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List of Abbreviations

SEP15	Special Experimental Program 15
AADT	Average Annual Daily Traffic
AASHTO	American Association of State Highway and Transportation Officials
ACE	Automated Commercial Environment
ACP	Asphalt Concrete Pavement
ASTM	American Society for Testing and Materials
AVL	Automated Vehicle Location
B/C	Benefit Cost Ratio
BANs	Bond Anticipation Notes
BEA	Bureau of Economic Analysis
BLM	Bureau of Land Management
BNRR	Burlington Northern Railroad
CAD	Computer Aided Dispatch
CAPUFE	Caminos y Puentes Federales de Ingresos y Servicios Conexos
CBP	Customs and Borders Protection
CCTV	Closed Circuit TV
CDMP	Corridor Development and Management Plan
CDOT	Colorado Department of Transportation
CE	Categorical Exclusion
CERCLIS	Comprehensive Environmental Response, Compensation & Liability Information System
CMAQ	Congestion Mitigation and Air Quality Improvement
CORBOR	National Corridor and Border Program
CPI	Consumer Price Index
CSI	Container Security Initiative
CTE	Colorado Tolling Enterprise
C-TPAT	Customs-Trade Partnership Against Terrorism
CV	Commercial Vehicle
CVISN	Commercial Vehicle Information Systems and Networks
CVO	Commercial Vehicle Operations
DMS	Dynamic Message Sign
DOT	Department of Transportation
E9-1-1	Emergency 9-1-1
EA	Environmental Assessment
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
ESA	Environmental Site Assessment
EO	Environmental Overview
ETC	Electronic Toll Collection
FAST	Free and Secure Trade
FCC	Federal Communications Commission
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FM	Farm to Market
FONSI	Finding of No Significant Impact
GARVEE	Growth Anticipation Revenue Vehicles
GIS	Geographic Information Systems
GRIP	Governor Richardson's Investment Partnership
HAR	Highway Advisory Radio
HAZMAT	HAZardous MATerial(s)
HB	House Bill
HBRR	Highway Bridge Replacement and Rehabilitation

List of Abbreviations (continued)

HMMM	100 Million Vehicle Miles
HTF	Highway Trust Fund
I-	Interstate Highway
ISTEA	Intermodal Surface Transportation Equity Act
ITS	Intelligent Transportation Systems
LPST	Leaking Petroleum Storage Tank
LUST	Leaking Underground Storage Tank
M&O	Maintenance and Operations
MPO	Metropolitan Planning Organization
MOU	Memoranda of Agreement
NAAQS	National Ambient Air Quality Standards
NAFTA	North American Free Trade Act
NBI	Nation Bridge Inventory
NEPA	National Environmental Policy Act
NHS	National Highway System
NHPA	National Historic Preservation Act
NLCD	National Land Cover Data Set
NMDOT	New Mexico Department of Transportation
NNL	National Natural Lands
NOAA	National Oceanic and Atmospheric Administration
NPV	Net Present Value
NRCS	National Resource Conservation Services
NRHP	National Register of Historic Properties
NWI	National Wetland Inventory
O&M	Operations and Maintenance
ODOT	Oklahoma Department of Transportation
OMB	Office of Management and Budget
PABs	Private Activity Bonds
PDO	Property Damage Only
RIMS	Regional Industrial Multiplier System
ROD	Record of Decision
ROW	Right-Of-Way
RWIS	Road Weather Information Systems
RV	Recreational Vehicle
SAFETEA	Safe, Accountable, Flexible and Efficient Transportation Equity Act
SB	Senate Bill
SEP	Special Experimental Program
SH	State Highway
SHPO	State Historic Preservation Office
SIBs	State Infrastructure Banks
SREP	Southern Rockies Ecosystem Project
STIP	Statewide Transportation Improvement Program
STP	Surface Transportation Program
TEA 21	Transportation Equity Act of the 21st Century
TEA-LU	Transportation Equity Act: A Legacy of Users
TIFIA	Transportation Infrastructure Finance and Innovation Act
TIP	Transportation Improvement Program
TMC	Traffic Management Center
TNRCC	Texas Natural Resources Conservation Commission
TPWD	Texas Parks & Wildlife Department
TRANS	Transportation Revenue Anticipation Notes
TRB	Transportation Research Board
TxDOT	Texas Department of Transportation

List of Abbreviations (continued)

U.S. or US	United States
USACE	U.S. Army Corps of Engineers
USFS	United States Forest Service
USFWS	United States Fish & Wildlife Service
USGS	United States Geological Survey
VHT	Vehicle Hours Traveled
VMS	Variable Message Sign
VMT	Vehicle Miles Traveled
WASHTO	Western Association of State Highway and Transportation Officials
WIM	Weigh-in Motion
WWW	World Wide Web

Executive Summary

The Departments of Transportation from Colorado, Texas, New Mexico, and Oklahoma developed this Corridor Development and Management Plan (CDMP) for the Ports to Plains Corridor. The CDMP outlines a series of priorities and steps to improve the corridor and serves as an essential tool for securing federal funding for corridor development.

The Plan

This CDMP was developed to enhance the efficiency of the Ports to Plains Corridor. It contains several elements that improve the transportation network's ability to move people and goods. Nearly 1,400 miles long, the corridor consists of 511 miles of 4- to 6-lane roadway, 755 miles of 2-lane roadway, and 113 miles of roadway in metropolitan areas. The Ports to Plains Corridor includes the following construction elements:

- Widening 755 miles of 2-lane roads to 4-lane divided roads;
- Constructing 15 relief routes around larger towns;
- Adding amenities needed by commercial vehicle operators;
- Improving or constructing connective interchanges;
- Improving or constructing overpasses for railroad crossings;
- Replacing obsolete or deficient bridges;
- Installing corridor-specific signs; and
- Integrating an intelligent transportation system.

This plan allows staged implementation of the construction elements, using a prioritization process that first ranked projects based on engineering considerations (such as safety and efficiency), then adjusted the scheduled implementation to fit existing planning on the corridor and reasonable funding and construction times. Capital improvement projects were assigned to one of four priority groups: Group A (first five years), Group B (second five years), and so on.

The total costs associated with this investment include both the capital expenditure to improve the roadway and the operations and maintenance spending that will occur once the roadway improvements are completed. These costs, expressed in millions of 2004 dollars are summarized below. The costs also are shown discounted at 7.0 percent following Office of Management and Budget (OMB) guideline for investment appraisal.

Corridor Development Plan: Study Recommendations



Existing (2004)



Group-A (2005-2010)

1. The corridor Development Plan shown is part of the Ports to Plains Corridor Development and Management Plan, and is not necessarily an indication of State DOT programmed projects.
2. Relief Route construction may include initial 2-lane facilities, followed by 4-lane construction by corridor completion.

Corridor Development Plan: Study Recommendations



Group-B (2011-2015)



Group-C (2016-2020)

1. The corridor Development Plan shown is part of the Ports to Plains Corridor Development and Management Plan, and is not necessarily an indication of State DOT programmed projects.
2. Relief Route construction may include initial 2-lane facilities, followed by 4-lane construction by corridor completion.

Corridor Development Plan: Study Recommendation



Group-D (2021-2025)



Complete

1. The corridor Development Plan shown is part of the Ports to Plains Corridor Development and Management Plan, and is not necessarily an indication of State DOT programmed projects.
2. Relief Route construction may include initial 2-lane facilities, followed by 4-lane construction by corridor completion.

Project Costs

	Costs (Millions of 2004 Dollars)	Costs (Millions of 2004 Dollars @ 7.0%)
Colorado	\$610.2	\$303.1
New Mexico	\$173.7	\$98.7
Oklahoma	\$177.0	\$107.1
Texas	\$1,908.7	\$929.6
Total	\$2,869.5	\$1,438.5

Both routine and preventive maintenance actions are analyzed to identify the different needs, challenges, and problems arising along the corridor. The Maintenance and Operations (M&O) plan identifies actions that can be taken to address these different challenges. The cost of maintaining and operating the existing corridor over the next 20 years is estimated at over \$1 billion. The net cost of M&O for the improvements is \$143 million.

Included in this CDMP is an Intelligent Transportation System (ITS) Plan that recommends a series of projects for intended to complement the four states' existing ITS activities. The projects are divided into the following subgroups:

- Traffic Management Projects (upgrades to signal and school zone flasher systems)
- Commercial Vehicle Operations (CVO) Projects (weigh/inspection station improvements, automated truck inspections, and fleet permitting and registration)
- Emergency/Incident Management Projects (agreements among government agencies, promotion of tower sites for expanded cell phone service, and oversized mile markers)
- Traveler Information Systems Projects (message signs and 511 system upgrades)
- Maintenance and Construction Management System Projects (road weather information and work zone construction safety systems)
- Operational Support Project (additional staff support at transportation management centers)
- Projects Funded by Other Organizations (projects funded by private trucking companies and other organizations)

The ITS Plan identifies a total of \$32 million in capital costs and \$57 million in ITS M&O costs.

The Benefits

The economic value of transportation benefits are summarized in the following exhibit.

Summary of Transportation User Benefits

User Benefit	Benefits (Millions of 2004 Dollars)	Benefits (Millions of 2004 Dollars @ 7%)
Safety	\$381.2	\$114.3
Vehicle Travel Time	\$541.9	\$151.5
Vehicle Operation Cost	-\$11.1	-\$3.1
Total	\$912.0	\$262.7

The benefits are expressed in millions of 2004 dollars at a 7.0 percent discount rate. The numbers reflect the sum of benefits from 2011 to 2030.

Comparing the total of discounted transportation benefits in the Exhibit to the total project costs yields a Benefit Cost Ratio of 0.18. The conclusion, based on this ratio, is that the project is not justified based on American Association of State Highway and Transportation Officials (AASHTO) Red Book criteria to evaluate highway investments. Of note, however, AASHTO criteria for Benefit Cost Analysis do NOT address economic benefits associated with highway improvements. The economic benefits projected to occur if the corridor improvements are identified in the following exhibit.

Summary of Economic Benefits

Benefit Category	Jobs	Total Income 2006-2030 (Millions 2004 \$ @ 7%)
Construction (person years)	1,700	\$28
Distribution & Some Manufacturing (2030)	39,600	\$4,258
Roadside Services (2030)	2,000	\$216
Tourism (2030)	300	\$27
Total	43,600	\$4,529

The Ports to Plains Corridor does not meet the project feasibility test based on transportation benefits and costs alone. The project is motivated more by the economic development prospects that it affords than by transportation benefits. The economic analysis has identified four potential sources of economic benefits. If all sources came to fruition, the total economic benefits measured by income to residents would exceed the project cost by a ratio of 3.15.

Finance Plan

Financing for the Ports to Plains Corridor will require new traditional and alternative funding sources. Of the \$2.87 billion in identified projects, federal and state funds totaling \$331 million are currently committed. This leaves more than \$2.5 billion in new funds that will be needed over the next 20 years. An overall capital structure schedule was developed using the four different priority groupings broken down by state.

The Finance Plan considered the following traditional funding sources:

- Federal highway program funds from motor fuel and vehicle-related tax revenues for facility development, expansion, rehabilitation, and preservation;
- Special Federal highway programs, including earmarks, discretionary grants, and demonstration funding;
- State highway program funds for capital, maintenance, operations, and preservation; and
- Local matching funds.

These traditional funding sources are struggling to keep pace with growing transportation needs and do not appear to be sufficient to meet the identified capital and M&O needs. Thus, the following alternative sources are necessary to finance this corridor.

- Federal earmarks;
- Special state programs;
- Local government contributions from general or special taxes and/or fees;
- Right-of-way donations;
- Sharing of bridge toll revenue;

- Railroad participation in grade separation projects;
- State Infrastructure Banks or federal loans and credit supports;
- Utility easement revenues;
- Grant anticipation bonds; and
- Tolls (direct and/or indirect).

Potential Risks

The risk assessment process evaluated factors that may affect project development. Four areas of focus were used to evaluate the level of risk in financial, environmental, social, and political arenas. The evaluation was conducted by using a variety of inputs, including applicability of potential and traditional funding sources; inventories of environmental sensitivities; surveys distributed at public meetings and through a web site; interviews and personal interactions with community leaders and residents; and research into the political setting surrounding the corridor.

The result of the assessment is a summary of distinguishable opportunities that have created or could create momentum, and an assessment of any sensitive issues that could impede CDMP implementation. Where possible, action is prescribed that can help maintain momentum and manage potential risks.

Potential political risks for the Ports to Plains Corridor were not readily evident. In fact, strong support for this corridor was documented from all public sector perspectives- local, state, and federal. The same level of support is generally evident from a social perspective as well.

Communities, businesses, trucking associations, and interested members of the public also offered strong support for the CDMP. Observed and identified social risks were limited to discrete locations such as relief routes, and the potential negative impact to the regions of the states where traffic will divert from and to the Ports to Plains Corridor. However, the level and occurrence of this latter type of risk was very limited, and certainly insufficient to offset the overall support for the CDMP. And these types of social risks are not uncommon for this type of corridor.

From the evaluations, failure to acquire funding for the corridor presents the greatest potential risk to completing the CDMP within a 25-year time frame. Absent a long-term commitment of federal dollars, completion of the trade corridor faces a significant financial risk.

CHAPTER 1

Introduction

Key Concepts:

- *The Ports to Plains Corridor route is one of 45 High Priority Corridors on the National Highway System.*
- *The Ports to Plains Corridor route was adopted in 2000.*
- *This Corridor Development and Management Plan is prepared in compliance with Section 1118(d) of TEA-21.*
- *This Corridor Development and Management Plan was completed in partnership between the states of Colorado, New Mexico, Oklahoma, and Texas.*



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1 INTRODUCTION

The Transportation Equity Act of the 21st Century (TEA-21), enacted by Congress in May of 1998, authorized highway and other surface transportation programs for the period 1998 through 2003. One element of TEA-21 was designation of additional “High Priority Corridors” on the National Highway System (NHS), including Corridor #38, the “Ports to Plains Corridor,” which was described as extending “from the Mexican border via Interstate 27 (I-27) to Denver, Colorado.” The *Ports to Plains Feasibility Study*, completed in June of 2001, was a joint undertaking by the states of Colorado, New Mexico, Oklahoma, and Texas. The study resulted in defining the route of the corridor and the feasibility of a four-lane highway between the Texas-Mexico border and Denver, Colorado.

The *Ports to Plains Feasibility Study* (2001) and the, *Lubbock to I-10/Amarillo North Route Study* (1996) led to designation of the specific route from the border crossing at Laredo to US Highway (US) 83; US 83 to US 277 at Carrizo Springs; US 277 through Eagle Pass, Del Rio and Sonora to US 87 in San Angelo; US 87 to I-27 in Lubbock; I-27 to Amarillo; and US 287 to Dumas, Texas. From Dumas, Texas to Denver, Colorado, the corridor route was US 287, US 40, and I-70, and from Dumas to Raton, New Mexico, was US 87/64. Also designated as part of the corridor was State Highway (SH) 158 at US 87 near Sterling City to Midland, and SH 349 from I-20 near Midland to Lamesa, Texas.

In 2002, the Texas Department of Transportation (TxDOT) received a congressional appropriation of \$1.7 million for the completion of a Corridor Development and Management Plan (“the plan” or the “CDMP”) for the Ports to Plains Corridor. In September 2002, TxDOT transferred those funds to the Colorado Department of Transportation (CDOT) to manage the development of the Plan. The four states matched the federal funding with a total of \$340,000 (20% match) with each state’s pro rata contribution based on corridor mileage within the state. A Steering Committee composed of a representative from each of the four states guided the completion of this plan

The Ports to Plains Corridor, with its southern U.S. terminus in Laredo, serves as a U.S.-Mexico trade route. The Port of Laredo is the largest inland port for commerce in the United States. According to that city’s *Comprehensive Mobility Plan, March 15, 2001*, the Laredo ports of entry account for 50 percent of the value and 36 percent of the volume of goods carried between the United States and Mexico by rail and truck. The Ports to Plains Corridor is also significant to the surrounding communities and regions within the four states providing increased opportunities for interregional trade, economic growth and coordinated planning, design, and construction of improvements.

In addition to being one of 45 High Priority Corridors on the National Highway System, the Ports to Plains Corridor intersects five of the other High Priority Corridors – Corridor 23 (I-35 in Laredo, Texas), Corridor 20 (US 59 in Laredo which is part of I-69), Corridor 3 (East-West Transamerica near the Texas-Oklahoma border), Corridor 14 (proposed Heartland Expressway in Denver and Limon, Colorado), and Corridor 27 (Camino Real in Raton, New Mexico and Denver).

The entire Texas portion of the corridor is on the planned Texas Highway Trunk System, and a major portion of the corridor is identified as a Trans Texas Corridor route. The section from Campo to Hugo in Colorado has been identified by that state as one of 28 “Strategic Projects.” US 64 from

Raton to Clayton is a priority project under New Mexico Governor Richardson's 2003 Investment Partnership.

This Corridor Development and Management Plan is prepared in compliance with Section 1118 (d) of TEA-21 related to the National Corridor Planning and Development Program. That section, entitled "Corridor Development and Management Plan" declares that, "a state or metropolitan planning organization receiving an allocation under this section shall develop, and submit to the secretary for review, a development and management plan for the corridor, or a usable component thereof, with respect to which the allocation is being made. Such plan shall include, at a minimum, the following elements:

- A coordinated corridor development plan and schedule, including a timetable for completion of all planning and development activities, environmental reviews and permits, and construction of all sections;
- The results of any environmental reviews and mitigation plans;
- A complete and comprehensive analysis of corridor costs and benefits;
- A finance plan, including any alternative financing methods and, if the corridor is a multi-state corridor, a state-by-state alternative of corridor finances;
- The identification of any impediments to the development and construction of the corridor, including any possible environmental, social, political, and economic objections."

The four state Steering Committee further refined the concept of the corridor agreeing on the following definitions:

- 4-lane divided highway, except in sections where more than 4-lanes exist or are planned, with a stepped development process to achieve the ultimate 4-lane corridor;
- Individual state rules and guidelines will be followed for specific design details, such as highway width and access management;
- Inclusion of planned relief routes and upgrading of at-grade rail crossings in costs; and
- Consideration of other major safety bottleneck improvements.

Major elements of the Ports to Plains Corridor Development and Management Plan are listed below:

- Development Plan, including current and future corridor assessments, definition of improvements, and cost, prioritization, and schedule considerations;
- Environmental Considerations;
- Maintenance and Operations Plan;
- Benefit/Cost Analysis;
- Finance Plan;
- Risk Assessment; and
- Stakeholder Involvement Summary.

Separate from this plan, but developed concurrently, is a *Communications Guide* for the corridor. This separate volume identifies strategies to increase:

- Public awareness of the completion of the CDMP and the corridor;
- Economic development along the corridor; and
- Usage and development of the corridor.

CHAPTER 2

Development Plan

Key Concepts:

- █ *This Development Plan assesses the condition of the existing Corridor and defines the Corridor for the future.*
- █ *Operational enhancements are recommended to increase Corridor efficiency.*
- █ *Amenities are identified to ease use for travelers on the Corridor.*
- █ *Improvement costs are estimated, and a schedule of implementation is recommended.*
- █ *A Gap Analysis summarizes the improvements and related costs for the Corridor that are not currently funded.*



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2 DEVELOPMENT PLAN

This chapter has the purpose of defining the improvements to the Corridor, developing costs for those improvements, and a recommended schedule of implementation. To accomplish this purpose, the existing condition of the Corridor was assessed, existing and future traffic demands were evaluated, and already planned or programmed improvements were considered.

The proposed Corridor improvements include the expansion of the existing system from 2-lanes to 4-lanes, construction of relief routes, and application of Intelligent Transportation System (ITS) technologies. Estimates of costs and prioritization of these improvements are included.

2.1 Corridor Assessment

The Corridor assessment includes an inventory of existing conditions and facilities, current and forecasted traffic volumes, safety analysis, an overview of currently funded projects in the Corridor, and a definition of the improved Corridor as considered in this report.

2.1.1 Description of Existing Corridor

The route for the Ports to Plains Corridor is illustrated in Exhibit 2.1-1. The Corridor extends from Laredo, Texas to Denver, Colorado. The existing roadway characteristics and facilities along this approximately 1,400-mile Corridor are explained in detail in the following section descriptions.

Laredo primary truck crossings to I-35/US 83 interchange, Texas:

The primary truck-carrying border crossings in Laredo include the Solidarity and World Trade bridges. Both of these bridges are located to the northwest of Laredo, with the Solidarity bridge connecting to Interstate 35 (I-35) via the Camino Columbia Tollway and by way of Farm to Market 1472 (FM 1472), and the World Trade bridge connected to I-35 also by way of FM 1472. FM 1472 is a 4-lane divided facility with a full-movement direct-connect interchange with I-35. The Camino Columbia Tollway, which is owned by TxDOT, also has a full-movement direct-connect interchange with I-35. I-35 is a fully access controlled freeway north of Laredo.

I-35/US 83 interchange to Carrizo Springs, Texas:

The I-35/US 83 junction is currently configured with diamond interchange ramps and a two-way frontage road on the east side of I-35. US 83 is an undivided, 2-lane facility with 10-foot shoulders. The terrain is generally slightly rolling, with gentle horizontal curves. Access on this facility is not controlled, but there are few intersecting roads and driveways. The Corridor passes through the two small communities of Catarina and Asherton. In Catarina, the roadway is 4-lanes with raised median and left turn pockets, and in Asherton the roadway is three lanes, and wide shoulders with the center lane a continuous left-turn-lane.

US 277 Carrizo Springs to Eagle Pass, Texas:

In Carrizo Springs, the Corridor takes a ninety-degree turn to the west onto US 277 towards Eagle Pass. This section of roadway is 2-lanes undivided with 8-foot shoulders. Access to the roadway is low with most roadway intersections accommodated with stop control for the intersecting roads and acceleration and deceleration lanes on the main line Corridor. The Corridor does not pass through any communities on this section of US 277.

Exhibit 2.1-1 Ports to Plains Corridor



US 277 Eagle Pass to Del Rio, Texas:

Northwest of Eagle Pass, US 277 parallels the Rio Grande River and then passes through gently rolling terrain, with few intersecting roads, and the small communities of Normandy and Quemado. The roadway, including through the communities of Normandy and Quemado, is 2-lanes with 8-foot shoulders.

US 277 Del Rio to Sonora, Texas:

The terrain north of Del Rio is rolling and winding, with cuts and embankments defining the existing 2-lane with 8-foot-shoulder roadbed. In some of the more rolling terrain, the roadway has already been widened to 4-lanes undivided with 4-foot shoulders. Seven miles north of Del Rio the Corridor crosses Amistad Reservoir with a bridge over 2,000 feet in span. Several horizontal curves along this section of the Corridor are advisory signed for speeds ranging from 50 to 60 mph.

US 277 Sonora to San Angelo, Texas:

Directly north of Sonora the terrain remains rolling near Eldorado, however, the terrain flattens and the roadway straightens. The roadway is generally 2-lanes with 10-foot shoulders, with some areas of 4-lane widening for passing. The Corridor passes through the community of Eldorado and adjacent to the community of Christoval. In Eldorado the roadway widens to 4-lanes with 10-foot shoulders. Near the Christoval turn-off, the roadway is 2-lanes with wide 10- to 20-foot shoulders.

US 87 San Angelo to Lubbock, Texas:

In San Angelo, US 277 joins with US 87 just south of town. The Corridor continues to the northwest of San Angelo on US 87. The rural section of the Corridor is 4-lane divided. The shoulders are 4-foot on the inside and 10-foot on the outside. In this section, the Corridor passes through the town of Sterling City as a 4-lane undivided roadway, with 10-foot shoulders for parking. On the rural section, at intersections with higher volume roads, either the roadway widens for left and right turn deceleration and acceleration lanes or the intersecting roads are grade-separated.

SH 158/US 87 to Midland, Texas:

The interchange of SH 158 and US 87 just north of Sterling City is a grade-separated direct connect interchange that does not require traffic to stop. The rural length of the Corridor on SH 158 is 2-lanes with 8-foot shoulders. In this section, the Corridor passes through the town of Garden City as a 4-lane undivided roadway, with 10-foot shoulders for parking. At the Midland County line the roadway widens to 4-lanes undivided with 8-foot shoulders, and continues to the City of Midland as a 4-lane roadway.

SH 349 Midland to Lamesa, Texas:

In Midland, SH 158 intersects SH 349 and the Corridor turns north. On SH 349 north of Midland the roadway is 2-lanes and has shoulders ranging from 4- to 8-foot. The Corridor passes through the town of Patricia as 2-lanes with 8-foot shoulders. Just to the south of Lamesa, SH 349 intersects FM 2052, and the Corridor follows FM 2052 for two miles and then intersects US 87 at a diamond interchange.

I-27 Lubbock to Amarillo, Texas:

In Lubbock, US 87 becomes designated as I-27. The divided roadway in this section is fully access controlled with interchanges and grade separations. The roadway is 4-lanes divided with 4-foot inside shoulders and 10-foot outside shoulders.

US 87 Amarillo to Dumas, Texas:

North of Amarillo the Corridor is again designated as US 87. The roadway on this section is four-lanes divided with a graded median, and the shoulders are 4-foot on the inside and 10-foot on the outside. There are few roads that intersect the Corridor in this section.

US 287 Dumas to Stratford, Texas:

In Dumas, the Corridor splits, with US 87 turning west toward New Mexico and US 287 continuing north toward Oklahoma. The roadway on this section is 4-lanes divided with a graded median, and the shoulders are 4-foot on the inside and 10-foot on the outside. There are very few roads that intersect the Corridor in this section.

US 287 Stratford, Texas to Boise City, Oklahoma:

This section of roadway is an undivided 2-lane facility with 10-foot shoulders. The terrain is generally flat with gentle horizontal curves. At one location, a horizontal curve is advisory signed for 45 mph. There are occasional sections of three-lane roadway that allow for passing. There are few intersecting roads and driveways.

US 287 Boise City, Oklahoma to Springfield, Colorado:

The roadway in this section is 2-lanes with 10-foot shoulders. There are occasionally three-lane passing sections in Oklahoma, but there are no three-lane sections on this section in Colorado. The terrain is generally flat throughout the section with isolated horizontal and vertical curvature. The Corridor through the community of Campo is 2-lanes with 10-foot outside shoulders and a valley pan at the roadway edges for drainage.

US 287 Springfield to Lamar, Colorado:

In the town of Springfield, the roadway is 4-lanes with left-turn-lanes and shoulders or parking. The roadway continues north of Springfield as a 2-lane facility with 10-foot shoulders. There are two locations along this section with three-lane passing sections. The terrain is generally flat with isolated horizontal and vertical curvature. There are no communities along this section of the Corridor.

US 287 Lamar to Kit Carson, Colorado:

In the town of Lamar the roadway is 4-lanes with left-turn-lanes and shoulders or parking. North of Lamar the roadway is 2-lanes with 10-foot shoulders. There are no passing lanes along this section of the Corridor. The terrain is flat with horizontal curves in the roadway near the town of Eads. These curves are designed for no more than 45 mph. In Eads there is a curve that is advisory posted for 25 mph, and the roadway widens to three-lanes with 10-foot shoulders.

US 40 Kit Carson to Limon, Colorado:

In Kit Carson, US 287 joins with US 40 and the Corridor continues to the northwest. In Kit Carson the road widens to 4-lanes with raised median/left-turn pockets and 10-foot shoulders. North of Kit Carson the highway is a 2-lane facility with 10-foot shoulders. There are locations along this section that have been widened to three-lanes to accommodate passing. The roadway continues through the town of Hugo and widens to 4-lanes with shoulders ranging from 10 to 15 feet.

I-70 Limon to Denver, Colorado:

This Interstate facility in the primarily rural Corridor length is 4-lanes divided with a graded median and is fully access-controlled with interchanges. The shoulders are 4-foot on the inside and 10-foot on the outside. In metropolitan Denver, the roadway changes dramatically in design and function. The Corridor ends at I-25.

US 87 Dumas, Texas to Clayton, New Mexico:

US 87 enters Dumas from the south, then turns west towards New Mexico, with US 287 continuing north. The section of roadway between Dumas and Hartley to the west is a 2-lane highway with 8-foot shoulders. The terrain is very flat with occasional intersecting farm-to-market roads that primarily service the agricultural industry in the area. To the south of Hartley there is a direct-connect interchange with US 385, and the highways are on the same alignment until Hartley. The road passes through Hartley as a 4-lane section with a center left-turn-lane. Northwest of Hartley the road continues to Dalhart as a 4-lane divided highway. In Dalhart, US 87 diverges from US 385 and continues northwest toward the New Mexico border. Through Dalhart the road is a 4-lane section with a center left-turn-lane. The road continues to the New Mexico border as a 2-lane highway with 8-foot shoulders. Immediately past the border the road widens to a 4-lane divided highway, with 4-foot inside shoulders and 10-foot outside shoulders for nine miles to Clayton, New Mexico.

US 64 Clayton to Raton, New Mexico:

In Clayton the road becomes US 64 and continues to Raton, New Mexico as a 2-lane highway with 6-to-8-foot shoulders. The road passes through the villages of Des Moines and Capulin. In both Des Moines and Capulin the road widens to 4-lanes undivided with 10-foot shoulders. In Raton, US 64 intersects I-25 and is serviced by a diamond interchange.

2.1.2 Traffic Analysis**Current Traffic (2003)**

Current (2003) traffic volumes were provided by the four state departments of transportation (DOTs). These daily traffic volumes, corresponding volume over capacity (V/C) ratios, and Level of Service (LOS) are depicted in Exhibit 2.1-2.

As depicted in Exhibit 2.1-2, all sections operate at Level of Service (LOS) "A" or "B." This generally reflects congestion-free, operating conditions along all intercity links of the Corridor. Sufficient passing opportunities appear to exist along the entire Corridor, although these opportunities decrease on the 2-lane sections between Dumas and Limon.

Exhibit 2.1-2 Existing Traffic Volumes, Volume to Capacity Ratios (V/C), and Level of Service (LOS) By Corridor Section

Corridor Section ¹	Lanes per Direction	Annual Average Daily Traffic (AADT) ²	Trucks per Day ²	V/C ³	LOS ⁴
I-35, North of Laredo	2	16,000	6,550	0.27	A
US 83, I-35 to Carrizo Springs	1	2,650	960	0.17	B
US 277, Carrizo Springs to Eagle Pass	1	3,450	920	0.18	B
US 277, Eagle Pass to Del Rio	1	2,750	800	0.17	B
US 277, Del Rio to Sonora	1	1,150	560	0.08	A
US 277, Sonora to San Angelo	1	2,550	740	0.16	B
US 87, San Angelo to Sterling City	2	5,200	890	0.09	A
SH 158, Sterling City to County Line	1	2,350	740	0.11	A
SH 158, County Line to Midland	2	2,350	740	0.08	A
SH 349, Midland to Lamesa	1	2,000	380	0.09	A
US 87, Sterling City to Big Spring	2	2,800	590	0.05	A
US 87, Big Spring to Lamesa	2	3,600	660	0.06	A
US 87, Lamesa to Lubbock	2	6,400	1,120	0.11	A
I-27, Lubbock to Amarillo	2	9,200	1,830	0.14	A
US 87, Amarillo to Dumas	2	9,900	3,520	0.18	A
US 287, Dumas to Stratford	2	5,100	2,270	0.10	A
US 287, Stratford to Boise City	1	3,050	1,620	0.14	B
US 287, Boise City to Lamar	1	2,600	1,690	0.15	B
US 287, Lamar to Kit Carson	1	2,900	1,480	0.13	B
US 40, Kit Carson to Limon	1	3,100	1,210	0.13	B
I-70, Limon to Denver	2	12,100	3,020	0.19	A
US 87, Dumas to Hartley	1	3,550	1,210	0.15	B
US 87, Hartley to Dalhart	2	6,100	1,610	0.11	A
US 87, Dalhart to Clayton	1	4,100	1,160	0.21	B
US 64/87, Clayton to Raton	1	2,950	870	0.15	B

1. The table reflects a representation of rural sections between metropolitan areas.
2. Total volumes have been rounded to the nearest fifty, and truck volumes have been rounded to the nearest ten.
3. As described in the Highway Capacity Manual, the ratio of flow rate to capacity for a transportation facility.
4. As described in the Highway Capacity Manual, Level of Service (LOS) is a widely used measure of traffic delay and congestion as experienced by motorists. Levels of Service range from "A," indicating free flow with little or no delay, to "F," denoting saturation of the facility and severe congestion. Many state Departments of Transportation define "C" or "D" as the minimum acceptable LOS on rural and urban highways.

Within individual cities along the Corridor, there are varying levels of traffic control and congestion. During the survey of existing Corridor conditions, travel times through individual cities that were candidates for relief routes were measured. The starting and ending points of the time trials were the locations where the speed limit of the Corridor drops from the intercity speed (typically 65 to 70 mph) to a reduced speed through the city in question. Time trials were collected in two directions and averaged, and were collected at various times during the day. This information combined with photographs of traffic controls and roadway characteristics were used to measure delay and in prioritization of relief routes. For prioritization, the results of the travel times on the existing route were compared to an estimate of the travel times that could be realized by adding relief routes. The results of the time trials along the exiting routes are shown in Exhibit 2.1-3.

Exhibit 2.1-3 Travel Time Results (Existing Conditions)

Community	Travel Time (min)	Distance (miles)	Average Speed (mph)
Carrizo Springs	11.1	8.9	48
Eagle Pass	16.7	6.5	23
Del Rio	16.6	8.4	30
Sonora	5.7	3.3	35
San Angelo	19.5	11.8	36
Big Spring	8.4	5.1	37
Midland	23.2	21.0	54
Lamesa	6.8	5.2	46
Dumas	7.3	4.6	38
Stratford	3.8	2.1	34
Boise City	5.2	3.1	35
Lamar	8.9	4.5	30
Dalhart	6.6	4.2	38
Clayton	6.3	2.7	26

Of these communities, Eagle Pass and Del Rio, Texas seem to have the most delay and congestion. As it passes through these two cities, the Corridor turns at city street intersections. Numerous signal cycle failures and significant stacking were observed at these signalized intersections where traffic is required to turn to move through town. This results in vehicles having to wait through several signal cycles in order to pass through the intersection.

Urban, stop-and-go driving conditions were also observed in Midland and San Angelo, Texas. This accounts for some delay in passing through these communities, but signal cycle failures and significant stacking were not observed during the hours of the time trials. Other communities such as Dumas, Big Spring, Lamesa, and Lamar did exhibit some delay at traffic signals, but significantly congested conditions were not observed.

Corridor interchanges with major Interstate highways (I-35, I-10, I-20, I-40, and I-70) were observed to operate acceptably. It should be noted that the interchange between I-35 and US 83 north of Laredo, Texas does require vehicles to make several turns and go through several stop signs to reach US 83. The Corridor Development and Management Plan (CDMP) includes upgrading this interchange with a direct-connect ramp from northbound I-35 to northbound US 83. The estimated costs for this and other improvements can be found in Appendix A.

Other sources of congestion are the Border Patrol inspection stations on I-35 north of Laredo and on US 277 northwest of Carrizo Springs, Texas. Although traffic volumes were observed to be modest, a delay of several minutes to get through these checkpoints was also observed. This wait time can vary significantly, depending on demand, time of day, staffing levels, and the security threat level (e.g., yellow, orange).

Future Traffic Forecast (2030)

The methodology used in the 2030 traffic forecasts started with developing an existing conditions model for the entire region surrounding the Ports to Plains Corridor. The length of the Corridor necessitated a large model area, which includes much of Colorado, Kansas, New Mexico, Oklahoma, and Texas. Over 500 traffic analysis zones (TAZs) were used in the model, resulting in a TAZ for every county and significant city within the modeled area.

Two existing condition models were developed: one for total vehicles and another for trucks. The “existing total vehicles” model was based on and calibrated to existing traffic volumes. For the truck model, 1998 Texas REEBIE freight model information was calibrated to existing truck volumes for the Corridor. This model data has truck origin and destination freight information for every county in Texas. The data was used as a starting point to develop origin and destination matrices for the entire model. The output of these two existing condition models includes a matrix showing the number of vehicle trips between each pair of TAZs.

Once these existing condition trip tables were developed, the trip tables for trucks and total vehicles were increased and calibrated to the 2025 traffic forecasts in the *Ports to Plains Feasibility Study (2001)*. Growth factors between existing conditions and the *Ports to Plains Feasibility Study (2001)* forecasts were then established for all TAZ pairs. These individual TAZ annual growth rates were then extrapolated for five additional years to arrive at 2030 truck and total vehicle travel matrices. These trip tables were then overlaid on the existing conditions roadway network, resulting in 2030 Background, or “No-Build,” traffic forecasts.

With the 2030 No-Build condition model established, proposed roadway improvements resulting from the Ports to Plains Corridor Development Plan were then added to form the Build model. The improvements directly affecting the model include widening the entire Corridor to 4-lanes as well as implementing relief routes around several Corridor cities.

The 2030 Build travel demand model results indicate that when all improvements have been made, additional traffic will be attracted to the Port to Plains Corridor from surrounding facilities, including I-35 and I-25. The model indicates a 12 percent increase in Corridor vehicle miles traveled over the 2030 No-Build scenario. In addition to these attracted trips, the 2030 Build forecast also reflects a significant shift of travel demand from Dumas, Texas to the north. Because of improvements to the US 287 Corridor through eastern Colorado and increasing congestion on I-25 south of Denver, the model forecasts a shift from I-25 to the improved US 287 Corridor. As a result of this shift, the 2030 Build traffic forecasts for US 64 east of Raton are lower than the 2030 No-Build forecasts. Thus, the proposed Ports to Plains improvements would shift some traffic from one branch of the Corridor (the US 64 or New Mexico branch) to the other (the US 287 or Oklahoma and Colorado branch).

However, New Mexico is rapidly advancing the 4-lane improvements on US 64 as part of Governor Richardson’s Investment Partnership (GRIP), and construction is assumed to be completed before 4-lane improvements on US 287 in Oklahoma and Colorado. To better understand this scenario, an additional analysis that considered only improvements to the US 64 or New Mexico branch was completed. The results of this analysis showed that if only improvements to the US 64 New Mexico

branch are made, then the shifting from US 64 to US 287 as previously explained would not occur, and traffic would in fact be attracted to the 4-lane US 64 roadway.

Traffic forecasts for individual sections and relief routes are depicted on the summary sheets in Appendix A of this report. Exhibit 2.1-4 below summarizes some of the overall model findings for both 2030 No-Build and 2030 Build conditions. The output is broken down for the entire model area, which includes the entire roadway network in the region and specifically for the roadways directly on the Ports to Plains Corridor. With the improvements to the Corridor, vehicle miles traveled (VMT) and vehicle hours traveled (VHT) decrease for the entire model area.

Exhibit 2.1-4 Traffic Model Summary Results

		Cars (Non-Truck)		Trucks	
		VMT/Day	VHT/Day	VMT/Day	VHT/Day
2030 No-Build	Entire Model	88,462,714	1,349,496	63,425,456	1,002,188
	Corridor	8,742,287	134,346	2,883,735	45,533
2030 Build	Entire Model	88,404,504	1,344,661	63,411,136	998,929
	Corridor	9,902,540	146,736	3,167,895	48,174
Difference	Entire Model	-58,210	-4,835	-14,320	-3,258
	Corridor	1,160,253	12,390	284,161	2,641

2.1.3 Safety Analysis

Accident data was obtained from the state DOTs. Each state reports accident information in varying units and formats. The data provided by each state was converted to a common rate that reports the total number of all types of accidents that occurred over a given length of road per 100 million vehicle miles (HMVM) traveled on the same length of road. The analysis did not consider the locations or causes of individual accidents.

The accident data was used for both rural section and urban section accident rate calculations. The data was sectioned in this way to isolate “open-road” versus “urban” improvements to be considered for the Corridor. Exhibits 2.1-5 and 2.1-6 summarize the accident rates calculated for both 2-lane and 4-lane highway sections on the Corridor, Exhibit 2.1-7 summarizes statewide average accident rates on similar facilities, and Exhibit 2.1-8 summarizes accident rates in urban areas on the Corridor. The calculations are based on three years of data (1999 through 2001) provided by the state DOTs.

Exhibit 2.1-5 Existing 2-lane Section Accident Rates

Roadway	From	To	Length (mile)	Existing AADT	Accidents / HMVM ¹
US 83	I-35	Webb/Dimmit County Line	34	2,650	41
US 83	Webb/Dimmit County Line	Catarina, FM 133	9	2,650	36
US 83	Catarina, FM 133	Carrizo Springs Relief Route	9	2,650	49
US 277	Carrizo Springs Relief Route	Dimmit/Maverick County Line	17	3,450	36
US 277	Dimmit/Maverick County Line	Eagle Pass Relief Route	19	3,450	30
US 277	Eagle Pass Relief Route	Maverick/Kinney County Line	23	2,750	34
US 277	Maverick/Kinney County Line	Kinney/Val Verde County Line	14	2,750	45
US 277	Kinney/Val Verde County Line	Del Rio Relief Route	8	2,750	91
US 277	Del Rio Relief Route	Val Verde/Edwards County Line	55	850	70
US 277	Val Verde/Edwards County Line	Edwards/Sutton County Line	10	850	71
US 277	Edwards/Sutton County Line	Sonora Relief Route	20	1,150	33
US 277	Sonora Relief Route	Sutton/Schleicher County Line	8	2,350	21
US 277	Sutton/Schleicher County Line	Schleicher/Tom Green County Line	30	2,550	34
US 277	Schleicher/Tom Green County	San Angelo Relief Route	22	2,550	51
SH 158	Sterling City	Sterling/Glasscock County Line	14	2,350	32
SH 158	Sterling/Glasscock County Line	Glasscock/Midland County Line	30	2,300	29
SH 349	Midland	Midland/Martin County Line	7	2,000	25
SH 349	Midland/Martin County Line	Martin/Dawson County Line	34	2,000	33
SH 349	Martin/Dawson County Line	FM 2052	13	2,000	44
FM 2052	SH 349	US 87	2	1,350	0
US 287	Stratford	Sherman/Dallam County Line	9	3,050	29
US 287	Sherman/Dallam County Line	Oklahoma/Texas Border	7	3,050	25
US 287	Oklahoma/Texas Border	Boise City Relief Route	21	3,050	73
US 287	Boise City Relief Route	Oklahoma/Colorado Border	19	2,350	66
US 287	Oklahoma/Colorado Border	Springfield	32	2,350	68
US 287	Springfield	Baca/Prowers County Line	18	2,600	53
US 287	Baca/Prowers County Line	Lamar Relief Route	28	2,600	117
US 287	Lamar Relief Route	Prowers/Kiowa County Line	16	2,900	86
US 287	Prowers/Kiowa County Line	Eads	19	2,900	54
US 287	Eads	Kiowa/Cheyenne County Line	10	2,900	27
US 287	Kiowa/Cheyenne County Line	Kit Carson	12	2,900	21
US 40	Kit Carson	Wild Horse	13	3,100	35
US 40	Wild Horse	Cheyenne/Lincoln County Line	10	3,100	107
US 40	Cheyenne/Lincoln County Line	Hugo	23	3,100	58
US 40	Hugo	Limon	16	2,900	67
US 87	Dumas	Moore/Hartley County Line	9	3,550	58
US 87	Moore/Hartley County Line	Hartley/Interchange with US 385	12	3,550	38
US 87	Dalhart Relief Route	Texas/New Mexico Border	24	4,100	55
US 64	Clayton	Capulin	52	2,950	52
US 64	Capulin	Union/Colfax County Line	1	2,950	98
US 64	Union/Colfax County Line	Raton	26	2,950	98

1. Colorado Department of Transportation data provided as number of accidents, milepost and section, and AADT. Texas Department of Transportation data provided as Accidents/Hundred Million Vehicle Miles(HMVM) for rural and urban control sections. Oklahoma Department of Transportation data provided as Accidents/MVM for rural and urban control sections. New Mexico Department of Transportation data provided as number of accidents, milepost and section, and AADT.

Exhibit 2.1-6 Existing 4-lane Section Accident Rates

Roadway	From	To	Length (mile)	Existing AADT	Accidents / HMVM
I-35	Loop 20	US 83	11	16,000	31
US 87	San Angelo	Sterling City	41	5,200	40
US 87	Sterling City	Big Spring	35	2,800	35
US 87	Big Spring	Lamesa	38	3,600	57
US 87	Lamesa	Lubbock	56	6,400	63
I-27	Lubbock	Amarillo	130	9,200	47
US 87	Amarillo	Dumas	49	9,900	58
US 287	Dumas	Stratford	33	5,100	34
US 87	Hartley	Dalhart	15	6,100	64
I-70	Limon	Denver	87	12,100	76

The weighted average 2-lane accident rate on the Corridor is 55 accidents per 100 million vehicle miles traveled, and the weighted average 4-lane (excluding interstates) accident rate on the Corridor is 49 accidents per 100 million vehicle miles traveled. This small difference in accident rates between 2-lane and 4-lane sections is not typical. A possible reason is that many existing sections operate under low congestion conditions; therefore, the accidents on 2-lane sections with causation related to passing and differential speeds are not as prevalent as on 2-lane roads under heavier congestion. It is believed that as traffic grows on the existing 2-lane sections, the number of accidents will increase, and a larger difference between 2-lane and 4-lane accident rates will be observed. Further research was conducted to analyze state average accident rates on similar facilities. Exhibit 2.1-7 illustrates this information.

Exhibit 2.1-7 Average Accident Rates for 2-lane and 4-lane Roadway

State	2-Lane Classification	Accidents/HMVM
Colorado	Rural Principal Arterial	149
New Mexico	Rural Undivided	60
Oklahoma	Rural 2 or 3 lane	72
Texas	Rural 2 lane	101
State	4-Lane Classification	Accidents/HMVM
Colorado	Rural Interstate	107
New Mexico	Rural, Divided	40
Oklahoma	Rural 4-Lane Divided	40
Texas	Rural 4-Lane Divided	54

The data found in Exhibit 2.1-7 shows that expanding from 2-lane undivided to 4-lane divided has the potential to reduce accidents by an average of 47 percent in Texas, 28 percent in Colorado, 44 percent in Oklahoma, and 33 percent in New Mexico. For purposes of this report, reduction of

accidents similar to reported statewide averages are expected to be better indicators of safety benefits than using only existing Corridor-specific data. The benefit/cost chapter of this report makes further use of this information by placing value on the estimated future crash reductions.

Accident rates were also calculated within the city limits of towns where relief routes are proposed. The purpose of this information is to better understand communities where the existing urban Corridor is experiencing higher levels of incidents and where relief routes could be implemented to manage safety, increase Corridor reliability, and reduce delay. Exhibit 2.1-8 summarizes the urban accident rates where relief routes are proposed.

