and must be located so as not to interfere with routine maintenance operations.

Maintenance of utility attachments to a bridge is the responsibility of the utilities. Installation and maintenance of utility attachments will be conducted so as not to inconvenience or interfere with...
highway traffic and will comply with governing laws and TxDOT regulations and policies. During attachment installation or maintenance, all traffic controls should comply with the Texas Manual on Uniform Traffic Control Devices for Streets and Highways.

Exhibits submitted by the district to the Bridge Division project manager should include the following:

- Details on how the line is attached to the bridge -- (Utility Attachment Exhibit A)
  - Show proposed location of attachment on elevation view of bridge layout
  - Show specific detail of attachment to bridge with appropriate notes to the contractor
  - The Utility Attachment Exhibit A must be signed and sealed by a licensed professional engineer
- Identification of control, section, and original job number of the bridge if possible
- National Bridge Inventory (NBI) number of bridge
- Copies of bridge layout and pertinent details of existing bridge as-built plans (if available)

**United States Geologic Survey -- Gauging Stations**

The Bridge Division project manager must approve requests by the United States Geologic Survey or other public or private agencies for gauging stations to be located on or near highway stream crossing bridges. These requests are handled by permit after approval is received from the district. A stipulation of the agreement is that the gauging equipment will be removed upon 30 days’ notice when it is necessary to widen, repair, or reconstruct the bridge. Notify the bridge project manager of any proposed work that will require removal or relocation of a gauging station.

**Texas Water Development Board**

The Bridge Division project manager must review and approve requests by the Texas Water Development Board for water quality stations to be located on or near highway stream crossing bridges. These requests are handled by permit after approval is received from the district. A stipulation of the agreement is that the station will be removed upon 30 days’ notice when it is necessary to widen, repair, or reconstruct the bridge. Notify the Bridge Division project manager of any proposed work that will require removal or relocation of a Texas Water Development Board water quality station.

**Counties and Municipalities**

Where either the state or a local government wishes to place an attachment to a structure within the other’s right of way, the Bridge Division project manager will coordinate the agreement process with assistance from the Bridge Division Field Operations Section, the Right of Way Division, and
the Maintenance Division. A satisfactory agreement will set forth the financial responsibility and commitments, including maintenance and liability, of each party involved.
Chapter 5 — Preliminary Layout Approval Process

Contents:

- Section 1 — Preliminary Bridge Layouts
- Section 2 — Layout Considerations and Requirements
- Section 3 — Bridge Division Submittal Requirements
- Section 4 — Submission Schedule
Section 1 — Preliminary Bridge Layouts

Overview

Submit a preliminary bridge layout for review and approval for all bridges before any detail work is performed. The layout is reviewed by the following:

◆ Design Division/Field Section reviews the layout for roadway items, such as:
  • roadway width
  • compliance with approved schematic
  • vertical and horizontal curvature
  • Americans with Disabilities Act (ADA) requirements

◆ Design Division/Hydraulics Branch reviews the layout for hydraulic items, such as
  • scour
  • design frequency
  • Federal Emergency Management Agency (FEMA) requirements
  • Hydraulic methodologies used

◆ Bridge Division/Geotechnical Branch reviews the layout for geotechnical items, such as
  • types of foundations
  • soil borings
  • retaining walls

◆ Bridge Division/Design Section reviews the layout for structural items, such as
  • beam types
  • span lengths
  • crash tested railings
  • appropriate use of standards
  • revisions to standards

◆ Federal Highway Administration (FHWA) reviews the layout if they have oversight

◆ If a railroad is involved, the layout (the Railroad Exhibit A of the railroad agreement) is sent to the railroad company for its approval

Also, if the bridge is programmed for the Highway Bridge Program, check it to make sure it is eligible for highway bridge replacement or rehabilitation funds.

When reviewing the plans, specifications and estimates (PS&E), the Bridge Division project managers check to make sure all the issues involved with the preliminary bridge layout have been
resolved. If the bridge is not eligible for the funding category or is not CONSTRUCT-authorized, the project cannot be let for construction. If there is a design problem, the bridge may have to be redesigned, and the project pulled from the letting if there is not enough time to resolve all of the issues. Resolve all outstanding issues at the time of the preliminary review and not during the PS&E stage.

Refer to the Bridge Detailing Manual for Preliminary Bridge Layout criteria, Completed Bridge Layout criteria and typical layouts. Complete and submit the Information Sheet for Structural Design with all preliminary layouts for projects to be designed by the Bridge Division or their consultant pool.

Preliminary bridge layout submittal process:
1. The district bridge engineer must approve preliminary layouts prior to submission.
2. The layout is submitted to Bridge Division project manager for approval.
3. Division review comments are resolved, and layouts are finalized.

Begin work on bridge detail sheets only after final approval of the bridge layouts from the Bridge Division.
Section 2 — Layout Considerations and Requirements

Layout Approval Information

In addition to the requirements shown in the Bridge Detailing Manual, the following information is necessary for layout approval.

Stream Crossings. Submit the scour analysis envelope with the preliminary bridge layout.

Bridge Widening. For bridge widenings, include the following in the layouts:

- Existing bridge widths and lengths
- Existing bridge width to remain and width of widening on plan view and typical section
- Existing foundations
- Appropriate thickness of asphalt level-up coarse on the transverse section, if applicable

If stage construction is required, refer to stage construction requirements below.

Railroad Overpasses/Underpasses. For railroad overpasses or underpasses, submit the preliminary bridge layout to the Bridge Division, and submit Railroad Exhibit A, additional plan sheets provided to the railroad company for approval, to the Rail Division.

Place emphasis on the following items:

- Location of railroad tracks and right of way
- Intersecting mileposts of railroad and stations of roadway centerlines
- Railroad milepost marker and Department of Transportation crossing identification number
- Elevation at top of rail
- Vertical and horizontal clearances from centerline of track
- Railroad track profile
- Direction of increasing railroad milepost
- Proper title block indicating Railroad Exhibit A
- Indication if grade separation structure eliminates a highway-rail at-grade crossing with active warning signals
- Location of crashwalls, if required
- The Railroad Requirements for Bridge Construction sheets
Stage Construction. If stage construction is required, show it on the bridge layouts. Illustrate the stage construction sequence. Use additional sheets if necessary. Show existing bridges on the bridge layouts. Include foundation locations. Show proposed lane widths and temporary rail locations for each stage.

Interchanges and Complex or Unusual Projects. For complicated designs, such as braided ramps or interchanges, it is vital to have accurate information on the plan and profile of roadways beneath the structures. The types of bents required, such as straddle, single column, offset columns, etc., depend on geometry of roadways.

Retaining Walls. Preliminary layouts for retaining walls are required when the maximum height exceeds 25 ft. Submit preliminary layouts for walls and slopes undergoing specific ground stability-improvement measures for review. Such measures include the following:

- Removing and replacing more than 5 ft. of soil.
- A requirement for earth reinforcements exceeding 70% of the wall height.
- Use of dynamic compaction, wick drains, stone columns, geopiers, surcharging, or other measures to improve ground below walls or embankments.

Include justification in the preliminary submission for ground improvement, including soil testing and analysis leading to the decision to use ground improvement techniques, as well as analysis of the ground improvement itself.

Federal Compliance

The Federal Highway Administration (FHWA) requires TxDOT to submit preliminary structural layouts to FHWA for review and approval as follows.

The Bridge Division submits to the FHWA Texas Division for approval all preliminary structural layouts for all bridges, major geotechnical features and major hydraulic structures on projects for which FHWA has retained oversight. A list of these projects is available from the Design Division.

For all other projects, the FHWA Texas Division and the FHWA Headquarters Office of Bridge Technology approve preliminary documents for unusual bridges and structures, including the following:

- Difficult or unique foundations.
- New or complex designs with unique operational or design features.
- Bridges with span lengths greater than 600 ft.
- Cable-stayed or suspension bridges.
- Bridge types that deviate from AASHTO specifications.
- All vehicular tunnels.
• Bridges with major supporting elements of ultra-high strength materials.
• Geotechnical structures featuring new or complex wall systems or ground improvement systems.
• Hydraulic structures involving complex stream stability measures.
• Designs or design techniques that are atypical or unique.

Include the following items in the preliminary documents for unusual bridges and structures submitted by TxDOT to FHWA:

• Description of structure-related environmental concerns and suggested mitigation
• Studies of bridge types and span arrangements
• Approach bridge span layout plans and profile sheets
• Controlling vertical and horizontal clearance requirements
• Roadway geometry
• Design specifications used
• Special design criteria
• Special provisions
• Cost estimates
• Hydraulic and scour design studies and reports showing scour prediction and related mitigation
• Geotechnical studies and reports and information on substructure and foundation types
Submission Requirements

Submit together all structures to be let under a project. This will assure uniformity of design and eliminate duplication of standards. Submittal requirements for typical bridge layouts and bridge layouts involving a railroad are listed below.