Exhibit 2.1-8 Urban Accident Rates on Existing Corridor Roadway Facilities

City	Length (mile)	Accidents/HMVM
Carrizo Springs	11.1	46
Eagle Pass	16.7	47
Del Rio	16.6	184
Sonora	5.7	40
San Angelo	19.5	172
Big Spring	8.4	157
Midland	23.2	129
Lamesa	6.8	62
Dumas	7.3	88
Stratford	3.8	31
Boise City	5.2	169
Lamar	8.9	177
Dalhart	6.6	67
Clayton	6.3	26

2.1.4 Currently Funded Projects

Colorado

The Colorado transportation planning process has identified the roadway in the Ports to Plains Corridor from Hugo on the north to Campo on the south as a Strategic Project. This corridor project is one of 28 such Strategic Projects in the state. As identified in the 2020 Statewide Transportation Plan, which was prepared in November 2000, Strategic Projects will receive nearly one-third of state transportation resource allocations from 2001 to 2020.

Funding for the US 287 Strategic Project is made available through State Senate Bill 97-001 (SB 1), and through a funding program called Transportation Revenue Anticipation Notes (TRANS). Due to a weakened Colorado economy, revenues from these sources have not been realized, and consequently the US 287 Strategic Project has, along with other Statewide Strategic Projects, been put on hold until the economy recovers.

New Mexico

The New Mexico Transportation Commission has identified the 4-lane expansion of US 64 from Raton to Clayton as a priority project under Governor Richardson's 2003 Investment Partnership (GRIP). This project has already advanced into the Environmental Assessment phase, which was completed in the fall of 2004. The entire funding for this project is estimated at \$118 million, of which \$90 million will be made available through GRIP financing.

Oklahoma

The Oklahoma Department of Transportation (ODOT) FFY 2004 – FFY 2011 Construction Work Plan report identifies 10 projects in the Corridor from 2004 to 2011. These projects include purchase of right-of-way (ROW), utility relocations, and expansion to 4-lanes. The first project is in 2004, and includes \$675,000 for 4-lane ROW purchase for 4.3 miles directly north of Boise City. Utility adjustments and expansion to 4-lanes in this same section are planned to follow in 2006 and 2007. Another 6.5 miles of ROW acquisition, utility relocation, and expansion projects are scheduled from 2007 to 2011 north toward the Colorado border. No projects are scheduled south of Boise City on US 287. The total of all project budgets on US 287 from 2004 to 2011 is \$18,636,446. Actual funding for widening construction is planned in 2010.

Texas

The entire Ports to Plains Corridor is on the Texas Highway Trunk System. This is a 10,500-mile planned rural network of 4-lane divided highways that both includes and complements the Interstate system.

In Texas, a total of \$148 million is programmed in the 2004 Statewide Mobility Program for Trunk System expansion projects for projects on the Ports to Plains Corridor, including \$26 million in the Laredo District on I-35 and US 277. Another \$69 million is programmed in the San Angelo District for 4-lane expansion of SH 158 west of Sterling City. The remaining \$53 million is programmed in the Amarillo District including 4-lane expansion on US 87 west of Dumas.

2.1.5 Corridor Definition

The many sections constituting the Ports to Plains Corridor are considered a single system for analysis purposes. Within this system, however, are four states that use slightly different design criteria, access provisions, and roadway project prioritization guidelines.

For Ports to Plains Corridor system analysis, it is important to create a definition of the "improved" Corridor. Construction elements on the Ports to Plains Corridor are prescribed to improve the efficiency of the transportation network in moving both people and goods. The existing Corridor as defined is nearly 1,400 miles long and is comprised of 511 miles of 4-lane roadway, 755 miles of 2-lane roadway, and 113 miles of roadway in metropolitan areas. Major construction elements to improve the Corridor to the envisioned functionality include the following:

- Widening 755 miles of existing 2-lane roads to 4-lane divided roads;
- Constructing 15 relief routes;
- Improving or constructing connective interchanges;
- Improving or constructing overpasses/underpasses for railroad crossings;

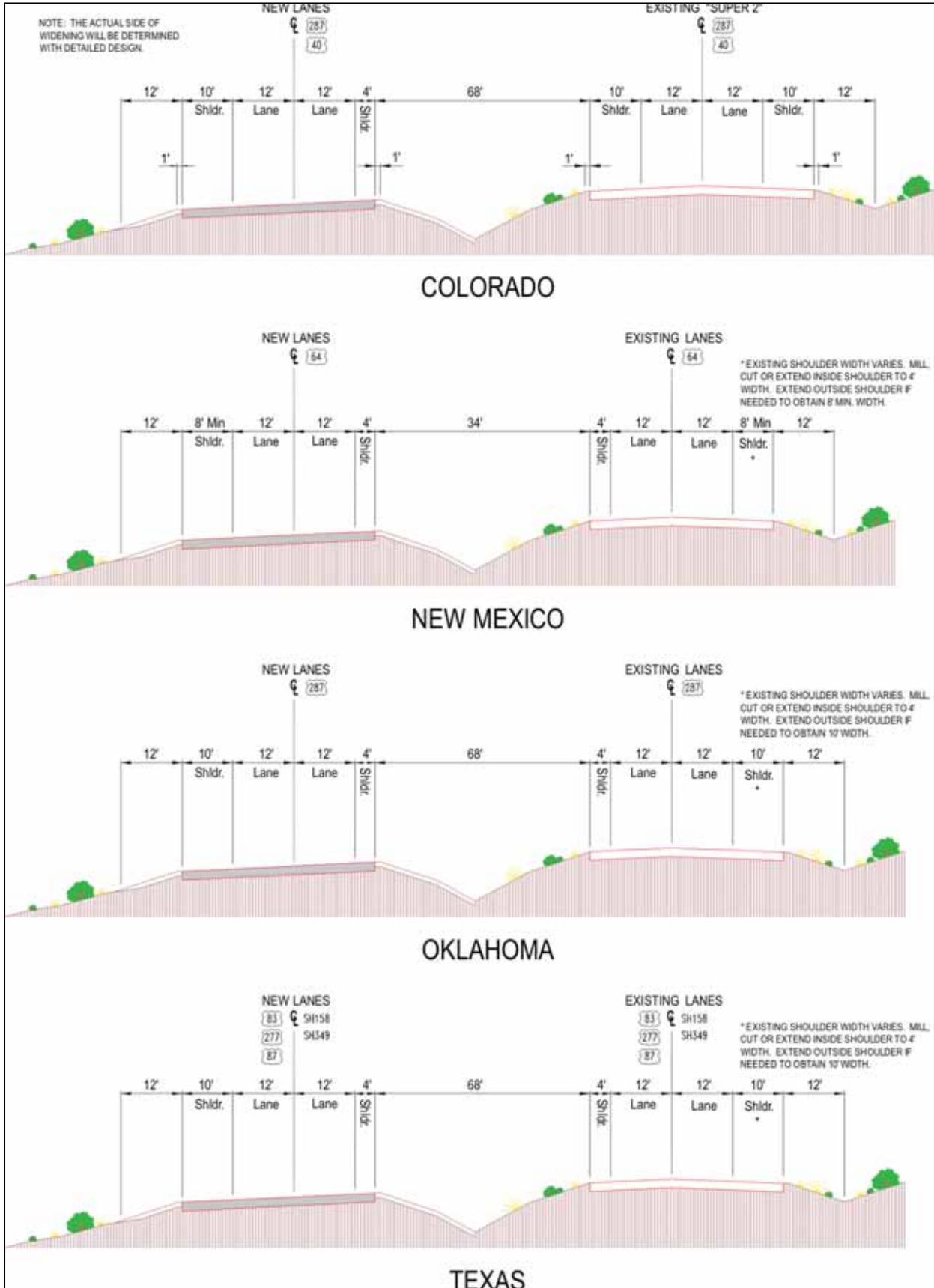
- Replacing obsolete or deficient bridges;
- Installing Corridor specific signs; and
- Installing Intelligent Transportation Systems.

Exhibits 2.1-9 and 2.1-10 describe various design criteria for the “improved” Ports to Plains Corridor. Appendix A provides more detail for the identified improvements and their estimated costs.

Exhibit 2.1-9 Criteria Definition of "Improved" Corridor

4-lane divided highway (minimum).
68-foot median in Colorado, Oklahoma, and Texas. 34-foot median in New Mexico.
4 foot inside shoulders (minimum).
10-foot outside shoulders (minimum) in Colorado, Oklahoma, and Texas. 8-foot outside shoulders (minimum) in New Mexico.
12-foot lanes (minimum).
Overpass or underpass rail crossings.
Access level and design will be determined by each state.
Replace bridges that are considered obsolete or deficient.
Improve or construct direct connections of primary facilities.

Exhibit 2.1-10 Corridor Typical Sections (Rural Areas)



2.2 Gap Analysis

The purpose of the Gap Analysis is to identify and discuss enhancements to the Corridor that help to fill gaps in the Ports to Plains transportation network. By enhancing the sections, use of the Corridor should become more attractive to both the private and commercial motorist. Enhancements include relief routes, roadway geometric improvements, highway-railroad grade separations, corridor signage, rest areas, connections to intersecting corridors, and Intelligent Transportation Systems (ITS).

2.2.1 Relief Routes

Identifying locations where the addition of relief routes around communities will provide safer and more efficient facilities for Corridor users is a major concern of this study. Relief routes perform a needed function for communities as well as for through traffic.

A primary focus of the supporters of this Corridor is to develop a safer and more efficient facility consisting of a 4-lane, median-separated highway. Achieving this objective requires an analysis of each town that may have safety or delay concerns. The analysis includes a thorough review of the existing facility in terms of traffic operations in and around each community, the impact of current and future through movements on local traffic, and safety concerns. As more detailed design occurs, information such as traffic signal delays, turning movements, right-of-way width restrictions, and access management will be studied in more detail. This study pays particular attention to delay, safety, and cost of the relief routes. These factors all help determine the overall benefit of a proposed relief route to each community and to the Corridor as a whole.

This assessment will provide a “thumbnail” review of locations where relief routes should be considered. At locations where relief routes are in the planning and design stages, care was taken to maintain consistency and not create situations that would impact the progress of already advancing projects. The design guidelines of the appropriate DOTs were followed as each location was considered. In addition to the information obtained from the DOTs and from previous studies, public meetings and workshops were conducted to obtain public comment on potential relief routes. These comments are included in the overall project assessments. When a particular DOT embarks on a more detailed analysis of possible route locations, public meetings will be held to obtain additional community input.

A review of the particular proposed locations for future relief routes follows.

Carrizo Springs, Texas – The intersection at the junction of US 83 and US 277 in Carrizo Springs tends to restrict traffic flow. Coupled with a narrow roadway width and safety issues, this prompts consideration of a relief route whose logical termini provide relief both to the Asherton area as well as Carrizo Springs. Such a route would have a length of approximately nine miles. Since this alignment has not yet been the subject of any planning studies, it is recommended that an extensive traffic flow study be performed should the process begin. Traffic flow on both US 277 and US 83 should be considered in selecting an alignment that would maximize future benefits to the communities.

Eagle Pass, Texas – TxDOT has completed the location and environmental studies and is beginning the design effort for two sections for this relief route, which will provide an improved connection from

the International Bridge to US 277. The relief route is divided into two separate sections in this study. One section connects the border crossing to the Corridor. The other section creates an alternative route around the city. An interior relief route was constructed a number of years ago, but it provides limited relief because access is not controlled.

Del Rio, Texas – TxDOT is in the final, location-study phase of a relief route for US 277 and US 90. The study began as a loop study, but local considerations resulted in a phased approach to the loop. This decreased opposition to the overall project and gave the state the opportunity to concentrate on the higher priority sections. While approximately one-half of the original loop has been placed on hold, certain aspects should continue to be monitored, such as the existing roadway to the International Bridge (which runs through town), access to the growing warehouse district (also in town), and the connection that will be needed to the proposed international bridge north of Del Rio.

Sonora, Texas – The location of a proposed route around Sonora is in the development phase. There is great concern about any delay in the establishment of an alignment, since a possible change in the law raising the allowable density of oil and gas wells from one well per 40 acres to one per 20 acres poses a problem for potential alignments. Increased development of the oil and gas fields will increase the complexity of new alignment studies.

San Angelo, Texas – A relief route has been discussed for quite some time at the local level. As traffic through the city has increased, efforts have focused on temporary solutions. The result is a system utilizing one-way streets with synchronized signals. Ever-increasing traffic, however, will increasingly focus the community on a relief route as a long-term solution. Portions of the proposed relief route have excellent connections to the network of highways that serve the city. Existing facilities, with certain new connections, can provide an interim relief route until increased traffic dictates the need for additional facilities.

Big Spring, Texas – TxDOT is in the process of holding public meetings to collect public input for a relief route. Various route locations, both east and west of the community, are now being considered. During this public outreach, certain questions have arisen about the impact of relief routes on communities. Big Spring is an example of how a community is able to survive such an impact, since the through traffic of US 80 moved to the I-20 route. Traffic using connections between US 87 and I-20 will influence the final location.

Midland-Odessa, Texas – These cities are on a major east-west Interstate facility with direct connections to the Ports to Plains Corridor to the north and south. While this location is not on the most direct route for traffic with destinations farther north or south, it serves as a vital link to other corridors, such as the La Entrada Al Pacifico, connecting to the west coast of Mexico. The existing routes through Midland cross downtown and Loop 250, which are congested and not conducive to long-distance, corridor traffic. The proposed relief route location study is progressing and will provide added value with additional connections to the local airport.

Lamesa, Texas – The determination of the proposed location for this relief route is in its final stages. Utilizing project-specific funds, a large portion of the planning effort has been completed. There are a few minor alignment adjustments requiring public review before preparation of the environmental documents and completion of the schematic design. This project will connect two routes on the Ports to Plains Corridor and provide a safe and efficient route northward toward Lubbock. It will also

provide a connection for the La Entrada Al Pacifico Corridor from the Midland-Odessa area northward.

Dumas, Texas – This community serves as a focal point for the two major routes connecting Denver and Amarillo. The need for a relief route presents itself in many different ways. The western branch of the Corridor into New Mexico serves as a significant tourist route as well as a freight route, while the northern branch provides a bypass for vacationers and truckers around the rugged terrain in the Raton area and the increasing congestion in the I-25 corridor south of Denver. Dumas has an adequate facility for existing traffic, but the ever-increasing volumes indicate the growing need for a relief route connecting the three major routes extending from the city.

Stratford, Texas – In Stratford, two major rail lines intersect, as do two US highways. Safety is a significant concern to local residents, since these intersecting transportation corridors serve as barriers in the event of emergencies requiring the movement of emergency equipment from one part of the community to another. Even with only one traffic signal at the intersecting highways, the railroad barriers restrict the ability to move both passenger and commercial vehicles.

Boise City, Oklahoma – Highways that connect several states intersect in this community. One significant traffic hindrance is the circular roadway around the Cimarron County Courthouse. There are four approaches to the center of the city, highways entering the city center and this creates an unusual mix of local and regional traffic. Confusion and safety are both concerns with the current roadway through Boise City. ODOT has begun a study to determine the appropriate location of the relief route.

Lamar, Colorado – One of the most significant east-west routes, US 50, intersects the Ports to Plains Corridor in this area. This crossing, coupled with major railroad corridors and an offset of the north-south route, makes construction of a relief route especially important. The state has selected the final alignment of the relief route. The existing north-south facility is adequate for current traffic but the relief route becomes a likely solution based on future traffic and community concerns, such as safety.

Dalhart, Texas – This community, like many others, serves as a crossroad for both highway and rail transportation. The intersection of two major railroads and two U.S. highways, together with a restrictive railroad underpass, presents challenges as well as opportunities to the community. Although the existing facilities are adequate for current traffic volumes, there is a need to consider relief routes because of the previously mentioned conflicts.

Clayton, New Mexico – This community is served by two major highway corridors, creating a crossroads for highway transportation. The Amarillo to Raton route serves both as a truck route and a corridor for leisure travel from Texas to New Mexico and Colorado. The existing facilities are adequate for current traffic volumes, but the planned expansion of the US 64 Corridor to Raton, and US 87 to Amarillo will increase the need for a relief route for efficiency as a trade corridor.

2.2.2 Geometric Safety Improvements

Because this is a system project, additional emphasis was placed on creating geometric design consistency along the Corridor. To this end, it was necessary to identify existing roadway geometric features that could influence driver behavior and to propose improvements, where necessary, to

create more uniform driver expectations along the entire length of the Corridor. A recent report from the National Cooperative Highway Research Program¹ was used to identify geometric features that require analysis and possible mitigation. Such features include the following:

- Inadequate shoulder width;
- Highway-railroad grade crossings; and
- Horizontal alignment.

In addition, a report from the Federal Highway Administration² indicates that of the candidate design consistency measures studied in research, speed reduction on a horizontal curve relative to the preceding curve or tangent has a strong correlation to accident frequency.

The following geometric improvement categories have been analyzed in the Corridor.

Inadequate Shoulder Width

Two sections currently have shoulders that are not consistent with the typical 8-to 10-foot shoulders along the Corridor. The first is a 16-mile section of SH 349, beginning approximately 22 miles north of Midland, Texas. The existing shoulders here are approximately 4-foot in width. The second section is a 2-mile length of FM 2052 that connects SH 349 to US 87 just south of Lamesa, Texas. The existing shoulders in this section range from 0-to 4-foot in width.

Highway-Railroad Grade Crossings

There are three locations in the Corridor where existing rail crossings should be grade-separated from the roadway. These locations do not include all at-grade crossings in the Corridor, but rather only include crossings that will not be improved by future relief route construction.

- Five miles north of Dumas, Texas on US 287;
- One mile north of Campo, Colorado on US 287; and
- Springfield, Colorado on US 287.

In addition, three locations have existing grade separations that will either need to be upgraded, due to poor overhead clearance and shoulders, or expanded from 2-lane to 4-lane.

- Dalhart, Texas on US 287;
- Eads, Colorado on US 287; and
- Kit Carson, Colorado on US 40.

Horizontal Alignment

It is assumed that as sections are improved from existing 2-lane facilities to 4-lane facilities, the following discussed horizontal alignment improvements will be made. Site-specific analysis to determine the feasibility of the recommended improvements was not conducted at this early stage.

- In Catarina, Texas, on US 83, there is a curve with an advisory speed of 30 mph. To be consistent with the posted 45 mph regulatory speed in Catarina, it is recommended

¹ Wooldridge, Harwood, Eleftheriadou, Torbic, "Geometric Design Consistency on High-Speed Rural 2-lane Roadways," Report 502, Transportation Research Board, 2003.

² Fitzpatrick, "Evaluation of Design Consistency Methods for 2-lane Rural Highways", Report FHWA-RD-99-173, Federal Highway Administration, 2000.

that this curve be re-designed to a minimum 50 mph design speed, or a preferred 70 mph design speed.

- Approximately eight miles south of Boise City, Oklahoma on US 287, there is a curve with an advisory speed of 45 mph. To be consistent with the posted 70 mph regulatory speed, it is recommended that this curve be re-designed to a 70 mph design speed.
- Eight miles north of Boise City on US 287, a series of curves have advisory signage for 50 mph. To be consistent with the posted 70 mph regulatory speed, it is recommended that these curves be re-designed to a 70 mph design speed. (Engineering studies are now underway to alleviate this situation.)
- Approximately three miles east of Eads, Colorado a curve at the intersection of US 287 and SH 96 has a posted advisory speed limit of 45 mph. It is recommended that this curve be upgraded to a 70 mph design speed, with the median widened to allow a wider refuge area for larger vehicles.
- In several locations north of Del Rio, Texas there are curves that have advisory speeds less than the regulatory speed of 70 mph. Due to the rolling terrain in these sections, it may be costly and difficult to re-design these curves. A site-specific analysis is recommended to determine the feasibility of improving these curves.

All horizontal curve locations should be examined in more detail as design for expansion sections is completed. Likewise, additional horizontal alignment issues may be identified through more detailed design work on specific sections.

2.2.3 Intermodal Facilities

Background

The term “intermodal” refers to the use of more than one mode of transportation to move people or goods. The efficiency of a given facility can be viewed in terms of a “seamless” transfer between modes that occurs easily and with minimal delay. Intermodal connectors include public roads linking intermodal terminals, where people or goods transfer between modes to the highway system.

The US economy has recently experienced changes in business practices and evolution in key economic sectors, such as manufacturing and trade. These changes reflect consolidation of production at fewer, lower-cost locations, with increasing reliance on multinational production. Inventory costs are also being reduced by limiting inventories of supplies and parts used in manufacturing and moving production directly into supply chains with minimal delay.

For these types of operations to exist in today's market, companies must be able to move raw materials and partially assembled products and finished goods, to and from all parts of the world efficiently. The highway network is an integral part of such operations.

As the value of products increases, the importance of inventory control in both production and distribution also increases. With the changes in demand levels at various times in the economic cycle, manufacturers have adopted techniques that meet changes in demand.

This emphasis on reduced inventory requires smaller and more frequent shipments. Inventory control has evolved into the concept of just-in-time delivery. Reliability of delivery times is often written into exacting specifications in contracts with transportation providers. Therefore, the transportation system must be able to function reliably, so that businesses can count on their deliveries being on time, with minimal delays due to congestion at or near intermodal terminals or elsewhere along the route.

Existing and Planned Corridor Intermodal Facilities

Laredo Area, Texas

- Union Pacific Railroad (UPRR) Laredo Intermodal Facility (truck/rail), located east of I-35 at the Uniroyal exit (I-35 mile marker 12);
- Texas Mexican Railway(truck/rail), located near downtown Laredo;
- Laredo International Airport, located at Loop 20 and US 59; and
- Border warehouses and distribution centers (truck/truck/rail).

Del Rio Area, Texas

- UPRR freight switching point, located at 100 North Main Street; and
- Del Rio International Airport, located at 1108 West 10th Street.

Midland/Odessa Area, Texas

- Midland International Airport, located at Ranch Road 1788 and Business I-20.

Amarillo Area, Texas

- Burlington Northern and Santa Fe Railway (BNSF) Amarillo Intermodal Facility (truck/rail), located between Farmers Avenue and Loop 335 and west of Washington Street;
- Diamond Shamrock/Phillips (truck/pipeline), Loop 335 and Western Street, between the Diamond Shamrock plant and I-40; and
- Amarillo International Airport.

Denver Area, Colorado

- BNSF Denver Intermodal Facility (truck/rail), located west of I-25 between I-70 and West 53rd Place;
- UPRR Denver Intermodal Facility (truck/rail), located on the north side of 40th Avenue, just west of York Street;
- UPRR Auto Transfer (truck/rail), near I-76 and 96th Avenue;
- BNSF Auto Transfer (truck/rail), 88th and Yosemite Avenues;
- Kaneb Pipeline Transfer (pipeline to truck/rail), Brighton Road and 80th Avenue;
- UPRR Transfer Facility (truck/rail), Pecos Street and 56th Avenue;
- Conoco Pipeline Transfer (truck/pipeline), 56th Avenue and Brighton Boulevard;

- Denver International Airport, north of I-70 (Exhibit 2.2-1 shows the airports on the Corridor with significant intermodal capabilities) ;
- Proposed TransPort - The State of Colorado is currently studying the viability of relocating much of the rail activity/movement, especially coal trains, from tracks passing through the Front Range (Fort Collins-Denver-Colorado Springs) to a much less developed corridor to the east near the Denver International Airport. The plans would involve relocation of approximately two-thirds of existing rail activity/movement to this new alignment. TransPort, a proposed 6,000-acre development surrounding the Front Range Airport (six miles from the Denver International Airport), has been working with UPRR to develop a new intermodal facility directly in the path of the proposed rail relocation. BNSF may share this facility with UPRR. The TransPort concept would be modeled after Alliance in the Dallas/Ft. Worth, Texas area. TransPort's developer anticipates that 90 percent of the goods transfer would involve a rail/truck interaction. The remaining 10 percent would be between air and truck modes, with an improved Front Range Airport providing the air component. TransPort is near the northern terminus of the Corridor and is considered complementary to Ports to Plains in promoting regional and international trade.

Intermodal Evaluation

Given the importance of the timing of shipments in the new market environment, the need for roadway reliability in attracting new trucking activity cannot be overstated. Widening to 4-lanes from 2-lanes improves reliability primarily in two ways:

- Incident management. 4-lane highways are safer than 2-lane highways, and incidents and accidents on the route can be bypassed more easily with an additional lane in each direction. Incident response time is also decreased.
- Travel time. Travel time is shorter and more predictable with an extra lane in each direction. The potential for a shipment to be stuck in a traffic platoon without an opportunity to pass is reduced.

Based upon research of intermodal facilities, relative weights on a scale of 1 to 10 were assigned for prioritization to reflect not only existing intermodal facilities, but the potential for new and expanded ones, such as Transport. The estimated weights by location are:

- Laredo, Texas 7;
- Del Rio, Texas 3;
- Midland, Texas 3;
- Amarillo, Texas 5;
- Denver, Colorado 8.

Exhibit 2.2-1 Existing Intermodal Airport Facilities



2.2.4 Connecting Routes

The Ports to Plains Corridor is parallel to, intersected by, and overlaid by a number of significant corridors. Many of these corridors are Interstates, while others are similar to Ports to Plains in that they are in the development stage. These corridors serve local, regional, and national interests, either as complete corridors or as sections tying other corridors together. A review of the existing Interstate highway system, as it relates to the Ports to Plains project, may be useful.

Six different Interstates directly impact the Ports to Plains Corridor. When the Interstate system was first developed, attention was directed to movement of people and freight between the two coasts. I-70 through Denver and Limon, Colorado; I-40 at Amarillo, Texas; I-20 through Midland-Odessa and Big Spring, Texas; and I-10 at Sonora, Texas all cross the Ports to Plains Corridor. As the east-west routes became fully developed, north-south corridors became necessary to connect them. I-25 on the west and I-35 on the east serve to frame the study area, while I-27 lies within the Ports to Plains Corridor from Lubbock to Amarillo, Texas.

Other highways also provide vital connections to the Ports to Plains Corridor. These include US 50 at Lamar, Colorado; US 56 at Clayton, New Mexico and Boise City, Oklahoma; US 54 at Dalhart and Stratford, Texas; US 60 and 287 at Amarillo and Canyon, Texas; SH 194 at Plainview, Texas; US 62, 82, 84, and SH 114 in Lubbock, Texas; US 87 in San Angelo, Texas; US 90 in Del Rio, Texas; US 83 in Carrizo Springs, Texas; and US 59 and 83 in Laredo, Texas.

Along some corridors, various groups have joined together to advocate roadway expansion, safety improvements, tourism, or economic development. The following discussion highlights some of these corridors.

The Great Plains International Trade Corridor extends from Canada to Mexico through a vast expanse of predominately agricultural land. A group for the northernmost sections strongly advocates for the Theodore Roosevelt Expressway, which would extend from the Canadian border in western North Dakota southward to I-90 in western South Dakota. Joining that section on its southern end is the Heartland Expressway. The Heartland Expressway is proposed to begin in Limon, Colorado on SH 71, and then continues through Nebraska on US 385. The highway terminates in Rapid City, South Dakota. These three corridor concepts together create the Great Plains International Trade Corridor in the United States.

Another support group named the Southwest Passage Initiative for Rural and Interstate Transportation (S.P.I.R.I.T.), has as its primary focus US 54, which extends from Wichita, Kansas to El Paso, Texas, and intersects the Ports to Plains Corridor at Stratford and Dalhart, Texas. S.P.I.R.I.T. provides a direct route from the nation's breadbasket to an international port.

The southernmost group supports a corridor called La Entrada al Pacifico, extending from the Permian Basin, through Presidio, to Topolobampo, Mexico. This corridor overlaps the Ports to Plains Corridor from Midland to Lamesa, Texas. The group's mission is to create economic opportunities for the Permian Basin by improving transportation infrastructure and forging strong partnerships with Mexico.

Other development in the Ports to Plains region is being advanced by the individual DOTs. An example of this development in Texas is a partnership with several states for the extension of I-69

from its present southern terminus at Indianapolis to the Mexico border. A section will terminate in Laredo, Texas.

Public meetings were held statewide in Texas for a recently developed corridor concept, the Trans-Texas Corridor. This concept would bring together rail, utilities, heavy trucks, and cars on different facilities within the same corridor. The estimated right-of-way width would be approximately 1,200 feet. While the Ports to Plains Corridor is on one of the Trans-Texas Corridors under consideration, this section is not one of TxDOT's highest priorities. Thus, the planning, design, and construction of the proposed Ports to Plains 4-lane facility should not be impacted.

None of these corridors or routes stand alone. Both individually and as a system, they affect the need for expansion of the Ports to Plains Corridor. When a route is expanded from two to 4-lanes, it typically attracts additional traffic from other facilities. Therefore, the impact of Ports to Plains improvements on the connectivity of other high-volume routes has been considered in prioritizing the improvements along the approximate 1,400 miles of Ports to Plains roadways.

2.2.5 Signage

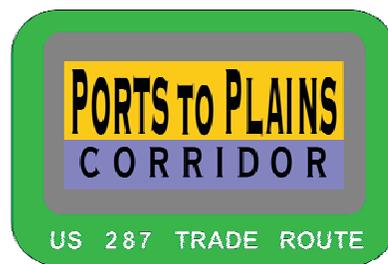
Signage of the Corridor was approached from a practical standpoint. Signing practices vary from state to state but are generally in conformance with the Federal Highway Administration's "Manual on Uniform Traffic Control Devices". Therefore, a simple plan is introduced that should not conflict with current state or federal signing practices. As the Corridor becomes more developed, more detailed signing schemes may be necessary.

Two types of signing schemes are proposed in the signing plan. The first type provides advance information to the driver about the official route numbers to follow, to enter, exit, or remain on the Ports to Plains Corridor. These signs should be placed in locations that do not conflict with existing signing schemes. Existing signs that are placed in advance of interchanges will continue to control the actual points of decision near exits, and the Ports to Plains advance information signs will serve to direct the driver to look for route markers and destinations that are listed on the existing interchange exit signs. The second type of sign provides route confirmation to the driver. These signs should be placed between metropolitan areas and should not conflict with other signs on the road. Examples of advance information and route confirmation signs are shown below.

Advance Information Sign



Route Confirmation Sign



It is intended that each DOT may implement this study's recommendations in its current signing installation and maintenance program. Exhibits 2.2-2 and 2.2-3 show the preliminary signing scheme for the Corridor. To maintain continuity and a uniform appearance, it is recommended that

each state follow as closely as possible the style and type of information shown in this plan. Exact locations of the signs should be studied before installation.

Exhibit 2.2-2 South Corridor Signing Plan

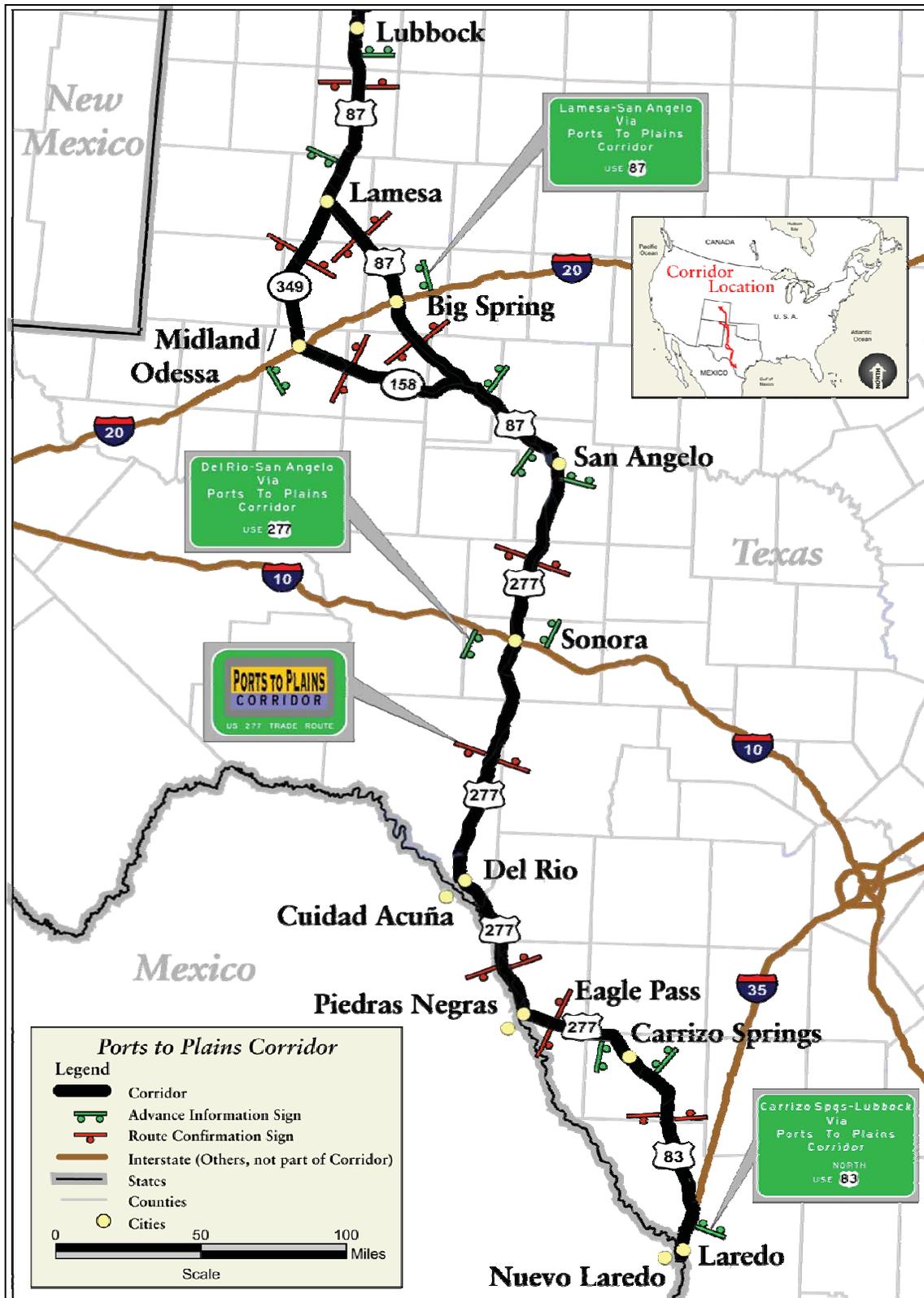
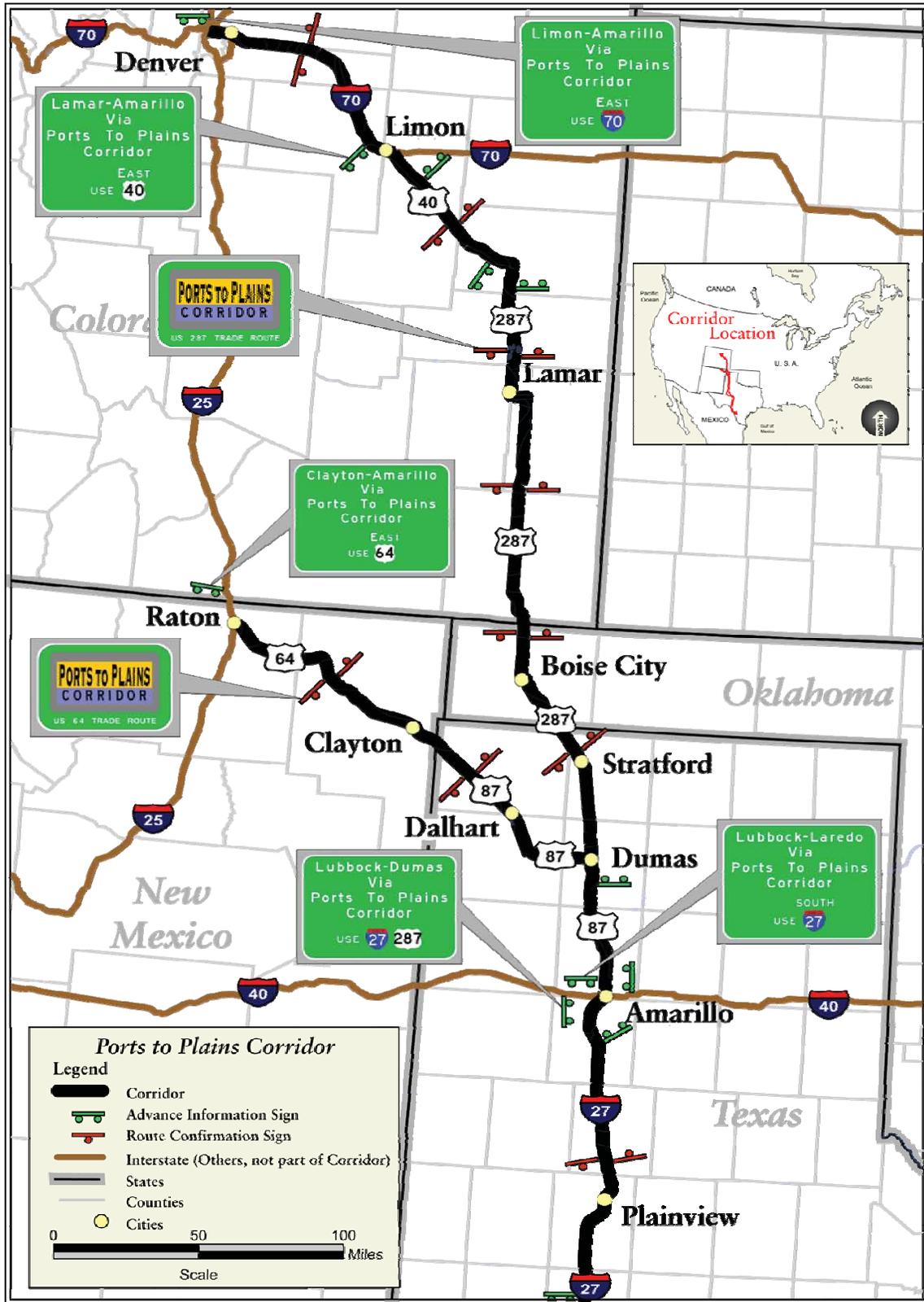


Exhibit 2.2-3 North Corridor Signing Plan



2.2.6 Truck Parking and Rest Areas

In April 2003, the Federal Motor Carrier Safety Administration issued revisions to the Hours-of-Service regulations which apply to truck drivers. The new regulations focus on providing greater opportunity for drivers to obtain rest through a science-based approach emphasizing restorative sleep. A goal of the Ports to Plains Corridor is to provide facilities for commercial drivers at intervals not exceeding 100 miles. Facilities should allow truckers to park in an area where they know they can rest safely without interruption and without affecting other motorists on the roadway.

With increased truck demand on the Ports to Plains Corridor, it is important to accommodate both the design characteristics of trucks as well as the drivers who operate the equipment. Recent research conducted by the U.S. Department of Transportation found that a high percentage of truck parking areas are overwhelmed by demand and have restrictions on parking that are rarely enforced. These conditions often lead to trucks parking in undesignated areas alongside the roadway, on ramps, or in private parking lots. On the other hand, the research found that car parking lots at rest areas are generally underutilized. The research concluded with three categories of policy revision that could help improve rest areas and truck parking. These categories are modification, renovation, and new construction.

The Ports to Plains project will consider the employment of all three of these methods to accommodate the increased trucking demand. Modifications could include minor changes to parking areas that would allow trucks to use car parking spaces at night when car parking demand is low. Renovations could include installation of more parking area, new restrooms, picnic areas, vending machines, communications/weather information stations, and more advance communication services, such as Internet connections. New construction will be necessary to fill gaps where rest areas are not spaced closely enough to provide adequate options for drivers to pull off the roadway.

Currently there are eight fully operational public rest areas on the roadways that make up the Ports to Plains Corridor. New rest areas are recommended to fill gaps where intervals between existing facilities exceed 100 miles. Both existing and recommended new rest areas are shown in Exhibit 2.2-4.

The existing locations shown on Exhibit 2.2-4 include only public facilities that have signed exits, with ramps or auxiliary lanes that allow drivers to enter and exit the roadway safely. In addition, these facilities can accommodate varying numbers of parked trucks for extended periods without interfering with the operation of the roadway. The existing rest areas are operationally functional from the transportation perspective. Most of the listed facilities have picnic tables and restrooms. Those that do not should be considered for renovation or modification to include these facilities, as shown in Exhibit 2.2-4. Other improvement considerations for all existing and proposed rest areas include helicopter landing areas for emergency response, display of weather/roadway conditions and other communication technologies (such as Internet connections) and field offices for State Patrol/Troopers. In Colorado, newer rest areas are being designed such that one facility can accommodate both directions of traffic. This can be accomplished by building adequate turn-lanes into the facility or building the facility in a median area between the two directions of traffic.

Exhibit 2.2-4 Rest Areas



As the Corridor is developed and demand for rest areas and truck parking increases, rest area modifications, renovations, and new construction should be considered by each DOT. These facilities should continue to be studied to identify how existing facility use is increasing and what improvements are most cost-effective. The cost of new facilities depends largely on the extent of facilities installed. Rest area construction can range from \$1.5 million for a minimal installation to \$15 million for a comprehensive installation. It is estimated that it would cost \$8 million to construct each new rest area for the Ports to Plains Corridor. The cost for renovations and modifications to existing rest areas depends on the elements actually included in the changes, and these costs were not specifically estimated, and will be left to each DOT to determine.

2.2.7 Border Crossings

The southern portion of the Ports to Plains Corridor is heavily impacted by traffic crossing the international bridges. Heightened security following September 11, 2001, has impacted border crossings. Historically, there has been a high level of inspection for contraband drugs and money on the United States side, but this level has increased over the last three years. Added to this have been the increased requirements associated with trucking-related rules, particularly in terms of appropriate documentation for Mexican trucks now allowed to enter the United States. A number of systems are being used to expedite crossing when possible including improved ITS and Customs processing systems.

Since the passage of the North American Free Trade Act (NAFTA) in 1994, the northern, border cities of Mexico have experienced rapid and dramatic population growth, outpacing population growth in Texas counties along the border. In addition, the border region is becoming more economically significant for Mexico and the United States, driven in large part by the maquiladora industry's impact on employment, trade, and commercial and non-commercial traffic between Mexico and the United States.

Maquiladoras, or maquilas, are assembly plants in Mexico, primarily located very close to the U.S.-Mexico border, that make products generally for export to the United States. Often, raw materials or components are sent to Mexico from the United States for some level of processing with final assembly occurring in the United States. Products manufactured in maquiladoras receive favorable tariff and tax treatments with tariffs paid only on the value added in Mexico, not on the value of the entire products.

The principal maquiladora products utilizing the crossings connected with Ports to Plains Corridor can be separated into export and import from Mexico. The products exported include auto parts, textile fabrics, motor vehicles and agriculture. The products imported include auto parts, clothing, and motor vehicles. The transportation of these products contributes to increased traffic congestion, especially at the border ports of entry and in the warehousing districts of Laredo.

Exhibit 2.2-5 provides an indication of various types of traffic: vehicles, trucks, rail and pedestrians utilizing the various border crossings, separated for northbound and southbound directions. The map shown in Exhibit 2.2-6 shows the location of border crossings in Laredo, Eagle Pass, and Del Rio.

Exhibit 2.2-5 Border Crossing Traffic (in thousands)

TYPE		LAREDO			EAGLE PASS			DEL RIO		
		2002	2003	2004 (see note 2)	2002	2003	2004 (see note 2)	2002	2003	2004 (see note 2)
NON TRUCKS	NB	7.49	7.10	4.08	3.55	3.37	1.95	2.12	1.90	1.09
	SB	7.19	7.03	4.61	3.45	3.25	2.37	2.10	1.91	1.40
TRUCKS	NB	1,442.0	1,354.0	898.5	89.9	88.3	67.1	72.0	65.6	43.4
	SB	1,461.0	1,386.0	962.0	87.3	87.0	74.8	78.0	72.0	48.9
RAIL BOXES	NB	174.9	174.8	113.7	24.2	15.5	4.3	-	-	-
	SB	191.0	219.4	152.9	86.3	75.0	17.8	-	-	-
PEDESTRIANS	NB	4,757.0	4,467.0	2,660.0	778.0	745.0	419.0	91.4	97.1	68.2
	SB	4,225.0	4,037.0	2,718.0	600.0	596.0	441.0	56.0	62.8	57.0

Notes:

1. There are no rail crossings at Del Rio.
2. The figures shown for 2004 are for eight months ending August.
3. Information obtained from 2004 Texas Center for Border Economic and Enterprise Development

Exhibit 2.2-6 Existing Border Crossing Locations - Laredo

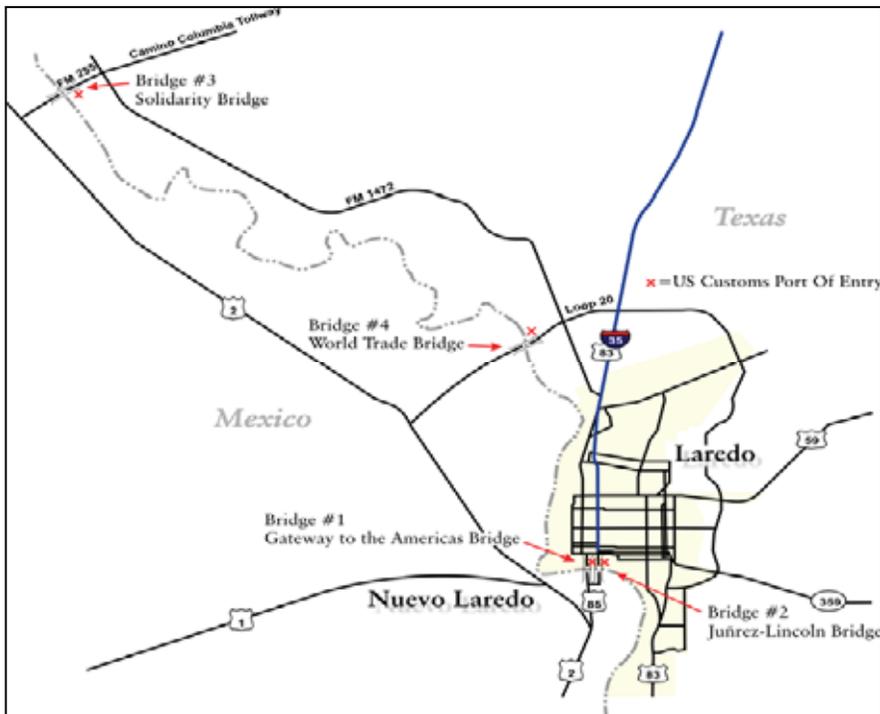
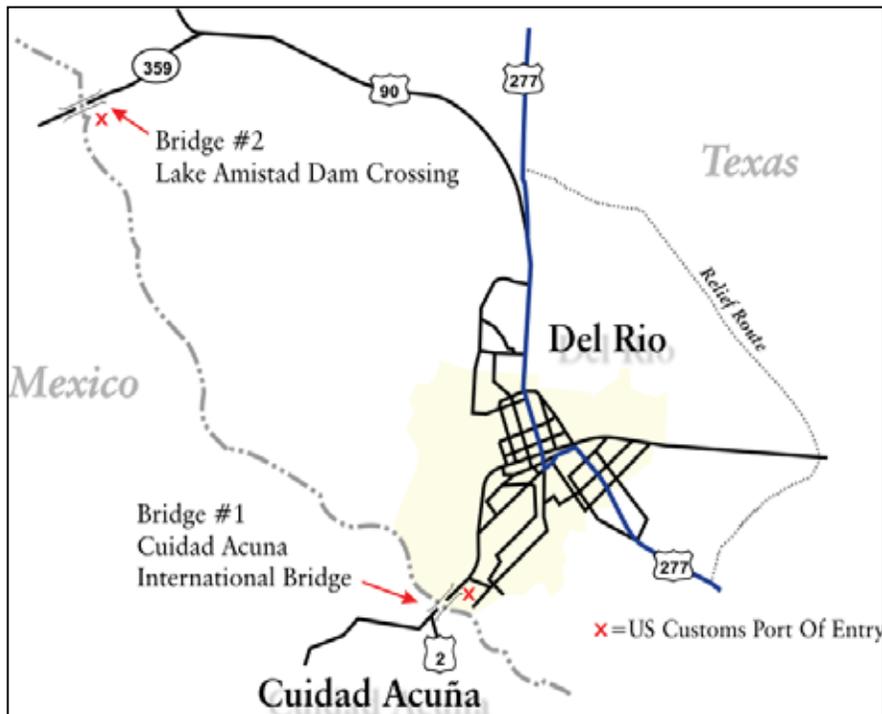


Exhibit 2.2-6 Existing Border Crossing Locations - Eagle Pass



Exhibit 2.2-6 Existing Border Crossing Locations - Del Rio



Border Crossing Infrastructure

Laredo, Texas

Laredo has four existing international bridges. The original two, Gateway to the Americas Bridge (Bridge No. 1) and Juarez – Lincoln Bridge (Bridge No. 2), are located in downtown Laredo. These serve the downtown areas of Laredo in the United States and Nuevo Laredo in Mexico. While originally used for all traffic, both structures now only allow pedestrian and automobile traffic.