The transmittal e-mail from the district to the Bridge Division project manager must contain the following:

- District (both letting district and designing district, if different)
- County
- CSJ
- Facility and Feature Crossed
- Ready-to-let date and proposed letting date
- Project type (new construction, rehabilitation, replacement, widening, etc.)
- Bridge designer (District, Division, Consultant)
- Contact information
- Request for review or for review and preparation of details
- Any relevant information that the division may need to complete its review
- The preliminary bridge layout and Information Sheet for Structural Details
- Typical sections sheet
- Hydraulic data sheet
- Construction sequence sheet
- The hydraulic report and scour analysis, if applicable
- If the project is funded from the Highway Bridge Program, the plan and profile sheets showing the project limits and the completed original of Form 1002 pg. 3 of 3
- A map view of the project illustrating the relationship of the roadways if the project is an interchange or an interchange exists within the vicinity
- The Railroad Exhibit A plan sheets, if applicable (also submit these to the Rail Division.)
Section 4 — Submission Schedule

Submission Schedules

Estimated lead times for the submission of preliminary bridge layouts are provided in the table below. This table provides an aid to project completion in time for scheduled letting.

Table 5-1: Submission Schedule

<table>
<thead>
<tr>
<th>Project Type</th>
<th>Typical Overpass</th>
<th>Typical Stream Crossing</th>
<th>Railroad Overpass</th>
<th>Railroad Underpass</th>
<th>Widenings/Rehab</th>
<th>Interchanges</th>
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</thead>
<tbody>
<tr>
<td>Condition survey, calculate load rating,</td>
<td>3 months</td>
<td>3 months</td>
<td>3 months</td>
<td>3 months</td>
<td>3 months</td>
<td>3 months</td>
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<tr>
<td>deck cores, etc.</td>
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<td></td>
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<tr>
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<td>1 month</td>
<td>1 month</td>
<td>1 month</td>
<td>2 months</td>
</tr>
<tr>
<td>Railroad approval</td>
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<tr>
<td>Railroad approval</td>
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</tr>
<tr>
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<td>3 months</td>
<td>3 months</td>
<td>4–5 months</td>
<td>3–5 months</td>
<td>7–12 months</td>
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<tr>
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<td>1 month</td>
<td>1 month</td>
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<td>1 month</td>
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<tr>
<td>PS&amp;E processing</td>
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<td>3 months</td>
<td>3 months</td>
<td>3 months</td>
<td>3 months</td>
<td>3 months</td>
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<tr>
<td>Total lead time required before letting</td>
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<td>8 months</td>
<td>11 months</td>
<td>15-16 months</td>
<td>11-13 months</td>
<td>13-18 months</td>
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</table>
Chapter 6 — Plans, Specifications, and Estimates (PS&E) Review

Contents:

Section 1 — PS&E Review Process
Section 2 — PS&E Approval Requirements
Section 1 — PS&E Review Process

Overview

The Bridge Division Plan Review Branch reviews all plans, specifications, and estimates (PS&E) containing structural items prior to contract letting. Structural items include the 400 Standard Specification Series and the 4000 Special Specification Series. The 400 Items are contained in Part II, Construction Details, Division IV, Structures, of the Standard Specifications for Construction of Highways, Streets, and Bridges. The 4000 Items are statewide, district-wide, and project-specific items pertaining to structures not covered in the standard specifications.

Avoid or reduce delays in letting of projects by taking the proper steps early in the project development process. Understanding the PS&E review process and letting schedule can assist in preparing an accurate work schedule and determining proper lead times.

Project PS&E Schedule

The project PS&E schedule can be found on the Bridge Division’s internal Project Development web pages.

NOTE: Access to the internal web site is available only to TxDOT personnel.
Section 2 — PS&E Approval Requirements

Overview

Preparing proper plans, specifications, and estimates (PS&E) preparation is essential to avoid delayed lettings dates. The PS&E Preparation Manual contains general requirements for PS&E. Requirements specific to projects that contain structural items are provided below to further assist in the PS&E preparation.

Plans

Abide by the following plan preparation guidelines:

- Include bridge plan sheets prior to submitting final PS&E for review.
- Ensure information on the title sheet corresponds with information on Design and Construction Information System (DCIS).
- Include the most current standards. All standards used must be clearly listed on the index of sheets even if unavailable at the time of submission.
- All modified (MOD) and special (SPL) standards must be signed and sealed by the responsible engineer. Include a brief description of the modifications, typically shown in the Revisions area of the title block.
- Show all hydraulic documentation correctly in the final plans as required by the Hydraulic Design Manual. Hydraulic comments based on the preliminary submissions must be addressed prior to submitting final PS&E.
- For projects involving a highway-rail grade separation, an executed railroad agreement is required prior to letting. On federal oversight projects, send a copy of the agreement to the Federal Highway Administration (FHWA). Further information concerning railroad agreements can be found in Advanced Planning -- Agreements and Permits (see Agreements and Permits) of this manual.

Specifications

The specification preparation guidelines below must be followed:

- List approved names and addresses of manufacturers of proprietary designs included in a project.
- For projects involving lead paint or asbestos, clearly state the proper containment measures complying with federal and state regulations. Contact the bridge construction/maintenance engineer for the latest approved plan notes.
For projects involving a railroad agreement, it may be necessary to add a fiber optics note when required by the executed railroad agreement. The Rail Division will specify the requirement for the fiber optics note during the PS&E review process.

**Special provisions and special specifications** must be in the Rich Text Format with the appropriate template as specified by Project Services of the Design Division.

### Estimates

Prepare an estimate using the following guidelines and methods described in the Project Development pages of the Bridge Division’s internal web site. **Note:** Access to the internal web site is available only to TxDOT personnel.

All bid items pertaining to each bridge or bridge class culvert must be broken out and listed separately.

**Estimate items.** Show the following items on the estimate:

- The current price for each bid item along with appropriate bid code
- Items participating and not participating in federal aid
- Contractor credit items

Alternate bid items; contact the Bridge Division plan review engineer for preparing estimates with alternate bid items.

**Bid Items.** Cost estimates for bridge work are shown on the DCIS P4 screen. Bridge items, including bridge class culvert structures, are broken-out separately from roadway items. This break-out arrangement provides information requirements for the reporting of bridge construction cost information to the Federal Highway Administration, Legislature, Commission, Administration and users within the department, and other public agencies.

The old system, known as the 12 Card, has been changed to a more user friendly screen called the Bridge Cost Information Screen (BCI). Navigation in the new screen is similar to others in DCIS.

Place the following information on the BCI screen:

- Type of bridge work (replace, widen, rehabilitation, maintenance, repair and new)
- National Bridge Inventory (NBI) number
- On- or off-state system
Type of bridge
Deck area
Cost percentage
Bridge length

Place the following information on the P3B screen:
- National Bridge Inventory (NBI) number (existing structures only)
- Type of bridge work (removal, replace, widen, rehabilitation, and maintenance or repair)

The Guide to Bridge Estimate Items contains additional information. Note: Access to the internal web site is available only to TxDOT personnel.

Roadway items section. Include the following items under the roadway (not bridge) items section of the estimate:
- Mobilization
- Demolition of existing structure (Item 496)
- Stream channel work
- Earthwork relating to channel excavation
- Clearing and grubbing
- Retaining walls not attached to or not for the protection of the abutments
- Riprap and slope paving not being provided as abutment or other substructure protection
- Guardrail transitions to bridges
- Maintenance and protection of traffic
- Detour costs
- Signing and marking
- Lighting
- Electrical Conduit
- Field office
- Construction engineering items
- Training
Right of way
Utility relocations
Contingencies

The following items should be included with the bridge items section of the estimate:
Riprap (CRR) for abutment protection
Inlets, frames and grates included in the bridge deck
Bridge approach slabs

NBI numbers. Include the new NBI number in the estimate. The NBI number is a 15-digit number. The last three digits of the NBI number make up the permanent structure number (PSN).

On-system numbers. NBI numbers are defined as follows: a two-digit district number, a three-digit county number, a zero, a four-digit control number, a two-digit section number, and the three-digit permanent structure number. The zero is a placeholder required for national inventory purposes. A typical NBI number is 14-150-0-0289-07-026.

Each new, replaced, rehabilitated, or widened bridge structure (NBI number) must have separate bid items. The Bridge Division’s internal Project Development web page has instructions on the proper use of the Bridge Cost Information (BCI) Screen in DCIS.

NOTE: Access to the internal web site is available only to TxDOT personnel.

A new permanent structure number (PSN) is assigned when a new structure is being constructed or an existing structure is being replaced. Bridges that are being widened or rehabilitated retain their PSNs. Contact the Bridge Division Inspection Branch to obtain new PSNs for new construction or when an existing bridge is being replaced.

When two or more bridges are widened (generally box culverts) to form one bridge, contact the Bridge Division Inspection Branch to obtain the PSN that will be assigned to the bridge.

Off-system numbers. Off-system structure numbers are defined as follows: a two-digit district number, a three-digit county number, a zero, and the nine-digit structure identification (ID) number. The structure ID number is made up of a route number and a permanent structure number. The route number is “alpha-numeric” with the first two digits being “AA” for county roads and some other letter for city streets. An example NBI number is 15-247-0-AA0114-001. Off-system bridges that are being replaced retain their structure ID numbers. The district assigns and maintains the structure ID number for off-system bridges.
For off-system bridges, notify the Bridge Division Inspection Branch so that pertinent information regarding structure type, completion date, etc., can be updated in the bridge inspection database. This is necessary even though the structure ID number remains the same. If the local entity replaces the bridge, then the bridge inspection database should be updated and the bridge should be removed from the off-system Highway Bridge Program prioritization. Notification and updates to the bridge inspection database are essential.