Laredo's Colombia Solidarity Bridge (Bridge No. 3), approximately 27 miles upstream of Bridges 1 and 2, provides access into Mexico through the Mexican State of Nuevo Leon, connecting to Mexican Highway 2. This is the only authorized, hazardous materials crossing to and from Mexico in the Laredo area. The initial connection from Bridge No. 3 into Texas was to FM 255 and FM 1472 (Mines Road). Later, a privately owned toll facility called the Camino Columbia Tollway, was constructed, connecting the crossing with US 83 and I-35. This highway facility has recently been purchased by TxDOT. With its reopening in September 2004, it becomes the first toll highway owned and operated by TxDOT. Initially, a minimum charge per vehicle will be set based on the number of axles. In the future the use of toll tags is planned.

The World Trade Bridge (Bridge No. 4), approximately eight miles upstream of bridges 1 and 2, provides a new route into the Mexican State of Tamaulipas and connects to Mexican Highways 2 and 85. The connecting roadway in Texas is Loop 20, which provides access to I-35, US 59, US 83 and FM 1472. An improved interchange has been constructed at Loop 20 and I-35.

There are ongoing discussions between the City of Laredo and Webb County concerning an additional bridge downstream of bridges 1 and 2. At this time the exact location and ownership has not been determined.

There are significant intermodal facilities in the Laredo area. In Mexico, Transportacion Ferroviaria Mexicana, a railroad, has an intermodal yard near Mexican Highway 1. A Tex Mex Railroad intermodal yard is located adjacent to SH 359 in Laredo, providing connection to Corpus Christi and the Port of Corpus Christi. In September 2004, the Port of Corpus Christi received United States Corps of Engineers approval of environmental clearance for a new container facility. UPRR railroad has an intermodal facility near Loop 20 and I-35. In addition to the highway bridges, there is a rail bridge connecting Laredo and Nuevo Laredo.

Eagle Pass, Texas

Eagle Pass has one railroad bridge and two highway bridges connecting to the Mexican city of Piedras Negras. The initial highway bridge (Eagle Pass) was originally constructed in 1927 and has since been reconstructed and rehabilitated. It served pedestrians, vehicles and trucks until the second bridge (Camino Real) was opened in 1999. Trucks are now required to use the new bridge. The Camino Real bridge is immediately downstream of the Eagle Pass bridge and is adjacent to the railroad bridge. The Camino Real bridge provides reasonable connections to US 57 and US 277 in Texas and Highways 2 and 57 in Mexico. A proposed loop to connect the Camino Real bridge directly to US 277 is in the design stage. This loop will provide access to the new U. S. Border Station that has been constructed near the Camino Real bridge crossing.

Del Rio, Texas

Connecting the cities of Del Rio and Ciudad Acuna is a bridge that opened in 1930. This structure provides access to US 90 and US 277 in Texas and Highways 2 and 57 in Mexico. There is an additional crossing for non-commercial vehicles on the Lake Amistad dam. There is no rail access across the border in this area. Another highway crossing is in the planning stages. Its future location is thought to be between the City of Del Rio and Lake Amistad.

Border Programs and Policies

The United States Customs and Border Protection (CBP) is the unified border agency within the Department of Homeland Security. CBP combined the inspectional workforces and broad border authorities of U.S. Customs, U.S. Immigration, Animal and Plant Health Inspection Service and the entire U.S. Border Patrol. The Ports to Plains Corridor is dependent on this agency to integrate transportation and security functions.

The following summary outlines some of the programs and initiatives currently being developed and implemented at border crossings and as border policy. A large focus for borders has been on increasing the transfer and use of security information, as well as implementing new technology.

Container Security Initiative (CSI)

This initiative was created with four core elements, which are as follows:

- Using intelligence and automated information to identify and target containers that pose a risk of terrorism;
- Pre-screening those containers that pose a risk at the port of departure before they arrive at U.S. ports;
- Using detection technology to quickly pre-screen containers that pose a risk; and
- Using smarter, tamper-evident containers.

Modernization Program and Automated Commercial Environment (ACE)

The Automated Commercial Environment (ACE), a part of the Modernization Program, includes the implementation of technologies that will become the primary platform for current and future updates to technology. ACE has already created a technology that integrates data and communications in an on-line accessible format that streamlines the data and communication abilities among CBP, the trade community, and other government agencies.

Free and Secure Trade (FAST) – FAST is a bilateral initiative between the US and Mexico that seeks to ensure security and safety while enhancing the economic prosperity of both countries. FAST uses improved management practices and technology to facilitate the screening and clearing of commercial traffic. By implementing US Customs and Border Protection (CBP)-approved security measures, FAST participants have demonstrated that their facilities are secure and their shipments are low-risk. Trucks participating in the program are given an electronic windshield stickers and access to a dedicated lane at the border crossing. In El Paso, where U.S. Customs and Border Protection (CBP) opened a dedicated FAST lane in October of 2003, truck wait times were reduced from two hours to 20

minutes. A dedicated FAST lane was opened at the Laredo World Trade Bridge in April of 2004.

Customs-Trade Partnership Against Terrorism (C-TPAT)

C-TPAT was established in April of 2002 as a government/business initiative to increase cargo security while improving the flow of trade. Under this program, businesses must conduct comprehensive self-assessments of their supply chain, using the security guidelines developed jointly with the Customs Service, and they must familiarize companies in their supply chain with the guidelines and the program. In short, these businesses must provide Customs Service with specific and relevant information about their trucks, drivers, cargo, suppliers, and routes. To gain FAST approval, importers and carriers must commit to the security enhancing practices required by C-TPAT.

Trade Act of 2002 - Advance Electronic Information

The Trade Act of 2002 final rule was established on December 5, 2003. The final rule provides for advance manifest regulations for all modes of transportation both in and out of the United States. By November 15, 2004, all truck carriers must be in conformance with the Mandatory Advance Electronic Cargo Information that is outlined by the Trade Act of 2002.

Electronic Toll Collection at the Border Crossings

There are seven bridges between the United States and Mexico directly linked to the Ports to Plains Corridor: one in Del Rio, two at Eagle Pass, one west of Laredo and three in Laredo. There is also a 2-lane roadway on top of the Lake Amistad Dam near Del Rio. The bridges are operated by the City of Del Rio, the Eagle Pass Bridge System, and the Laredo Bridge System. The Laredo Bridge System has Electronic Toll Collection (ETC) and has plans to upgrade this system to be compatible with the electronic systems operated by CBP, Mexico's Caminos y Puentes Federales de Ingresos y Servicios Conexos (CAPUFE), the Harris County Toll Road Authority, and the North Texas Tollway Authority. The City of Del Rio has an ETC system on its international bridge. The Eagle Pass Bridge System does not currently have an ETC system.

Bridge Construction Approval Process

The United States Congress identified the federal approval process, beginning with the application for a Presidential Permit, with the passage of the International Bridges Act of 1972. The law authorizes the President to issue a Presidential Permit for an international bridge if construction is deemed to be in the national interest. Prior to the International Bridges Act, approval to construct an international bridge was granted by individual acts of congress. The Presidential Permit process involves the collaboration of both federal and state agencies and may take several years due to environmental and other issues involved. The Mexican approval process for constructing international bridges is similar to that of the United States. Upon completion of each review process, diplomatic notes committing both nations to the construction of a new crossing are exchanged.

2.3 Intelligent Transportation Systems (ITS)

ITS is a means of using computer, communication and management systems to enhance the safety and efficiency of road travel. Examples of ITS elements include closed circuit television systems that confirm the existence of road accidents, and Dynamic Message Sign (DMS) systems that can inform drivers of delays resulting from accidents. The ITS elements that are most appropriate for a project will vary from one area to another and should be selected to address the needs of the local community or region.

This section provides an ITS Plan for the Ports to Plains Corridor. It includes an introduction to the National ITS Architecture and identifies the major ITS activities that are already underway in the regions. A series of ITS Market Packages, which are part of the National ITS Architecture, were selected to reflect the user needs in the Corridor, based on continuing ITS activities and the outreach to stakeholders that was conducted as part of this project. The ITS Plan for the Ports to Plains Corridor is comprised of a series of projects that were selected to support the implementation of these market packages. This section concludes with a review of the capital costs and the ongoing operational and maintenance costs associated with these projects, as well as their implementation.

2.3.1 National ITS Architecture Overview

When the first ITS projects were developed, each one was custom designed for a particular application. Although these systems were significant achievements, the systems were incompatible because they did not adhere to a common framework. Examples of these early incompatibilities include electronic toll systems with toll tags that would only work on one particular bridge and electronic information systems that could not exchange data with one another. The Transportation Equity Act for the 21st Century began to remedy this incompatibility problem by requiring that ITS projects using federal funds conform to regional ITS architectures developed from the National ITS Architecture.

The National ITS Architecture is a tool to help identify and plan for system functionality, information sharing and component interoperability. The architecture guides planners and engineers in the development of new ITS designs. It does this by providing a framework for the interaction of the ITS systems and subsystems. Small projects will use only a small part of this framework. Large projects will use many of its features. The key is that the adoption of this common framework for both small and large projects will simplify the addition of future functions, facilitate the sharing of information among systems, and enable the operation of devices on multiple systems. More information regarding the National ITS Architecture can be found in Appendix B, and can also be researched using <http://itsarch.iteris.com/itsarch/>.

2.3.2 Related ITS Activities in the Region

A series of ITS related efforts have been undertaken in the regions included in the Ports to Plains Corridor. Many of these have been completed, many others are in progress.

Statewide and Regional ITS Architecture Development

The FHWA has required that all regions seeking federal funding for ITS projects have a Regional ITS Architecture in place that conforms to a series of specific requirements in order to ensure the compatibility of these ITS architectures. The status of these architecture efforts in the summer of

2004 is reviewed in the following paragraphs. The level of information provided varied between states, with Oklahoma and Texas providing detailed information about Statewide ITS Architecture.

Colorado - The Colorado Department of Transportation (CDOT) has developed ITS Strategic Plans and Architectures for the state, for the Denver region (CDOT Region 6), and for the northeastern portion of the state (CDOT Region 4). The state's ITS Strategic Work Plan identifies three improvements pertinent to the Ports to Plains Corridor: expanding the state speed map to cover additional rural areas, promoting weigh-in-motion, and promoting electronic credentialing for commercial vehicle operations. CDOT is currently developing architectures for the remaining regions. The architecture for CDOT Regions 3 and 5 will encompass the western slopes of Colorado and the San Luis Valley, and the architecture for Regions 1 and 2 will include the central and southern portions of the Front Range and the Eastern Plains, which includes the Ports to Plains Corridor. Although an ITS Regional Architecture was recently prepared for CDOT Region 2, the focus of that architecture effort was I-25 and the cities of Pueblo and Colorado Springs.

New Mexico - The FHWA Office of Operations indicates that as of April, 2004 a Statewide ITS Architecture has been completed for New Mexico. In addition, Regional ITS Architectures have been completed for the cities of Albuquerque and Las Cruces, and a rural ITS Architecture has been developed for District 4 in the northeast corner of the state, which includes a portion of the Ports to Plains Corridor. The projects that have been identified for District 4 include:

- A modest traffic operations center;
- Gate closure, closed circuit television and Highway Advisory Radio (HAR) systems;
- Pager Activated School Crossing Warning system;
- Eagles Nest HAR and Travelers Advisory Radio Systems;
- A "Smart Trailer" with HAR and DMS equipment; and
- Raton Pass Speed Advisory System.

Oklahoma - The April 2004 status report from FHWA also indicates that a Statewide Architecture has been prepared for Oklahoma, and Regional ITS Architectures have been prepared for Oklahoma City and Tulsa. The market packages that were selected in the Statewide Architecture Project are listed in Exhibit 2.3-1.

Exhibit 2.3-1 Market Packages selected in the Oklahoma Statewide ITS Architecture

Archived Data Management	
ITS Data Mart	ITS Virtual Data Warehouse
ITS Data Warehouse	
Public Transportation	
Traveler Information	
Broadcast Traveler Information	
Traffic Management	
Network Surveillance	High Occupancy Vehicle Lane Management
Probe Surveillance	Traffic Information Dissemination
Surface Street Control	Regional Traffic Control
Freeway Control	Traffic Incident Management System
Vehicle Safety	
Commercial Vehicle Operations (CVO)	
Electronic Clearance	Roadside CVO Safety
CVO Administrative Processes	HAZMAT (Hazardous Material) Management
Weigh-In-Motion	
Emergency Operations	
Emergency Call Taking and Dispatch	Emergency Routing
Maintenance and Construction Management	
Maintenance and Construction Vehicle and Equipment	Roadway Maintenance and Construction
Road Weather Data Collection	Work Zone Management
Weather Information Processing and Distribution	Maintenance and Construction Activity Coordination
Winter Maintenance	

Source: "Oklahoma Statewide Intelligent Transportation Systems Architecture" PB Farradyne, March 2003

Texas - Regional ITS Architectures are being developed throughout Texas, and have been completed for the Amarillo, Del Rio and Laredo regions. Regional Architectures for the Abilene/West Central Texas, Lubbock, Permian Basin, and San Angelo regions are in progress. The highest-rated market packages from the published studies in Texas are listed in Exhibit 2.3-2.

Exhibit 2.3-2 High Priority Market Packages in Texas Regional ITS Architectures

Archived Data Management	
ITS Data Mart (L, DR & A)	
Public Transportation	
Transit Vehicle Tracking (L, DR & A)	Transit Passenger and Fare Management (L Only)
Transit Fixed-Route Operations (L & DR)	Transit Security (L & A)
Demand Response Transit Operations (DR only)	Transit Traveler Information (DR & A)
Traveler Information	
Broadcast Traveler Information (L, DR & A)	
Traffic Management	
Network Surveillance (L, DR & A)	Traffic Incident Management System (L, DR & A)
Surface Street Control (L, DR & A)	Electronic Toll Collection (DR only)
Freeway Control (A only)	Standard Railroad Grade Crossing (L Only)
Traffic Information Dissemination (L, DR & A)	Railroad Operations Coordination (L Only)
Regional Traffic Control (L, DR & A)	
Vehicle Safety (No High Priority Market Packages)	
Commercial Vehicle Operations (CVO)	
Electronic Clearance (L & DR)	Weigh-In-Motion (L Only)
CVO Administrative Processes (L Only)	Roadside CVO Safety (L Only)
International Border Electronic Clearance (L Only)	HAZMAT (Hazardous Material) Management (DR only)
Emergency Operations	
Emergency Call Taking and Dispatch (L, DR & A)	Evacuation and Reentry Management (A only)
Emergency Routing (L, DR & A)	
Maintenance and Construction Management	
Maintenance and Construction Equipment Tracking (A only)	Roadway Automated Treatment (A only)
Road Weather Data Collection (DR & A)	Work Zone Management (L & A)
Weather Information Processing and Distribution (DR & A)	Maintenance and Construction Activity Coordination (DR & A)

Key: L = Laredo, DR = Del Rio, A = Amarillo. Bold Items are high priority in all three Regions

Intelligent Transportation Systems at the US/Mexico Border

Although the National ITS Architecture identifies an International Border Electronic Clearance market package, this market package is still under development. Although there has been significant work on Statewide and Regional ITS Architectures in Texas, this is not true in Mexico. Based on conversations with FHWA staff, the Border Clearance market package cannot be finalized until the ITS Architecture for Mexico has been completed. In an effort to develop an ITS Architecture for Mexico and lay the groundwork for finalizing the International Border Crossing ITS Architecture, the U.S. Trade and Development Administration approved funding for technical assistance and capacity building for Mexico's Secretariat for Communication and Transportation for the National Intelligent Transportation Systems Architecture project in FY '03. The U.S. Department of Transportation is now assisting Mexico in the preparation of a Scope of Work for further development of this architecture through its Office of International Programs.

The goal of the ITS Architecture effort at the border crossings will be to integrate the transportation related information with the commercial information that is being used by the U.S. Customs and

Border Protection (CBP). Even without this overall ITS Architecture, there are several ITS related activities underway at the border crossings. These include: FAST, C-TPAT, and ACE as mentioned in previous sections of this chapter. The implementation of these existing and proposed programs for expediting shipping procedures and enhancing the security of shipments across the border will create a database that may be used to expedite the driver and vehicle checks that take place at weigh stations and inspection stations. In addition, these programs will also increase the efficiencies of trucking activities and will contribute to the continued growth of truck movements across the border, and along the Ports to Plains Corridor.

2.3.3 Functional Requirements of the Ports to Plains Corridor

The public outreach conducted during this study posed a series of questions to selected stakeholders to help identify the market packages that were most important in the Corridor. A series of one-sentence statements of functionality were developed that are based on the descriptions of the various market packages. A copy of this questionnaire is contained in Appendix B. The following are examples of these statements:

- “The system should collect traffic data for monitoring traffic flow in the entire Corridor.”
- “The system should support automated clearance of commercial vehicles at roadside check facilities.”
- “The system should support the computer-aided dispatch of emergency vehicles.”

The stakeholders were asked to indicate how strongly they agreed (or did not agree) with these statements by giving a numerical rating from four to zero to each statement. Statements were provided reflecting the functional abilities of all of the market packages except for those in the Public Transit and Vehicle Safety groups. Questions concerning Public Transportation were excluded because of the emphasis on long-distance travel in the Corridor, and questions concerning Vehicle Safety market packages were excluded because the primary responsibility of their implementation rests with the automobile manufacturers.

Highly Rated Market Packages

The functionality statements in the top half of the ratings by the stakeholders are shown in Exhibit 2.3-3. The market package associated with each of these statements is shown in bold below the statement.

As shown in Exhibit 2.3-3 by shading, the functionality statements have been divided into three groups based on the ratings.

The four functionality statements in the top group received ratings higher than 3.6 out of a possible 4.0. The highest rated statement was related to the HAZMAT Management market package. Two of the other highly rated statements refer to the capabilities of the Regional Traffic Control and Traffic Incident Management System market packages, which are in the Traffic Management System Group. The remaining statement in this top group deals with the Mayday Support market package in the Emergency Management group.

Another group of six functionality statements received ratings higher than 3.3 but less than 3.6. Two of these statements are from the Commercial Vehicle Operations group: one from the Commercial Vehicle (CV) Administrative Processing market package and the other from the Roadside HAZMAT Security Detection and Management market package. One statement relates to Emergency Call-Taking and Dispatch market package. The remaining three statements are all based on market packages in the Maintenance and Construction Management Group. Two are variations of the Road Weather Data Collection market package, and the other is from the Weather information Processing and Distribution market package.

An overall review of the market packages associated with the functionality statements in these top groups revealed that eight of these statements are related to Commercial Vehicle Operations, six of these statements are related to Traffic Management, four are related to Maintenance and Construction, four are related to Emergency Management, and one is related to Archiving Data.

2.3.4 Recommended Market Packages

This Ports to Plains ITS Plan cannot and should not duplicate the ITS efforts which have been undertaken at considerable time and expense by the individual states. It must also be recognized that ITS Architectures that are focused on large cities tend to address the user needs for traffic and incident management. The intent of the ITS Plan is to indicate how regional ITS activities can be linked together and to direct attention to the rural areas of the Corridor.

Because of this rural focus, the Ports to Plains ITS Plan emphasizes the ITS elements of greater interest in rural areas, i.e. Road Weather Information Systems (RWIS), and less attention to the traditional "Big City" ITS projects, like the installation of Closed Circuit Television (CCTV) systems.

The recommend market packages for the Ports to Plains Corridor are shown in Exhibit 2.3-4. This list is based on a synthesis of the market packages and recommendations determined from other studies, the results of the ratings obtained from stakeholders contacted as part of the Ports to Plains project, and additional comments from the Ports to Plains project's Steering Committee.

Exhibit 2.3-3 Highly Rated Functionality Statement

	Importance (0 to 4)
The system should support the response to incidents involving Hazardous Materials (HAZMAT) HAZMAT Management	3.72
The system should exchange data with the CDOT, TxDOT, ODOT, NMHTD and local traffic agencies Regional Traffic Control	3.67
The system should improve coordination among agencies that respond to accidents Traffic Incident Management System	3.62
The system should support the Enhanced 911 system to identify the location of calls from cell phones Mayday Support	3.61
The system should support the detection of sensitive HAZMAT cargo Roadside HAZMAT Security Detection and Management	3.50
The system should support the computer aided dispatch of emergency vehicles Emergency Call-Taking and Dispatch	3.44
The system should monitor roads to determine if they may become icy Road Weather Data Collection	3.39
The system should monitor roads to determine if they are flooded Road Weather Data Collection	3.39
The system should provide weather information to the media and traffic management agencies Weather Information Processing and Distribution	3.39
The system should support the electronic processing of CVO permits and credentials CV Administrative Processes	3.38
The system should provide emergency vehicles with a green light at traffic signals Emergency Routing	3.28
The system should support the operation of flashing warning lights at school speed zone signs Surface Street Control	3.24
The system should coordinate grade crossing operation with the railroad Railroad Operations Coordination	3.24
The system should support the identification of unauthorized drivers CV Driver Security Authentication	3.22
The system should support high speed weigh-in-motion Weigh-in-Motion	3.17
The system should improve coordination among agencies dealing w/ maintenance and construction management Maintenance and Construction activity Coordination	3.17
The system should alert commercial drivers of congestion and incidents along the Corridor Fleet Administration	3.12
The system should support automated cargo clearance at US/Mexico border crossings International Border Electronic Clearance	3.12
The system should support automated clearance of commercial vehicles at roadside check facilities Electronic Clearance	3.11
The system should enhance the operation of traffic signals in the Corridor Surface Street Control	3.10
The system should recommend routes for emergency vehicles based on traffic conditions Emergency Routing	3.06
The system should support the closure of road sections because of weather and other emergencies Roadway Closure Management	3.00
The system should save Corridor traffic data for future analysis ITS Data Mart	3.00

Exhibit 2.3-4 Recommended ITS Market Packages

Archived Data Management	
ITS Data Mart	
Traveler Information	
Interactive Traveler Information	
Traffic Management	
Network Surveillance	Traffic Incident Management System
Surface Street Control	Standard Railroad Grade Crossing
Traffic Information Dissemination	Roadway Closure Management
Regional Traffic Control	
Commercial Vehicle Operations (CVO)	
Fleet Administration	Weigh-In-Motion
Electronic Clearance	HAZMAT (Hazardous Material) Management
CVO Administrative Processes	Roadside HAZMAT Security Detection & Mitigation
International Border Electronic Clearance	CVO Driver Security Authentication
Emergency Operations	
Emergency Call Taking and Dispatch	Mayday Support
Emergency Routing	
Maintenance and Construction Management	
Road Weather Data Collection	Maintenance & Construction Activity Coordination
Weather Information Processing & Distribution	Work Zone Management
Winter Maintenance	Work Zone Safety Monitoring

Brief narrative descriptions of these market packages are included in Appendix B. Complete descriptions of all of the market packages in the National ITS Architecture may be found at the Architecture web page previously identified.

2.3.5 Concept of Operations

This concept of operations explains how the recommended projects will function with respect to the delivery of ITS services.

The Concept of Operations for the ITS projects in the Ports to Plains Corridor does not envision centralized monitoring and control of the Corridor. The Corridor is a long network comprised of roads under the jurisdiction of four state DOTs. Each state has mandated responsibilities for its roadways and cannot transfer its responsibilities to others. Moreover, it would be unreasonable to suggest that the roads comprising the Corridor be the operating responsibility of one entity and have the many roads that it intersects be the responsibility of other entities.

The Concept of Operations for the ITS elements in the Ports to Plains Corridor does envision that the operating responsibility of these elements will be divided along state lines. There will also be Memoranda of Understanding (MOU) between the states that will allow the shared control of selected devices under specific circumstances. This would make it possible for New Mexico to post a message on a Dynamic Message Sign (DMS) unit in Texas, or vice versa. The circumstances under which this transfer of control take place would be indicated in the MOU and may include a restriction that the state owning the DMS not be displaying a message of lower priority. The MOU might also include a

restriction on this being done only when there is no staff on duty at the Traffic Management Center (TMC) that would normally control the unit.

Control of the ITS devices within each state would be the responsibility of the nearest Traffic Management Center (TMC). In most cases this would be the regional TMC that monitors and operates the roads. These TMCs have a trained staff that is usually dedicated to these functions 24-hours a day, 7-days a week. If a local state DOT maintenance office becomes aware of a situation which requires posting of a message, it would provide the information to an operator at the regional TMC, who would then be responsible for taking action and disseminating this information using all of the TMC's resources. This alternative relieves the maintenance office staff from the obligation of learning how to monitor and control the various systems and recognizes that these maintenance offices are not usually staffed around the clock. Communications would be required between the regional TMC and the maintenance office so that all systems receive current information from the Road Weather Information Systems and other devices that provide information used by the maintenance office.

This Concept of Operations also envisions robust communications links among the various agencies involved in responding to incidents, including law enforcement, fire, rescue, and the state DOT maintenance office. Initially these communications links will support voice communications, and this will be expanded to include data and video communications as the agencies acquire new equipment which can accept others' data and video signals. The regional TMCs will also be the originators of travel information going out to the broadcast media and private sector information service providers, the 511 information system, DOT web sites, and the CVO dispatchers.

The Concept of Operations for the DOT websites parallels the above mentioned operational discussions. There would not be a website devoted to current traffic conditions in the Corridor. Each state DOT web page would provide information on the roads within its borders, including their portion of the Ports to Plains Corridor. Each state's web site would, however, provide links to the other states' web sites.

Additional details of the Concept of Operations, functional requirements, and design of the systems will be identified and refined by the Ports to Plains stakeholders as the regional and statewide ITS Architectures are developed.

2.3.6 Recommended ITS Projects

A series of projects have been identified to help implement the recommended market packages. A major objective in identifying these projects is to complement and supplement the other ITS activities of the states, particularly in aspects related to the high-priority, market packages selected by their Regional ITS Architecture efforts and to craft them in a manner that is consistent with the Concept of Operations.

A conscious decision has also been made to identify projects that can be implemented throughout the Corridor. The projects identified in this ITS Plan emphasize ITS elements that are relatively inexpensive. This has been done because it is difficult to justify the installation of expensive ITS elements when the volumes that are being served are relatively low and accidents relatively infrequent. At the same time, it is recognized that the Ports to Plains Corridor does pass through

several large cities. In these locations the installation of CCTV systems and other costly elements may be justified because of local conditions, and funding for these improvements would be provided by other projects. Any elements that are deployed to mitigate local problems would, of course, be available to address issues important to long-distance travelers on the Ports to Plains Corridor.

The recommended projects are divided into seven subgroups corresponding to the major user needs that they address. These projects are identified in Exhibit 2.3-5, with further descriptions of projects found in subsequent discussions.

Exhibit 2.3-5 Recommended Ports to Plains ITS Projects

Traffic Management Projects	
TM1	Signal System Upgrades
TM2	School Zone Flasher Upgrades
TM3	Traffic Monitoring Equipment
TM4	Railroad Grade Crossing Improvement
Commercial Vehicle Operations (CVO) Projects	
CV1	Weigh/Inspection Station Improvements
Emergency/Incident Management Projects	
EM1	Upgrade DOT Radio Communications Equipment
EM2	Deploy Trailers with Incident Response Equipment
EM3	Sponsor Multi-agency Incident Management Teams
EM4	Install Oversize Mile Markers
EM5	Provide Tower Sites for Expanded Cell Phone Service
Traveler Information Systems Projects	
TI1	Install Dynamic Message Signs
TI2	Install Flashing Beacon Signs
TI3	Provide 511 System Upgrades
TI4	Provide E-mail Alert Upgrades at TMCs
TI5	Rest Area Communication Upgrades
Maintenance and Construction Management System Projects	
M1	Provide Road Weather Information Systems
M2	Provide Weather Information Processing
M3	Provide Work Zone Management and Construction Safety Systems
Operational Support Project	
OS1	Additional TMC Operational Support
Projects Funded by Other Organizations	
PFO1	Actions by CV Operating Companies
PFO2	Actions by CVO Monitoring Agencies
PFO3	Upgrades by Emergency Service Agencies

ITS Projects and Market Package Relationship

The relationship between the recommended ITS Projects and the recommended market packages is shown in Exhibit 2.3-6. (In a sense, the market packages represent “goals”, and the ITS Projects are similar to “objectives” that help advance the achievement of the goals.) The market packages form the columns in this exhibit and the projects are the rows. A “P” identifies the project that is the “Primary” project supporting the implementation of the market package in the Ports to Plains

Corridor. An "S" has been entered to indicate the other market packages that have their implementation advanced by the project. The prefix in front of the project name is an identifier based upon the National ITS Architecture. As Exhibit 2.3-6 indicates, some projects are the primary project for several market packages, and some market packages are supported by many projects.

It is also worth noting that there are a series of market packages whose primary implementation responsibility rests with projects that will be implemented by others. These include projects like the International Border Electronic Clearance and projects that require advanced technology that does not currently exist, like Roadside Hazmat Security.

Exhibit 2.3-6 Relationship Between Projects and Market Packages

		ITS MARKET PACKAGES																									
KEY		ITS Data Mart - AD 1	ATIS 2 Interactive Traveler Information	ATMS 1 Network Surveillance	ATMS 3 Surface Street Control	ATMS 6 Traffic Information Dissemination	ATMS 7 Regional Traffic Control	ATMS 8 Traffic Incident Management System	ATMS 13 Standard Railroad Grade Crossing	ATMS 21 Roadway Closure Management	CVO 1 Fleet Administration	CVO 3 Electronic Clearance	CVO 4 Administrative Processes	CVO 5 International Border Electronic Clearance	CVO 6 Weigh-In-Motion	CVO 10 HAZMAT (Hazardous Material) Mgmt	CVO 11 Roadside HAZMAT Security	CVO 12 CVO Driver Security Authentication	EM 1 Emergency Call Taking and Dispatch	EM 2 Emergency Routing	EM 3 Mayday Support	MC 3 Road Weather Data Collection	MC 4 Weather Information Processing & Distribution	MC 6 Winter Maintenance	MC 8 Work Zone Management	MC 9 Work Zone Safety Monitoring	MC 10 Maintenance and Construction Coordination
ITS PROJECTS																											
Traffic Management																											
TM1	Signal System Upgrades	S	S	P	S													S									
TM2	School Zone Flasher Upgrades			S																							
TM3	Traffic Monitoring Equipment	P	P																								
TM4	Highway Rail X-ing Upgrades							P																			
Commercial Vehicle Operations																											
CV1	Weigh Station Improvements										P			P													
Emergency/Incident Management																											
EM1	DOT Radio Comm. Equ'mnt						S	S																S			
EM2	Trailers w/ Incident Response Eqpt						S	S																			
EM3	Incident Management Teams						S	S																			
EM4	Install Oversize Mile Markers						S													S							
EM5	Tower Sites for Cell Phones	S	S			P													S								
Traveler Information Systems																											
TI1	Install Dynamic Message Signs				S	S	S																		S		
TI2	Install Flashing Beacon Signs				P	S	S																	S			
TI3	Provide 511 System Upgrades	P			S	S	S																				
TI4	E-Mail Alert Upgrades at TMCs				S	S	S	S																			
TI5	Rest Area Comm Upgrades	S			S	S	S	S																			
Maintenance & Construction Mgmt																											
M1	Provide RWIS (Weather Sensors)																					P	S	S			
M2	Provide Weather Info Processing																						P	P			
M3	Work Zone Mgmt & Cnstrn Safety																							S	P	P	P
Operational Support Project																											
OS1	Additional TMC Operational Support	S	S	S	S	S	P	S	S	P												S	S				S
Projects by Other Organizations																											
PFO1	Actions by CVO Companies										P	S	S			S		P									
PFO2	Actions by CVO Monitoring Agencies											S	P	P			S										
PFO3	Procurements by Em'gncy Services															P	P	S	P	P	P						

Traffic Management Projects

These projects focus on improvements to the devices and systems that control traffic flow and collect traffic flow data.

TM1 - Signal System Upgrades

This project would provide funds for a variety of improvements to the traffic signal system. These include replacing old traffic signal controllers with new controllers with improved capabilities, replacing in-ground loop detectors with CCTV-based detectors that are less prone to fail, providing “pre-emption” capabilities that allow emergency vehicles to stop traffic at the intersection so that they can proceed through more safely, installing new or upgraded pedestrian heads, periodically adjusting signal timing in response to changing traffic demands, monitoring the performance of flashing signals to quickly identify and remedy failures, and making provisions for archiving the data for future analysis. These upgrades would continue to be funded throughout the duration of the Ports to Plains project. Upgrades in later years would include making the CCTV images from the detectors available to the emergency service agencies in the community and the regional Traffic Management Center (TMC). This project is the primary project for the Surface Street Control market package. It also supports the ITS Data Mart, Network Surveillance, Regional Traffic Control, and Emergency Routing market packages.

TM2 - School Zone Flasher Upgrades

This project provides for the upgrading of school zone flashers to allow them to be responsive to late starts and early dismissals that were not part of the original school calendar. It also provides for the monitoring of these devices so that device failures can be quickly identified and remedied. This project also supports the Surface Street Control market package.

TM3 - Traffic Monitoring Equipment

Traffic monitoring equipment would be installed at periodic intervals along the Corridor to collect data on traffic volumes and speeds. This data would be used for long-term planning and speed maps supported on the DOT web sites. If machine-vision (i.e.: camera) based detection systems are used, the images could be brought back to the regional TMC. The project also includes provisions for archiving the data for future analysis, as well as the establishment of a Memorandum of Understanding (MOU) among the agencies collecting data that governs the formats for data storage and any restrictions or procedures for accessing the data. The project is the primary implementation project for the ITS Data Mart and the Network Surveillance market packages.

TM4 - Railroad Grade Crossing Improvement

The review of the Corridor indicated that the railroad grade crossing on US 287, 4 miles north of Dumas, Texas, is the only active railroad crossing that is not equipped with both active cross-buck flashing lights and gate arms. This project will install gates at this railroad grade crossing. Equipment monitoring at all railroad crossings would also be improved to quickly identify equipment failures in need of repair. This is the primary implementation project for the Standard Railroad Grade Crossing market package.

Commercial Vehicle Operations Project

These projects are intended to facilitate the operations of commercial trucking in the Corridor by reducing delays to truckers and facilitating CVO administrative activities.

CV1 - Weigh/Inspection Station Improvements

This project would provide funds for a variety of improvements to the weigh stations and/or inspection stations along the Corridor. These improvements may take the form of Weigh-in-Motion (WIM) equipment, computer systems for the electronic verification of driver licenses and fleet operating credentials, or support of additional PrePass installations. This project is the primary support for the Electronic Clearance and Weigh-in-Motion market packages.

Emergency / Incident Management

The following projects have been selected because of their ability to improve the detection and response to emergencies on the roadway.

EM1 - Upgrade DOT Radio Communications Equipment

This project will upgrade the communication equipment used by DOT dispatchers contacting field forces and other emergency agencies when there are accidents or other incidents on the roadway. This will also improve the maintenance and construction management functions provided by the DOTs. This project supports the Traffic Incident Management System, Roadway Closure Management, and Winter Maintenance market packages.

EM2 - Deploy Trailers with Incident Response Equipment

These trailers would reduce the time needed to get these traffic control resources to major incidents by being kept "ready-to-go" at the DOT maintenance offices located along the Corridor. The equipment kept on the trailers would include traffic cones, portable signs, flares, and other temporary traffic control devices. The trailer would also include a portable DMS unit and/or a flashing arrow-board. This project supports the Traffic Incident Management System and Roadway Closure Management market packages.

EM3 - Sponsor Multi-agency Incident Management Teams

Incident Management Teams are comprised of representatives of the DOT, state law enforcement agencies, and local traffic and emergency service agencies. These groups meet several times a year to identify ways to improve and coordinate the response to roadway incidents. Standard activities of these teams include critiques of recent incidents to identify activities that should be improved. Other activities that can be undertaken by these teams include: multi-agency incident response training drills, identification of hazmat response resources, keeping lists of e-mail addresses and phone numbers current, and the establishment of protocols for sending emergency assistance requests and travel alerts. This project supports the Traffic Incident Management System and Roadway Closure market packages.

EM4 - Install Oversize Mile Markers

This project recommends installing clearly visible mile markers along the entire length of the Corridor. The intent of the signs is to make it easier for the traveling public to identify the locations of incidents when they report problems to local emergency agencies using cell phones. The project supports the Traffic Incident Management System and Mayday Support market packages.

EM5 - Provide Tower Sites for Expanded Cell Phone Service

This project would promote the expansion of cell phone service in the Corridor by providing areas for the towers at periodic points along the right-of-way where power is available. These properties would be made available at subsidized rates during the initial years of the agreement to encourage the

expansion of the service. This project is the primary support of the Traffic Incident Management System. The project supports the Mayday Support market package, and, in conjunction with the installation of flashing beacon signs, also supports the Interactive Traveler Information and Traffic Information Dissemination market packages.

Traveler Information Systems

This series of projects provides information to travelers in the Corridor. They also support the Traffic Management and Maintenance and Construction Management in that they can divert drivers from locations where there are severe delays caused by accidents, maintenance activities, and weather related problems.

T11 - Install Dynamic Message Signs (DMS)

Because of their high installation and maintenance costs, DMS units, also known as variable message signs and changeable message signs, would be installed at selected locations in the Corridor where drivers can easily divert to an alternate route. This project supports many market packages, including Traffic Information Dissemination, Traffic Incident Management System, and Roadway Closure Management, and Winter Maintenance.

T12 - Install Flashing Beacon Signs

These low-cost signs instructing drivers to “Call 511 for Traffic Information When Flashing” would be installed at frequent intervals, providing numerous opportunities to warn travelers of problems. The flashing beacons would be solar powered and would receive a command to turn the beacons on and off through a paging system. Separate northbound and southbound signs would be used so that drivers can be alerted on a directional basis. This project is the primary support for the Traffic Information Dissemination market package and also supports the Traffic Incident Management System, Roadway Closure Management, and Winter Maintenance market packages.

T13 - Provide 511 System Upgrades

511 is the national number that has been designated for travel information by the Federal Communications Commission (FCC). Travelers calling 511 will reach a menu-driven system providing information on selected routes in response to numeric inputs or voice commands. In order for this system to be effective, the response system must have sufficient capacity, and the responsible agencies must provide timely and accurate information. This project will expand the existing systems and provide communications links to the traffic management centers responsible for sections of the Corridor. It is also recommended that the systems in each state establish protocols for exchanging data, (or “handing off” an inquiry to an adjacent state system) so that travelers can find out about problems that may exist when they cross the state line. This is the primary project for the Interactive Traveler Information and also supports the Traffic Information Dissemination, Traffic Incident Management System and Roadway Closure Management market packages.

T14 - Provide E-mail Alert Upgrades at TMCs

It is recommended that the e-mail capabilities of the TMCs be upgraded so that they are capable of quickly composing messages in real-time, or selecting a message from a robust library of stored messages and disseminating this message to an e-mail list that may include hundreds of addresses. These addresses would include emergency service agency contacts, other DOT divisions and response personnel, DOT contacts in other states, local traffic agencies, the media, CVO dispatchers,

and other individuals and organizations that should be made aware of major delays on the Ports to Plains Corridor and other roadways within the jurisdiction of the TMC. This project supports the Traffic Information Dissemination, Traffic Incident Management System, Roadway Closure Management, and Fleet Administration market packages.

T15 - Rest Area Communications Upgrades

This project will provide upgraded communications capabilities in the form of wireless internet access and kiosk-based access at the rest areas located along the Corridor. These communications channels would be used by travelers and truck drivers to obtain updated travel information, update credentials information, and take care of personal travel and communications needs such as hotel reservations. This project supports the Interactive Traveler Information, Traffic Information Dissemination, Traffic Incident Management System, and Roadway Closure Management market package.

Maintenance and Construction Management

This group of projects addresses problems that are caused by hazardous weather conditions and maintenance and construction activities. Several of the Traveler Information projects previously described will help inform travelers of these problems. The projects below will also provide additional information and systems that DOT managers can use to improve the cost-effectiveness and safety of their maintenance and construction activities.

M1 – Provide Road Weather Information Systems (RWIS)

RWIS stations would be installed at intervals of approximately 75 miles to supplement the RWIS equipment that already exists in the Corridor. These stations would provide an indication of when roadway sections are likely to become icy, when they are flooded, and when there are high winds in the area. Hazardous conditions would be communicated to drivers through various traveler information systems. It is also recommended that these RWIS stations be equipped with a “wind sock” to provide motorists with a direct visual indication of the force and direction of wind conditions. This project is the primary support of the Road Weather Data Collection market package and also supports the Weather Information Processing and Distribution and Winter Maintenance market packages.

M2 – Provide Weather Information Processing

This package will provide software that improves the accuracy of road condition forecasting. This software would fuse data from the RWIS sensors with National Oceanic and Atmospheric Administration (NOAA) weather information systems and locally collected weather stations. This will improve the ability of the DOTs to forecast when and where sand/salt trucks should be dispatched before storms and adverse conditions actually occur, providing a more cost-effective use of DOT resources. This project is the primary support of the Weather Information Processing and Distribution and Winter Maintenance market packages.

M3 – Provide Work Zone Management and Construction Safety Systems

Several innovative ITS systems have been developed to facilitate construction activities and improve safety in construction work zones. One of these systems has an “all-in-one” trailer that includes a detector for identifying speeds and queues, a portable tower mounted CCTV to observe conditions in the work zone, and a portable DMS unit and/or highway advisory radio unit to advise drivers of

downstream hazards. Other ITS systems have been developed that activate a siren when a car accidentally enters the area where people are working. Protocols should also be established among the construction division, local agency construction coordinators, and the TMCs, defining the conditions under which the construction contractor or on-site supervisors will notify the TMCs, on a real-time basis, of construction activities that reduce capacity and when these activities have been completed. These and similar systems should be included in the specifications for construction projects located along the Corridor. This project is the primary support for the Work Zone Management, Work Zone Safety Monitoring, and Maintenance and Construction Activity Coordination market packages, and is supporting to the Winter Maintenance market package.

Operational Support Project

One of the fundamental aspects of ITS projects is that most ITS systems require on-going operational and maintenance support. Staff is needed in the TMCs to respond to the “alerts” that come in from the systems in the field and help activate the systems that disseminate information. Field personnel are needed to provide periodic preventive maintenance and repair of the equipment. The cost estimate presented later in this section identifies funding for the operations and maintenance of ITS elements. However, above and beyond this basic level of Operations and Maintenance (O&M), this ITS Plan recognizes the need for additional staffing at the TMC as indicated below.

One additional item that should be mentioned is the staffing assumption for the additional TMC operational support. This project recommends two new staff positions for operations at a TMC in Colorado, New Mexico and Oklahoma, and four new staff positions for TMC operations at TMCs in Texas.

OS1 – Additional TMC Operational Support

Many of the ITS systems identified in the ITS Plan will not work well if the TMCs that receive data and send out information are inadequately staffed. The Ports to Plains Corridor Development and Management Plan is not recommending the establishment of any new TMCs, but it does recognize that the devices that are deployed will place an additional operations burden on the existing TMCs. For this reason the ITS Plan recommends that funds be provided for additional staffing at the existing TMCs. The duties of these staff would include: periodic checks of the traffic monitoring systems and communications links to the 911 systems to identify incidents; placing messages on the DMS units; activating the appropriate flashing beacon signs; recording messages to be played on the 511 system; maintaining an up-to-date e-mail list of dispatchers at the emergency service agencies and local trucking companies, and contacts at the construction sites; developing programs to export traffic data to the emergency agencies in formats compatible with their computer aided dispatch systems; and working toward agreements and MOUs governing the exchange of data among agencies, archiving of data, and the distribution of traffic data, video images, and weather information to the media. This project becomes the primary support for the implementation of Regional Traffic Control and Roadway Closure Management. It also supports all of the other traffic control market packages and several other market packages as shown in Exhibit 2.3-6.

The operational cost of this project is based on providing two additional full-time staff positions in Colorado, New Mexico and Oklahoma, and four additional full-time staff positions in Texas. The cost of these staff positions is significant, and as a result the annual ITS operations and maintenance (O&M) costs exceed the annual ITS capital costs in each state.

Projects Funded by Other Agencies and Organizations

The projects that have been identified thus far should be implemented with funds allocated to the Ports to Plains Program. The projects identified below are also important projects that should be implemented. These projects, however, should use funds provided by other organizations. There are several reasons for stating that these projects be funded by others. 1) A project or activity may bring greater efficiency or other financial benefits to a company in the private sector. It is reasonable to assume that the organization pay for the cost of achieving these benefits. 2) The project may serve an area much larger than the Ports to Plains Corridor. For example, improving the U.S./Mexico border crossing system provides benefits for many parts of the United States. 3) It is also possible that the project may add benefits to many of the services and responsibilities already being provided by public agencies in addition to those related to travel in the Ports to Plains Corridor. For example, improvements to a police department Computer Aided Dispatch (CAD) system will assist them in all of their law enforcement responsibilities, in addition to those related to traffic in the Ports to Plains Corridor.

PFO1 - Actions by Commercial Vehicle Operating Companies

These actions include the CVO companies participating in the PrePass program and installing PrePass transponders in their vehicles to expedite the clearance of these vehicles at weigh stations and inspection stations. It also includes the periodic update of communications equipment between the CVO dispatchers and the drivers, so that the drivers can be warned of significant delays reported to the dispatchers by the TMCs. The CVO operating companies should also participate in the variety of programs that will expedite automated processing of driver and vehicle credentials and the safe and secure shipment of cargo across the U.S./Mexico border. These actions are the primary projects supporting the Fleet Administration and Driver Security market packages and also support many of the other CVO related market packages.

PFO2 - Actions by CVO Monitoring Agencies

These agencies will continue to make investments in equipment and procedures that enable them to be more cost-effective in their roadside screening of drivers and commercial vehicles. The investments to be made by these agencies include: improvements to the data bases used for the Commercial Vehicle Information Systems and Networks (CVISN) and other CVO monitoring programs, the electronic processing of CVO and driver credentials, providing roadside inspectors with laptops containing the data to facilitate roadside checks of drivers and vehicles, the development and deployment of detectors that can identify the presence of hazardous materials, and the installation of equipment and systems to monitor shipments across the U.S./Mexico border. These actions are the primary market packages for CV Administrative Processes and International Border Electronic Clearance, and supporting market packages for Roadside HAZMAT Security and Electronic Clearance.

PFO3 - Upgrades by Emergency Service Agencies

The investments that should be made by these agencies include the installation of traffic signal pre-emption transmitters on their emergency vehicles to reduce the response time to incidents, the installation of Computer Aided Dispatch (CAD) equipment in the dispatch office, Automatic Vehicle Location (AVL) equipment on the response vehicles, and improved communications equipment linking the dispatchers and the drivers, so that the dispatchers can quickly identify and inform the

nearest available response unit when there is an incident. These actions are the primary support of the three emergency management market packages: Emergency Call-Taking and Dispatch, Emergency Routing, and Mayday Support. These upgrades will also develop and implement systems for the remote information of hazardous materials carried by vehicles involved in traffic accidents, so that the first responders can prepare to approach the accident safely. This is also the primary support of the HAZMAT Management, Roadside HAZMART Security, Emergency Call Taking and Dispatch, Emergency Routing, and Mayday market packages. It also supports the CVO Driver Security Authentication.

2.3.7 Estimated ITS Project Costs

The main source of cost data for the recommended projects is the FHWA's "ITS Unit Costs Data Base," which can be found on the web at www.benefitcost.its.dot.gov. This database contains a variety of cost-related factors for almost 250 ITS components. The cost factors include: estimated lifetime, high and low estimates of capital cost, and high and low estimates of operations and maintenance (O&M) costs. These costs are drawn from project data collected over the past 10 years and have recently been adjusted, so that all costs are expressed in 2003 dollars. Since many of the costs did not change or have even decreased, when compared to their original values, these 2003 costs are assumed to be current costs.

As mentioned in the preceding paragraph, the estimated cost of the components in the FHWA database contain high and low estimates of the capital costs and the O&M costs. In most cases this ITS Plan is based on the average of these high and low values. However, in several instances the high end or low end costs were used to reflect the characteristics of the recommended project for the Ports to Plains Corridor.

A few of the projects identified in the Ports to Plains ITS Plan contain components that are not included in the FHWA database. These cost components were estimated using cost data drawn from the DOTs and equipment suppliers.

The estimates for both the capital cost and the continuing O&M cost were developed on an annual basis. This has been done for two reasons. 1) It more reasonably expresses the fact that ITS elements will operate for many years but will eventually have to be replaced during the period over which the Corridor is developed. 2) The use of these annual costs also facilitates the factoring of these costs to a 25-year construction period and a 25-year O&M period. The underlying assumption to this expansion is that ITS projects can be relatively quick to implement, when compared with roadway construction, and can bring immediate service improvements to the Corridor. Because of their cost-effective nature, it is assumed that all of the ITS projects will be implemented in the first five years of the Ports to Plains construction improvements.

The costs estimates are presented separately for each state. Depending on the nature of the project, the number of units was determined on the basis of the number of miles, the number of existing devices or locations to be improved, or the number of maintenance districts. Some improvements were determined to be best represented by assigning one item to each state. Texas was divided into regions during the development of the cost estimate.

Summaries of the annual capital cost and the annual operations and maintenance costs of the projects are shown in Exhibit 2.3-7, and 2.3-8 respectively. The annual capital costs range from a low of \$47,000 per year in Oklahoma to a high of \$927,000 per year in Texas. The annual O&M costs range from a low of \$340,000 per year in Oklahoma to a high of \$1,115,000 per year in Texas. In all of the states the total annual ITS O&M costs exceed the total annual ITS capital costs. This is due to the increased staff that is necessary to maintain the systems once implemented.

As shown in Exhibit 2.3-7, the project with the highest annual capital cost varies from one state to another. In Colorado and New Mexico, it is the deployment of trailers with incident response equipment. In Oklahoma, it is the weigh station improvements, and in Texas, it is the signal system upgrades. This is very different from the annual O&M cost data, where the additional TMC operational support is the highest cost project in all of the states, varying from 35 percent to almost 60 percent of the total annual O&M expenditure.

**Exhibit 2.3-7 Annual Capital Costs of Recommended ITS Projects
(2004 dollars in thousands)**

		CO	NM	OK	TX
Traffic Management Projects					
TM1	Signal System Upgrades	27.2	4.5	0.0	416.9
TM2	School Zone Flasher Upgrades	1.5	0.5	0.0	2.5
TM3	Traffic Monitoring Equipment	3.7	1.6	1.0	11.5
TM4	Railroad Grade Crossing Improvement	0.0	0.0	0.0	4.9
Commercial Vehicle Operations (CVO) Projects					
CV1	Weigh/Inspection Station Improvements	16.4	14.0	12.8	30.8
Emergency/Incident Management Projects					
EM1	Upgrade DOT Radio Communications Equipment	30.5	15.2	5.1	111.7
EM2	Deploy Trailers with Incident Response Equipment	33.8	16.9	5.6	124.0
EM3	Sponsor Multi-agency Incident Management Teams	See O&M Exhibit 2.3-8 for Project Costs.			
EM4	Install Oversize Mile Markers	3.5	1.0	0.5	12.1
EM5	Provide Tower Sites for Expanded Cell Phone Service	Lease costs offset any acquisition costs			
Traveler Information Systems Projects					
TI1	Install Dynamic Message Signs	14.8	4.9	0.0	73.8
TI2	Install Flashing Beacon Signs	12.0	3.6	1.2	39.6
TI3	Provide 511 System Upgrades	8.8	8.8	8.8	17.5
TI4	Provide E-mail Alert Upgrades at TMCs	8.8	8.8	8.8	17.5
TI5	Rest Area Communication Upgrades	32.5	8.1	0.0	32.5
Maintenance and Construction Management System Projects					
M1	Provide Road Weather Information Systems	10.0	3.0	3.0	31.7
M2	Provide Weather Information Processing	See O&M Exhibit 2.3-8 for Project Costs.			
M3	Work Zone Management and Construction Safety Systems	Costs are included in construction costs			
Operational Support Project					
OS1	TMC Operational Support	See O&M Exhibit 2.3-8 for Project Costs.			
Projects Funded by Other Organizations					
PFO1	Actions by CV Operating Companies	These costs are not included.			
PFO2	Actions by CVO Monitoring Agencies	These costs are not included.			
PFO3	Upgrades by Emergency Service Agencies	These costs are not included.			
TOTAL ANNUAL ITS CAPITAL COSTS PER STATE		\$203	\$91	\$47	\$927
25-YEAR TOTAL OF ANNUAL CAPITAL COSTS PER STATE		\$5,082	\$2,272	\$1,170	\$23,173

Note: Totals are in constant dollars and may not equal the sum of the individual items because of rounding.

The following comments are also reflected in these exhibits. Several of the projects are procedure oriented. These have O&M costs but no capital costs. These procedural projects include the sponsoring of multi-agency incident management teams, providing weather information processing, and the additional TMC operational support. It should also be noted that the project that will provide sites for cell phone towers shows no capital or O&M costs because it is assumed that the property acquisition costs, if any, will be repaid by long-term lease agreements with the cell phone service providers. No project or O&M costs are shown for projects to be implemented by other agencies and organizations. The costs for work zone management and construction safety systems are assumed to be incorporated in the Maintenance and Protection of Traffic or Maintenance of Traffic costs that are incorporated into the roadway construction cost estimates.

Exhibit 2.3-8 Annual Operations and Maintenance Costs of Recommended ITS Projects (2004 dollars in thousands)

		CO	NM	OK	TX
Traffic Management Projects					
TM1	Signal System Upgrades	4.9	0.8	0.0	75.4
TM2	School Zone Flasher Upgrades	2.4	0.8	0.0	4.0
TM3	Traffic Monitoring Equipment	6.1	2.1	1.1	20.3
TM4	Railroad Grade Crossing Improvement	0.0	0.0	0.0	4.0
Commercial Vehicle Operations (CVO) Projects					
CV1	Weigh/Inspection Station Improvements	8.7	8.7	8.7	8.7
Emergency/Incident Management Projects					
EM1	Upgrade DOT Radio Communications	30.0	15.0	5.0	110.0
EM2	Deploy Trailers with Incident Response	26.6	13.3	4.4	97.5
EM3	Sponsor Multi-agency Incident Management	108.0	108.0	108.0	216.0
EM4	Install Oversize Mile Markers	3.5	1.0	0.5	12.1
EM5	Provide Tower Sites for Expanded Cell Phone	Lease costs offset any acquisition costs			
Traveler Information Systems Projects					
TI1	Install Dynamic Message Signs	9.9	3.3	0.0	49.5
TI2	Install Flashing Beacon Signs	12.0	3.6	1.2	39.6
TI3	Provide 511 System Upgrades	5.6	5.6	5.6	11.3
TI4	Provide E-mail Alert Upgrades at TMCs	5.6	5.6	5.6	11.3
TI5	Rest Area Communication Upgrades	13.8	3.5	0.0	13.8
Maintenance and Construction Management System Projects					
M1	Provide Road Weather Information Systems	16.8	5.1	5.1	53.0
M2	Provide Weather Information Processing	0.6	0.6	0.6	12.0
M3	Work Zone Management and Construction Safety	Costs are included in construction costs			
Operational Support Project					
OS1	Additional TMC Operational Support	194.0	194.0	194.0	388.0
Projects Funded by Other Organizations					
PFO1	Actions by CV Operating Companies	These costs are not included.			
PFO2	Actions by CVO Monitoring Agencies	These costs are not included.			
PFO3	Procurements by Emergency Service Agencies	These costs are not included.			
TOTAL ANNUAL ITS O&M COSTS PER STATE		\$449	\$371	\$340	\$1,115
25-YEAR TOTAL OF ANNUAL ITS O&M COSTS PER STATE		\$11,215	\$9,274	\$8,497	\$27,880

Totals are in constant dollars and may not equal the sum of the individual items because of rounding.

2.3.8 ITS Implementation Plan

The purpose of this Corridor Development and Management Plan is to identify what improvements can and should be done in the Corridor. It is a preliminary planning document that will be followed by other, more detailed planning and engineering studies. The ITS plan presented in this section is similar. It identifies what can and should be done in the Corridor but does not provide the level of detail that will be produced by future ITS planning and design activities.

One of these future activities is the preparation of an ITS Implementation Plan that fulfills the requirements of the FHWA. These guidelines are indicated in the FHWA's Federal Aid Policy Guide – Part 940 Intelligent Transportation System Architecture and Standards, Section 11 Project Implementation (23 Code of Federal Regulations 940.11, 2001). These regulations have established a specific series of requirements to ensure that ITS projects are designed, built, operated and maintained in the most efficient manner possible.

In the meantime, there are several things that can and should be done to further the implementation of the Ports to Plains Corridor ITS Plan.

1. The implementation of the Regional ITS Architectures can include portions of the recommended ITS projects whenever they can be reasonably added to the construction projects.
2. Several of the recommended projects do not fall under the restrictions of the National ITS Architecture and can be implemented when suitable opportunities arise.
 - Signal system upgrades can be implemented whenever funds are available.
 - Weigh station improvements can continue to be implemented with state agreements for PrePass operations.
 - Deploying trailers with incident response equipment can proceed with available funds and equipment.
 - Multi-agency incident management teams can be formed.
 - Installing oversize mile markers can be done as an upgrade to the existing program.
 - Providing sites for expanded cell phone service can begin as soon as representatives from the DOTs can be assigned to pursue and negotiate these agreements.
 - The DOTs can supply wireless Internet access at the rest areas through agreements with the private sector.
 - Agreements can be established between the states governing the exchange of data and the co-sharing of control of DMS units.
 - The U.S. Customs and Border Protection and CVO monitoring agencies will continue to define and improve the efficiency with which movements occur across the U.S./Mexico border and the safety and security of these shipments.

- The commercial vehicle operators will also continue to do their part in signing up for automated submission of credentials information, expanding their participation in the PrePass program and improving communications between dispatchers and truck drivers.

With continued oversight by interested parties, the ITS Plan for the Ports to Plains Corridor will move toward implementation through these private sector initiatives, on-going programs of the state and federal agencies, and the potential funding that is made available through this Corridor Development and Management Plan.

2.4 Cost, Prioritization, Implementation Schedule

This portion of the report provides an overview of the methods used to develop section expansion and relief route costs estimates, prioritization of section and expansion and relief routes, and an assumed schedule of construction that will be used later in the report.

2.4.1 Cost Estimates

Data collected for this analysis consisted of:

- A windshield survey of the structures, roadway geometrics, terrain characteristics, and density of drainage crossings;
- National Bridge Inventory cross-referenced to the windshield survey;
- Cost estimates from state DOTs of projects programmed on the Corridor;
- Cost estimates from state DOTs of programmed projects that are similar to improvements proposed by Ports to Plains;
- ROW acquisition and utility relocation costs as provided by the state DOTs; and
- FHWA's "ITS Unit Costs Database."

Expansion Section Cost Estimating

Existing programmed projects were identified in the four state programs. Projects both on and off the Corridor were used to estimate costs as accurately as possible on different sections of the improved Corridor.

In Texas, two classifications of terrain were used, rolling and flat. Rolling terrain costs were used in the Del Rio and Sonora areas, where significant rock cuts and drainage crossings were observed. In Colorado, two classifications of construction were used. The first was applied to the 145 miles of the Corridor which has already been concrete "super-2'd." The Colorado "super-2" section includes two 12-foot lanes and 10-foot shoulders. On Colorado sections, where the existing road has already been "super-2'd," a cost per mile was used to add 2-lanes without reconstruction of the existing lanes. The second classification was used for sections in Colorado where there is existing asphalt. For these sections, a cost per mile was applied for full reconstruction of the existing 2-lanes and adding an additional 2-lanes. In Colorado, Oklahoma, and Texas the minimum roadway section will include 4-foot inside shoulders and 10-foot outside shoulders. In New Mexico, the minimum roadway section will include 4-foot inside shoulders and 8-foot outside shoulders. Oklahoma was treated

with the same methodology as Colorado. New Mexico provided more detailed estimates of costs through an Environmental Assessment that was submitted in May 2004 for US 64 from Raton to Clayton. These cost estimates were used for the New Mexico sections of the Corridor, pro-rated based upon the length of each section. Interchange construction costs at I-25 in Raton were added to the cost of the nearest section.

The Right-of-Way (ROW) acquisition calculations were based upon the assumption that the existing lanes are centered within the current ROW width. Then estimates were made on the additional ROW necessary for adding 2-lanes of roadway with median, shoulders, and adequate clear zones. It was assumed that the existing road will remain in its current location and that the two new lanes of roadway will be added directly parallel. Acres of additional ROW were then calculated, and acquisition costs per acre as obtained from the state DOT's were applied. Utility relocations were also approached on a per acre basis with cost per acre provided by each state DOT.

Percentage cost increases for planning, design, construction management, and administrative costs were calculated based upon construction costs. The complexity of the design and improvements was considered in the percentages applied.

Structures in the Corridor were inventoried in a Geographic Information System (GIS), then cross-checked with the National Bridge Inventory (NBI) records. Each structure was classified as requiring replacement, modification, or neither. The costs for these structure improvements were added to the per-mile calculated costs. Structure additions were estimated on a square footage basis, also taking into consideration comparable costs of similar projects within each state DOT.

Environmental mitigation costs were estimated as cost per acre and added to the overall project cost.

Relief Route Cost Estimating

Information on the cost of relief routes was obtained by surveying state DOT personnel in the area near each proposed route. Some relief routes have advanced to the planning stages and estimates generated by those planning efforts have been used. In some cases, ROW and utility relocation costs have been added; while in others project costs supplied by the state DOT are all-inclusive. Similarly, in some cases the estimates supplied by the state DOT included the planning, design, construction management, and administrative costs. If not, they are estimated on a "percentage of construction" basis, recognizing that the relief routes are significantly more complex than expanding the existing route.

Exhibits 2.4-1 and 2.4-2 reflect the total costs for expansion sections and relief routes, broken down by Corridor and by state. A full tabulation of cost estimating is provided in Appendix B.

***Exhibit 2.4-1 Expansion Sections Total Costs
(2004 dollars in millions)***

	Entire Corridor	Colorado	New Mexico	Oklahoma	Texas
Miles	755.0	197.0	79.0	40.0	439.0
Cost	\$1,896.1	\$474.7	\$1,030.3	\$141.6	\$1,149.5

Texas total includes \$10M for railroad crossings. Colorado total includes \$15.3M for railroad crossings.

Exhibit 2.4-2 Relief Routes Total Costs
(2004 dollars in millions)

	Entire Corridor	Colorado	New Mexico	Oklahoma	Texas
Miles	137.3	9.0	3.8	3.5	121.0
Cost	\$799.1	\$96.0	\$19.6	\$10.4	\$673.1

Structures Cost Estimating

The Ports to Plains Corridor contains approximately 660 structures, i.e. bridges and culverts. Approximately 430 of these structures are bridges, and 230 are culverts. During the structure investigation, the structures were separated into the following categories to better identify proposed structure improvement costs:

- Existing rail crossings that would not be improved by future relief route construction;
- Existing grade separation structures with substandard vertical clearances or shoulder widths; and
- Existing 2-lane and 4-lane bridges including those located at major interchanges.

Improvement costs for the bridges within the first two categories were computed on an individual basis and are included with the total Corridor improvements. Bridges within the remaining category were classified as Group 1 (existing 2-lane) or Group 2 (existing 4-lane) bridges. Group 2 bridges were further refined to include only those bridges determined to be structurally deficient or functionally obsolete. As a result, approximately 112 group 1 and 2 structures were identified. These structures are located on or over the Ports to Plains Corridor, as shown in Exhibit 2.4-3.

Exhibit 2.4-3 Group 1 and Group 2 Structures

Structures along the Corridor		Structures over the Corridor	
Total	109	Total	3
- Over Other roads	26	- Other roads	2
- Over Railroads	2	- Railroads	1
- Over Waterways	81		

The structures within Groups 1 and 2 were found in generally good structural condition with about three-quarters of the structures with sufficiency ratings above 80. The sufficiency rating is a function of the structure’s structural adequacy and safety, serviceability and functional obsolescence, and its essentiality for public use. Values above 80 would not qualify for any Federal Highway Bridge Replacement and Rehabilitation Program Funding.

After the sufficiency rating screening, the remaining structures had average-to-substandard structural evaluation ratings. The structural evaluation rating is a function of the Average Annual Daily Traffic (AADT) and the structures inventory bridge rating. Based on the structural evaluation

rating, fifty-six bridges had substandard bridge railings, roadway transitions, or approach roadway guardrails. Approximately 37 percent had deck widths that just meet minimum standards.

A comparison of the bridge ratings indicates that a few of these structures are posted for restrictive loads. Eighteen bridges have operating ratings less than 36 tons, which indicates the potential for posting for restrictive loads.

A more extensive discussion on the bridge inventory, structure condition, and method of obtaining an estimate of reasonable costs for the Group 1 and 2 structures are contained in Appendix B. Group 1 and 2 costs were included in the section costs and each structure and costs are shown in Appendix A.

2.4.2 Prioritization

With such a large investment required to upgrade the entire Ports to Plains Corridor to the envisioned capacity and functionality, it is important to understand priority from the standpoint of system need. The prioritization process used several criteria for ranking sections and relief routes relative to one another. The following criteria were used for ranking both expansion sections and relief routes.

Truck Average Annual Daily Traffic (AADT)

The Ports to Plains Corridor is conceptualized as a trade corridor that promotes the flow of goods both regionally and internationally. Using truck AADT allows priority to be given to sections that are expected to have a higher number of trucks. For expansion sections, both existing and forecast truck AADT were considered, while for relief routes, due to data availability, only forecast truck AADT was considered.

Accident Rate

Existing accident rates allow priority to be given to sections or cities where improvements are most needed to enhance safety.

Existing Pavement Condition

The existing pavement condition was inventoried as poor, fair, or good. Sections with a poor pavement condition receive higher priority than sections with good pavement condition, thus reflecting a priority based on drivability and safety of the roadway surface.

Intermodal Connection

As discussed in Section 2.2.3 of this report, intermodal facilities are at the forefront of increasing efficiency in the transfer and transport of goods. Roadway expansion or relief routes that support existing or planned intermodal facilities should be considered in prioritizing improvements to the system.

System Connectivity

As discussed in Section 2.2.4, system connectivity measures the ability of improvements to create a continuous and complete network of roadways that together provide for efficient movement of goods and people. The measure provides priority to projects that connect higher volume state highways and Interstates.

Total Vehicle AADT

While a primary focus of the Ports to Plains Corridor is to promote trade growth, the general motorist will also benefit from improvements. This measure accounts for all motorists, not just commercial vehicles. The data includes existing and forecast AADT.

Travel Time Savings Rate

This criterion allows existing and (forecast) future delay on the Corridor to be accounted for in prioritization. Improvements that cause greater travel time savings per mile of improvement have a higher priority for implementation.

Cost per Vehicle Mile Traveled

This measure allows cost to play a role in prioritizing improvements. The lower the cost per vehicle mile traveled, the greater the cost-effectiveness of the improvement.

Volume to Capacity Ratio

The volume to capacity ratio is a measure that allows areas with higher congestion to gain priority over areas where congestion is less of a problem. Congested roadways cause costly delays in the movement of goods and people.

Exhibits 2.4-4 and 2.4-5 show the weighting used to attach importance of these criteria for prioritization purposes. The weights were established based upon the significance of the criteria in meeting the function of the Corridor and a more detailed summary of assigned weights is shown in Appendix B.

Exhibit 2.4-4 Expansion Section Prioritization

Criteria	Weight
Truck AADT (Existing and Future)	18
Accident History Rate	16
Existing Pavement Condition	16
Intermodal Connection	12
System Connection	10
Total Forecast Vehicle AADT	8
Travel Time Savings Rate	7
Cost/Vehicle Mile	7
V/C	6

Exhibit 2.4-5 Relief Route Prioritization

Criteria	Weight
Forecast Truck AADT	20
Travel Time Savings Rate	20
Accident History Rate	16
System Connection	14
Forecast Total Vehicle AADT	12
Intermodal Connection	9
Cost/Vehicle Mile	9

After the sections and relief routes were given a priority scoring, they were sorted into “groups” of improvements (A,B,C,D). Expansion sections were sorted into four groups, and relief routes were sorted into three groups. The top group contains the highest priority projects according to the criteria listed above. The bottom group contains the projects with the lowest priority.

2.4.3 Implementation Schedule

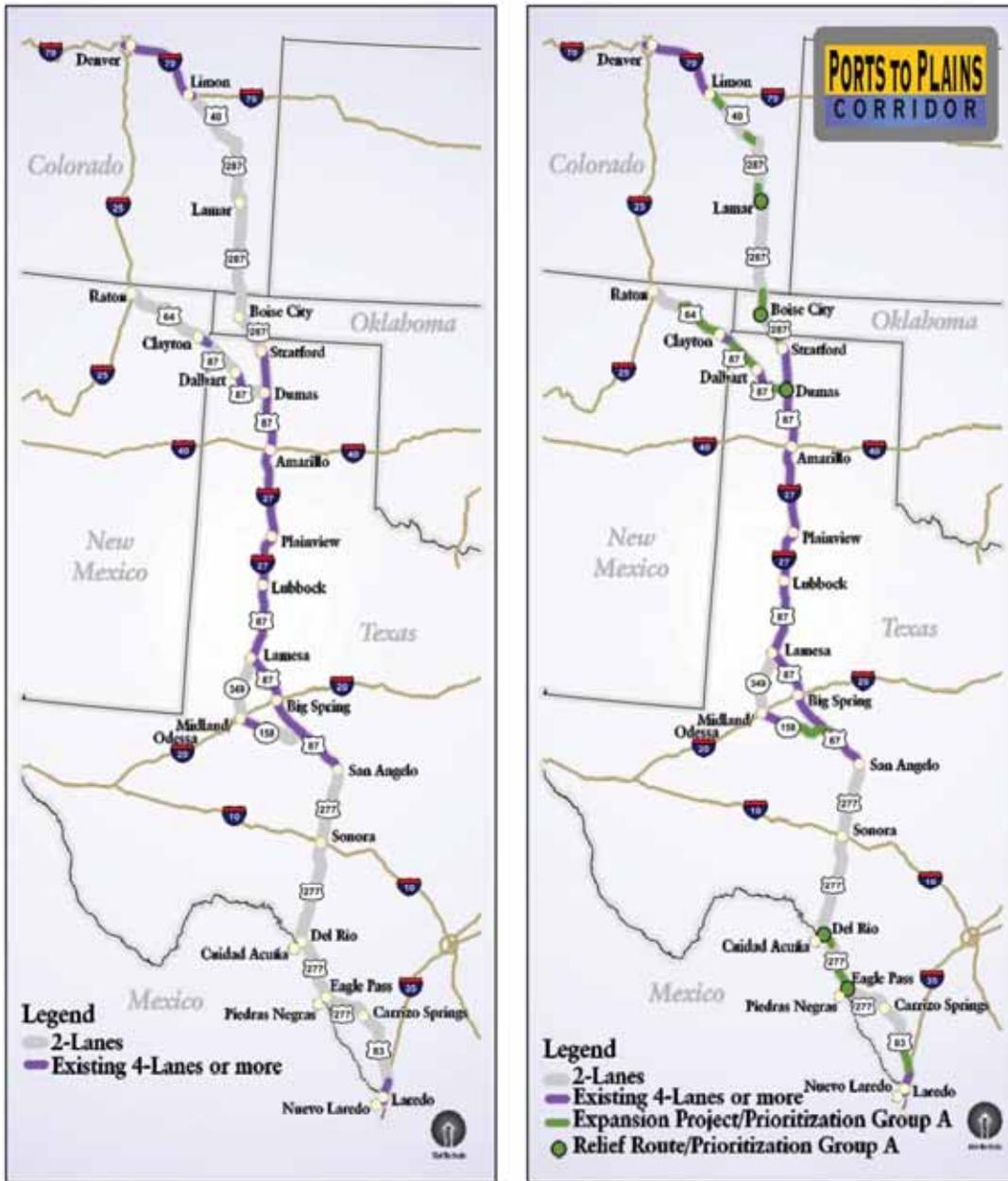
The criteria described above for the engineering prioritization process address only engineering and operational concepts. An additional step was necessary to develop an implementation schedule for expansion sections and relief routes. The implementation schedule is based on a 2025 build-out of all expansion sections and relief routes. Therefore, four scheduling periods were used to plan the construction of the Corridor. These periods are 2005-2010, 2011-2015, 2016-2020, and 2021-2025.

To develop the implementation schedule, existing programmed sections and relief routes were identified in State Transportation Improvement Programs and local Capital Improvement Programs. These projects were assigned to the Ports to Plains implementation schedule based upon the funded dates from the corresponding budgeted programs. The engineering ranking was then used to complete the schedule, assuming that each scheduling period should be of similar funding magnitude. Exhibit 2.4-6 shows the Corridor implementation beginning with existing conditions and ending with a completed Corridor. Further information regarding the timing of all recommended Corridor improvement elements and considerations can be found in the Financial Plan in Chapter 6 of this document.

In addition, information sheets found in Appendix A provide a complete inventory of section and relief route details. They are organized by state from south to north. Each section terminates where the roadway intersects a relief route start or end point, intersects a town, or crosses a state or county line.

Exhibit 2.4-6 Corridor Improvement Implementation Plan

Corridor Development Plan: Study Recommendations



Existing (2004)

Group-A (2005-2010)

1. The corridor Development Plan shown is part of the Ports to Plains Corridor Development and Management Plan, and is not necessarily an indication of State DOT programmed projects.
2. Relief Route construction may include initial 2-lane facilities, followed by 4-lane construction by corridor completion.

Corridor Development Plan: Study Recommendations



Group-B (2011-2015)

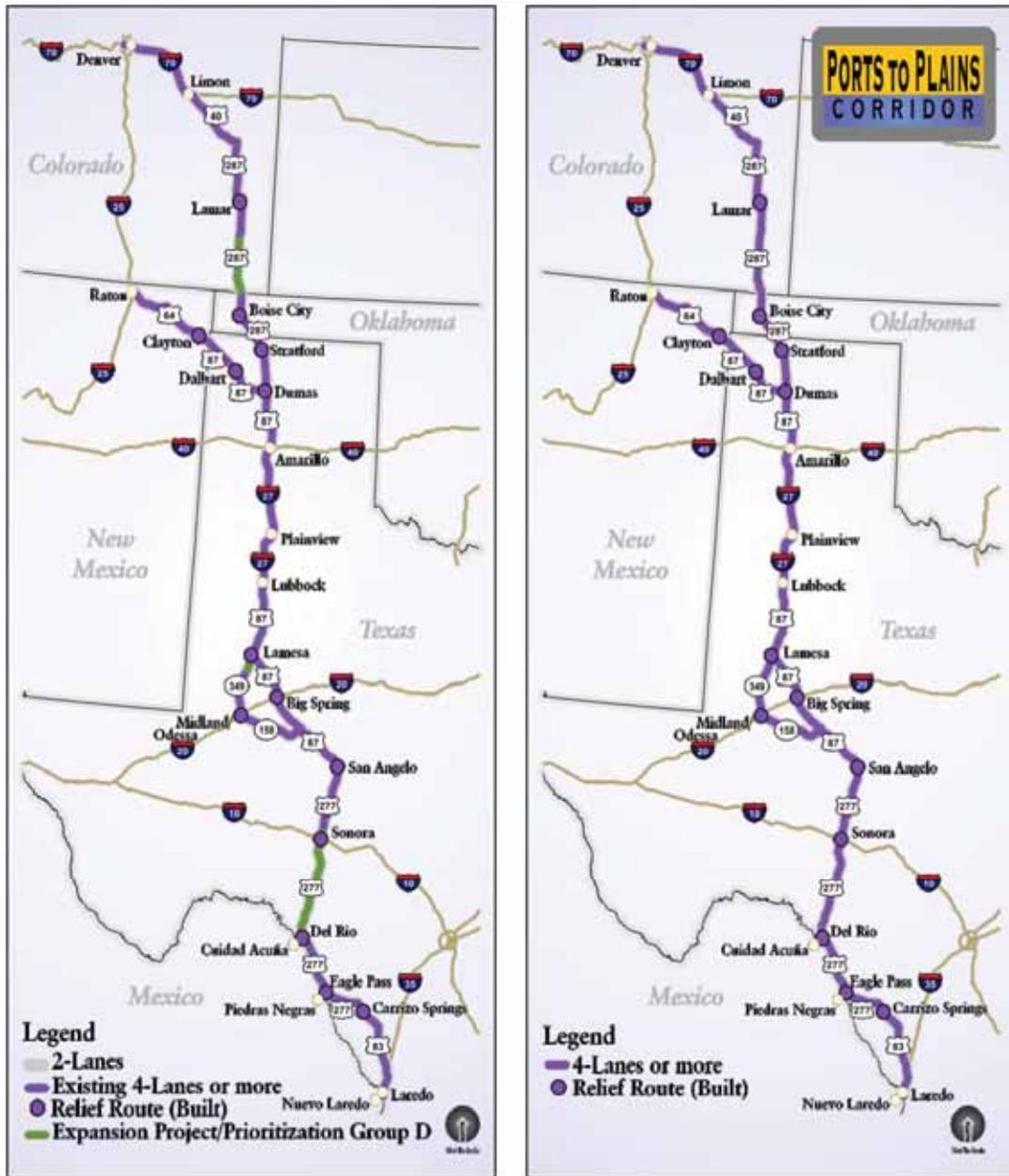


Group-C (2016-2020)

1. The corridor Development Plan shown is part of the Ports to Plains Corridor Development and Management Plan, and is not necessarily an indication of State DOT programmed projects.
2. Relief Route construction may include initial 2-lane facilities, followed by 4-lane construction by corridor completion.

Exhibit 2.4-6 Corridor Improvement Implementation Plan (continued)

Corridor Development Plan: Study Recommendation



Group-D (2021-2025)

Complete

1. The corridor Development Plan shown is part of the Ports to Plains Corridor Development and Management Plan, and is not necessarily an indication of State DOT programmed projects.
2. Relief Route construction may include initial 2-lane facilities, followed by 4-lane construction by corridor completion.

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CHAPTER 3

Environmental Considerations

Key Concepts:

- *Individual corridor development projects will be required to meet various state and federal environmental regulations. The required detailed assessment is underway on certain sections where individual projects are about to be undertaken.*
- *The CDMP is only a scan of environmental features and issues along the Corridor. Various key features are inventoried and mapped.*
- *Potential impacts to the environment as the result of improvements are discussed along with available methods for mitigation when avoidance may not be possible.*



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3 ENVIRONMENTAL CONDITIONS

3.1 Introduction

This chapter describes in general terms the environmental elements that have been inventoried in this study along the Corridor sections where construction will occur in the future. The topics include: major rivers, streams, and reservoirs; wetlands; riparian habitats; floodplains; protected species, threatened or endangered; air quality; cultural resources; low-income and minority populations; noise; potential relocations; public lands and community facilities; irrigated farmlands; induced growth and cumulative impacts; and hazardous materials.

Methodology

The screening inventory in this Corridor Development and Management Plan (CDMP) is being done only to assist future project staff determine the level of effort required to complete detailed environmental studies under the National Environmental Policy Act of 1969, as amended (NEPA). It begins by identifying areas of potential concern, areas of environmental complexity that may lengthen a NEPA process, and provides data for estimating the magnitude of costs associated with potential environmental mitigation. With the exception of photos taken along the Corridor, no field work was completed to identify the resources or hazards listed. All of the data collected were available from existing sources in a readily usable format, and no new prediction models or forecasts were developed.

The overall project Corridor has been divided into 41 "project" sections and 15 relief routes. The project sections in this document were established for geographic convenience and primarily for purposes of identifying the likely project sponsors and funding agencies as well as for cost estimation. To meet the requirement for federal and state funding under NEPA, programmatic activities must be undertaken and logical termini for projects must be established according to the federal guidelines and local agreements among the affected agencies. Logical termini are discussed in greater detail below. In the future, each section and relief route must undergo a detailed environmental study according to established federal and state environmental policies and practices. Existing data presented here will need to be confirmed and new data collected on each resource. Electronic data from various sources were directly downloaded into the Ports to Plains Geographic Information System (GIS) database. This included such data as state and county boundaries, cities and towns, highways and roads, watersheds, National Land Cover Data (NLCD) wetlands, major rivers/streams, and the availability of Federal Emergency Management Agency (FEMA) floodplain designations. Data provided on paper or by Internet were studied, and notes were entered into a master matrix of environmental conditions for each section proposed for a construction project (widening or relief route).

In addition to the data sources discussed above, a review and summarization of existing and currently approved environmental documents, documents in progress (where available), and environmental information from other studies (e.g., route studies, and community and regional plans) pertinent to the Ports to Plains CDMP were conducted. Information in these documents will be used to supplement data collected and to ensure compatibility of this study with other projects and plans affecting the Ports to Plains Corridor. NEPA also encourages reference to such documents.

The documents consulted as part of this study are listed below.

- ◆ Ports to Plains Feasibility Study, Project Steering Committee (Texas Department of Transportation, Oklahoma Department of Transportation, New Mexico Highway and Transportation Department, and Colorado Department of Transportation), June 30, 2001.
- ◆ US Highway 64-87 Environmental Assessment (DRAFT), Raton to Clayton, Colfax and Union counties, New Mexico Department of Transportation (formerly New Mexico Highway and Transportation Department), May 2004. Finding of No Significant Impact signed October 26, 2004.
- ◆ Eagle Pass Outer Loop Environmental Assessment, Texas Department of Transportation, November 1999.
- ◆ US Highway 287 at Lamar Environmental Assessment, Colorado Department of Transportation (CDOT), in progress and under CDOT review.
- ◆ Lamesa Route Study, Texas Department of Transportation, February 2002.
- ◆ I-70 East Corridor Environmental Impact Statement, Colorado Department of Transportation (CDOT), in progress, to be completed in 2005, www.i-70eastcorridor.com.
- ◆ Laredo 2025 Metropolitan Transportation Plan, Laredo Metropolitan Planning Organization (MPO), November 2003.
- ◆ US 50 Corridor Pueblo to Kansas--Corridor Selection Study, Colorado Department of Transportation (CDOT), September 2003.
- ◆ I-69/Trans-Texas Corridor Study (Tiered Environmental Impact Statement; 1,000 miles in Texas from Louisiana to Laredo), draft in progress to be completed in 2007, www.i69corridorstudy.com.

Summaries of these documents are provided in Appendix B, Section 3.1. Appendix B, Section 3.2 documents coordination with federal and state agencies in the preparation of this report and summarizes the responses received to date. Appendix B, Section 3.3 provides sources of information collected for the study on each of the environmental topics or elements.

3.1.1 Use of Data

In each case it is important to remember that all environmental reviews of sections of the Ports to Plains Corridor will follow the guidelines and requirements of each state during design and permitting activities. In addition, the information provided here is not the final comprehensive environmental document for this Corridor.

3.1.2 National Historic Preservation Act

Each section will undergo its own study; only then can determinations be made regarding the complete environmental inventory, potential impacts, compliance with the National Historic Preservation Act (NHPA) of 1966 (16 USC 470), Section 106 and NEPA documentation compliance. Section 106 of the NHPA requires federal agencies to "take into account" the effects of their actions on "historic properties"—that is, "districts, sites, buildings, structures, and objects included in or eligible for the National Register of Historic Places." The National Register is a list of known significant historic places in the United States, Puerto Rico, Guam, American Samoa, the

Commonwealth of the Northern Marianas, the Federated States of Micronesia, and the Republics of Palau and the Northern Mariana Islands. Section 106 is implemented by following regulations issued by the Advisory Council on Historic Preservation. Cultural resources and Section 106 are discussed in more detail in section 3.2.6.

3.1.3 NEPA Processes

The approach to funding the various sections of the Corridor, which is sometimes the key to determining how NEPA is administered, is presented in Chapter 6. Many funding options involving the use of federal, state and private funds are being considered. The use of federal funds for the construction of a project would require compliance with NEPA regulations. However, the specific level of required NEPA review is dependent on the action itself and collaboration between the lead state agency and the Federal Highway Administration (FHWA) or other federal funding agency. These levels, from most to least detailed, are Environmental Impact Statement (EIS), Environmental Assessment (EA) and Categorical Exclusion (CE).

The type of federal funding and the federal agency administering the funds frequently determine the lead federal agency in the NEPA process. For example, if federal highway trust funds are used, then FHWA is typically the lead federal agency. In addition, some Ports to Plains projects may require federal permits or approvals, and the types of federal permits and approvals required will help determine the level of environmental compliance required. Some federal authorizations, such as the U.S. Army Corps of Engineers (USACE) Section 404 permit, which allows the discharge of dredged and fill material into waters of the United States, are considered a major federal action and could trigger a NEPA action. Further, some sections of the Corridor may require the use, either temporary or permanent, of federal land or property, such as National Forest lands. In these cases, the granting of the federal right-of-way could trigger an environmental review, resulting in a NEPA action. Descriptions of the NEPA actions, from the most to the least complex, follow.

Environmental Impact Statement (EIS)

An EIS is required when an action is likely to have significant effects on the environment. Such actions could include a new controlled-access freeway, a highway project of four or more lanes on a new alignment, or new construction or extension of fixed-rail, transit facilities. These types of actions require a Record of Decision (ROD). A Draft EIS is prepared, and then a Final EIS is produced to address comments on the draft. A ROD, prepared after the Final EIS, for signature by the participating state(s) and the FHWA, then presents the basis for the decision, summarizes any mitigation measures, and documents Section 4(f) approval requirements. Section 4(f) of the U.S. Department of Transportation Act of 1966 (23 USC 138; 49 USC 1653) protects public parks and recreational lands, wildlife habitat, and historic sites of national, state, or local significance from acquisition and conversion to transportation use. Section 4(f) is discussed in more detail in Section 3.2.13.

Environmental Assessment (EA)

An EA is completed when the significance of the environmental impacts of a proposed action is unclear. An EA determines whether an action that is not clearly eligible for a CE needs an EIS. Following completion of an EA, the state department of transportation (DOT) and FHWA adopt a "Finding of No Significant Impact" (FONSI) if FHWA determines that "no significant impact" is created

by the action. On the other hand, if significant impacts are determined to be unavoidable, an EIS is then prepared.

Categorical Exclusion (CE)

A CE is completed for actions that do not individually or cumulatively have a significant environmental effect. Projects that may in some cases be documented with a CE include pedestrian facilities, landscaping and routine maintenance. The approval of the CE depends on each state DOT's agreement with FHWA (if federal funding is involved). Some types of CE projects are programmatic, which means that FHWA approval is not needed. Non-programmatic CE projects require state DOT and FHWA approval.

3.1.4 Determining NEPA Class of Action

The determination of the NEPA "class of action" presented here is in accordance with FHWA's guidance document ("Guidance for Preparing and Processing Environmental and Section 4(f) Documents"--FHWA Technical Advisory T6640.8A, October 30, 1987). In general, the class of action suggested below is based on the following assumptions:

- The Ports to Plains Corridor relief routes are typically being planned in new locations but may or may not require an EIS. Construction on a new alignment typically requires an EIS, though an EA may determine that impacts are not significant. Relief routes that have been or are about to be cleared under the NEPA process have all been documented under EAs. The relief routes are discussed individually in Appendix A.
- Areas of widening from two to four lanes will typically require an EA, unless preliminary study shows that potential impacts are very low or unlikely, in which case a CE can be prepared. Each section proposed for widening is discussed individually in Appendix A.
- Most Intelligent Transportation Systems (ITS) and signage projects can be cleared with a CE.
- Construction of rest areas will be cleared under either an EA or a CE.
- Construction of intermodal facilities, if privately funded, will not require a NEPA document. However, they will necessitate NEPA action if they require a USACE permit, U.S. Forest Service (USFS) or Bureau of Land Management (BLM) land transfer or permission, or clearance under the Endangered Species Act, or if there is any other federal agency involvement. If state or federal funds are involved, an EA will be the likely NEPA document for clearance of these facilities. If unavoidable significant impacts are found, however, an EIS will be required.

3.1.5 Logical Termini

Logical termini for project development are defined as (1) rational end points for a transportation improvement, and (2) rational end points for a review of the environmental impacts. The environmental impact review frequently covers a broader geographic area than the limits of the transportation improvements. In the past, the most common termini have been points of major traffic generation, especially intersecting roadways. This is because in most cases traffic generators determine the size and type of facility being proposed. In this report, however, the termini of the sections are frequently based on political boundaries such as county lines and state lines, where the

funding of the sections could be an issue. These artificial boundaries are not necessarily the most logical from an environmental standpoint. For example, the US 277 (2 new lanes) from Carrizo Springs Relief Route to Dimmit/Maverick county line and the US 277 (2 new lanes) from Dimmit/Maverick county line to Eagle Pass Relief Route sections might logically be combined for environmental study, even though they cross county lines. As individual construction projects are developed, each state DOT will coordinate with the appropriate FHWA office(s) in establishing logical termini for NEPA purposes.

3.2 Key Environmental Elements, Impacts, and Mitigations

This section presents the key environmental elements that were inventoried by this study, the types of impacts that could occur during construction and long-term operation and maintenance of the Ports to Plains Corridor facilities, and the types of mitigations that are available for each element. It also includes maps of the Ports to Plains Corridor, illustrating which sections were found to have known environmental elements in each topic area or the potential for an impact to that element to occur.

3.2.1 Surface Water Resources

Growing public awareness and concern for controlling water pollution led to enactment of the Federal Water Pollution Control Act Amendments of 1972. As amended in 1977, this law became commonly known as the Clean Water Act. This act is applicable to many of the water resources discussed below. Section 404 of this act provides regulatory authority to the USACE to issue or deny permits for the discharge of dredged or fill material into waters of the United States. Early discussions with the USACE will help to determine whether an EA or EIS is the appropriate NEPA action for each section.

Surface waters in the Corridor are located in many watersheds, and water quality and quantity are monitored by a number of federal and state agencies. Watersheds that the Corridor traverses are shown in Exhibit 3.2-1A and Exhibit 3.2.1B, Watersheds and Major Rivers.

Major Rivers

The Corridor crosses several major rivers and tributaries, such as branches of the Concho River, Devils River, Cimarron River, and Arkansas River. Some have been dammed to create reservoirs, such as the John Martin Reservoir on the Arkansas River west of Lamar and the Amistad Reservoir north of Del Rio. The Amistad Reservoir, which is part of the Amistad National Recreation Area, is at the convergence of the Rio Grande, Devils, and Pecos rivers. Besides being of great importance in the Corridor as a source of water for consumption and irrigation, these surface waters are an important habitat for waterfowl, fish and other species.

Exhibit 3.2-1A South Watersheds and Major Rivers

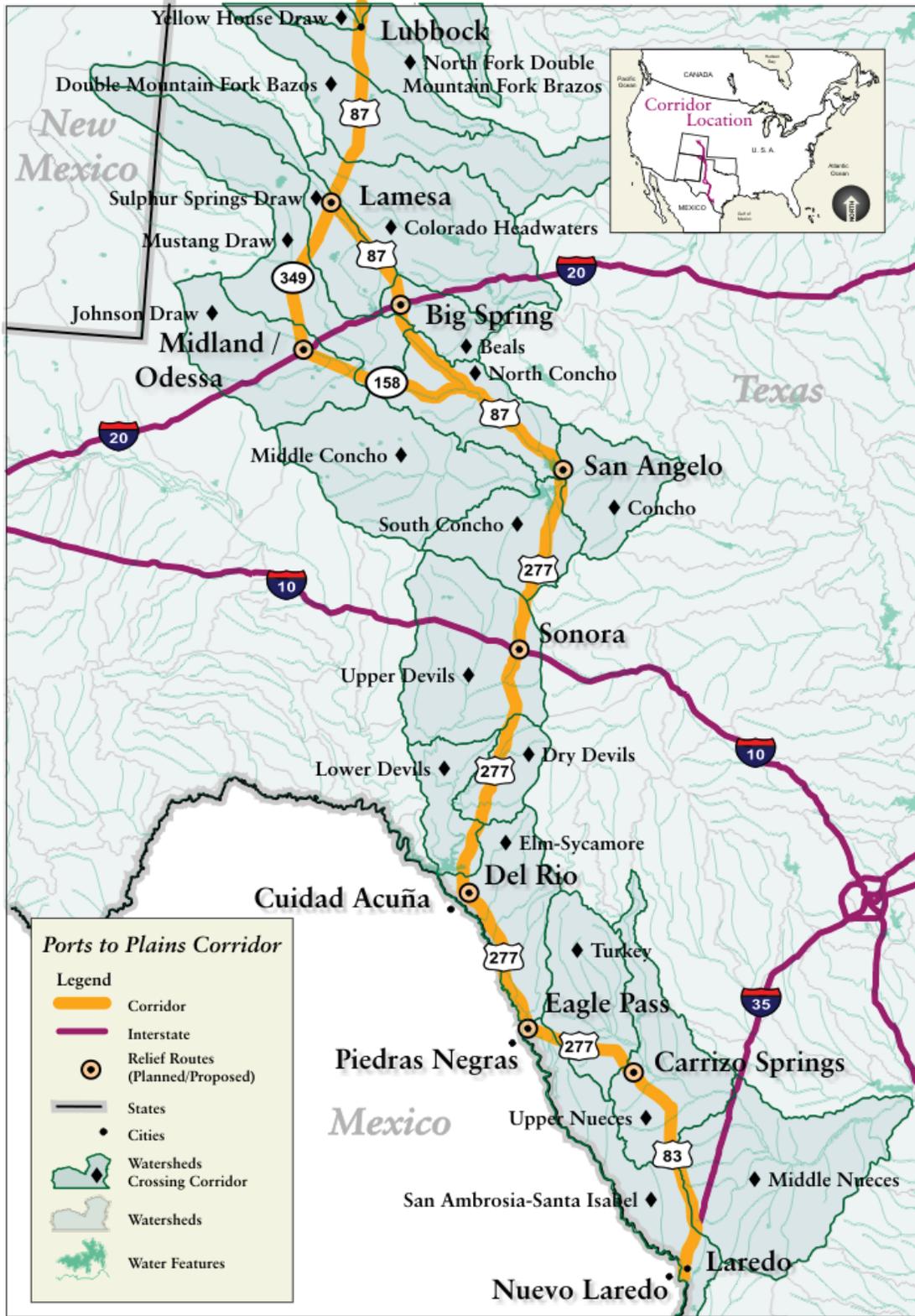


Exhibit 3.2-1B North Watersheds and Major Rivers



USACE made special note of the crossing of the Canadian River in Texas, because the wetlands and riparian corridors are high-priority fish and wildlife habitat and resources of national concern. In addition, USACE drew special attention to Colorado tributaries of the Platte River because of the importance of this river to wildlife, particularly for critical habitats in Nebraska.

Special Status Streams

Several rivers and creeks along the Corridor in Texas are designated by the state as Ecologically Unique River and Stream Segments for their roles in local ecosystems. As a result of the passage of Senate Bill 1 in 1997, water planning in Texas became the domain of regional planning groups rather than the Texas Water Development Board. Each regional planning group may include recommendations for the designation of such segments in its adopted regional water plan, based on the following criteria: biological function, hydrologic function, riparian conservation areas, high water quality/exceptional aquatic life/high aesthetic value, and threatened or endangered species/unique communities.

Watercourses in the Corridor containing Ecologically Unique River and Stream Segments include Las Moras Creek, Pinto Creek, Sycamore Creek, Rita Blanca Creek, San Felipe Creek, and the Concho River. Sections that cross Ecologically Unique River and Stream Segments in Texas and sections that cross other rivers meriting special attention are shown on Exhibit 3.2-2. Sections with Special Status Rivers and Streams are listed in Exhibit 3.4-1 Environmental Considerations Summary Table. Detailed information regarding each section can be found in Appendix A.

Mitigation

Adverse impacts to water resources may consist of short-term damage caused by construction activities or long-term/permanent damage, i.e., removal or degradation of the resources. Construction mitigation focuses on best management practices. These would include measures to control erosion, sedimentation and stormwater runoff, and retain and filter stormwater in accordance with state and local requirements. Other measures could include minimizing the clearing of vegetation, controlling erosion by promptly seeding to stabilize exposed areas, constructing stormwater basins, and installing silt fences. Long-term mitigation focuses on maintenance of surface water quality, both locally and within the watershed. However, the first level of mitigation is always avoidance—commitment to avoidance in designing projects and construction practices that, where possible, avoid the resources before proposing minimizing or mitigating of impacts.

Surface Water Quality Mitigation

Prior to construction, a project sediment and erosion control plan will need to be prepared and submitted for the approval of the state environmental quality office (or similar agency) and local jurisdictions. Erosion and sediment control measures during construction, such as those prescribed in best management practices, will minimize surface water impacts.

Stormwater management regulations administered by state DOTs typically require that there be no net increase in peak discharge above predevelopment conditions. State-mandated best management practices for engineering, stormwater management, and erosion control will need to be implemented to retain and renovate stormwater, and to minimize potential effects on wetlands and streams in conjunction with DOT requirements. Use of best management practices minimizes clearing, controls erosion and stabilizes exposed areas.

Exhibit 3.2-2 Sections and Relief Routes with Special Status Rivers and Streams



Bridges that span a concrete-lined creek, tributary, canal or drainage ditch will have no permanent effects, so mitigation will not be required. However, if any natural-bottomed stream is converted to culverts or pipes, long-term impacts will require mitigation, such as stormwater retrofits within the watershed of the affected stream, riparian buffers planted near the affected area, or enhancements to aquatic habitats.

Mitigation of Impacts to Critical Areas

The Environmentally Unique River and Stream Segments in Texas provide some level of protection for these critical water resources, several of which are crossed by Ports to Plains Corridor sections and relief routes. In most cases, the proposed roadway crossings will not alter the course, current, or cross-section of the streams. During the design phase of each affected section, coordination with the Texas Parks and Wildlife Department (TPWD) and the USACE will be required to ensure that roadway designs are consistent with each agency's policies for protection of water quality and habitat along these rivers and that protected species associated with these waters are not harmed. Furthermore, the design teams will need to coordinate with TPWD regarding any necessary mitigation.

Coordination with the USACE, U.S. Fish and Wildlife Service (USFWS), and appropriate state agencies is also important in regard to the Canadian River and the Platte River and its tributaries to protect their associated wetlands, riparian corridors, wildlife resources and water quality.

3.2.2 Wetlands

Two federal agencies oversee wetland issues. The Natural Resources Conservation Service (NRCS) has jurisdiction over wetlands on "Agricultural Lands." The USACE has jurisdiction over "waters of the United States, including wetlands." Additionally, the U.S. Fish and Wildlife Service (USFWS) has jurisdiction over wetlands provided through their easement program. "Jurisdictional wetlands" are those that fall under state or federal regulatory authority.

Wetlands are classified by the USFWS in a hierarchical method that includes five systems, many subsystems, and numerous classes, which are explained in the Classification of Wetlands and Deepwater Habitats of the United States (Cowardin 1979). Wetlands include swamps, marshes, and bogs, and are generally defined as areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Section 404 provides regulatory authority to the USACE to issue or deny permits for the discharge of dredged or fill material into waters of the United States, including special aquatic sites (e.g., wetlands, mud flats and vegetated shallows). The inventory in this plan focuses on wetlands shown on National Wetland Inventory (NWI) maps, and contains three broad categories: palustrine wetlands, riverine wetlands, and a few lacustrine wetlands.

Palustrine wetlands include the following types:

- Forested wetlands, often called swamps or wooded wetlands, are where trees are the dominant plants. These often resemble the neighboring upland areas but include wetland plants in the understory.
- Scrub-shrub wetlands are characterized by low-growing, woody plants and may include harvested forest areas that are regenerating.

- Emergent wetlands have objects or organisms that are partly in water and partly exposed, such as plants that are rooted in water but whose upper parts are above the water or floating. Emergent wetland vegetation includes erect, rooted, herbaceous plants such as sedges, rushes, and grasses.

A special subset of palustrine wetlands (not lacustrine) along the Corridor is the “playa lake.” These isolated wetlands are circular depressions typically less than 1 mile in diameter and less than 60 feet deep, which cover large areas of the High Plains region and contribute to the recharge of the Ogallala aquifer. They protect water quality by filtering and retaining freshwater runoff and associated pollutants from adjacent roads and developed properties. They are also valuable habitat for migrating and nesting waterfowl, aquatic species, and terrestrial wildlife. However, in the arid portions of this Corridor, the geological depressions known as playas rarely have water or vegetation even if they were not generally under cultivation and have not functioned as true playas for most of the historic period. While isolated wetlands are not regulated or part of the USACE permitting process, it is usually recommended that all wetland areas be identified and that isolated wetlands be protected and mitigated to the same extent as jurisdictional wetlands. Thus, exact wetland impacts to playas are specific to each project with the state highway agency coordinating with the USACE and other appropriate federal and state agencies.

Portions of perennial streams and their tributaries are riverine wetland. Wetlands in this inventory also include a combination of forested, scrub-shrub and emergent wetlands, and any hydrologically connected streams or tributaries.

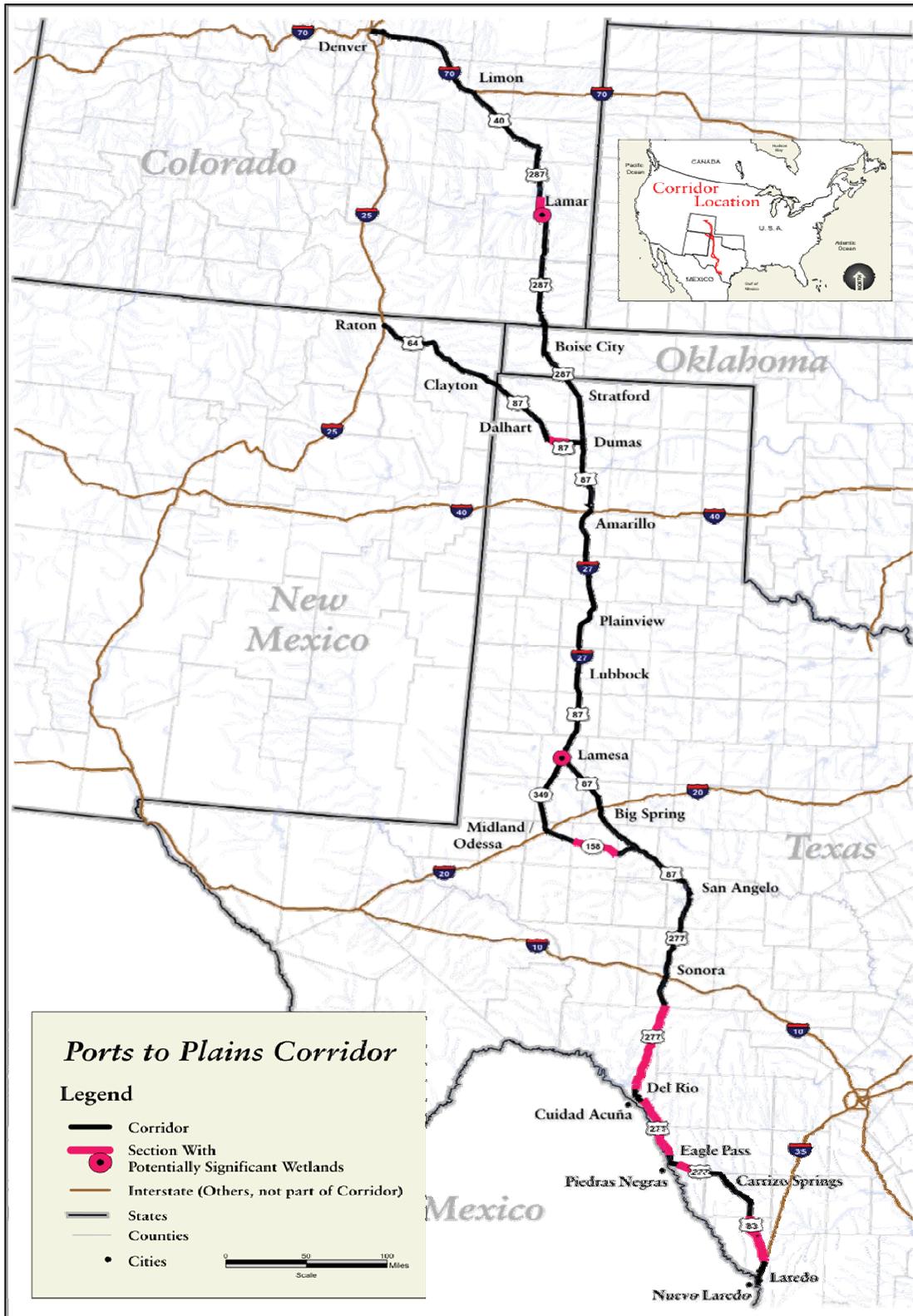
Another type of wetland is Lacustrine and are associated with lakes and reservoirs.

Wetlands are habitats of primary importance for wildlife along the Ports to Plains Corridor, including mammals, birds, amphibians, reptiles and invertebrates. In some areas, livestock grazing and farming of the wetlands have decreased their habitat value and thus threatened the viability of some wildlife species.

Sections with Potentially Significant Wetlands

Exhibit 3.2-3 Sections and Relief Routes with a High Potential for Wetland Impacts and Exhibit 3.4-1 Environmental Consideration Summary Table show which sections and relief routes have the potential to impact a high amount of wetlands. It is important to note that in most cases, the wetlands can probably be avoided and that riverine wetlands can typically be bridged with minimal impacts, if any. However, the purpose of identifying these sections is to raise awareness of the potential for impacts early. Detailed information regarding each section can be found in Appendix A.

Exhibit 3.2-3 Sections and Relief Routes with a High Potential for Wetland Impacts



Mitigation of Impacts to Wetlands

Appropriate and practicable mitigation is required for unavoidable adverse impacts to wetland resources. The functional values lost by the affected resource must be considered in developing the mitigation plan. While no engineering plans have been done by which to assess wetland impacts for most sections and relief routes of the Ports to Plains Corridor, it is likely that complete avoidance of impacts to waters of the United States, including wetlands, is not practicable in many cases due to the wetlands' proximity to the existing roadways being widened and other constraints present along proposed relief route alignments. In addition, minor impacts could occur from bridge support piers and stormwater management outfalls.

Restoration or creation of wetlands and waterways to compensate for the loss of wetland and waterway functions and values is the final step in the wetland mitigation process. Where practicable, mitigation should take place in locations adjacent or contiguous to the impacted area. If on-site mitigation is not practicable, off-site mitigation should be undertaken in the same watershed, if possible. The following mitigation measures are typically available:

- Restoration of wetlands;
- Creation of new wetlands;
- High-ratio enhancement of degraded wetlands (3 acres or more of enhancement to 1 acre of impact rather than a 1 to 1 ratio);
- High-ratio (such as 3 to 1) preservation of existing wetland and adjacent buffers; or
- Restoration of degraded stream channels, where applicable.

The USACE provides guidance on appropriate replacement ratios for restoration and creation, based on the goal of no lost function. Mitigation "banking" is also used in some cases. Mitigation banking is the restoration, creation, enhancement, and sometimes preservation of wetlands or other aquatic resources, expressly for the purpose of providing compensatory mitigation in advance of authorized impacts to similar resources.

3.2.3 Floodplains

Floodplains are low-lying areas subject to flooding from time to time that can present a hazard where structures encroach upon them, blocking the flow of water during a storm event. Most floodplains in the Corridor are adjacent to streams and lakes, although almost any area can flood under the right circumstances. According to the Federal Emergency Management Agency (FEMA), the 100-year floodplain refers to the areas along or adjacent to a stream or body of water that are capable of storing or conveying floodwaters during a storm expected to occur once every 100 years.

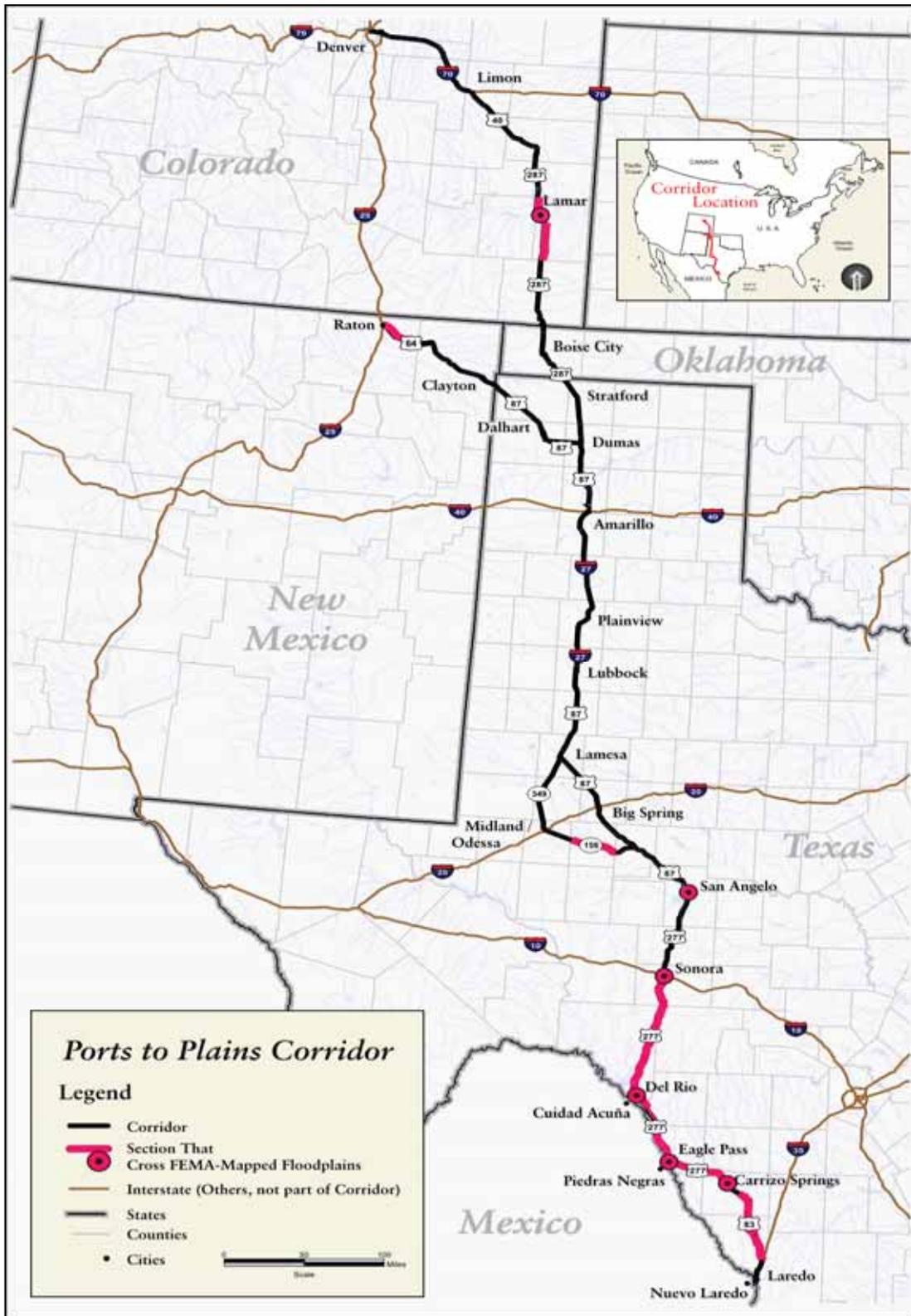
Development in a floodplain is regulated at federal, state, and local levels. Of particular importance to this Corridor are the floodplains of the Arkansas River in Colorado, and the Dry Devils (and its tributaries) and Rio Grande rivers in Texas. Many of the rivers and streams along the Corridor have not been mapped by FEMA for Flood Insurance Rate Maps.

The Ports to Plains sections and relief routes that have mapped floodplains typically have floodplains designated Zone A, Zone AE, Zone X, and Zone X shaded. FEMA defines these as shown below;

- Zone A is the flood insurance rate zone that corresponds to the 1 percent annual chance floodplains that are determined in the Flood Insurance Study by approximate methods of analysis. Because detailed hydraulic analyses are not performed for such areas, no Base Flood Elevations or depths are shown within this zone. Mandatory flood insurance purchase requirements apply.
- Zone AE is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by detailed methods. In most instances, Base Flood Elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone. Mandatory flood insurance purchase requirements apply.
- Zone X is the flood insurance rate zone that corresponds to areas outside the 1-percent annual chance floodplain, areas of 1-percent annual chance sheet flow flooding where average depths are less than 1 foot, areas of 1-percent annual chance stream flooding where the contributing drainage area is less than 1 square mile, or areas protected from the 1-percent annual chance flood by levees. No Base Flood Elevations or depths are shown within this zone. Insurance purchase is not required in these zones.
- Zone X shaded is the flood insurance rate zone that corresponds to areas of 0.2 percent chance flood in any given year, areas of the 1 percent chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile, and areas protected by levee from the 1 percent chance flood. No Base Flood Elevations are shown within this zone. Insurance purchase is not required in these zones.

Sections and relief routes that cross FEMA-mapped floodplains are shown on Exhibit 3.2-4 as well as listed in Exhibit 3.4-1 Environmental Consideration Summary Table. Detailed information regarding each section can be found in Appendix A.

Exhibit 3.2-4 Sections and Relief Routes that Cross FEMA-Mapped Floodplains



Mitigation of Impacts to Floodplains

Development in a floodplain is regulated at the federal, state, and local levels. Executive Order 11988, Floodplain Management of May 24, 1977, and the National Flood Insurance Act of 1968, as amended, require federally funded projects to avoid or minimize encroachment within a 100-year floodplain, where practicable. For transportation projects, the U.S. Department of Transportation established policies and procedures (U.S. Department of Transportation Order 5650.2, "Floodplain Management and Protection," April 23, 1979) to ensure that adequate consideration is given to avoiding and mitigating floodplain impacts. In future stages of Ports to Plains Corridor development, plans will need to be reviewed with the applicable agencies, and all facilities located within floodplains will need to be designed to comply with federal, state and local regulations. Roadway facilities proposed to be located within floodplains must be designed to prevent changes of 1 foot or more in base floodplain elevations.

3.2.4 Riparian Habitat

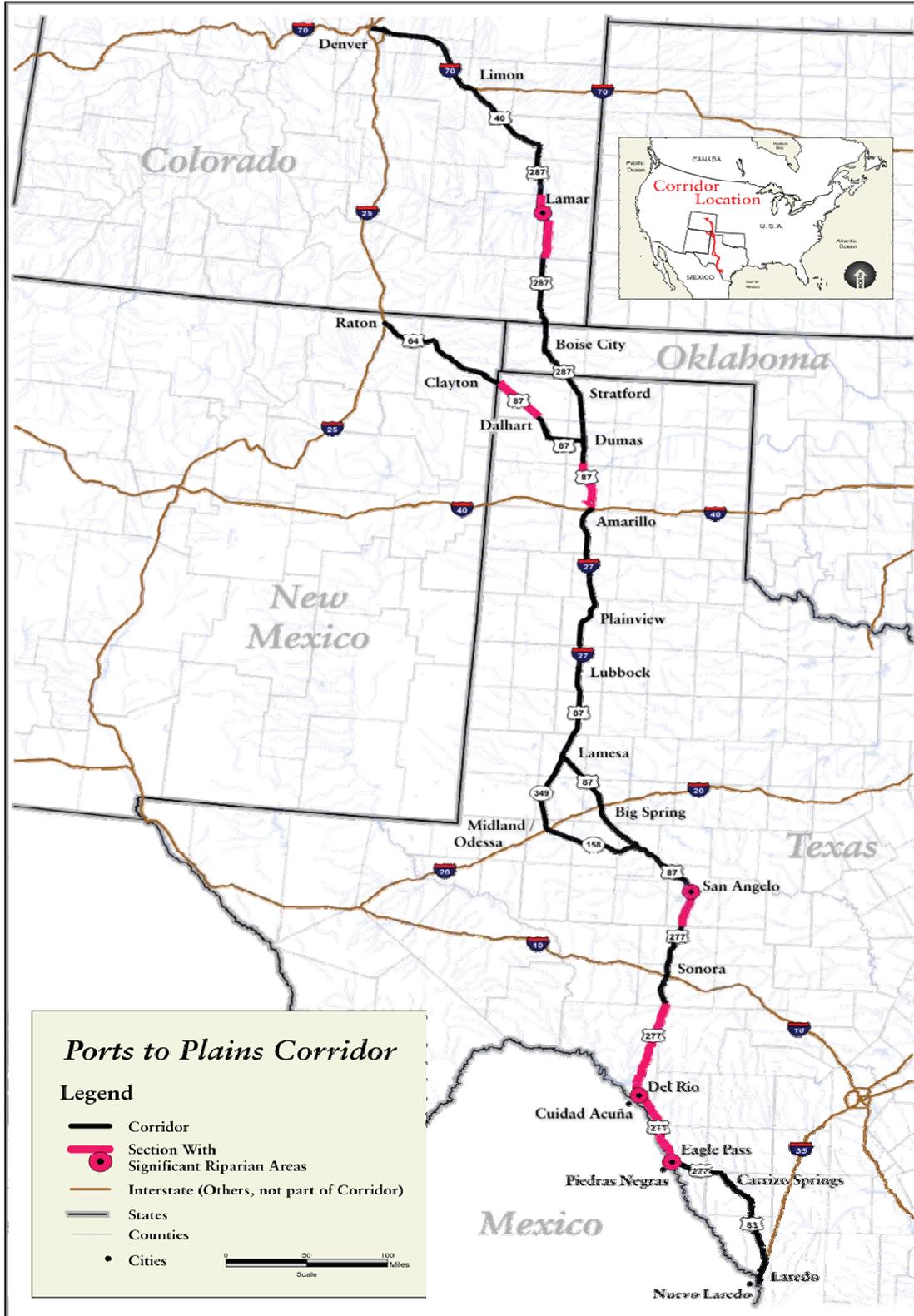
Riparian areas are widely recognized for the significant and diverse roles they play in the landscape. They are typically associated with rivers, streams, lakes and their floodplains, but can also occur along irrigation and drainage channels. They are high quality wildlife habitat, providing water, cover, and diverse nesting and living environments.

Numerous wildlife species, including a variety of mammals, birds, amphibians, reptiles and invertebrates, rely on the riparian habitats within numerous sections and relief routes of the Ports to Plains Corridor. The sections and relief routes shown in Exhibit 3.2-5 Sections with Significant Riparian Areas and listed in Exhibit 3.4-1 Environmental Consideration Summary Table are those that, in addition to other riparian crossings, include the several rivers and creeks in Texas designated as Ecologically Unique River and Stream Segments for their roles in local ecosystems, and the Canadian River.

Mitigation of Impacts to Riparian Habitat

As stated above, riparian habitats are of extreme importance to wildlife. Meaningful improvement or enhancement of wildlife habitat is very limited with highway construction and widening projects. Minimizing impacts and mitigation for losses and degradation is the best course of action after first making every effort to avoid impacts. The use of previously disturbed lands such as crop fields, improved pastures, and existing road or utility rights of way is encouraged during the design and construction phase of each section and relief route. Best management practices during construction, operations and maintenance is important. Incremental reestablishment of vegetation at work sites is encouraged to prevent erosion. Final revegetation of disturbed ground should be completed using only native grasses and forbs that are selected in cooperation with USFWS, local offices of the Soil Conservation Service, and local/regional wildlife agencies.

Exhibit 3.2-5 Sections and Relief Routes with Significant Riparian Areas



3.2.5 Protected Species

Plant and animal species whose populations have declined to a point where extinction is imminent are afforded legal protection under federal and state laws. Section 7 of the Endangered Species Act of 1973 directs all federal agencies to use their existing authorities to conserve threatened and endangered species and, in consultation with the USFWS, to ensure that their actions do not jeopardize listed species or destroy or adversely modify critical habitat. Section 7 applies to management of federal lands as well as other federal actions that may affect listed species, such as federal approval of private activities through the issuance of permits or licenses, or other actions.

The USFWS has authority to identify species in danger of extinction and provide for their management and protection. Each of the Ports to Plains Corridor states has adopted its own regulation of species classified as endangered or threatened, in addition to the regulations of the USFWS, USFS, and Bureau of Land Management (BLM). The Corridor has many habitat areas where these species may be found. While only a few protected species may be present in some sections and relief routes of the Corridor, other sections and relief routes may have well over 20. The latter number could prolong a planning and implementation schedule, and increase project costs, because these species may require Section 7 discussions with the USFWS and state wildlife agencies, or even the development of a Habitat Conservation Plan or similar document. Protected plants and animals, their federal and state status, and the counties along the Ports to Plains Corridor in which they might reasonably be found are listed in Appendix B.

For wildlife species, a potential long-term or permanent impact is generally defined as a conversion of the existing habitat or land use to another habitat or land use (such as a transportation facility) that would result in the death or displacement of the wildlife in the habitat. This would include converting land in a floodplain, wetland, riparian area, creek or river, farmland, or any other land that is used as wildlife habitat or that includes protected plant species. It also includes actions that block or impede wildlife from reaching habitats (e.g., by crossing over or under roadways), increases the chance of wildlife vehicle collisions (e.g., by increasing the roadway width and the speed and volume of traffic), fragments habitats so that they are no longer useful to wildlife, or otherwise makes habitats unable to support wildlife (e.g., by allowing contaminated waters to flow into wetlands or streams, allowing noxious weeds to become established, altering water flow, or similar impacts).

Construction activities also temporarily impact wildlife through increased noise, use of large machines, dust, vibrations, and disturbance of habitats (removal of vegetation, temporary blockage or rerouting of stream flow, and similar disturbances). Sometimes wildlife species does not return to its previous habitat even after the disturbance is over and mitigation measures have been applied. Construction is especially disruptive during breeding and nesting periods.

All of the sections and relief routes of the Ports to Plains Corridor can and do support wildlife that may include state and federal threatened and endangered species and species of concern.

Of particular importance is the increased chance of impacting protected species associated with one of the Sensitive River and Stream Segments designated by the TPWD, all of which are valued for the riparian habitats they support. Many rare species are associated with Las Moras Creek, including the South Texas siren, common black-hawk, wood stork, interior least tern, proserpine shiner, ocelot, margay, jaguarundi, and the white-nosed coati. The high water quality of Pinto Creek

provides for exceptional aquatic life such as the threatened or endangered species/unique communities associated with the proserpine shiner. Federal and state threatened or endangered species associated with Sycamore Creek and San Felipe Creek include the proserpine shiner, Rio Grande darter, and Devils River minnow.

USACE made special note of the crossing of the Canadian River, because the wetlands and riparian corridors are high priority fish and wildlife habitat and resources of national concern. The Ports to Plains Corridor crosses the Canadian River north of Amarillo, Texas. The USFWS reports that the threatened Arkansas River shiner is known to occur throughout the Canadian River in Potter County, Texas. The species is now almost entirely restricted to the Canadian (South Canadian) River in Oklahoma, Texas, and New Mexico.

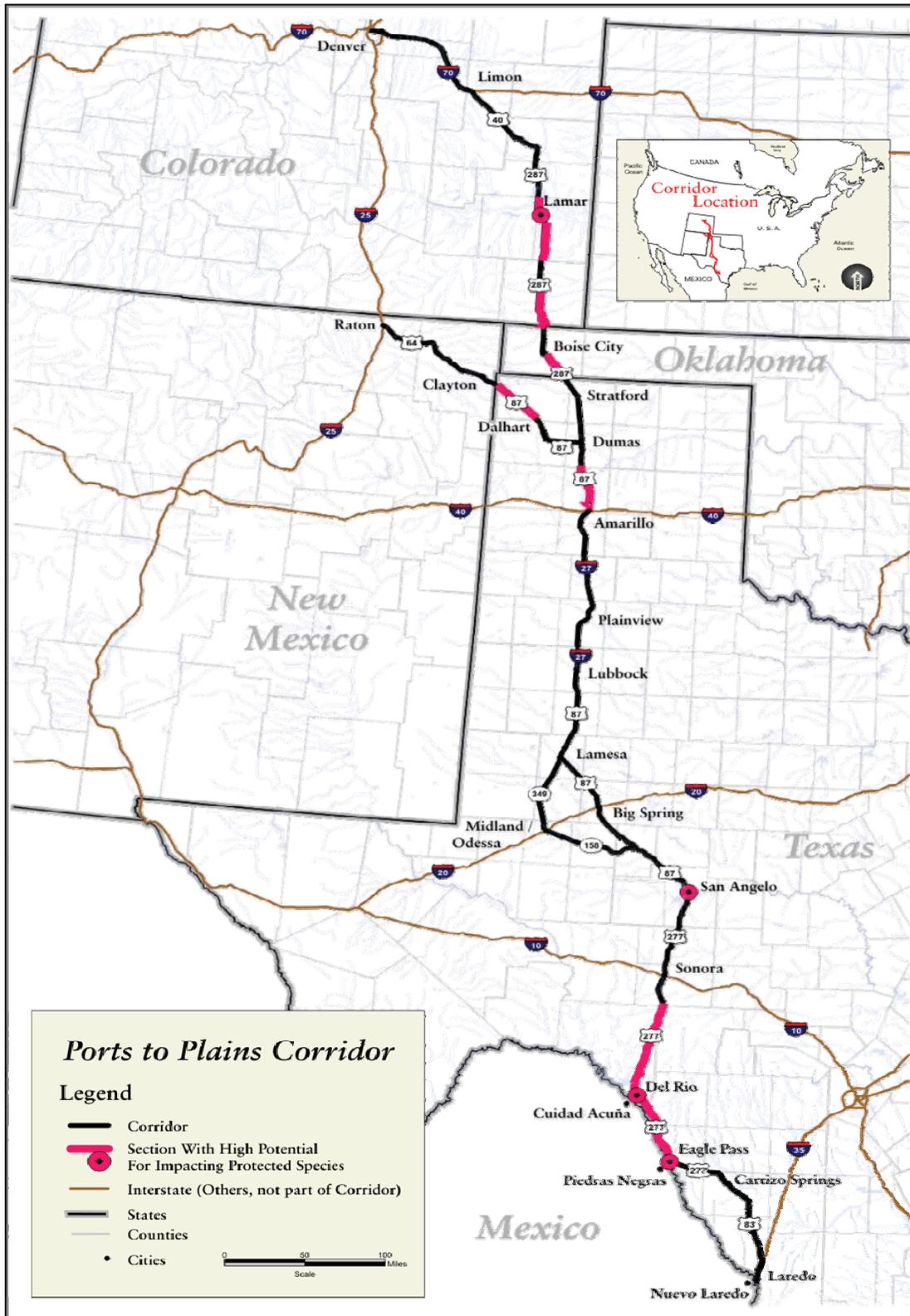
Another important area of riparian habitats is the Amistad Reservoir, which is part of the Amistad National Recreation Area. It is located at the convergence of the Rio Grande, Devils, and Pecos rivers. Besides being of great importance in the Corridor as a source of water for consumption and irrigation, these surface waters are an important habitat for waterfowl, fish and other species.

Sections and relief routes with a high potential for impacting protected species are shown in Exhibit 3.2-6 and listed in Exhibit 3.4-1 Environmental Consideration Summary Table.

Other Considerations for Wildlife and Protected Species

For sections in Colorado, the Colorado Field Office of the USFWS recommended that “the project become familiar with the Central Shortgrass Prairie Initiative, a cooperative effort between CDOT, Federal Highway Administration (FHWA), USFWS, The Nature Conservancy, the Colorado Department of Natural Resources and the Colorado Division of Wildlife. This memorandum commits these agencies to identify mitigation opportunities in the Colorado shortgrass prairie ecosystem and work with local communities and landowners to preserve thousands of acres of shortgrass prairie in eastern Colorado. This initiative covers anticipated impacts (approximately 22,000 acres) to 36 species and habitats in CDOT right-of-way from CDOT projects identified in their 20-year transportation plan. It is hoped that mitigating these anticipated impacts will result in the preservation of critical species habitats, thus reducing the likelihood that they will require protection under the Endangered Species Act (ESA). In addition, ESA requirements will be addressed on a system-wide basis, resulting in an expedited project processing time. At this time, the USFWS is uncertain whether the project will fall under the umbrella of this Initiative.

Exhibit 3.2-6 Sections and Relief Routes with High Potential for Impacting Protected Species



The USFWS also recommends that the findings (as yet incomplete) of the Habitat Connectivity Campaign, headed by the Southern Rockies Ecosystem Project (SREP), be incorporated into the project design and impact analysis. The Habitat Connectivity Campaign targets protection of critical wildlife linkages and movement corridors across the Southern Rockies. The SREP is leading the effort, in conjunction with the CDOT, to develop a wildlife linkage map that prioritizes key areas for wildlife movement in the state of Colorado. SREP and other Southern Rockies Conservation Alliance (SRCA) groups will then work to protect these linkages, for example, by encouraging CDOT to build highway underpasses or overpasses to allow wildlife crossings and prevent traffic fatalities.

Further, the Colorado Field Office of the USFWS “has consistently taken the position in its section 7 consultations that Federal agency actions resulting in existing or new water depletions to the Platte River system may affect threatened and endangered species including the whooping crane, least tern, Eskimo curlew, piping plover, bald eagle, and pallid sturgeon as well as designated critical habitat for whooping crane and piping plover in the Central Platte River in Nebraska.” Bijou Creek and Beaver Creek, which are tributaries to the Platte River, are crossed by a Colorado section. Sections that have special conditions or are likely to have federal and state threatened or endangered species or species of concern present are shown in Exhibit 3.2-6 and listed in Exhibit 3.4-1 Environmental Consideration Summary Table. More detailed information about each section can be found in Appendix A.

Mitigation of Impacts to Protected Species

Early discussions with USFWS and the local wildlife agencies will help to determine whether an EA or EIS is the best NEPA action for the individual Ports to Plains Corridor sections and relief routes and will determine the extent of impacts requiring mitigation and the type of mitigation required. The following paragraphs present an overview of some types of mitigation available, always remembering that avoidance, if possible, is the best practice.

While it is likely that some habitat will need to be converted to transportation uses for the roadway widening projects and relief routes along the Ports to Plains Corridor, no long-term adverse impacts on protected aquatic vegetation or wildlife are anticipated if best management practices are implemented to control erosion, sedimentation, and stormwater runoff. Such practices will need to be implemented to retain and filter stormwater in accordance with state and local requirements. These could include minimizing the clearing of vegetation, controlling erosion by promptly seeding to stabilize exposed areas, constructing stormwater basins, and installing silt fences. Best management practices for handling, use, and disposal of hazardous materials will need to be put into effect during construction to prevent any releases. Other mitigation measures, such as replacement of wetland habitat, may also be necessary depending on the amount of disturbance and land conversion required by the projects. All aspects of habitat protection, minimization of wildlife disturbance, best management practices, and mitigation planning and implementation will need to be done in consultation with the USFWS and state wildlife agencies.

Some terrestrial habitat is also likely to be converted to transportation uses during the widening of roadways along the Ports to Plains Corridor. Terrestrial species, like aquatic species, will generally not be adversely impacted by any Ports to Plains Corridor facilities if best management practices are implemented throughout their known and potential habitats. In dry land or upland areas, best

management practices would consist of minimizing potential impacts by clearing only the minimum width necessary for building the new lanes, replacing native plant materials where necessary, and following local ordinances. Other mitigation measures, such as constructing wildlife crossings, may also be necessary, depending on the amount of disturbance and land conversion required by the individual sections. All aspects of habitat protection, wildlife disturbance, best management practices, and mitigation planning and implementation will need to be done in consultation with the USFWS and state wildlife agencies.

For protected species, potential impacts are defined as take (harassing, harming, pursuing, hunting, shooting, wounding, killing, trapping, capturing or collecting, or attempting to engage in any such conduct) of the listed species or its critical habitat. At the project level, project teams for each section and relief route must work with the USFWS and state wildlife offices to identify the protected species and habitats that might be present near the proposed improvements. Mitigation for potential adverse impacts identified during detailed environmental work and preliminary engineering studies will need to be coordinated with the appropriate agencies. Mitigation may include postponing construction near specific sites during nesting season.

3.2.6 Cultural Resources

Historic and archaeological resources reflect the historical settlement and economic opportunities and trends presented by the country and region in earlier times. These would include geographic opportunities (such as a confluence of rivers, an easy mountain pass, a favorable climate, or good farmland), transportation corridors (first for wildlife and big game, then for people following them), and economic opportunities (mineral deposits, development or settlement incentives, or business prospects). The Ports to Plains Corridor has historic and prehistoric sites in several locations, and the potential for others to be identified as more surveys are done for transportation projects and other development activities. Thus, unknown and unrecorded historic and archaeological sites may be discovered during environmental investigations or during the implementation of highway improvements and relief routes for the Ports to Plains Corridor.

Section 106 of the National Historic Preservation Act (NHPA) requires federal agencies to "take into account" the effects of their actions on "historic properties," that is, "districts, sites, buildings, structures, and objects included in or eligible for the National Register of Historic Places." The National Register is a list of known significant historic places in the United States, Puerto Rico, Guam, American Samoa, the Commonwealth of the Northern Marianas, the Federated States of Micronesia, and the Republics of Palau and the Northern Mariana Islands.

Section 106 is implemented by following regulations issued by the Advisory Council on Historic Preservation (ACHP). In general, the Section 106 review process involves the following steps:

- Establish whether the action being considered is a federal undertaking subject to Section 106 review. Virtually any federal action that has the potential for environmental impacts -- including many that are categorically excluded from substantial NEPA review -- are subject to Section 106.

- Initiate the review process in consultation with the state and/or Tribal Historic Preservation Officer and other stakeholders. Coordinate with other reviews (e.g. NEPA review), plan for public participation, and identify who to consult.
- Conduct scoping to determine what should be done to identify historic properties and determine effects on them.
- Conduct the necessary identification studies and analyses, in consultation with stakeholders. Note that properties that are eligible for the National Register must be identified, as well as those already included in the Register. This may include heretofore entirely unknown properties.
- Consult further about any effects that may be adverse.
- Execute and implement memoranda of agreement (MOA) about how adverse effects will be resolved, or obtain and consider a final comment from the ACHP.
- NEPA requires federal agencies to coordinate and plan their actions so as to preserve important historic, cultural, and natural aspects of the national heritage. Because the potential exists for unrecorded archaeological and historic sites all along the Ports to Plains Corridor, appropriate coordination with the relevant State Historic Preservation Office (SHPO) will be necessary. In addition, coordination with the environmental staff, staff archaeologist, and staff historian of each DOT in dealing with cultural resource issues is critical. The locations of known sites and areas where new discoveries may be made are given in the section and relief route descriptions in Appendix A.

An adverse impact to a cultural resource could include any of the following:

- Physical damage to or destruction of all or part of the property;
- Isolation or alteration of the character of the property's setting, when that character contributes to the property's qualification for the National Register of Historic Places (NRHP);
- Introduction of visual, audible, or atmospheric elements that are out of character with the property or that alter its setting;
- Changes that result in neglect of a property, leading to deterioration or destruction; or
- Changes that result in the transfer, lease, or sale of the property without adequate restriction or conditions to ensure preservation of its historic features.

While the state SHPO will be consulted and asked to concur on determinations of effect, the agencies (FHWA and the state DOTs) will initially define and determine the nature of impacts. It is important to remember that all effects must be defined by the state SHPO, and that mitigation plans must be done in consultation with the SHPO with the state DOTs playing a primary role.

Archaeological Resources

A 106 consultation, as described above, has not been conducted as part of this screening inventory. However, using readily available information and previous corridor studies as described above, the sections and relief routes shown in Exhibit 3.2-7 and listed in Exhibit 3.4-1 Environmental

Consideration Summary Table have been identified as sections and relief routes with a higher potential for archaeological resource issues. Future environmental studies and project implementation for all Ports to Plains Corridor sections and relief routes must start with early consultations among the FHWA, the state DOT, and SHPO regarding archaeological resources, and full investigations that may discover more resources must be conducted according to the agreements made among these agencies. .

Historic Resources

A 106 consultation has not been conducted as part of this screening inventory. However, using readily available information and previous corridor studies as described above, the sections and relief routes shown in Exhibit 3.2-8 and listed in Exhibit 3.4-1 Environmental Consideration Summary Table have been identified as sections and relief routes with a high potential for historic resource issues. Future environmental studies and project implementation for all Ports to Plains Corridor sections and relief routes must start with early consultations among the FHWA, the state DOT, and SHPO regarding historic resources, and full investigations that may discover more resources must be conducted according to the agreements made among these agencies.

Historic Bridges

Two historic bridges have been identified in the Ports to Plains Corridor. Bridge #1785 is located between Capulin and the Union/Colfax county line in New Mexico. It is not located in an area that will be impacted by construction. The U.S. 64-87 EA states that no adverse impact will occur and no mitigation will be necessary. The other is the Union Pacific Railroad bridge spanning the Rio Grande, which according to the Eagle Pass Outer Loop EA (FONSI 1999), appears to be eligible for the NRHP.

Mitigation of Impacts to Archaeological Sites and Areas with Archaeological Potential

Actual locations of archaeological sites are kept confidential by the states' historic and archaeological preservation officials to protect them from disturbance, and are typically not provided at this level of planning. However, some general information is available regarding several of the sites known to be crossed by or adjacent to this Corridor. In addition, because several areas are known to have high potential for archaeological sites, a cultural resources investigation plan will need to be developed by the appropriate state DOT in consultation with the appropriate SHPO during section-specific planning and design, particularly in areas with known sites, areas known for high density of resources, and areas of known potential for unrecorded sites. The need for mitigation for adverse impacts on archaeological resources will then be decided and planned by the DOT in consultation with the SHPO. When the section alignment designs are completed, mitigation measures will need to be investigated in detail by the DOT in consultation with the SHPO.

Exhibit 3.2-7 Sections and Relief Routes with Known or Potential Archaeological Resources

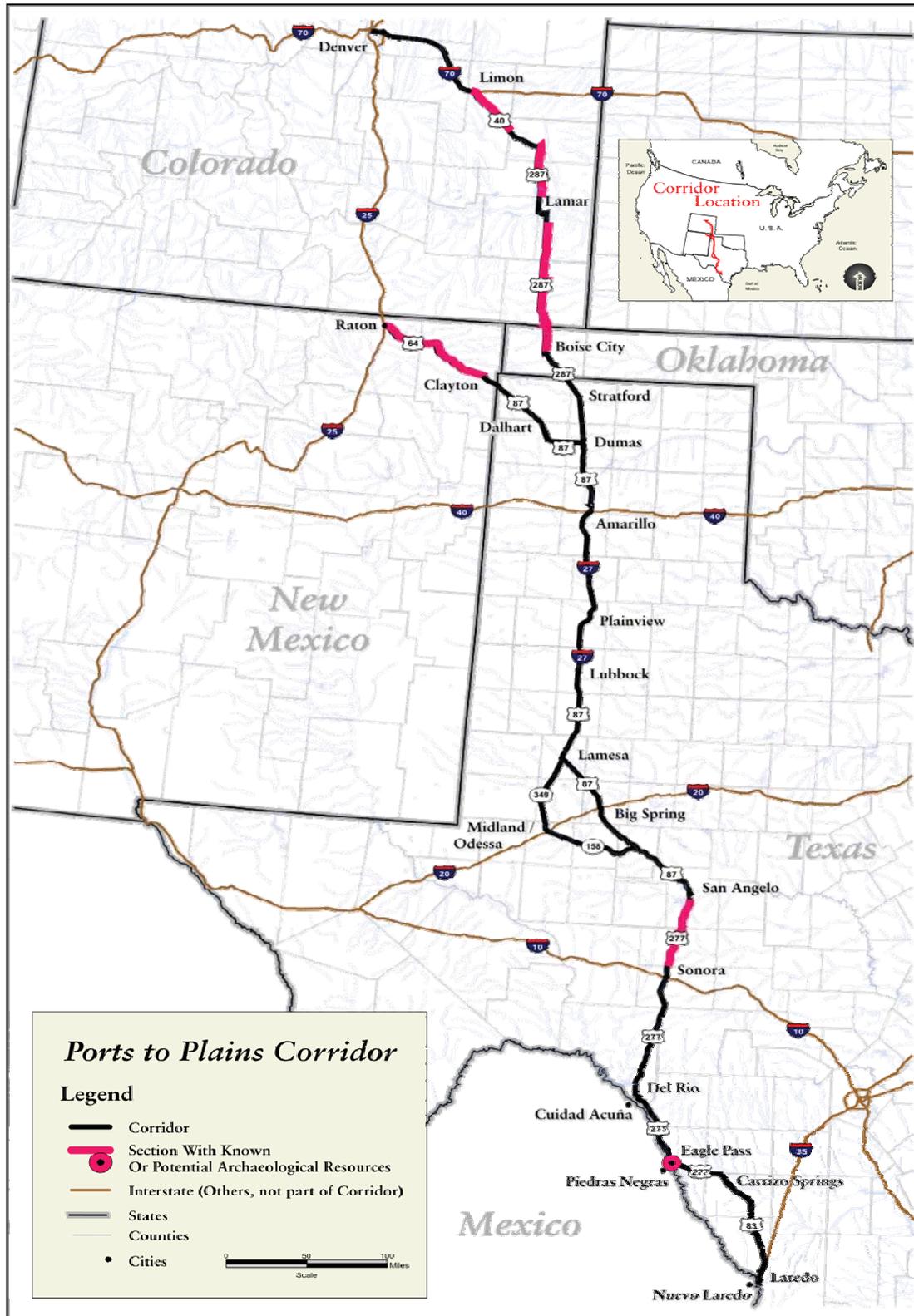
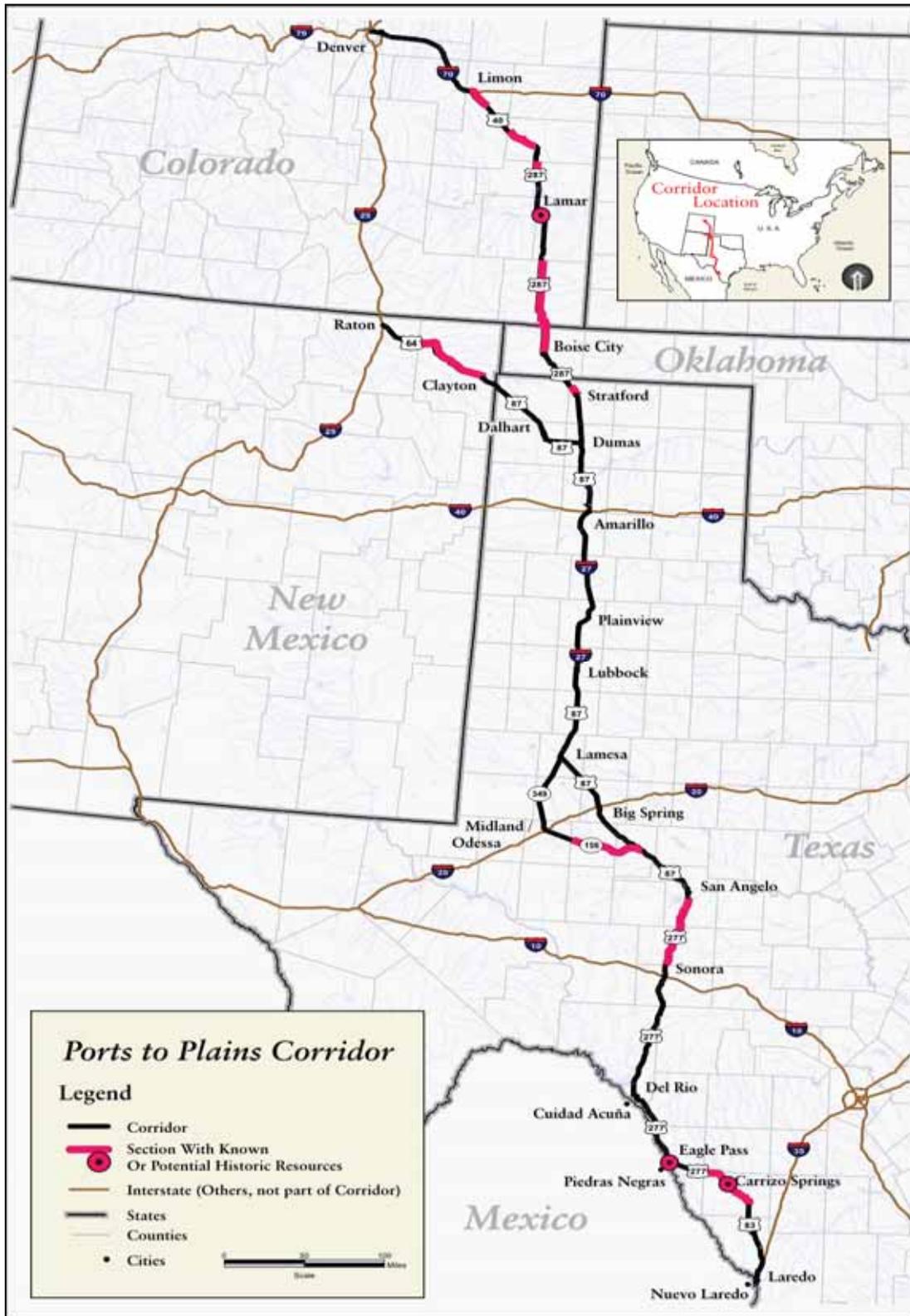


Exhibit 3.2-8 Sections and Relief Routes with Known or Potential Historical Resources



Mitigation of Impacts to Historic Resources, Including Buildings and Sites in the National Register of Historic Places

The requirements for mitigation of adverse impacts on historic resources will need to be decided by each state DOT in consultation with the appropriate SHPO for each section and relief route with known historic buildings, and for NRHP sites. At this time, physical impacts to known sites are not anticipated. However, potential noise impacts to identified historic architectural resources will need to be assessed in accordance with applicable noise criteria. Potential vibration levels at these resources will need to be assessed for annoyance and for thresholds of cosmetic damage. In addition, historic resources can be impacted by the visual character of new transportation facilities, and each DOT and SHPO must conduct an analysis of this relationship. If necessary, mitigation measures will be investigated in detail when the section or relief route alignment designs are completed.

3.2.7 Paleontological Resources

A variety of federal statutes specifically address paleontological resources. The statutes generally apply to projects that cross federal lands or involve a federal license, permit, approval, or funding.

The Antiquities Act of 1906 (16 United States Code [USC] 431-433) protects "antiquities" situated on federal lands. Although there is no specific mention of natural or paleontological resources in the Act itself, or in the Act's uniform rules and regulations (Title 43 Part 3, Code of Federal Regulations [43 CFR 3]), "objects of antiquity" have been interpreted to include fossils by the National Park Service (NPS), Bureau of Land Management (BLM), United States Forest Service (USFS), and other federal agencies. Section 120 of the Federal Aid Highway Act of 1956 amends the Act for the Preservation of American Antiquities (June 8, 1906) under which Federal-aid highway funds may be used by State highway departments for archeological and paleontological salvage in compliance with or State laws. It allows funding for mitigation of paleontological resources recovered by federal aid highway projects, provided that "excavated objects and information are to be used for public purposes without private gain to any individual or organization." It also states, "When a road location or improvement is in an area where it is anticipated that historical objects may be encountered, the appropriate authority should be advised as early as possible of the exact location of the road to enable such authority to determine the likelihood of the highway destroying historical objects."

The National Natural Landmarks (NNL) program (National Registry of Natural Landmarks (16 USC 461-467)) was established in 1962 and is administered under the Historic Sites Act of 1935. A NNL is defined as an area designated by the Secretary of the Interior as being of national significance to the United States because it is an outstanding example of major biological and geological features found within the boundaries of the United States or its territories or on the Outer Continental Shelf (36 CFR 62.2). Such landmarks include terrestrial communities, landforms, geological features and processes, habitats of native plant and animal species, and fossil evidence of the development of life. However, other than consideration under NEPA, NNLs are afforded no special protection, and there is no requirement to evaluate a paleontological resource for listing as an NNL. State and local project proponents are not obligated to prepare an application for listing potential NNLs, should such resources be encountered during project planning and implementation.

The National Historic Preservation Act of 1966 (16 USC 470), Section 106, does not apply to paleontological resources unless the paleontological specimens are found in culturally related contexts (e.g., fossil shell included as a mortuary offering in a burial or culturally-related site such as petrified wood locale used as a chipped stone quarry). Section 4(f) of the Department of Transportation Act of 1966 (23 USC 138; 49 USC 1653) does not specifically address paleontological resources. Such resources would fall under this law only if located within a 4(f) property.

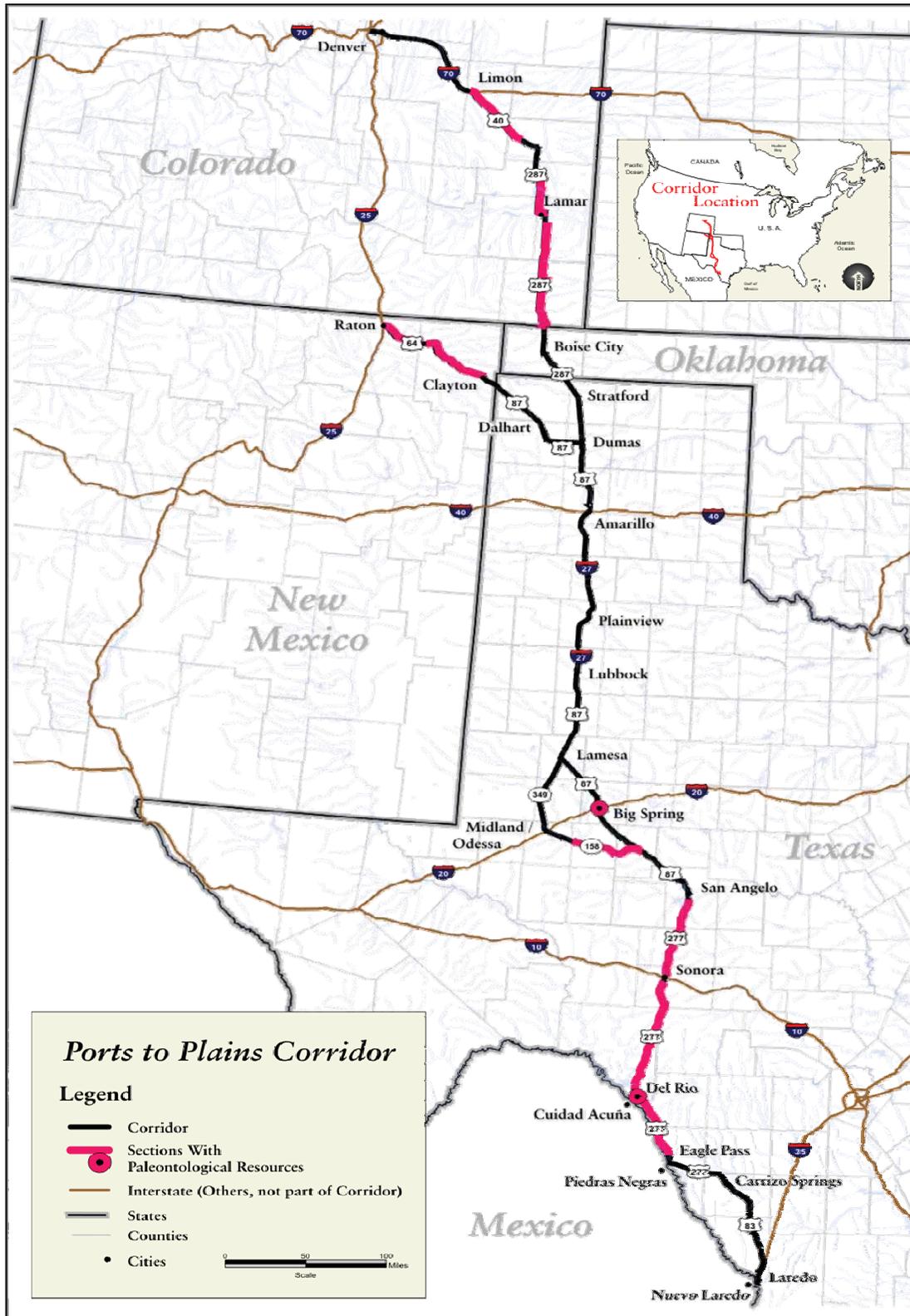
NEPA directs federal agencies to use all practicable means to, "Preserve important historic, cultural, and natural aspects of our national heritage..." If a significant environmental resource is identified during the scoping process, federal agencies and their agents must take the resource into consideration when evaluating project effects. Consideration of paleontological resources may be required under NEPA when a project is proposed for development on federal land or land under federal jurisdiction. The required level of consideration depends upon the federal agency involved. Project proponents may also be subject to state and local ordinances concerning paleontological resources. Each state has paleontologists with whom to consult on these issues. Cities and counties should be contacted to determine if additional local requirements must be met.

There are no NNL sites within the Ports to Plains Corridor. However, paleontological resources have been discovered in every county of the Ports to Plains Corridor. Important fossils of Cretaceous reptiles have been found in the Trans-Pecos region, and fossil vertebrates, especially mammals of the middle to late Tertiary and Pleistocene ages, are known to abound in Texas. Rich deposits of late Tertiary vertebrates occur in the Texas Panhandle. New Mexico has fossils and trace fossils of Triassic, Jurassic, and Cretaceous periods throughout the state, except the southeast corner. New Mexico's most extensive dinosaur resources (tracks) come from Early Cretaceous rocks near Clayton Lake in Union County, where the Morrison Formation is exposed, and footprint sites can be found throughout Texas, Oklahoma, and parts of Colorado. The Morrison Formation is believed to have been deposited about 150 million years ago, during late Jurassic time, and is found over a large area of the western states, including all of Colorado, Northern New Mexico, and the panhandles of Oklahoma and Texas. Over most of that area, the formation is rich in dinosaur fossils. Given these data, sections and relief routes that have potential for paleontological resources are shown in Exhibit 3.2-9 and listed in Exhibit 3.4-1 Environmental Consideration Summary Table. More detailed information about each section and relief route is in Appendix A.

Mitigation of Impacts to Paleontological Resources

Mitigation for paleontological resource impacts must be considered on all sections and relief routes of the Corridor, and scoping activities with appropriate state and local agencies will need to be conducted to assess the relative potential of each section and relief route. If potential resources are identified in the planning process or during construction, their significance and/or scientific importance should be assessed. As appropriate, the resource should be avoided, removed intact or preserved in place.

Exhibit 3.2-9 Sections and Relief Routes with Known or Potential Paleontological Resources



3.2.8 Air Quality

Motor vehicle emissions are one of the major sources of air pollution. Such emissions vary with traffic volumes, distances traveled, travel speeds, and vehicle types. This study focuses on the current air quality of the Corridor to determine the potential for air quality degradation with an increase in vehicles, due both to background socioeconomic growth and improvements that increase a facility's attractiveness to drivers.

The federal Clean Air Act passed in 1970 and last amended in 1990, forms the basis for the national air pollution control effort. Basic elements of the act include National Ambient Air Quality Standards (NAAQS) for major air pollutants, hazardous air pollutants standards, state attainment plans, motor vehicle emissions standards, stationary source emissions standards and permits, acid rain control measures, stratospheric ozone protection, and enforcement provisions. Under the federal Clean Air Act, the Environmental Protection Agency (EPA) regulates air quality.

All sections and relief routes of the Corridor, with one exception, are currently in attainment or unclassifiable with respect to all pollutants for which a NAAQS exists. The section along I-70 from I-25 in Denver to Limon, the northern terminus of the Ports to Plains Corridor, recently had a ground-level ozone reading in violation of the EPA's new 8-hour ozone standard (summer 2003). In addition, the Air Quality Control Commission reports that the fine particles that cause Denver's "Brown Cloud" are from local not regional emissions and have been persistent. However, visibility has improved 28% since 1991.

Mitigation of Impacts to Air Quality

While there will be emission from increased traffic, the impact is expected to be negligible. No mitigation is required, but air quality agencies along the Corridor will continue to monitor this resource. In congested areas of the Corridor, air quality may improve as widening and relief routes decrease congestion and idling vehicles.

3.2.9 Noise

Noise is "unwanted sound," and, by this definition, the perception of noise is subjective. Several factors affect the actual level and quality of sound as perceived by the human ear, but the focus of this inventory is to recognize that traffic noise has an effect on the quality of life near transportation facilities. This topic is covered because increased traffic using the Ports to Plains Corridor could cause a corresponding increase in noise. Early recognition of potential areas of increased noise will assist with planning in the future.

The Noise Control Act of 1972 gives the EPA the authority to establish noise regulations to control major sources of noise, including transportation vehicles and construction equipment. In addition, this legislation requires that EPA issue noise emission standards for motor vehicles used in interstate commerce and requires that the Federal Motor Carrier Safety Administration enforce these noise emission standards. The FHWA noise abatement procedures are codified in the Code of Federal Regulations (23 CFR 772).

The FHWA criterion for residential uses is 67 decibels, but 66 decibels is usually used because FHWA requires the states to define an approach level which is usually 1 decibel below the criterion. Each state defines its own threshold for an impact and adopts its own guidelines.

As a general screening tool for this inventory, the distance of 300 feet from the centerline of a roadway was used to estimate where the 66 decibels level is reached. In fact, depending on the location, traffic volume, and the nature of the traffic, there may be impacts far outside of this distance. Simply stated, noise impacts are greater closer to the highway, but as distance increases, noise levels will drop below impact noise levels.

In most of the sections and relief routes shown in Exhibit 3.2-10 and listed in Exhibit 3.4-1 Environmental Consideration Summary Table, the Ports to Plains Corridor passes through a more densely inhabited area such as a town. More detailed information about the number and general location of noise receptors can be found in the section descriptions in Appendix A.

Mitigation of Noise Impacts

An important federal law that governs abatement of highway traffic noise is the Federal-Aid Highway Act of 1970. This law requires FHWA to develop standards for mitigating highway traffic noise. The FHWA regulations for mitigation of such noise in the planning and design of federally aided highways are contained in Title 23 CFR Part 772. The regulations require the following during the planning and design of a highway project: 1) identification of traffic noise impacts and examination of potential mitigation measures; 2) incorporation of reasonable and feasible noise mitigation measures into the highway project; and 3) coordination with local officials to provide helpful information on compatible land use planning and control. The regulations contain noise abatement criteria which represent the upper limit of acceptable highway traffic noise for different types of land uses and human activities. The regulations do not require that the abatement criteria be met in every instance. Rather, they require that every reasonable and feasible effort be made to provide noise mitigation when the thresholds are approached or exceeded. Compliance with the noise regulations is a prerequisite for granting of federal-aid funds for construction or reconstruction of a highway.

Each state's transportation agency is responsible for providing regulatory guidance and implementation of traffic noise analysis and abatement (e.g., noise barriers and other measures) in accordance with the federal regulations. These state noise guidelines describe the requirements for conducting noise analyses, computer modeling procedures, and documentation. In this Corridor, noise levels related to the FHWA Noise Abatement Criteria will need to be identified, and measures to reduce potential noise impacts considered. The traffic noise assessment findings must be included in the individual environmental documentation processes for each section and relief route. Construction-related noise impacts will need to be addressed for each section and relief route according to state and local guidelines and best management practices. The following sections have already been studied.

US 64 from Clayton to Capulin, US 64 from Capulin to Union/Colfax county line, and US 64 from Union/Colfax county line to Raton/I-25 - The US 64-87 EA states, "While noise impacts have been identified, mitigation of noise impacts is not practical or feasible."

Exhibit 3.2-10 Sections and Relief Routes with Potential for Noise Impacts



Eagle Pass Relief Route from Eagle Pass International Bridge to US 277 east of Eagle Pass and Eagle Pass Relief Route from US 277 east of Eagle Pass to US 277 north of Eagle Pass - The Eagle Pass Outer Loop EA states that a comprehensive traffic noise analysis which conforms to FHWA regulations, "would be performed for the preferred alternative in the Final EA. A copy of this traffic noise analysis would be provided to local officials to ensure, to the maximum extent possible, that future developments are planned, designed, and programmed in a manner that would avoid traffic noise impacts." "Prior to final design, all impacted areas would be investigated for noise abatement. Where feasible and reasonable, noise abatement would be considered, including sound barrier walls."

3.2.10 Low-Income and Minority Populations

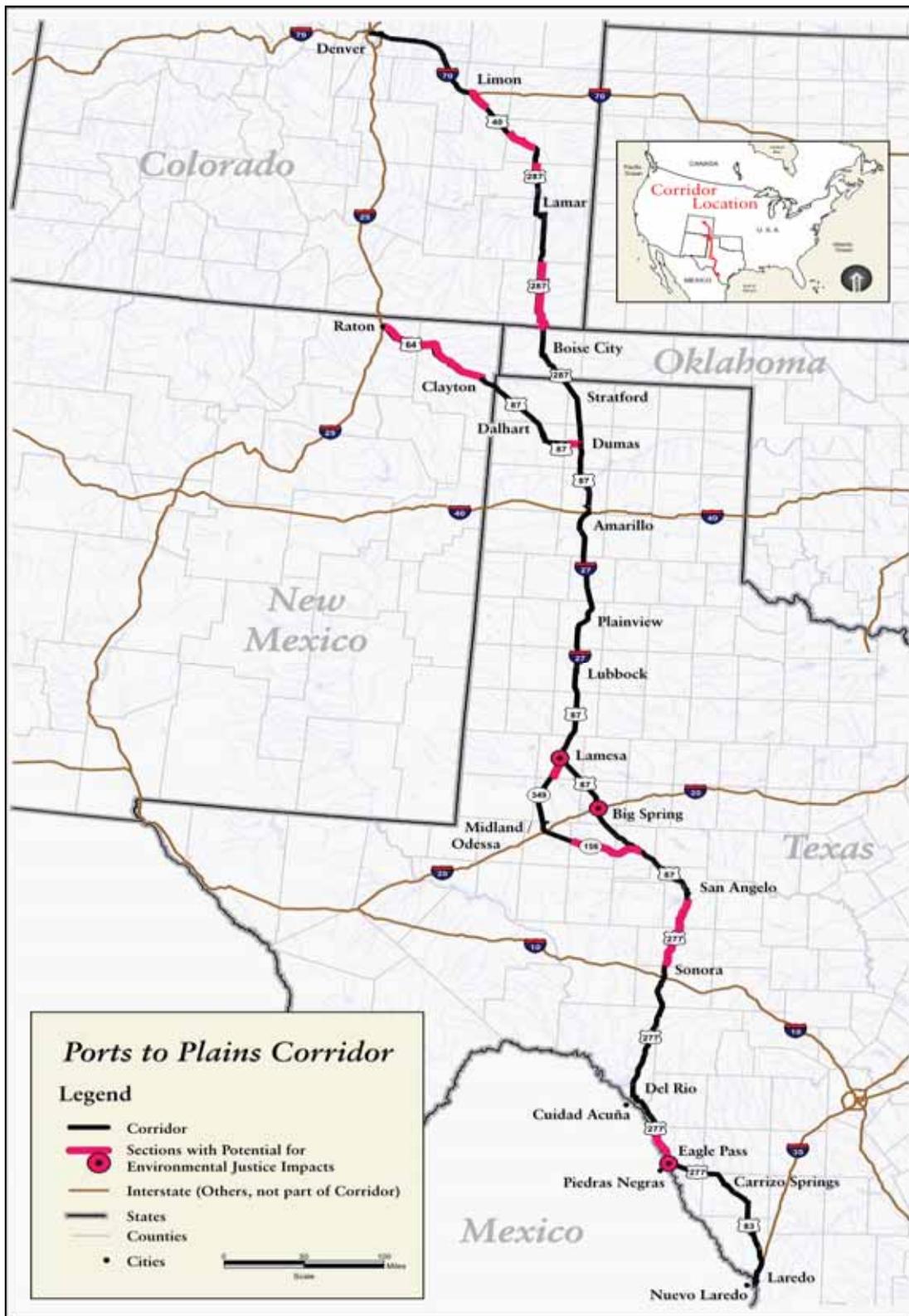
Along with policy statements and guidelines prepared by the U.S. Department of Transportation and the FHWA Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (EO 12898), dated February 11, 1994, strongly encourages public entities to conduct an environmental justice analysis both at the project development level and at the system or planning level. The purpose of the analysis is to identify and address, as appropriate, disproportionately high and adverse human health or environmental effects of federal programs, policies, and activities on minority and low-income populations.

On April 15, 1997, the U.S. Department of Transportation released Order 5610.2 to comply with the Executive Order 12898. According to this order, a disproportionately high and adverse effect on minority or low-income populations is one that, "(1) is predominately borne by a minority or a low-income population, or (2) will be suffered by the minority population or low-income population and is appreciably more severe or greater in magnitude than the adverse effect that will be suffered by the non-minority population or non-low income population." The effects could include increased noise; air quality degradation; water pollution and soil contamination; destruction or disruption of man-made or natural resources; destruction or reduction of aesthetic values; destruction or disruption of community cohesion or a community's economic vitality; destruction or disruption of the availability of and access to public and private facilities and services; adverse employment effects; and increased traffic congestion, isolation, exclusion, or separation of minority or low-income individuals within a given community or from the broader community.

Exact locations of minority and low-income populations that could be impacted will need to be determined at the project level with screening studies to determine the location of potentially affected populations, followed by a determination of whether the possibility of disproportionate impacts exists. If any disproportionate impacts are found, it will be necessary to determine the type of mitigation that is necessary and reasonable for each section.

The sections and relief routes shown in Exhibit 3.2-11 and listed in Exhibit 3.4-1 Environmental Consideration Summary Table have been selected because they pass through communities with potential noise and relocation impacts, and, in general, other impacts such as those listed above could also occur near the roadways in these Corridor communities. Poverty and racial data (Census 2000) are provided in Appendix B.

Exhibit 3.2-11 Sections and Relief Routes with Potential for Environmental Justice Impacts



Mitigation of Environmental Justice Impacts

If any disproportionate impacts are found, it will be necessary to determine the type of impact, consider how the magnitude and severity of the impact can be prevented or reduced, and the type of mitigation that is necessary and reasonable for each section and relief route. For each alternative that will result in environmental justice concerns, mitigation measures should be carefully examined with the affected population. Mitigation measures should focus on true mitigation of the impact, rather than merely shifting the impact from one population to another. The approach is first to avoid impacts if possible, then minimize impacts, then mitigate unavoidable impacts. Enhancements may also be considered. Examples of enhancements include the addition of pedestrian and bicycle facilities; safety and education activities; beautification projects such as lighting, landscaping, and public art; historic preservation; improved access to neighborhood parks and recreation facilities; and conversion projects such as rails to trails.

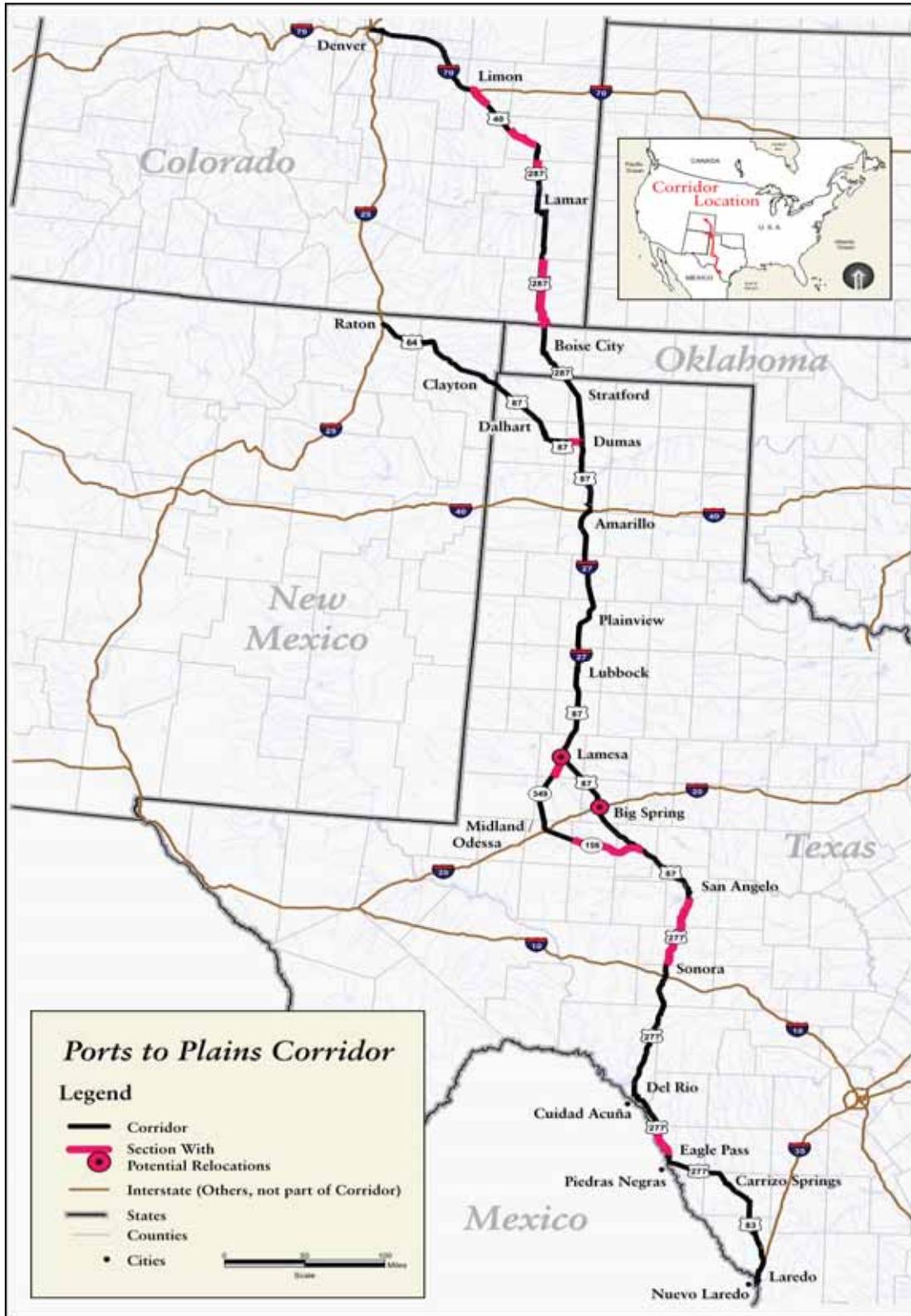
3.2.11 Potential Displacements and Relocations

In many cases, constructing a new transportation facility, widening an existing facility, or adding elements such as an interchange requires the relocation of existing residences or businesses. Displacement, relocations, or acquisitions (partial or full) might occur during roadway widening and implementation of relief routes along the Ports to Plains Corridor. Displacements result from right-of-way acquisitions that require the use of land with existing uses. Federal and state laws require that property owners be paid fair market value for their land and buildings and that they be assisted in finding replacement business sites or dwellings. Partial acquisitions occur when only a portion of an existing land use is required and, as such, may not result in a displacement or relocation. Full acquisitions occur when a complete parcel is required and results in either a displacement or relocation. If any relocations are required, they will need to be done under the Uniform Relocation Assistance and Real Property Acquisition Policy Act of 1970, as Amended, under which all federal agencies are required to meet certain standards for the fair and equitable treatment of persons displaced by federally supported actions. Relocation assistance must follow the guidelines set forth in Title 49, part 24 of the code of Federal Regulations.

The Ports to Plains Corridor passes through a number of towns that have businesses and residences within 100 feet of the roadway centerline. Some of these buildings will require relocation; their early identification will assist future planning efforts.

The sections and relief routes identified on Exhibit 3.2-12 are those with four or more buildings (as shown on USGS maps) that are within 100 feet of the roadway centerline. More detail concerning the number, use, and general location of these buildings can be found in the section descriptions in Appendix A.

Exhibit 3.2-12 Sections and Relief Routes with Potential Relocations



Mitigation for Relocation Impacts

As shown in Exhibit 3.2-12, many sections and relief routes have buildings within 100 feet of the existing roadways of the Ports to Plains Corridor. Most of these buildings are located within towns along the Corridor. Conceptual plans currently do not call for widening the roadways through most of these towns because the roadways are typically wide enough for four lanes of traffic already. In most cases, these roadways will simply be restriped from two lanes or four lanes to five lanes. In some cases, relief routes will be provided to direct traffic around the community instead of through the town. However, it may be found that some relocation is still necessary. In that case, upon completion of more detailed design and environmental studies for each section and relief route, a detailed relocation plan will need to be developed to ensure that the orderly relocation of all displaced persons occurs in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policy Act of 1970, as amended. Relocation resources must be available to all relocated households, businesses, and nonprofit organizations without discrimination.

3.2.12 Induced Growth and Cumulative Impacts

Induced socioeconomic impacts and cumulative impacts are evaluated to adequately assess the economic consequences and social ramifications of the development of transportation facilities, especially where no such facilities have previously existed, e.g., relief routes. Induced socioeconomic and cumulative impacts on surrounding communities include shifts in patterns of population movement and growth, changes in public service demands, and changes in business and economic activity. Whether induced growth is considered positive or negative depends on community objectives. Community participation in the planning process is necessary to elicit, quantify, and qualify the need for economic development that a new facility might bring.

Cumulative impacts result from the incremental effects of an action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over time. In addition to socioeconomic effects, cumulative impacts may include a reduction in air quality, increased noise, the permanent removal of wildlife habitat, habitat fragmentation, reduction in water quality, disruption of land use and landscape patterns, and a change in the visual character and quality of the area.

For the Ports to Plains Corridor, cumulative impacts would occur if the proposed roadway widening and relief routes, combined with other local development projects--such as new business, industry, or housing developments, to name only three types of projects--create significant socioeconomic or environmental impacts on the surrounding area.

New roadways are notorious for creating demand for development in formerly uninhabited locations, and roadway improvements that increase safety, capacity, and access are likely to spur growth and environmental impacts where the demand for new development is high. The Colorado Field Office of the USFWS is concerned that the project will, "induce considerable commercial and residential development," and that the effects, mitigation strategies, and commitments to implement the strategies be thoroughly addressed in NEPA documents.

With this in mind, all of the relief routes have potential to cause some induced growth and cumulative impacts. These are highlighted in Exhibit 3.2-13 Relief Routes with Potential Cumulative Impacts and listed in Exhibit 3.4-1 Environmental Consideration Summary Table.

Mitigation of Induced Growth and Cumulative Impacts

While it is not within the scope of this environmental inventory to assess the cumulative impacts and potential for induced growth from the Ports to Plains Corridor development, it may be helpful to consider some strategies that could be used within each section and relief route and by regional and local agencies to address cumulative impacts. A few examples follow:

- Reduce the negative cumulative effects of growth by encouraging mixed-use development instead of zoning that separates uses.
- Encourage activity centers rather than strip development along corridors.
- Incorporate land use and traffic planning into development review. Incorporate ozone-reducing strategies in project planning.
- Encourage land-development patterns that support and are supported by intermodal transportation. At the project level, incorporate alternate transportation into designs.
- Improve stormwater runoff control by maintaining riparian corridors in a natural state. At the project level, protect and restore riparian areas.
- Avoid severing connections among wildlife habitats with development. Set aside habitats and plan for riparian connections.
- Protect significant viewsheds and view corridors. At the project level, buffer transportation facilities from culturally significant areas, and provide well-design bridges and structures.

3.2.13 Public Lands and Community Facilities (Potential 4(f) / 6(f))

Section 4(f) of the U.S. Department of Transportation Act of 1966 protects public parks and recreational lands, wildlife habitat, and historic sites of national, state, or local significance from acquisition and conversion to transportation use. It states that the U.S. Department of Transportation cannot approve the use of land from these facilities or sites unless a determination is made that there is no feasible and prudent alternative to the use of that land and the action includes all possible planning to minimize harm to the property resulting from such use. Early identification of these sites will assist future planning efforts for the Ports to Plains Corridor.

Except for historic sites that are on, or have been determined to be eligible for listing on, the NRHP, Section 4(f) does not apply to lands that are privately owned. Section 4(f) does apply to any archaeological site on or eligible for inclusion on the NRHP if it has been determined, after consultation with the SHPO, and, if applicable, the Advisory Council for Historic Preservation, that the site warrants preservation in place.

Section 4(f) applies to protected resources when a "use" occurs. "Use" can be permanent, temporary, or constructive.

Exhibit 3.2-13 Relief Routes with Potential Cumulative Impacts



Permanent use includes acquisition and incorporation of the resource into the transportation facility, such as fee simple and permanent easement use.

- Temporary use occurs when a transportation project temporarily occupies any portion of the resource and results in an adverse condition. Criteria are in place for determining whether a temporary use is adverse.
- Constructive use occurs when the proximity effects of the transportation project, such as noise, vibration, air quality, or visual impacts, are so great that the use of the property is substantially impaired i.e., the value of the site in terms of its prior significance and enjoyment are substantially reduced or lost. Thresholds of substantial impairment are high and reserved for the most severe proximity effects.

Section 6(f) of the U.S. Land and Water Conservation Fund Act of 1965 preserves, develops, and assures the quality and quantity of outdoor recreation resources through purchase and improvement of recreational lands, wildlife and waterfowl refuges, and other similar resources. It contains provisions to protect and maintain the quality of federal, state, and local investments in parkland and recreation resources. The act established a funding source for federal acquisition of park and recreation lands and matching grants to state and local governments for recreation planning, acquisition, and development. Once purchased using these funds, these lands are protected from conversion to uses other than public outdoor recreational uses. Any such conversion must be in accordance with an existing comprehensive statewide outdoor recreation plan and must be approved by the Secretary of the Interior. If a conversion occurs, the land must be replaced with other recreational properties of at least equal fair market value and with reasonably equivalent usefulness and location.

The following sections are shown in Exhibit 3.2-14 and listed in Exhibit 3.4-1 Environmental Consideration Summary Table because they pass through towns where schools, parks, historic buildings, and other community facilities are present near the roadway, or are sections that have nationally important recreation or wildlife uses (Amistad National Recreation Area, Comanche National Grasslands, Queens State Wildlife Area, Santa Fe Trail, and El Camino Real de los Tejas). More details about the sections and relief routes and the potential impacts to 4(f) and 6(f) sites can be found in the section descriptions location in Appendix A.

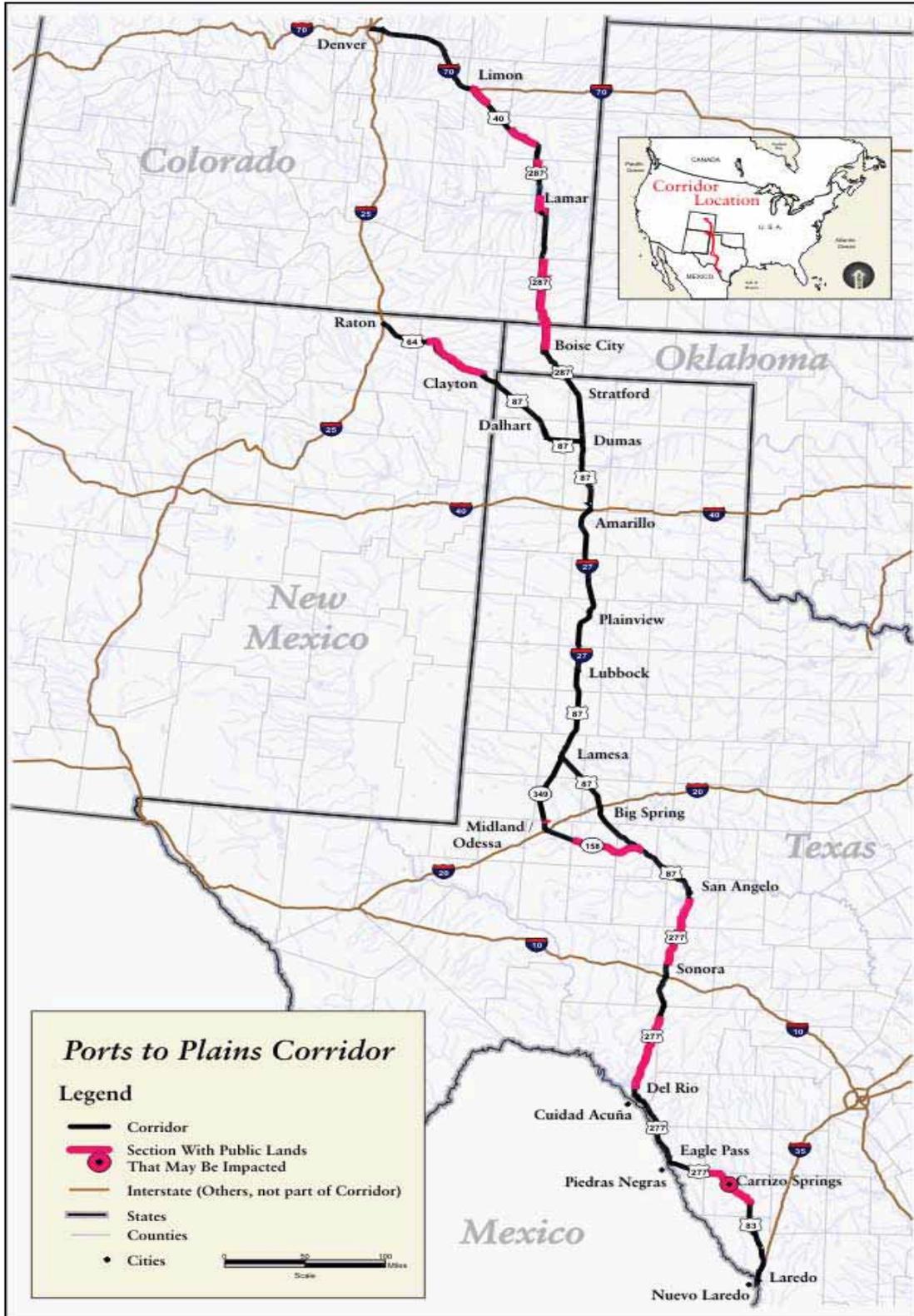
In addition to the sections shown in Exhibit 3.2-14, many of the Ports to Plains sections have roadside parks adjacent to them (noted in the section descriptions). While it is likely that these roadside parks are considered part of the transportation infrastructure, several also have interpretive plaques and other information incorporated into them. As each detailed environmental process is undertaken, these roadside parks will need to be analyzed for their use, ownership, and role in recreation and historic importance.

Mitigation of Impacts to Public Lands

Construction-Related Impacts

Temporary construction impacts will need to be mitigated through the use of best management practices to control stormwater, sediment, noise, fugitive dust, and disruption to regular activities

Exhibit 3.2-14 Sections with Public Lands that May Be Impacted



associated with public parks and other public lands and facilities. Continued access to the parks will need to be coordinated with park agencies.

Mitigation for Long-term Impacts

The current conceptual plans for the Ports to Plains Corridor will not result in permanent or temporary use of Section 4(f) or 6(f) resources. No proximity impacts in the immediate future will substantially impair the use of these properties. (A proximity impact is one caused by the proximity of a roadway or other facility to the environmental resource.) Therefore, at this time no avoidance alternatives will be considered.

Some proximity impacts will, however, eventually occur as traffic grows over time along the Ports to Plains Corridor, increasing noise and potentially making it more difficult to access some facilities. As the sections are designed and environmental studies completed, potential mitigations of long-term proximity impacts will need to be coordinated with the National Park Service (Comanche National Grasslands, Amistad National Recreation Area, crossings of the Santa Fe Trail and El Camino Real de los Tejas), local school districts, departments of transportation (for roadside parks), towns and counties (for local parks and recreation sites), Colorado Division of Wildlife (Queens State Wildlife Area), Texas Parks and Wildlife Department (Amistad National Recreation Area), the various SHPOs (historic and archaeological resources), and others as necessary.

3.2.14 Irrigated Farmland

Several areas of irrigated farmlands are located along the Corridor, especially in west Texas. These are not necessarily prime farmlands, but they are considered important land uses that need to be identified and considered in this inventory because of their ecological and economic value. Irrigated farmland, particularly along fence lines, is often an important wildlife habitat that should be left undisturbed if possible. These farmlands may also have high economic and cultural value to the communities in which they lie.

The sections and relief routes with irrigated farmlands adjacent to the roadway are shown in Exhibit 3.2-15 and listed in Exhibit 3.4-1 Environmental Consideration Summary Table. More detail is located in the section and relief route descriptions found in Appendix A.

Mitigation of Impacts to Irrigated Farmland

At the project level, the value of the soils and the impact of their conversion to transportation uses may need to be undertaken using the Farmland Impact Rating form, and if the analysis dictates, coordinating with the local office of the U.S. Soil Conservation Service, the local office of the NRCS, the state DOT, and the FHWA division coordinator or as local practices prescribe. If it is found that the farmland is also valuable habitat, coordination with the state wildlife agency will be necessary. The state DOT, Soil Conservation Service, National Resources Conservation Services, FHWA, and state wildlife agency may need to plan and coordinate any necessary mitigation measures according to local practices. If during final design it is determined that acquisition of irrigated farmland is necessary, acquisitions will be done in accordance with the Farmland Protection Policy Act of 1985 and the Uniform Relocation Assistance and Real Property Acquisition Policy Act of 1970, as amended. Where wildlife is at issue, best management practices will need to be used to minimize or eliminate impacts to the farmlands and long-term maintenance of the facilities.

Exhibit 3.2-15 Sections and Relief Routes with Irrigated Farmland



3.2.15 Hazardous and Contaminated Materials

The principal objective of a hazardous materials inventory is to identify recognized environmental conditions and to begin identification of the potential for discovering hazardous or contaminated materials in the Ports to Plains Corridor, particularly where construction activities may occur. According to the American Society for Testing and Materials (ASTM) standard, a recognized environmental condition is defined as the presence or likely presence of any hazardous substance or petroleum products on a property under conditions that indicate an existing release, a past release, or a material threat of a release into structures on the property or into the grounds, groundwater, or surface water of the property. Such a condition is typically identified with a Phase 1 Environmental Site Assessment during the project level environmental documentation stage. A Phase 1 assessment is intended to permit a user to satisfy one of the requirements to qualify for the innocent landowner defense to the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended (commonly known as Superfund), that is, the practices that constitute "all appropriate inquiry into the previous ownership and uses of the property consistent with good commercial or customary practice." The Phase 1 assessment would include research and field reconnaissance into Leaking Petroleum Storage Tanks (in Texas LPST); Leaking Underground Storage Tanks (in Colorado, Oklahoma and New Mexico LUST); and Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) sites; as well as other hazardous materials programs at the federal, state, and local level.

A number of LUSTs and LPSTs, oil and gas well sites, pipeline crossings and landfills--as well as one "Superfund" site--were identified in the Corridor. The Draft US 64-87 identified the "Superfund" monitoring well as well as four hazardous materials sites located along US 87 (First Street) in Clayton, New Mexico. Further information about this site and the other sections and relief routes can be found in the section description in Appendix A.

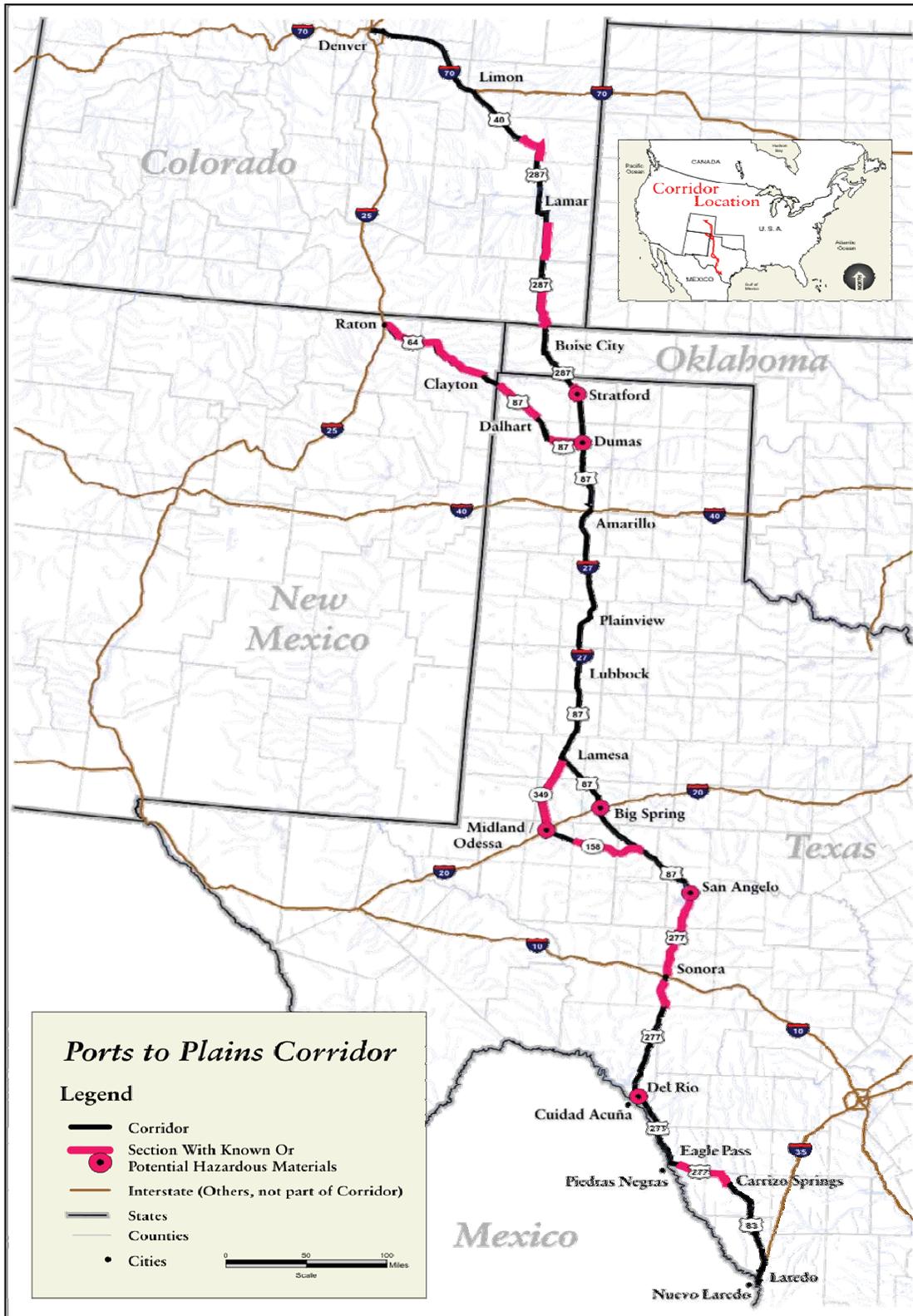
Sections and relief routes with identified sites are shown in Exhibit 3.2-16 and listed in Exhibit 3.4-1 Environmental Consideration Summary Table.

Mitigation of Impacts to Hazardous and Contaminated Materials Sites

During preliminary engineering and detailed environmental studies for each project, there will be a need to identify a complete list of potentially hazardous sites and the extent of any contamination. To avoid or mitigate potential liability associated with contaminated properties, environmental site assessment of properties to be acquired will need to be performed. If a property is found to be contaminated or to have hazardous materials and acquisition of the property is unavoidable, coordination with the contaminated facility and with regulatory agencies will ensure that construction will not impede site cleanup or exacerbate existing contamination.

In cooperation with the appropriate state and local agencies, a Hazardous Materials Management Plan, if necessary, will be prepared for the use of any hazardous materials during construction. This plan will cover the proper storage, handling, and use of hazardous materials required during construction, as well as emergency response procedures for any hazardous materials spills.

Exhibit 3.2-16 Sections and Relief Routes with Known or Potential Hazardous Materials



3.3 Sections with Existing 4-Lane Divided Highway Facilities

As explained earlier in this report, over 600 miles of the Ports to Plains Corridor already have four-lane divided highway facilities. These sections have not been studied further for this environmental inventory because no construction will occur where four lanes already exist. However, some of the environmental characteristics of these areas were summarized from the Ports to Plains Feasibility Study and are included here to complete the environmental overview of the entire Ports to Plains Corridor for this report.

It is important to repeat that this inventory does not constitute, nor does it replace, a detailed impact assessment that will be required for individual transportation projects to comply with NEPA policies and other state and federal environmental regulations. This baseline information is intended to be used as a starting point for preparation of environmental compliance documents and to provide a brief summary of issues.

3.3.1 US 83 from Laredo to I-35

Land use south of the US 83/I-35 intersection is a mixed pattern of industrial, rangeland, agricultural, and undeveloped land uses. Industrial operations can be found on this section, as well as large tracts of cropland and undeveloped areas. Truck stops and gas stations comprise the majority of businesses. The Laredo area is highly urbanized. The topography is nearly level to rolling and was originally covered with grassland. Shrubs and low trees are the result of grazing and fire suppression. Threatened and endangered species that may be present along this section are listed in Appendix B. Historic properties in and near Laredo are present in high numbers, ranging from the Spanish colonial period to mid-20th century highway culture and remnants of El Camino Real de los Tejas (Royal Road of Texas), a newly designated National Historic Trail. This trail is a combination of routes totaling more than 2,500 miles. An important part of Texas history, it was used for exploration, colonization, trading, ranching and battle. The San Augustine de Laredo Historic District is located in the central business district of Laredo. It is the locale of the nucleus of the original town, established in 1755. None of the properties date from the colonization period, but they reflect a historical continuum of local development. No archaeological sites were identified along this section.

3.3.2 US 87 from the San Angelo Relief Route to the Big Spring Relief Route

Between Sterling City and San Angelo lie several developed areas surrounded by cropland, including the small communities of Water Valley, Carlsbad, and Lake Gardens, which are mainly residential areas. Sixty percent of land in this area is cropland, the rest is typically rangeland. This area is frequently rocky and vegetated by tall and mid-grasses and a brush canopy of live oak, juniper, and mesquite. This section crosses the North Concho River and is adjacent to the San Angelo State Park. San Angelo State Park is located on the shores of O.C. Fisher Reservoir, which controls floods on the North Concho River. Big Spring State Park is located at the northern limit of the Edwards Plateau, culminating in a series of bluffs rising 200 feet above the rolling plains. Big Spring State Park caps one of the limestone bluffs at the northern edge of the plateau. Below the bluff, known as Scenic Mountain, sprawls the town of Big Spring, named for a large spring which served as the only watering place for herds of bison, antelope, and wild horses within a 60-mile radius. Each of these resources has the potential for wetland and riparian habitat. Threatened and endangered species

that may be present along this section are listed in Appendix B. Two churches are within 500 feet of US 87 in downtown Sterling and may be potentially NRHP eligible. A string of seven archaeological sites parallel to US 87 between Big Spring and Sterling City are the likely result of surveys performed in the area by TxDOT in 1995 and 1996, and more discoveries would be likely along the floodplains and alluvial terraces of the North Concho River. One archaeological site is located between Sterling City and San Angelo within the project Corridor (41TG232), and several are present within the San Angelo city limits that could be impacted by intersection improvements (if they are found to be necessary).

3.3.3 US 87 from the Big Spring Relief Route to the Lamesa Relief Route

This section has gently rolling to rough topography and was originally dominated by tall and mid-grasses. It passes through Ackerly Oil Field, but the majority of land between these two communities is cropland. No rivers are crossed, but several small creeks are crossed or lie adjacent to the section, and each has the potential for wetland and riparian habitat. Threatened and endangered species that may be present along this section are listed in Appendix B. The community of Fairview is traversed, but it is mainly widely scattered residences of two-to-three per square mile. Big Spring was an important services facility on the Texas & Pacific Railway and served the transcontinental Bankhead Highway to Sterling City. Two historic resources are within 500 feet of US 87. They include the Lamesa Farm Workers Community Historic District and the NRHP listed Potten-Hayden House (north-central Big Spring). No archaeological survey has been conducted near the project Corridor.

3.3.4 US 87 from the Lamesa Relief Route to Lubbock

This section has gently rolling to rough topography and was originally dominated by tall and mid-grasses. Cropland dominates the non-urban land use along this section. No rivers are crossed, but several small creeks are crossed or lie adjacent to the section, and each has the potential for wetland and riparian habitat. Threatened and endangered species that may be present along this section are listed in Appendix B. It passes through the Texas towns of Woodrow and Tahoka and bypasses most of O'Donnell via a relief route. North of Lamesa, there is a large concentration of industrial buildings. Lubbock was a major hub city for the Santa Fe Railway, and four rail branch lines radiated from the city, including one that went south to Lamesa. One NRHP listed property is the Lynn County Courthouse in Tahoka. Two archaeological sites are just southeast of Lubbock, one located within 1,000 feet of US 87. Another prehistoric site is located south of Tahoka, within 1,000 feet of US 87.

3.3.5 I-27 from Lubbock to Amarillo

This section descends from the high plains to rolling plains. Vegetation is variously classified as mixed-prairie and shortgrass prairie with sand sagebrush and honey mesquite. Threatened and endangered species that may be present along this section are listed in Appendix B.

3.3.6 US 87 from Dalhart Relief Route to Hartley

South out of Dalhart, US 87 leads toward the small residential and commercial community of Hartley. The land between these two towns is primarily rangeland. No rivers or reservoirs are

crossed by this segment, but several small creeks are, as well as numerous playa lakes. It is possible that protected species may occur along these creeks. No historic or archaeological resources were identified along this section. Threatened and endangered species that may be present along this section are listed in Appendix B.

3.3.7 US 87-287 from Amarillo to Stratford

Land between Stratford and Dumas is used primarily for crops and other agriculture. The small communities of Etter and Tenmile are along the route. Between Dumas and Amarillo, rangeland is the primary land use, but three areas of oil and gas activity are also present. The predominant vegetation is shortgrass communities of bunch grasses with a sparse layer of shrubs, including sagebrush, mesquite, and yucca. Palustrine wetlands occur along the Corridor in conjunction with drainages and floodplains, and in this arid to semi-arid region they stand out as riparian areas – conspicuous, sharply defined corridors of relatively lush vegetation. However, only the Canadian River (north of Amarillo) and several small creeks and streams are crossed. Playa lakes are also scattered throughout this part of the Corridor. It is possible that protected species may occur along these riparian areas and wetlands created by these creeks and drainage ways. Threatened and endangered species that may be present along this section are listed in Appendix B. This route follows a combination of historic rail (Santa Fe Railway) and highway alignments and features mid-20th century communities that owe their origins directly or indirectly to the heyday of the railroads, including Stratford, but no NRHP eligible properties or archeological sites were identified between Stratford and Dumas. Between Dumas and Amarillo there is one potentially eligible NRHP historic district, and the archaeological site, 41PT176, overlooks US 287.

3.3.8 I-70 from Limon to I-25 in Denver

Denver, the most urbanized city in Colorado, is the Corridor's northernmost terminus. Land use between Denver and Limon transitions from urban residential and commercial to rural agricultural/undeveloped. This section passes by the small communities of Bennett and Deer Trail and through scattered parcels of state-owned land, croplands, undeveloped areas, and dispersed residential areas. Limon is located on I-70/US 287 between the US 24 intersection and SH 71, but the Corridor does not pass through it. The predominant vegetation is short to mid-height grasslands, trees and shrubs such as juniper, sagebrush, and rabbitbrush. Palustrine wetlands occur along the Corridor in conjunction with drainages and floodplains, and in this arid to semi-arid region they stand out as riparian areas – conspicuous, sharply defined corridors of relatively lush vegetation. This section crosses five creeks and lies adjacent to Big Sand Creek for part of its length. It is possible that protected species may occur along these riparian areas and wetlands. Threatened and endangered species that may be present along this section are listed in Appendix B. This route follows a combination of historic rail (Rock Island Railroad) and highway alignments and features mid-20th century communities that owe their origins directly or indirectly to the heyday of the railroads. Two NHRP eligible sites are located between Deer Trail and Limon.

3.4 Summary of Key Environmental Elements, Impacts and Mitigations

This section describes in the most general terms the environmental elements that have been inventoried in this study. The topics include: major rivers, streams, and reservoirs; wetlands;

riparian habitats; floodplains; protected species; air quality; cultural resources; paleontology; low-income and minority populations; noise; potential relocations; public lands and community facilities; irrigated farmlands; secondary and cumulative impacts; and hazardous materials. It is important to reiterate that all sections and relief routes of the Ports to Plains Corridor will be studied under a NEPA process and that all aspects of the environment will be given a thorough review according to applicable federal and state regulations, guidelines and criteria. This information-compiling activity does not advocate or propose the development of any project.

The inventory in this Corridor Development Study was done only to help future project development staff determine the level of effort that may be required under NEPA, identify potential project need based on existing data and areas of environmental complexity that may lengthen a NEPA process, and estimate the magnitude of costs associated with potential environmental mitigation.

The level of effort that may be required under NEPA for each section and relief route is shown in Chapter 7 – Risk Assessment, and in Appendix A.

Areas of potential concern and complexity are briefly discussed above, shown in Exhibit 3.4-1, and outlined more fully in Appendix A.

The magnitude of potential mitigation costs is shown in Chapter 7 - Risk Assessment.

3.4.1 Environmental Considerations Summary Table

The following table shows which sections appear to have, at this very preliminary level of information gathering, the potential for a longer or more involved NEPA process in regard to certain environmental considerations and which considerations (♦) these are. Note that some sections listed below have already been studied under a NEPA process (■), and in some of these cases approvals or Findings of No Significant Impact (FONSI) have been issued.

Exhibit 3.4-1 Environmental Considerations Summary Table

Section or Relief Route			Environmental Considerations															
Roadway	From	To	Special Status Streams	Wetlands	Floodplains	Riparian Habitat	Protected Species	Archaeological Resources	Historic Resources	Paleontological Resources	Air Quality	Noise	Environmental Justice	Displacements and Relocation	Induced Growth and Cumulative Effects	Public Lands and Community Facilities	Irrigated Farmlands	Hazardous and Contaminated Materials
US 83	I 35	Webb/ Dimmit county line		♦	♦													
US 83	Webb/ Dimmit county line	Catarina		♦	♦				♦									
US 83	Catarina	Carrizo Springs Relief Route			♦				♦									
US 277	Carrizo Springs Relief Route	Dimmit/ Maverick county line			♦				♦									♦
US 277	Dimmit/ Maverick county line	Eagle Pass Relief Route			♦													♦
US 277	Eagle Pass Relief Route	Maverick/ Kinney County line	♦	♦	♦	♦	♦			♦		♦	♦	♦			♦	
US 277	Maverick/ Kinney County line	Kinney/ Val Verde county line	♦	♦	♦	♦	♦			♦								
US 277	Kinney/Val Verde county line	Del Rio Relief Route	♦	♦	♦		♦			♦								
US 277	Del Rio Relief Route	Val Verde/ Edwards county line		♦	♦	♦	♦			♦						♦		
US 277	Val Verde/ Edwards county line	Edwards/ Sutton county line		♦	♦	♦	♦			♦								

Section or Relief Route			Environmental Considerations															
Roadway	From	To	Special Status Streams	Wetlands	Floodplains	Riparian Habitat	Protected Species	Archaeological Resources	Historic Resources	Paleontological Resources	Air Quality	Noise	Environmental Justice	Displacements and Relocation	Induced Growth and Cumulative Effects	Public Lands and Community Facilities	Irrigated Farmlands	Hazardous and Contaminated Materials
US 277	Edwards/ Sutton county line	Sonora Relief Route			♦					♦								♦
US 277	Sonora Relief Route	Sutton/ Schleicher county line								♦								♦
US 277	Sutton/ Schleicher county line	Schleicher/ Tom Green county line						♦	♦	♦		♦	♦	♦		♦		♦
US 277	Schleicher/ Tom Green county line	San Angelo Relief Route				♦		♦	♦	♦		♦	♦	♦		♦		♦
SH (Texas) 158	Sterling City	Sterling/ Glasscock county line		♦	♦				♦	♦		♦	♦	♦		♦		♦
SH (Texas) 158	Sterling/ Glasscock county line	Glasscock/ Midland county line							♦	♦		♦	♦	♦		♦		♦
SH (Texas) 349	Midland	Midland/ Martin county line							♦			♦	♦	♦		♦		♦
SH (Texas) 349	Midland/ Martin county line	Martin/ Dawson county line			♦													♦
SH (Texas) 349	SH 349	FM 2052										♦	♦	♦				♦
FM 2052	SH 349	US 87																
US 287	Stratford	Sherman/ Dallam county line							♦								♦	♦

Section or Relief Route			Environmental Considerations															
Roadway	From	To	Special Status Streams	Wetlands	Floodplains	Riparian Habitat	Protected Species	Archaeological Resources	Historic Resources	Paleontological Resources	Air Quality	Noise	Environmental Justice	Displacements and Relocation	Induced Growth and Cumulative Effects	Public Lands and Community Facilities	Irrigated Farmlands	Hazardous and Contaminated Materials
US 287	Sherman/ Dallam county line	OK/TX Border																
US 287	OK/TX Border	Boise City Relief Route	♦				♦											
US 287	Boise City Relief Route	OK/CO Border						■	■									
US 287	OK/CO Border	Springfield					♦	♦	♦	♦		♦	♦	♦		♦	♦	♦
US 287	Springfield	Baca/ Prowers county line						♦	♦	♦		♦	♦	♦		♦		
US 287	Baca/ Prowers county line	Lamar Relief Route						♦		♦								♦
US 287	Lamar Relief Route	Prowers/ Kiowa county line					♦	♦	♦		♦					♦		
US 287	Prowers/ Kiowa county line	Eads						♦	♦	♦								
US 287	Eads	Kiowa/ Cheyenne county line						♦				♦	♦	♦		♦		♦
US 287	Kiowa/ Cheyenne county line	Kit Carson						♦										♦
US 40	Kit Carson	Wild Horse							♦			♦	♦	♦		♦		♦
US 40	Wild Horse	Cheyenne/ Lincoln county line							♦	♦		♦	♦	♦		♦		

Section or Relief Route			Environmental Considerations															
Roadway	From	To	Special Status Streams	Wetlands	Floodplains	Riparian Habitat	Protected Species	Archaeological Resources	Historic Resources	Paleontological Resources	Air Quality	Noise	Environmental Justice	Displacements and Relocation	Induced Growth and Cumulative Effects	Public Lands and Community Facilities	Irrigated Farmlands	Hazardous and Contaminated Materials
US 40	Cheyenne/ Lincoln county line	Hugo						♦		♦								
US 40	Hugo	Limon						♦	♦	♦		♦	♦	♦		♦		♦
US 87	Dumas	Moore/ Hartley county line										♦	♦	♦				♦
US 87	Moore/ Hartley county line	Hartley interchange with US 385		♦														♦
US 87	Dalhart Relief Route	TX/NM Border	♦			♦											♦	♦
US 64	Clayton	Capulin			■			■	■	■		■	■					■
US 64	Capulin	Union/ Colfax county line						■	■			■	■					■
US 64	Union/ Colfax county line	Raton/I 25						■				■	■					■
Carrizo Springs Relief Route	South of Asherton	North of Carrizo Springs			♦				♦						♦			
Eagle Pass Relief Route	Eagle Pass International Bridge	US 277 east of Eagle Pass			■	■	■	■	■			■	■		■			
Eagle Pass Relief Route	US 277 east of Eagle Pass	US 277 north of Eagle Pass			■	■	■					■	■		■			
Del Rio Relief Route	US 277 east of Del Rio	US 277 north of Del	♦		♦	♦	♦			♦					♦			♦

Section or Relief Route			Environmental Considerations															
Roadway	From	To	Special Status Streams	Wetlands	Floodplains	Riparian Habitat	Protected Species	Archaeological Resources	Historic Resources	Paleontological Resources	Air Quality	Noise	Environmental Justice	Displacements and Relocation	Induced Growth and Cumulative Effects	Public Lands and Community Facilities	Irrigated Farmlands	Hazardous and Contaminated Materials
Sonora Relief Route	US 277 south of Sonora	US 277 north of Sonora			♦					♦					♦			
San Angelo Relief Route	US 277 south of San Angelo	US 87 north of San Angelo	♦		♦	♦	♦			♦					♦		♦	♦
Big Spring Relief Route	US 87 south of Big Spring	US 87 north of Big Spring								♦		♦	♦	♦	♦			♦
Lamesa Relief Route	US 87 south of Lamesa	US 87 north of Lamesa		♦								♦	♦	♦	♦		♦	
Dumas Relief Route	US 287 south of Dumas	US 287 north of Dumas													♦			♦
Stratford Relief Route	US 287 south of Stratford	US 287 north of Stratford													♦		♦	♦
Boise City Relief Route	US 287 south of Boise City	US 287 north of Boise City													♦			
Lamar Relief Route	US 287 south of Lamar	US 50 north of Lamar		♦	♦	♦	♦		♦		♦				♦			
Dalhart Relief Route	US 87 south of Dalhart	US 87 north of Dalhart													♦		♦	
Midland Relief Route	I 20 west of Midland	SH 349 north of Midland													♦			♦
Clayton Relief Route	US 87 east of Clayton	US 64 west of Clayton													♦			

CHAPTER 4

Maintenance and Operation Plan

Key Concepts:

- *The costs of maintaining the existing Corridor and proposed improved Corridor are defined.*
- *Both, routine and preventive, maintenance costs are developed and compared.*



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4 MAINTENANCE AND OPERATION

4.1 Introduction

As the preservation of this Corridor is considered, many factors enter into the equation. First, there are four states, and each could have a different philosophy regarding the level of maintenance expected by the traveling public. Next, changing weather patterns and how to address them are major issues over this approximately 1,400-mile Corridor. Finally, the terrain and soil conditions vary with the alluvial plains along the Rio Grande River, the moderate hills with their rock formations north of Del Rio, the gently rolling sand hills south of Lubbock, and the high plains bread basket and ranch land between Amarillo and Denver. This chapter will detail the two types of maintenance that are considered: routine and preventive, including considerations in evaluating the costs of maintenance. It also examines the difference between the costs of maintaining the existing Corridor versus the improved Corridor. It also includes a review of individual state maintenance procedures and opportunities for Corridor collaboration.

4.2 Maintenance Types

Routine

Routine functions are those performed frequently and repeatedly, such as pavement repairs, shoulder grading, striping and re-striping, mowing, snow/sand removal, pavement edge repair, and unusual repairs due to extreme weather. Examples of unusual repairs include undermining of bridges and overtopping of roadways during flash flooding, removal of wind deposited sediment from the roadway and ditches, and excessive pavement rutting and fractures due to extreme heat and freeze-thaw cycles. Extreme heat can impact concrete roadways, creating locations where the expansion of the pavement causes fractures. A different phenomenon occurs with asphalt pavement as heat can actually cause the pavement to become fluid. The use of certain types of asphalt in regions with colder winter temperatures can create additional hardening, causing cracking and permitting water to enter the pavement structure. This, combined with the freeze-thaw cycles, damages the pavement structure. Windy conditions create problems with snowfall, as evidenced by the installation of fixed and natural living snow fences on the northern portions of the Corridor. As mentioned previously, there are different soil types along the entire Corridor, and they provide unique challenges for construction of transportation networks as well as the continued maintenance of these roadways. The initial roadway design takes into account the soil types and their ability to provide support to the pavement structure and the traffic using the road. Similarly, over the life of the roadway, the soil type does affect the amount of maintenance that is required.

A review of costs associated with each state's routine maintenance operation was conducted and can be found in Section 4.3, Corridor Maintenance Evaluation. This data was obtained from the different regions/districts of each state DOT. This provided an opportunity to analyze operations throughout the Corridor to determine the varying levels of maintenance and the impact of outside elements, especially the normal seasonal weather differences, on operations in each state. Typically both state DOT personnel and, in some cases, contracted service providers perform routine maintenance operations. Different situations dictate varying degrees of utilization of contract personnel. Therefore, the combination of in-house and contracted costs varies along the Corridor. The overall

resulting cost of routine maintenance is typically borne by the states without the help of federal funds.

Preventive

Preventive maintenance, which occurs less frequently and is longer lasting, includes seal/chip applications, pavement overlays, and pavement rehabilitation. This type of maintenance usually relies on contracted operations to provide services not routinely performed by state DOT personnel or that can be more efficiently and economically performed by specialists on an “as needed” basis.

Material type is an important variable in successful preventive maintenance operations. The comparison of maintenance operations dictated by different climates over the extent of the Corridor yields interesting results. The northern portion endures temperature ranges from highs of over 100 degrees to below minus 20 degrees Fahrenheit in a calendar year. The southern portion does not experience the intense cold but is subject to more intense heat during the summer months, with temperatures exceeding 110 degrees Fahrenheit. These varying conditions play an important role in selection of types of roadway materials, since longevity is a key to an economical maintenance plan. Examples of varying material types include the asphalt grade and pavement markings. Raised pavement markers are easily damaged and sometimes dislodged by snowplows, and the thickness of striping can prevent the full removal of snow by preventing the snowplow from lowering close enough to the roadway surface. Cost data was obtained from the different regions/districts of each state DOT, thus varying material types are accounted for in these costs, as discussed in the Corridor Maintenance Evaluation section. Preventive maintenance, such as overlays and rehabilitation, are eligible for federal funding assistance. Funding of maintenance is taken into consideration in the Finance Plan, Chapter 6 of this document. The overlay portion of preventive maintenance is eligible for federal funding and is characterized as “preservation” in the Finance Plan.

4.3 Corridor Maintenance Evaluation

An evaluation was made of the overall maintenance and operations practices of each state, including yearly costs for maintaining roadways along the Corridor in particular. This also provided anticipated average life cycles for different types of operations. The existing pavement condition was determined, rated, and then used to determine where each particular section fits into a maintenance schedule shown in Exhibit 4.3-1. Anticipated plans for improving pavement conditions were reviewed and used to aid in substantiating the matrix. This information was then used to determine the cost of both routine and preventive maintenance operations for each state as well as the total Corridor. This information allowed the development of a suggested maintenance schedule for the individual sections along with the estimated cost of the repairs.

The pavement conditions for each section were rated as Good, Fair, or Poor. The assumptions for preventive maintenance are based on the five-year maintenance schedule shown in Exhibit 4.3-1.

Exhibit 4.3-1 Preventive Maintenance of Asphalt Concrete Pavement (ACP)

Existing Condition	Year				
	2005-2010	2011-2015	2016-2020	2021-2025	2026-2030
Good	-	Seal	ACP Overlay	-	Seal
Fair	Seal	ACP Overlay	-	Seal	ACP Overlay
Poor	ACP Overlay	-	Seal	ACP Overlay	-

Seal = seal coat: ACP Overlay = asphalt overlay

On sections that will be expanded from two-lane to four-lane facilities and where relief routes will be constructed, the following schedules of pavement maintenance were used:

- Concrete Pavement – Determine construction date of existing pavement. Life expectancy of pavement is approximately 25 years. Place Asphalt Concrete Pavement (ACP) overlay at that time. Then begin asphalt pavement cycle, beginning with the Good condition in Exhibit 4.3-1.
- Asphalt Concrete Pavement – Utilize the visual rating of existing pavement, and begin the proposed preventive maintenance schedule as described in Exhibit 4.3-1.

The cost of maintaining this Corridor is not small. Exhibit 4.3-2 provides an analysis of routine maintenance costs with a comparison of the existing system to the improved system. The existing columns identify costs through the year 2030, with no expansion improvements or construction of relief routes. The improved columns introduce additional costs as the system is expanded and relief routes are constructed over the project life to year 2030.

**Exhibit 4.3-2 Routine Maintenance Total Costs Comparisons for 2005-2030
(2004 dollars in millions)**

State	Existing		Improved	
	Life Cost ³	Cost/Year ¹	Life Cost ³	Cost/Year ²
Colorado	\$43.1	\$1.7	\$46.9	\$1.9
New Mexico	\$13.3	\$0.5	\$17.3	\$0.7
Oklahoma	\$6.1	\$0.2	\$7.3	\$0.3
Texas	\$205.2	\$7.9	\$236.5	\$10.4
Total	\$267.7	\$10.3	\$308.0	\$13.3

1. Existing Cost/Year is based on average costs anticipated in the year 2005.
 2. Improved Cost/Year is based on average costs anticipated in the year 2030.
 3. Life cost is the total costs anticipated through the 2030 horizon. Existing takes into account only existing roadways, and Improved takes into account the incremental addition of Corridor expansion and relief routes through the 2030 horizon.



Example of New Concrete Pavement



Example of Distressed Asphalt Pavement

The routine maintenance costs range from \$10.3 million per year initially for the existing system to \$13.3 million per year upon completion of the Corridor expansion. This increased cost may have an impact on budgets and personnel allocations for the individual maintenance units along the Corridor.

Even as the Corridor is expanded, with significant improvements being made to the existing facilities, there remains a cost for preventive maintenance. Exhibit 4.3-3 provides a summary of these costs for the existing and improved Corridor through the 2030 horizon.

***Exhibit 4.3-3 Total Preventive Maintenance Costs for 2005-2030
(2004 dollars in millions)***

State	Existing ¹	Improved ²
Colorado	\$188.7	\$208.2
New Mexico	\$43.9	\$52.2
Oklahoma	\$15.0	\$29.2
Texas	\$792.5	\$795.9
Totals	\$1,040.2 ³	\$1,085.5 ³

1. Existing analysis includes all roads on the Corridor as they exist in 2004.

2. Improved analysis includes all roads on the Corridor as they exist in 2004, plus the incremental expansion to four lanes and construction of relief routes.

3. The portion of this total used for overlays is characterized as "preservation" in the Finance Plan.

It is notable to observe that in Texas the cost of preventive maintenance increases only slightly under the improved analysis. This occurs because as the Corridor is improved with expansion sections, the existing two lanes are also reconstructed. By reconstructing the existing two lanes, the preventive maintenance schedule is altered, and the reconstructed roadway will need less preventive maintenance action in the 2030 analysis horizon than in the existing analysis. If the analysis horizon were extended, the improved preventive maintenance costs would then exceed the existing preventive maintenance costs.

Installation of new Intelligent Transportation Systems (ITS) were discussed in Chapter 2. Included are considerations for maintenance and operations for the new ITS features. Exhibit 4.3-4 shows increased costs of the maintenance and operations for ITS features.

Exhibit 4.3-4 ITS Maintenance Costs for 2005-2030
(2004 dollars in millions)

State	Improved
Colorado	\$11.2
New Mexico	\$9.3
Oklahoma	\$8.5
Texas	\$27.9
Total	\$56.9

Since maintaining the Corridor at a uniform level of service is an absolute necessity, showing the overall maintenance costs is required. Exhibit 4.3-5 presents a combined summary of maintenance costs for the existing and improved Corridor for the entire 2030 horizon.

Exhibit 4.3-5 Total Combined Maintenance Costs for 2005-2030
(2004 dollars in millions)

State	Existing	Improved
Colorado	\$231.8	\$266.3
New Mexico	\$57.3	\$78.8
Oklahoma	\$21.1	\$45.0
Texas	\$997.7	\$1,060.3
Totals	\$1,307.9	\$1,450.4

4.4 Review of Procedures and Opportunities

Certain maintenance procedures that have evolved over time illustrate interesting differences as to their impact on transportation. Snow removal is one of the best examples of such varying maintenance procedures. Generally, the New Mexico DOT prefers to remain off I-40 until an intense snowstorm has passed; then begin the snow removal. In contrast, both Oklahoma and the Texas DOTs continue to remove snow until the point where blizzard conditions prevail and the lanes are being covered behind the snowplow, creating compromising safety conditions for the workers and the traveling public. Colorado has gates along many roadways that are used to restrict traffic during intense storms. Each of these snow-related procedures, while conducive to each area, has a different impact on transportation, especially on the interstate movement of freight. These procedural variations provide an excellent opportunity for the use of ITS; e.g., providing roadway information

such as closures with alternative routes and identifying current weather-related information, especially in remote areas.

There are certain steps that the states should consider to provide a Corridor that consistently meets the transportation needs of its users. The following summary identifies both specific items and formats to meet these needs:

1. Identify and advance ITS projects that will improve Corridor efficiency and driver information, such as weather conditions.
2. Increase maintenance budget and personnel to meet future needs of the expanded Corridor.
3. Utilize maintenance personnel in planning and design of transportation projects.
4. Increase the state maintenance research effort and that of the Transportation Research Board to minimize and reduce maintenance and operation costs.
5. Increase the scope of maintenance topics during state DOT conferences, both in-state and regional.
6. Continue the annual 5 State Snow and Ice Conference, which includes Colorado, Kansas, New Mexico, Oklahoma, and Texas. This provides an excellent opportunity to discuss problems and explore new products, techniques, and methods for winter maintenance. For example, at a recent snow conference, discussions centered on improved methods of forecasting, pre-application of chemicals, and removal methods and equipment.
7. Utilize the Western Association of State Highway Officials (WASHTO) conferences as a means to promote uniformity in roadway maintenance.
8. Share the innovative fund-saving ideas, such as Colorado's Adopt-A-Highway, Texas' Adopt-A-Highway, and Colorado's living snow fence program.

Benefit Cost Analysis

Key Concepts:

- *Investments in the Ports to Plains Corridor create transportation economic and fiscal benefits.*
- *Traditional benefit cost analysis (travel time savings, accident savings, and other transportation benefits) produced a benefit cost ratio of less than one.*
- *From the economic benefit perspective, the benefits that accrue through the road construction, use, and from the market response to the improved level of service, a benefit cost ratio of 3.15:1 is estimated.*



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5 BENEFIT COST ANALYSIS

This chapter of the report develops a Benefit Cost Analysis of the Ports to Plains Corridor. The objective of this analysis is to help select efficient transportation improvement projects. Two Benefit Cost (B/C) ratios are developed for the Ports to Plains Corridor. The first ratio compares the value of transportation benefits to the cost of the project. The second ratio compares the value of expected economic development attributable to the project to the cost of the project. Both B/C ratios address the feasibility of candidate highway investments. A positive value on a B/C ratio above 1.0 indicates that a project returns \$1 or more of transportation user benefits or economic development for every \$1 or more depending on the ratio of project cost. The B/C ratio can help rank elements of a project which is useful for decisions on project staging. The ratio may also be used to compare projects; this may have implications for funding when decision makers review a menu of alternative investments.

5.1 Project Costs

The costs associated with this investment include both the capital expenditure to improve the roadway and the operations and maintenance spending that will occur once the roadway improvements are completed. These costs, expressed in millions of 2004 dollars are summarized in the Exhibit 5.1-1. The costs also are shown discounted at 7.0 percent following Office of Management and Budget (OMB) guideline for investment appraisal.

Exhibit 5.1-1 Project Costs

	Costs (Millions of 2004 Dollars)	Costs (Millions of 2004 Dollars @ 7.0%)
Colorado	\$610.2	\$303.1
New Mexico	\$173.7	\$98.7
Oklahoma	\$177.0	\$107.1
Texas	\$1,908.7	\$929.6
Corridor	\$2,869.5	\$1,438.5

5.2 Transportation Benefit/Cost Analysis

The transportation user benefits will be realized as residents, tourists, and trucks travel the Corridor more efficiently and with greater safety. These user benefits include travel time savings, vehicle operating cost savings, and savings associated with increased safety; that is, crashes, including property damage, injuries, and fatalities that are avoided.

5.2.1 Safety Benefits

The economic benefit associated with crash reduction is calculated using national costs per crash by type of crash. Those costs include actual costs incurred, such as emergency and legal services, insurance costs, lost productivity, and travel delay for other motorists and also include a component to measure more intangible costs such as lost productivity and reduced quality of life resulting from injury.

The economic value of these safety benefits, summarized by Property Damage Only (PDO), Injury, and Fatality are summarized in Exhibit 5.2-1.

Exhibit 5.2-1 Benefits from Crash Reduction: 2011 to 2030

	Crash Reduction	Benefits (Millions of 2004 Dollars)	Benefits (Millions of 2004 Dollars @ 7.0%)
PDO	3,296	\$13.1	\$3.90
Injury	1,369	\$81.7	\$24.50
Fatality	70	\$286.5	\$85.90
Total	4,735	\$381.2	\$114.30

The total benefit is \$381.2 million for crashes that are avoided, in 2004 dollars. Discounting that benefit by 7.0 percent results in benefits of \$114.3 million. These are recurring benefits.

5.2.2 Travel Time Savings

The benefits of travel time savings were estimated using estimated savings in vehicle hours traveled predicted by the traffic model and the value of time saved. Travel time savings are estimated for autos and trucks.

Between 2011 and 2030, the total auto travel time savings benefit generated by improving the transportation infrastructure is estimated to be \$273.7 million in 2004 dollars. The discounted benefit associated with the reduction in auto travel times in the project Corridor is expected to be \$76.5 million using a 7.0 percent discount rate.

Between 2011 and 2030, the total truck travel time savings benefit generated by improving the transportation infrastructure is estimated to be \$268.2 million in 2004 dollars. The discounted benefit associated with the reduction in truck travel times in the project Corridor is expected to be \$75.0 million using a 7.0 percent discount rate.

5.2.3 Change in Vehicle Operations Costs

The value of vehicle operation costs in 2030 was calculated by multiplying the per mile costs for trucks and autos to the estimated changes in daily Vehicle Miles Traveled (VMT), provided by the travel demand forecasting model developed for the Ports to Plains Corridor.

Between 2011 and 2030, the total auto operations costs are increased resulting from improving the transportation infrastructure. This disbenefit is estimated to be \$-49.1 (increase of \$49.1 in auto operating costs) million in 2004 dollars. The discounted cost associated with this variance in auto operation costs in the project Corridor is expected to be \$-13.7 million using a 7.0 percent discount rate. As mentioned, the negative number actually represents a disbenefit as defined by this analysis. The reason for this is that a large number of auto vehicles are attracted to the Corridor. This creates an increase in VMT in the Corridor, and therefore, an overall increase in the cost to operate the vehicles in the corridor. It should be noted that the efficiency that is added by making CDMP improvements, which is represented by a positive number for travel time savings, far outweighs the vehicle operation cost disbenefit.

Between 2011 and 2030, the total truck operations costs are reduced. The benefits to truck operations generated by improving the Corridor is estimated to be \$38.0 million in 2004 dollars. The discounted benefit associated with the reduction in truck travel times in the project Corridor is expected to be \$10.6 million using a 7.0 percent discount rate.

Exhibit 5.2-2 summarizes the transportation benefits to users of the improved Corridor. The benefits are expressed in millions of 2004 dollars at a 7.0 percent discount rate. The numbers reflect the sum of benefits from 2011 to 2030.

Exhibit 5.2-2 Summary of Transportation User Benefits

User Benefit	Benefits (Millions of 2004 Dollars)	Benefits (Millions of 2004 Dollars @ 7%)
Safety	\$381.2	\$114.3
Vehicle Travel Time	\$541.9	\$151.5
Vehicle Operation Cost	-\$11.1	-\$3.1
Total	\$912.0	\$262.7

Source: AECOM Consult, Inc.

Comparing the total of discounted benefits in the Exhibit above to the project costs yields a Benefit Cost Ratio of 0.18. The conclusion, based on this ratio, is that the project is not justified based on American Association of State Highway and Transportation Officials (AASHTO) Red Book criteria to evaluate highway investments. Of note, however, AASHTO criteria for Benefit Cost Analysis do NOT address economic benefits associated with highway improvements. Such benefits may be a major part of the underlying motivation for the project. This is the case for the Ports to Plains Corridor, therefore, the analysis shifts focus to consider the economic benefits projected to occur if the Corridor improvements are made.

5.3 Economic Benefit Analysis

The economic benefits analyzed include construction benefits, roadside services benefits, increased manufacturing and distribution benefits, tourism benefits from seasonal travel, and the fiscal benefits attributable to the expansion of this economic base.

Construction Benefits: These are one-time benefits that stem from the construction work needed to improve the existing road.

Roadside Service Benefits: The improved road will attract more travelers, increasing the spending at roadside establishments. The roadside service benefits analysis examines the hiring and associated wage and salary gains generated to meet this increased demand.

Manufacturing and Distribution Benefits: Given its southern terminus at the Port of Laredo, Texas and the Corridor’s significance as an international trade route, much of the economic development potential of the Corridor stems from economic activity related to North American Free Trade Agreement (NAFTA) trade, namely manufacturing and distribution activities. This analysis projects the potential growth in these industries that would occur if development unfolds as it has along other more established NAFTA trade routes in the region.

Tourism: Winter seasonal migration is a growth industry in southern Texas and the Corridor lies along a feasible route for travelers from the Western U.S. The improved road opens up access to this travel market, permitting Ports to Plains communities to compete for a small share of this rapidly growing market. The expenditures made by these travelers generate demand in the local economy for food, entertainment, health and travel services.

Fiscal Benefits: The expansion of payrolls and commercial development described above increases the tax base of Corridor communities.

5.3.1 Estimation Methodology

The Bureau of Economic Analysis (BEA) has developed a method for estimating economic multipliers called its Regional Industrial Multiplier System (RIMS). Updated and improved over time, the current version of these multipliers is known as the RIMS II multipliers. RIMS II multipliers are used extensively in the public and private sector for economic benefit analysis.

The RIMS II multipliers used in this study represent the most recent available at the time of the study. The multipliers were customized by BEA to reflect the unique industrial structure of the Ports to Plains Corridor economy. The RIMS II model is expenditure driven and translates capital investment and related operational spending into economic outcomes measured in terms of earnings multipliers (earning incomes) and employment multipliers (full-time equivalent jobs).

The economic benefits described above represent a broadening and deepening of the Corridor economy—an expansion of the local tax base.

This analysis considered direct and indirect benefits (multiplier effects) through 2030. All measures are stated in year 2004 dollars (no escalation of benefits). Benefits are stated through the horizon year (2030) and as Net Present Value (NPV). NPV is derived using alternative discount rates including 7.0 percent following OMB guidelines reflecting cost of capital displaced from the private sector and 4.78 percent, which is the latest state and local bond rate. NPV results for the 4.78 percent calculations can be found in Appendix B.

5.3.2 Construction Benefits

The initial benefits of the Ports to Plains investment are generated by the direct expenditures associated with building the relief routes and expanding the existing 2-lane highway. This construction spending increases the employment, earnings and output for Corridor communities for the duration of the construction process as construction firms expand payrolls and purchase materials. The hiring associated with the project represents the direct effects of the Corridor construction investment.

The earnings of these newly-hired construction workers will translate into a proportional increase in consumer demand as these workers purchase goods and services in the region. These purchases in turn generate additional jobs across a variety of industrial sectors and occupational categories as employers hire to meet this increase in local consumer demand. This latter hiring represents the indirect effect of the project. These are one-time benefits that only last for the duration of the construction cycle.

For construction workers and residents in the states along the project Corridor over the 2006 to 2030 period, expenditures associated with construction activities are expected to produce in both direct and indirect effects a maximum of approximately 1,365 jobs and \$931.1 million in earnings, in 2004 dollars throughout the Corridor states. Discounting those earnings by 7.0 percent, the construction benefit would equal \$448.3 million.

5.3.3 Roadside Services

Once completed, the improved Ports to Plains Corridor is expected to divert some traffic away from the existing and heavily-traveled Interstate routes. This increase in traffic translates into increases in spending on food, gasoline, lodging, and other retail along the Corridor. Therefore, there will be an expansion of commercial activity to meet this increase in demand.

Between 2006 and 2030, the expansion of commercial activities serving Corridor travelers is expected to generate approximately 2,031 jobs and \$722.4 million in earnings in 2004 dollars throughout the Corridor states. Discounting that benefit by 7.0 percent results in a benefit of \$215.6 million. These are recurring benefits.

5.3.4 Manufacturing and Distribution

Given its southern terminus at the Port of Laredo, Texas, much of the economic development potential of the Corridor stems from economic activity related to NAFTA trade.

This improved alternative link increases the likelihood that distribution and other trade-related firms can locate in Corridor communities and enjoy the lower business costs of a non-metro Corridor location but with reliable access to Mexico and the larger metro areas within the Southwest U.S.

Between 2006 and 2030, the potential expansion of manufacturing and distribution activities in the Corridor would generate approximately 39,636 jobs and \$16.1 billion in earnings in 2004 dollars throughout the Corridor states. Discounting that benefit by 7 percent results in benefits of \$4.26 billion. These are recurring benefits.

The total employment benefits resulting from increased manufacturing and transportation/warehousing employment in the counties along the project Corridor are displayed in the following exhibits. Exhibit 5.3-1 contains employment benefits associated with manufacturing and transportation/warehousing for counties along the project Corridor while Exhibit 5.3-2 contains total employment benefits associated with manufacturing and transportation/warehousing for all counties in the states combined.

Exhibit 5.3-1 Total Employment Benefits in the Corridor Counties

Year	Colorado	New Mexico	Oklahoma	Texas	Total
2006	0	0	0	0	0
2007	38	0	0	54	92
2008	115	1	0	165	281
2009	234	1	0	335	570
2010	397	2	1	566	965
2011	605	3	1	862	1,471
2012	844	4	1	1,199	2,048
2013	1,114	5	2	1,581	2,702
2014	1,418	6	2	2,009	3,435
2015	1,757	8	2	2,485	4,252
2016	2,130	9	3	3,011	5,153
2017	2,541	11	3	3,593	6,149
2018	2,993	13	4	4,233	7,243
2019	3,488	15	5	4,933	8,440
2020	4,028	17	5	5,696	9,746
2021	4,608	19	6	6,527	11,159
2022	5,236	21	7	7,427	12,691
2023	5,914	24	8	8,402	14,348
2024	6,645	26	8	9,454	16,134
2025	7,431	29	9	10,588	18,058
2026	8,276	32	10	11,809	20,127
2027	9,148	35	11	13,070	22,264
2028	10,047	38	12	14,375	24,472
2029	10,976	41	13	15,723	26,753
2030	11,935	44	14	17,116	29,108

Source: AECOM Consult, Inc., Bureau of Economic Analysis, and Woods & Poole.
 Notes: Rows may not sum to totals due to rounding.

In 2030, it is estimated that the benefit of an increase of 3,324 manufacturing jobs would result in a total employment benefit of 8,409 jobs in project Corridor counties. Similarly, the transportation/warehousing employment benefit of about 9,381 jobs would result in an increase of approximately 20,699 jobs in project Corridor counties. Combined, the total estimated benefit of increases in employment that is associated with transportation improvements in the project Corridor is estimated to be 29,108 jobs.

Exhibit 5.3-2 Total Employment Benefits in all Counties in the States

Year	Colorado	New Mexico	Oklahoma	Texas	Total
2006	0	0	0	0	0
2007	52	0	0	73	126
2008	160	1	0	223	384
2009	325	2	1	452	780
2010	550	3	1	764	1,319
2011	839	5	2	1,163	2,009
2012	1,169	7	3	1,619	2,798
2013	1,543	9	3	2,134	3,690
2014	1,963	12	4	2,712	4,690
2015	2,431	14	5	3,355	5,804
2016	2,945	17	6	4,066	7,034
2017	3,512	20	7	4,852	8,391
2018	4,134	23	8	5,716	9,882
2019	4,815	27	9	6,662	11,513
2020	5,558	30	11	7,694	13,292
2021	6,355	34	12	8,816	15,217
2022	7,219	38	14	10,033	17,303
2023	8,150	43	15	11,351	19,559
2024	9,153	47	17	12,773	21,991
2025	10,232	52	19	14,306	24,609
2026	11,389	57	20	15,956	27,423
2027	12,584	63	22	17,662	30,330
2028	13,815	68	24	19,426	33,333
2029	15,086	73	26	21,250	36,435
2030	16,396	78	28	23,133	39,636

Source: AECOM Consult, Inc., Bureau of Economic Analysis, and Woods & Poole.
 Notes: Rows may not sum to totals due to rounding.

The total increase in employment in Colorado, New Mexico, Oklahoma, and Texas associated with improved Ports to Plains Corridor transportation infrastructure is estimated to be 39,636 jobs. The majority of that increase would occur in Texas; however, a significant share of that employment growth is also expected to take place in Colorado. Employment growth associated with improved transportation in New Mexico and Oklahoma is expected to be more modest.

5.3.5 Winter Tourists

Recreational vehicle (RV) tourism and winter seasonal migration is on the rise in the U.S. given the growing numbers of retirees. These seasonal tourists, largely RV travelers and other longer stay visitors, pass through the Corridor on their way to southern Texas.

Although southern Texas is the primary destination for winter seasonal travel, these visitors would be expected to make expenditures as they stop along the Corridor on their way to their seasonal destination. In addition, as southern Texas is increasingly developed and built up, the improved road opens up opportunities in the less developed Corridor communities to capture a small part of this market and develop its own tourism industry over time.

The potential expansion of a tourism industry in the Corridor would generate approximately 280 jobs and \$82.6 million in earnings in 2004 dollars throughout the Corridor states. Discounting that benefit by 7.0 percent results in benefits of \$27 million. These are recurring benefits.

5.3.6 Fiscal Benefits

The expansion of payrolls and commercial development described above increases the tax base of Corridor communities. Retail tax receipts, lodging taxes, and taxable property will increase as new distribution, manufacturing, tourism, and roadside service jobs are created and as visitors come through the Corridor. These revenues stay in the communities and help local government provide services such as schools, parks, and other public services.

Tax revenue gains vary by state according to the type of taxes and rates levied. Between 2006 and 2030, tax gains for state and local governments are estimated to be \$742.0 million in 2004 dollars throughout the Corridor states. Those revenues, when discounted by 7.0 percent, would equal \$211.3 million. These are recurring benefits.

5.3.7 Summary of Economic Benefits

When all economic benefits categories are combined, there is an overall benefit that exceeds the projects costs. The summary of these results are contained in Exhibit 5.3-3.

***Exhibit 5.3-3 Summary of Economic Benefits
(Millions of 2004 Dollars Discounted at 7.0 Percent)***

Benefit Category	Jobs	Total Income 2006-2030
Construction (person years)	1,700	\$28
Distribution & Manufacturing (2030)	39,600	\$4,258
Roadside Services (2030)	2,000	\$216
Tourism (2030)	300	\$27
Total	43,600	\$4,529

Source: AECOM Consult, Inc.

Note: Fiscal benefits were not included because those benefits do not represent new economic activity. Only the portion of construction activity that would be new to each state along the project Corridor was included.

5.4 Conclusion

The Ports to Plains Corridor does not meet the project feasibility test based on transportation benefits and costs alone. The project is motivated more by the economic development prospects that it affords than by transportation benefits. The economic analysis has identified four potential sources of economic benefits. If all sources came to fruition, the total economic benefits measured by income to residents would exceed the project cost by a ratio of 3.15. The assumptions, calculation, and results are presented in detail in Appendix B.

Finance Plan

Key Concepts:

- *The Finance Plan uses a phased approach over the next 25 years.*
- *Financing will require inclusion of both traditional and alternative sources of funding.*
- *There will be federal and state program funding necessary to complete the Corridor.*
- *Success of the plan will be determined by the ability to engage stakeholders in committing resources.*



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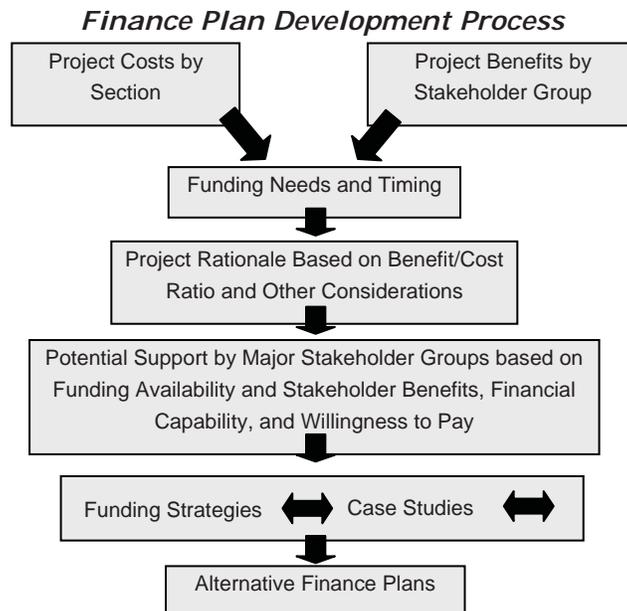
6.0 FINANCE PLAN

The key stakeholders of the Ports to Plains Corridor Development and Management Plan (CDMP) include those groups that benefit the most from the projects comprising the plan, as determined by the economic benefits estimated in the prior chapter. The estimated stakeholder benefits provide the economic rationale for the projects identified in the Plan. Comparing the estimated benefits of the improvement plan to its estimated costs indicates whether the improvements can be justified from an economic perspective, as determined in the prior chapter.

Even if an infrastructure investment project can be justified from an economic basis, it must attract sufficient funding to support its full costs. The determination of economic benefits by major stakeholder groups can provide a basis for defining stakeholder responsibility and establishing stakeholder participation in project funding. However, achieving the level of funding participation suggested by the benefits estimated for each stakeholder group depends on many other factors, such as the competitive interest of stakeholder groups and their ability and willingness to invest in the project. In the end, the ultimate feasibility of any highway improvement project depends on the ability to secure adequate funding to pay for the project.

This chapter presents the results of the financial assessment of the Ports to Plains Corridor projects. It begins by tracing the evolution of highway program financing from the traditional methods used to pay for most of the National Highway System that exists today to alternative approaches being used in recent years. These newer approaches have emerged to compensate for the inability of traditional highway funding sources and financing methods to keep up with the spiraling costs of highway development and preservation.

A review of several recent highway expansion projects demonstrates various ways such projects are being financed and indicates those project characteristics most appropriate to the application of these alternative approaches. These insights are used to develop several alternative finance scenarios that involve alternative approaches to funding. These scenarios include those finance methods deemed most applicable to the characteristics of the project or Corridor. The results show how alternative finance methods can leverage more traditional funding sources, particularly scarce state highway program funds. The following chart illustrates the approach used to develop the finance plans for this study.



6.1 Background

The financing of highway projects in this country is undergoing a significant transformation, prompted in large measure by the inability of traditional funding sources and financing methods to keep pace with the growing need for additional highway capacity combined with the increasing costs of preserving the aging infrastructure already in place. The changing nature and institutional context for funding highway projects provide both challenge and opportunity for the Ports to Plains CDMP. The challenge results from the shrinking ability of public highway program funds to meet the infrastructure needs of the traveling public, which significantly increases the level of competition for those funds that exist. The opportunity results from the increasing diversity of financing mechanisms available to state sponsors of highway improvement projects and the number of stakeholder groups willing to participate as funding sources for such projects. Both of these factors enhance the ability of project sponsors to leverage scarce state highway program resources, compete for those resources that can be tapped, and expedite projects scheduling and completion.

6.1.1 Development of the Federal-Aid Highway Program

The Federal-Aid Highway Program can be traced to the mid 1950s, when the federal government embarked on this major infrastructure initiative. In 1956, Congress passed the Highway Revenue Act which established the Federal Highway Trust Fund (HTF) to fund the construction of a national system of controlled-access, high speed highways (the Interstate System) and to aid in the funding of primary, secondary, and urban routes across the nation. The centerpiece of this program was the Interstate System, which was designed to significantly enhance the mobility of Americans, facilitate interstate commerce, decentralize the urban population centers, and promote improved accessibility for the nation's defense resources.

The HTF was the first time that federal motor fuel taxes (initiated in 1932 at one cent per gallon of gasoline) were placed in a dedicated fund, reserved for eligible highway projects, instead of being commingled into the General Fund. The HTF was initially funded by a federal four cents per gallon charge on gasoline, which paid for most of the costs of constructing and improving the Interstate System. Over time, eligible uses of the HTF have been expanded to include both rehabilitation and replacement of roadways making up the National Highway System.

States have also enacted their own state motor fuel taxes to provide financial resources to pay for construction and improvement of state highways and roads, with Oregon leading the way in 1919. States generally provide 10 to 20 percent of the costs of federally-assisted highway improvement projects. States are also responsible for the costs associated with operating and maintaining both federal and state highways. State transportation agencies serve as the organizational vehicle for administering highway program funds at the state and local levels.

Projects on the Federal-Aid Highway System were traditionally funded by the accumulation of revenues in the HTF and distributed by the federal government to the states, based on prescribed allocation formulas that considered system size and use. This "pay-as-you-go" approach has been used to finance most federal and state highway projects since the late 1950s. This approach reflected a policy of not using debt instruments to finance these projects. Given the need to build up the capability to manage and deliver such a massive program and the rapid growth of motor fuel tax revenues in the early decades of the program, this conservative financing approach worked well.

As long as motor fuel tax revenues were sufficient to meet the needs of federal and state highway programs, state transportation agencies did not have to resort to alternative funding sources or financing approaches. The alternate funding sources were left to various toll road organizations, which used toll-based revenue bonds to expedite the construction of their facilities, many of which were built before the advent of the Interstate Highway System and subsequently incorporated into the Interstate System. Proceeds from tolls were pledged to pay for the costs of developing, operating, maintaining, rehabilitating, and servicing the debt (principal and interest) of these facilities. Even though their patrons paid federal and state fuel taxes, the tolling organizations were not eligible for federal or state highway funding support for most of the last half of the twentieth century.

6.1.2 Current Federal-Aid Highway Program

The Federal-Aid Highway Program consists of several individual programs aimed at specific types of roadways to which HTF moneys are apportioned on a state-by-state basis. These include the following:

- Interstate Maintenance (IM) – for rehabilitation and reconstruction;
- National Highway System (NHS);
- Surface Transportation Program (STP);
- Congestion Mitigation and Air Quality Improvement (CMAQ); and
- Highway Bridge Replacement and Rehabilitation – (HBRR).

Exhibit 6.1-1 shows how federal funds were apportioned to the four states along the Ports to Plains Corridor in Fiscal Year 2003. Overall, the largest program is the Surface Transportation Program at 41 percent, with the National Highway System second at 25 percent. This is representative of each of the four states. Among the major HTF programs, the one most likely to apply to the plan is the NHS Program.

Exhibit 6.1-1 Federal-Aid Highway Program Apportionments by State Fiscal Year 2003 (dollars in millions)

PROGRAM	COLORADO		NEW MEXICO		OKLAHOMA		TEXAS		4-STATE TOTAL	
	Funding	% of Total	Funding	% of Total	Funding	% of Total	Funding	% of Total	Funding	% of Total
Interstate Maintenance	\$71.75	21%	\$66.27	26%	\$75.11	19%	\$390.03	19%	\$603.2	20%
National Highway System	\$92.65	27%	\$73.50	29%	\$93.72	24%	\$493.61	24%	\$753.5	25%
Surface Transportation Program	\$129.31	38%	\$88.45	35%	\$134.73	34%	\$899.05	43%	\$1,251.5	41%
Bridge Program	\$24.30	7%	\$12.73	5%	\$83.58	21%	\$166.14	8%	\$286.8	9%
Congestion Mitigation & Air Quality	\$19.73	6%	\$8.18	3%	\$7.27	2%	\$103.93	5%	\$139.1	5%
All Other	4.3	1%	1.8	1%	2.3	1%	16.5	1%	\$25.0	1%
STATE TOTAL (% of 4-state total)	\$342.08	11%	\$250.97	8%	\$396.74	13%	\$2,069.24	68%	\$3,059.0	100%

Source: FHWA Highway Statistics 2002, Table FA-4 Note: Total may not sum due to rounding.

Exhibit 6.1-2 shows how the highway programs in each state along the Ports to Plains Corridor have been funded and what these funds were spent on in calendar year 2002 (the last year for which this data is available). As indicated by this exhibit, state funds represent about half of the total funds available, while federal funds provide about a third of the total funds. General funds, local government funds, bonds, and tolls make up the rest. The relative contribution of each of these sources of funding varies significantly between the four states. This demonstrates the different funding capabilities and approaches used by each state and suggests a separate Ports to Plains Corridor finance plan for each state.

**Exhibit 6.1-2 State Highway Program Receipts and Disbursement
Calendar Year 2002 (dollars in millions)**

FUNDING CATEGORY	COLORADO		NEW MEXICO		OKLAHOMA		TEXAS		4-STATE TOTAL	
	Funding	% of Total	Funding	% of Total	Funding	% of Total	Funding	% of Total	Funding	% of Total
RECEIPTS										
State Highway User Tax Revenues	\$772.6	52%	\$390.6	43%	\$524.9	43%	\$3,251.8	52%	\$4,940.0	50%
Road & Crossing Tolls	0.0	0%	0.0	0%	177.9	15%	141.9	2%	319.7	3%
General Funds, Bond Proceeds, & Misc. Income	395.5	26%	187.0	20%	155.4	13%	196.4	3%	934.4	10%
Federal Government Payments	325.0	22%	339.4	37%	343.1	28%	2,241.6	36%	3,249.2	33%
Local Government Payments	0.0	0%	0.0	0%	9.4	1%	370.7	6%	380.1	4%
TOTAL RECEIPTS	\$1,493.2	15%	\$917.1	9%	\$1,210.7	12%	\$6,202.4	63%	\$9,823.3	100%
DISBURSEMENTS										
Capital Outlay	\$982.5	55%	\$472.1	52%	\$645.2	51%	\$3,551.8	60%	\$5,651.6	57%
Maintenance & Highway Services	267.1	15%	137.6	15%	145.3	11%	1,103.7	19%	1,653.8	17%
Other Disbursements	295.0	16%	196.4	22%	331.8	26%	860.5	14%	1,683.7	17%
Grants-In-Aid To Local Governments	250.6	14%	96.6	11%	147.3	12%	444.1	7%	938.7	9%
TOTAL DISBURSEMENTS	\$1,795.2	18%	\$902.7	9%	\$1,269.7	13%	\$5,960.2	60%	\$9,927.8	100%

Source: FHWA Highway Statistics 2002, Table SF-21 Note: Percentage of total receipts and total disbursements by state is each state's share of total 4-state receipts and disbursements.

(Please note that differences between receipts and disbursements for each state noted above result from different scheduling of program outlays and program receipts.)

According to Exhibit 6.1-2, state highway programs spend most (57 percent) of their available funds on capital outlays, including preservation activities such as rehabilitation, reconstruction, and replacement. The remainder is spent on maintenance and operations (M&O); other disbursements such as administration, enforcement and safety, bond retirement, and interest; and grants to local governments for their road programs. Colorado offers the largest portion (14 percent) of its state transportation funds to local governments, while Texas offers the least (7 percent). This is due primarily to the higher proportion of local roadways in Texas being the responsibility of the Texas Department of Transportation.

6.1.3 Funding Challenges to the Federal-Aid Highway Program

During the final development of the Interstate Highway System, the growth in motor fuel tax revenues failed to keep pace with the growth in the use, deterioration, and cost of highway facilities across the nation. The energy crises of the 1970s and early 1980s, the increasing costs and complexity of highway development, the advent of more fuel efficient vehicles and untaxed alternative

fuels, changing life styles associated with population and economic growth, and aging highway infrastructure have escalated highway program needs and costs and slowed growth in financial resources. This fiscal challenge has been exacerbated by the reluctance of elected officials to increase motor fuel taxes at both the federal and state levels. As a result, federal and state transportation agencies have been struggling to keep up with preserving the highway system already in place, let alone provide for increased capacity and security-driven redundant transportation routes. Consequently, there has been renewed interest in alternative sources of funding and methods of financing highway projects at all level of government.

During the past fifteen years, a variety of federal acts have granted state and local transportation agencies increasing flexibility and freedom to apply new financing approaches. These include:

- Establishment of state infrastructure banks (SIBs) to provide a mechanism for administering the use of federal, state, and/or local transportation funds through credit assistance and revolving loans (National Highway System Designation Act of 1995 – NHS Act).
- Provision of credit support and flexible terms for projects that involve third-party financing, and encouragement of public-private partnerships to leverage public funds for highway projects (Transportation Infrastructure Finance and Innovation Act of 1998 - TIFIA). Both Colorado and Texas have established legislation permitting public-private partnerships for transportation projects.
- More flexible ways to use federal funding for projects by counting capital expenditures on toll roads in a state towards that state's local match on federal-aid projects (toll credits were introduced in the Intermodal Surface Transportation Equity Act of 1991 - ISTEA).
- Use of grant anticipation revenue vehicles (GARVEEs) to expedite larger projects through the advanced accumulation of future federal funds (Transportation Equity Act for the 21st Century – TEA-21).

In addition, federal and state legislation has permitted innovation in the delivery of highway projects through various demonstration and pilot programs and subsequent mainstreaming of these experimental programs. Examples of this include design-build project delivery and streamlining the environmental clearance process mandated by the National Environmental Policy Act. At the same time, the federal government has backed away from increasing its share of transportation funding responsibility, opting instead to encourage innovation by the states while hinting that a reduction in federal funding responsibility may be in the offing.

6.2 Traditional and Alternative Approaches to Highway Project Funding and Financing

The search for alternative ways to fund highway programs and projects has led to a host of creative approaches to leveraging available resources of project sponsors by tapping the resources of project stakeholders who have traditionally benefited from highway projects without taking any direct responsibility for their costs. This section describes the most prominent approaches to highway project funding and finance, starting with traditional methods and continuing with alternative methods that augment or leverage traditional resources.

For the purposes of this report, funding is distinguished from financing in the following manner: funding refers to the amounts of monetary resources that are committed by various sources to pay for a project; while financing refers to various cash-flow methods by which these funding commitments are converted into available monetary resources to pay the direct costs of a project when incurred. A finance plan is that combination of funding and financing methods that will be used to pay for the costs of a project; in this case, over the first 25 years of the Ports to Plains program's life cycle.

6.2.1 Traditional Funding Sources

Traditional approaches to funding projects on the NHS include motor fuel and vehicle-related tax revenues from the federal and state governments, plus local funding when available, as described below:

- ◆ Federal motor fuel taxes – an excise tax imposed on the sales of motor fuels, including gasoline and diesel fuel on a per-gallon sold basis. The current 18.4 cents per gallon federal gasoline tax, 24.4 cents per gallon federal diesel fuel tax, and other related fuel taxes fund the Federal Highway Trust Fund and generate approximately \$32 billion per year.
- ◆ Other federal taxes – there are various federal taxes on trucks, trailers, and tires that also go into the Federal Highway Trust Fund. The various federal sources, including motor fuel and other taxes, generate about one-third of the funding for highway improvement programs nationally.
- ◆ State revenue sources – states also impose taxes on motor fuels, sales taxes on motor vehicle sales, personal property taxes, motor vehicle registration fees, and motor vehicle operator license taxes, with each state determining which tax methods and rates to apply. State funding sources generate about 40 percent of the funding for highway improvement programs nationally. State motor fuel taxes for gasoline in the Ports to Plains Corridor are listed below:
 - Colorado: 22 cents per gallon
 - New Mexico: 18 cents per gallon
 - Oklahoma: 17 cents per gallon
 - Texas: 20 cents per gallon
- ◆ Local revenue sources – local governments use a variety of strategies to raise transportation funds, including property taxes, sales taxes, vehicle registration fees, utility taxes, and general funds. Local governments provide about one-quarter of the funding for highway capital improvement programs and about 60 percent of the total maintenance expenditures nationally. Local governments also contribute to state highway program budgets. For example, local governments contributed almost 6 percent of the state transportation revenues for highways in Texas during 2002.

Federal funding comes through a variety of mechanisms, including the following:

- ◆ Capital program funds – formula-based allocation of program funds to state transportation agencies for development and preservation of highway facilities. This includes funding for capital

improvements to NHS roadways (under the NHS Program) and Intelligent Transportation Systems (ITS) (under the NHS, STP, and CMAQ programs).

- ◆ Earmarks – a form of grant money whereby funds are designated by Congress for specific projects in the federal authorizing legislation as part of the apportionment of HTF Program moneys to the states.
- ◆ Discretionary grants – discretionary funds provided to sponsors of special programs or projects. An example that is relevant to the Ports to Plains Corridor is the National Corridor Planning and Development Program and Coordinated Border Infrastructure Program (otherwise known as the National Corridor and Border Program or CORBOR). Authorized funding for CORBOR projects under TEA-21 is \$140 million per year. The designation of CORBOR projects is made by congressional committee action.
- ◆ Examples of multi-state corridors which have received funding under CORBOR include I-35 (Texas to Minnesota), I-69 (Texas to Michigan), and I-5 (California to Washington). Projects related to the Ports to Plains Corridor have also received funds under the CORBOR Program, amounting to \$13.8 million since 2002. The projects included in this total are listed in Exhibit 6.2-1.
- ◆ Pilot or demonstration project funds – assignment of funds for experimental or demonstration purposes.

State and local highway program funds are distributed to districts and localities based on capital and maintenance program allocation formulas. In certain states, state and local funds can be combined for distribution by a state infrastructure bank (SIB). State and local funding sources provide about two-thirds of the traditional public revenues for the four Ports to Plains states combined, with federal funds providing the remaining third. Hence, state and local funding sources are a critical component of the funding profile for projects on the National Highway System along this four-state Corridor.

Project earmarks represent an increasingly popular device used by Congress in the last two reauthorizations to advance selected projects in the home districts or states of sponsoring members of Congress. While they divert funds that would otherwise be apportioned to the states for subsequent distribution by the state transportation agency, they represent a way to promote projects that might not otherwise meet certain allocation, prioritization, or programming criteria. Earmarked funds have been an important funding source of multi-state corridor projects in the CORBOR Program.

6.2.2 Alternative Funding Sources

A number of alternative funding approaches have been authorized for use in federally-funded highway projects through succeeding federal and state legislation, policies, and regulations, on either a trial or mainstreamed basis over the past fifteen years. These alternative methods augment more traditional approaches, serving as complementary ways to stretch scarce public resources. These alternative funding approaches include the following:

Exhibit 6.2-1 Designated Funds for Specific CORBOR Projects and Activities

FY 2004 Projects	Cost
Ports to Plains highway rehabilitation between Del Rio and Eagle Pass, Texas	\$1,100,000
US 87 Relief Route around Big Spring, Texas	\$300,000
FY 2003 Projects	
SH 158--US 87 to 4.75 miles west, Sterling County, Texas	\$850,000
US 87 Relief Route, Lamesa, Texas	\$850,000
US 287 Corridor Development, Oklahoma	\$1,500,000
US 287 Wiley Junction Improvements, Colorado	\$3,000,000
West Laredo Multimodal Trade Corridor, Texas	\$3,500,000
FY 2002 - Projects	
Midland Relief Route for freeway connection from SH 349 to I-20, Texas	\$1,000,000
Ports to Plains Corridor development and management plan, Texas	\$1,700,000
Total Project Funding	\$13,800,000

Source: FHWA CORBOR Program Webpage (<http://www.fhwa.dot.gov/hep10/corbor/>)

- ◆ Specialized state funding programs – state funding initiatives that augment traditional highway program funds and boost public investment in highway and other surface transportation infrastructure. These initiatives typically reflect a response to specific events (such as the events of September 11, 2001, earthquakes, or hurricanes), the policies of a new state administration, or the culmination of effort to catch up on years of inadequate public investment in transportation infrastructure. Examples of such special programs in the Ports to Plains Corridor states include the following:
 - New Mexico GRIP (Governor Richardson’s Investment Partnership - authorized by HB 15) – to provide congestion relief in urban areas and expand critical segments of the state’s highway infrastructure in rural areas. The state recently issued \$1.6 billion in revenue bonds to fund 37 projects, including \$108.3 million for the state’s Ports to Plains section, US 64/87 from the Texas state line to I-25 at Raton. Proposed improvements include reconstruction and widening to a four-lane highway to enhance safety and provide economic opportunity.
 - Texas Mobility Fund (Proposition 15 in 2001) - consists of bonds secured by future state transportation revenues to accelerate mobility projects across the state. A portion of the bonds can be used to fund small urban-area mobility and statewide connectivity projects, with tolling/leveraging, system connectivity, safety, and economic development as considerations in project selection. Another state referendum, Proposition 14 of 2003, permits the Texas Transportation Commission to issue revenue bonds or other public securities for terms of up to 20 years in duration to pay for highway improvement projects, such as for sections along the Corridor. Thus far there are no identified projects.
 - Colorado 7th Pot (Senate Bill 97-1) – which allows Colorado Department of Transportation (CDOT) to receive a dedicated portion of the state’s sales tax proceeds that exceed a prescribed growth rate. Eligible projects include a portion of the Ports to Plains Corridor, US 287 from the Kiowa County line to the Oklahoma state line. Because of the economic downturn in recent years, no sales tax proceeds have been provided for 7th Pot projects, and

none are projected in fiscal year 2004-2005. To date, CDOT has fully funded 16 of the 28 7th Pot projects. Improvements to US 287, along the Ports to Plains Corridor, have yet to be funded. However CDOT remains committed to completing the 7th Pot projects, although no completion date is set.

- Oklahoma Corridor Plan – Oklahoma recently instituted a Corridor Plan program. In the first phase, projects in 12 major highway corridors totaling \$500 million in costs may be supported by GARVEE bonds, to be repaid with future federal highway funding allocations. The Ports to Plains Corridor through Oklahoma, a 41-mile stretch of US 287 across the Panhandle, is not included in the list of designated corridors.
- ◆ Toll revenues (direct user charges) – toll fees charged to users of the facility. Used by independent toll authorities and toll agencies to fund their facilities on a dedicated basis, including operations and maintenance, preservation, debt service associated with revenue bonds, and capital improvements. Until passage of TEA-21 in 1997, federal funds were prohibited from being used to convert un-tolled interstate highways to toll facilities. TEA-21 permitted up to three toll projects on a pilot basis, provided the funds were used for highway expansion or rehabilitation and other public funds were not available. One proposed project, the widening of I-81 in western Virginia, plans to use tolls collected on dedicated truck lanes to help fund the project.
- ◆ Shadow tolls (indirect user-based charges) – a specialized form of indirect tolling whereby the facility owner (usually a public sector transportation agency) reimburses the facility developer (usually a private sector firm or team of firms) for project costs (including both cost of capital and rate of return on developer investment), based on the volume of traffic using the facility. This method of cost reimbursement requires monitoring traffic volumes, but no direct tolling of users. All project revenues come from the project sponsor/facility owner. Shadow tolls are used by Florida’s Turnpike Enterprise to fund interchanges or additional on/off ramps that serve specific sponsors (such as developers or facility owners).
- ◆ Joint development – coordinated project development activities involving private developers, transit agencies, railroads, and local communities. Applications include constructing related facilities on the same or adjacent rights-of-way, such as parking facilities, multi-modal facilities, intermodal facilities, and air rights development over highway facilities.
- ◆ Developer contributions - contributions of right-of-way, technical support, and/or cash by private developers to expedite highway projects desired by the developers, especially when such projects significantly improve accessibility to and the value of commercial property or development.
- ◆ Special assessment districts – special local fees or taxes applied to businesses and/or residents in a specified geographic area to pay for highway development or expansion serving those businesses and/or communities.
- ◆ Tax increment financing – a value capture approach that uses a portion of future increases in property taxes in a community served by a new or improved transportation facility to help defray the costs of the improvement over a period of time.

- ◆ Local impact fees – impact fees collected from developers by local governments to help pay for transportation and other public works resulting directly from the new development, including schools, fire, and police facilities. These are typically applied as a per-unit or ad valorem charge when the development units are sold.
- ◆ Specialized funding sources – revenues earned from such specialized sources as advertising (allowed on certain toll highways), naming rights (facility branding such as service plazas on tollways), and utility access fees (electric transmission lines, fiber optic cables, microwave towers, and cell towers) along highway corridors. These can be in the form of one-time or annual payments, or the provision of in-kind services (such as access to a fiber optic network along highway rights of way). The latter is an example of what is referred to as “shared resources”, whereby state or local governments receive access to and/or services from utility infrastructure in exchange to private use of highway right-of-way.

Each of these alternative funding sources, except for specialized state program funding, is a form of “value capture”, by which a sponsoring agency is able to secure resources from stakeholders who directly benefit from a new or improved transportation facility, proportionate to their benefits. When used in combination, these alternative funding sources enable project sponsors to expedite needed projects which demonstrate strong beneficiary support through commitments of project financial support (either monetary or in-kind resources). The greater the participation of additional project stakeholders in a project’s finance plan, the greater the potential to attract more traditional public funds due to the ability to leverage these scarce funds.

6.2.3 Traditional Financing Methods

The traditional approach to financing projects on the NHS, which applies to the Ports to Plains Corridor, is pay-as-you-go financing, which is described below:

Pay-as-you-go financing – state and local transportation agencies accumulate funds to fully pay for projects based on annual allocations from federal and state sources (noted above). When adequate funding authority is accumulated to fully fund a project, it can then proceed into construction.

6.2.4 Alternative Financing Methods

There are alternative ways to schedule project funding to match project spending. Alternative financing methods convert the timing of sponsor funding commitments to match the cash flow associated with project development, at minimum borrowing costs.

- ◆ Revenue bonds – tax-exempt bonds when issued by a public entity or designated not-for-profit corporation (as provided under IRS Ruling 63-20 for so-called “63-20 corporations”) to pay for public use infrastructure projects such as new construction, expansion, rehabilitation, or replacement, whereby accrued interest and principal payments are covered by revenues collected from users of the facility (such as toll revenues collected by a toll road, bridge, or tunnel authority).
- ◆ Municipal/public bonds – tax-exempt bonds sold to investors and backed by the full faith and credit of the issuing governmental unit and paid from its general or special tax revenues. This

includes general obligation bonds, limited or special tax bonds, and hybrid (general tax and revenue-backed) bonds.

- ◆ Anticipation notes– these are bonds issued with the expectation that they will be paid off with anticipated (future) bond, tax, or revenue proceeds. A special case includes grant or bond revenue anticipation vehicles called GARVEEs. Variations on GARVEEs include grant anticipation notes (GANs), which are backed by expected future year grants from the federal HTF, and bond anticipation notes (BANs), which are backed by expected proceeds from revenue bonds (typically backed by future toll revenues where applicable).
- ◆ All four Ports to Plains states have authority to issue GARVEEs, and all use or are about to use this authority. GARVEEs were first used by New Mexico for the State Road 44 expansion and pavement warranty project. They were then used in Colorado as part of the T-REX financing plan in Denver. More recently, Texas used bond anticipation notes (BANs) as part of the diversified finance plan developed for the tolled bypass around the eastern side of Austin (SH 130). Oklahoma has recently developed a state-based highway funding initiative based on the application of GARVEEs.
- ◆ Private bonds – these are bonds issued by private or public corporations to pay for the up-front costs of capital projects. Private bonds are not eligible for federal tax exemption, unlike private activity bonds (PABs) issued for water supply, wastewater treatment, multifamily housing, redevelopment, and waste management facilities.
- ◆ Loan and credit support – direct federal loans, loan guarantees, and credit enhancements are provided by several special federal programs, authorized by recent federal highway funding legislation. These include the following two programs:
 - U.S. DOT’s Transportation Infrastructure Finance and Innovation Act (TIFIA) Program – which leverages available federal resources by lowering the cost of borrowing up to a third of the cost of large projects (over \$100 million total project cost).
 - Section 129 of Title 23 U.S.C. – which is another federal loan and credit support program aimed at lowering the borrowing costs associated with loans to toll projects.
- ◆ Texas is the sole Ports to Plains state with experience in using TIFIA-related assistance in the form of a TIFIA loan for \$917 million as part of the SH 130 toll highway project (Central Texas Turnpike).
- ◆ State Infrastructure Banks (SIBs) – revolving funds that provides loans and credit assistance to either public or private sponsors of Title 23 highway capital projects or Title 49 transit capital projects. Credit enhancement features of SIBs includes loan guarantees, standby lines of credit, letters of credit, certificates of participation, debt service reserve funds, and bond insurance. Since the latest reauthorization legislation (TEA-21) in 1997, only four pilot SIBs have received additional federal funding. However, the other SIBs can continue to use the federal funds already provided under earlier legislation, as well as state and local funds that are added to the SIB account. SIBs are authorized in all four Ports to Plains states, with Colorado, New Mexico, and Texas having issued loan agreements.

- ◆ Toll Credits – which enable states to count capital expenditures on toll roads in a state against the required state/local funding match for federal-aid projects. This permits the state to increase the proportion of available federal funds to fund eligible projects, up to a maximum of 100% federal share, thereby freeing up state funds for other projects that may not involve federal funds or requirements, or for other uses such as maintenance and operations activities not eligible for federal funding. Toll credits are not a direct source of funding but merely a reallocation of available federal and state funding among eligible projects and programs. This may result in fewer capital projects being funded, if state funds are reallocated to non-capital activities. However, savings may result from applying more of available state funds to projects not burdened by federal requirements. Toll credits have been requested in Oklahoma and Texas, but not in Colorado, which is also eligible to use them. New Mexico has no toll roads, and so is not eligible to use toll credits.

The addition of alternative funding and financing approaches to traditional methods provides project sponsors with more choices and flexibility in how to pay for highway infrastructure.

6.3 Case Study Projects and Finance Plans

The application of alternative funding and financing methods to major highway improvement projects can be best demonstrated by reviewing actual projects which use or plan to use these techniques, often in combination with more traditional approaches. For this study, nine large highway expansion projects were selected to demonstrate how alternative finance methods can be combined to leverage available funding and expedite needed projects. Candidate projects were selected that involved the expansion of highway capacity through widening or extension, required large capital investments that would be difficult to fund under pay-as-you-go financing, provided a wide geographic spread, and used one or more alternative finance approaches to leverage available federal and state highway program funds.

Exhibit 6.3-1 lists the principal characteristics of the nine highway expansion projects selected for this comparative review, plus the Ports to Plains Corridor improvement plan. The selected projects range in size from \$314 million to \$9.9 billion. The average size of the nine comparative projects is \$2.4 billion. The size of the Plan is a comparable \$2.8 billion.

Exhibit 6.3-1 Case Study Projects

Project		Characteristics				
		Location	Public Sponsor(s)	Physical Description	Cost	Opening Dates
1	CO T-REX Highway Expansion & LRT Extension	Along the I-25 corridor in metropolitan Denver	CDOT & Denver Regional Transportation District	25-mile highway corridor expansion & 19-mile Light Rail Transit (LRT) extension	\$1.7 billion	Estimated 2006
2	TX SH 130 Toll Highway	Metropolitan Austin	Texas Turnpike Authority & TxDOT	Construction of 65-mile toll highway bypass on the east side of Austin	\$3.6 billion	Estimated 2007
3	NM SR 44 (now US 550) Rehabilitation & Expansion	From Bernalillo NW to the CO Border	NMDOT & NM Finance Authority	Widening (from two lanes to four) of 120-mile stretch of SR 44. Completed as four separate project sections	\$314 million	November 2001
4	Virginia interstate 81 Rehabilitation & Expansion	From W. Virginia border SW to TN border	VDOT	Addition of 4 truck-only travel lanes & associated interchanges & tolling facilities to 325-mile interstate	\$9.9 billion	15 year project; Tier 1 EIS to be completed mid-2005
5	Massachusetts Route 3 North Rehabilitation & Expansion	From Burlington north to New Hampshire border	Mass EOTC/Mass Highway	21-mile limited access highway: lane addition, shoulder, bridge replacements (40+)	\$385 million	Scheduled May 2004 – currently delayed but near completion
6	Utah Interstate 15 Upgrade & Expansion	Metropolitan Salt Lake City	Utah DOT	16-mile interstate reconstruction, structure replacement, lane expansion, & traffic management system	\$1.6 billion	May 2001
7	South Carolina Highway Improvement Program	Statewide highway improvement program	Counties & municipalities, SCDOT, & State SIB	Six bridge & roadway projects (including Conway Bypass, Carolina Bays Parkway, Cooper River Bridge, & Upstate GRID)	\$2.3 billion	2004-2010
8	CO E-470 Toll Highway	Metropolitan Denver	E-470 Public Highway Authority; local municipalities	Construction of 47-mile toll beltway along eastern edge of metro Denver	\$1.2 billion	Completion of 4-Phase Development Program; January 2003 (widening continue)
9	Virginia Route 28 Expansion	Northern Virginia	Phase I: Fairfax & Loudoun Counties, VDOT, local I&owners; Phase II: Under Public-Private Transportation Ventures Act	Widenings & interchange replacements in high-growth 14-mile corridor	Phase I: Approximately \$185 million Phase II: \$200 million	Phase I: 1991 Phase II: Fall 2006
10	Ports to Plains Corridor Expansion	TX, CO, NM, OK	State Departments of Transportation	Expansion of corridor to four lanes from Laredo, TX to Limon, CO; construction of relief routes around selected cities	\$2.9 billion	2006-2025 timeframe

Source: AECOM Consult, Inc., October 2004

Exhibit 6.3-2 lists the various finance methods that helped move these projects forward.

Exhibit 6.3-2 Summary of Alternative Finance Approaches Used by Case Study Projects

Project	Innovative Finance Methods Used									
	Grant Anticipation Notes/Bonds	TIFIA Loans	State Infrastructure Bank	63-20 Corporation	Tolling	Local Taxes/Funds	Land Donations	Pavement Warranty	Development Rights	Federal Earmarks
1 Colorado T-REX Highway Expansion and LRT Extension	✓					✓				
2 Texas SH 130 Toll Highway	✓	✓			✓		✓			
3 New Mexico SR 44 (now US 550) Rehabilitation and Expansion	✓							✓		
4 Virginia Interstate 81 Rehabilitation and Expansion	✓	✓		✓	✓			✓		✓
5 Massachusetts Route 3 North Rehabilitation and Expansion				✓					✓	
6 Utah Interstate 15 Upgrade and Expansion						✓				✓
7 South Carolina Highway Improvement Program		✓	✓							
8 Colorado E-470 Toll Highway					✓	✓				
9 Virginia Route 28 Expansion						✓				

Source: AECOM Consult, Inc., October 2004

The most frequently used finance methods include:

- Grant anticipation revenue vehicles (bonds/notes) - to expedite the availability of federal and/or state funds;
- Local taxes, fees, and funds - value capture approaches that tap the resources of direct local project beneficiaries;
- TIFIA loans and credit enhancement – to lower the cost of debt associated with the projects; and
- Tolls – where highly congested facilities lack suitable alternatives and traditional funding that cannot be obtained to expand highway system capacity or better manage travel demand.

Many of these projects also used such alternative project delivery approaches as design-build and long-term performance warranties. Without the inclusion of multiple funding sources, financing approaches, and expedited project delivery, many of these projects would have remained on the shelf, awaiting the gradual accumulation of pay-as-you-go funding.

Exhibit 6.3-3 lists the key features of each representative project that promoted the applicability and use of innovation in finance and project delivery. Common features among the case study projects that promote alternative approaches in funding and finance included the following:

- Strong desire by state to move the project forward in an expedited manner to address current and future needs;

- State transportation agency willingness to apply alternative approaches to project finance and delivery;
- Legislative authority to apply alternative approaches to project finance and delivery;
- Involvement of multiple stakeholders in project funding, including multiple levels of government and the private sector; and
- Willingness of the private sector to share both project risks and benefits.

Exhibit 6.3-3 Key Features Underlying Use of Alternative Finance Methods by Representative Highway Expansion Projects

Project	Expansion or Reliever	Key Features Supporting Alternative Finance Methods
1 Colorado T-REX	Expansion (and transit extension)	1) Inventive partnership between highway and transit developers to convince public and private stakeholders and to attract significant federal funds. 2) Ability and willingness to leverage future funds through GARVEES.
2 Texas SH 130 Toll Highway	Reliever	1) Strong metropolitan growth (congestion) and inclusion in larger Central Texas Tollway Project (CTTP) makes tolling feasible. 2) Private stakeholders able to make non-cash contributions through ROW donation.
3 New Mexico SR 44 (now US 550)	Expansion	1) Ability and willingness to leverage future funds through GARVEES. 2) Use of 20-year pavement warranty to control life cycle preservation costs. 3) Long-term private sector commitment through 20-year pavement performance warranty.
4 Virginia Interstate 81	Expansion	1) State legislative environment specifically allows for unsolicited proposals for public-private partnerships. 2) Heavy use of corridor by trucks provides substantial base for tolling (few diversion options) and fuels public support for physical separation from autos
5 Massachusetts Route 3 North	Expansion	1) State highway funds being consumed by Central Artery/Tunnel project in Boston, so new financing mechanism was needed to advance projects. 2) Strong economics in corridor provided significant development opportunities for private partner.
6 Utah Interstate 15	Expansion	1) One-time large regional event (2002 Winter Olympics) generated federal earmark funding as well as special ITS corridor investments.
7 South Carolina State Infrastructure Bank	Expansion & Reliever	1) Sufficient funding from multiple sources (federal, state, local) were available to "seed" infrastructure bank at high level.
8 Colorado E-470	Reliever	1) Strong growth and geographic expansion produced congestion sufficient for residents to support bypass road funded by tolls and special taxes.
9 Virginia Route 28 Widening	Expansion	1) State legislative environment allowed county-level innovation. 2) Strong housing and business growth mitigated impact of new taxation district.

Source: AECOM Consult, Inc., October 2004

6.4 Finance Plan Scenarios

The Ports to Plains Corridor states of Colorado, New Mexico, Oklahoma, and Texas have responded to the fiscal challenges and opportunities impacting their respective highway programs by enacting legislation and procedures to use alternative as well as traditional approaches to finance needed highway projects. As noted earlier and depending on the state, these may include TIFIA loans and credit support, GARVEE bonds and notes, transportation revenue bonds, highway user tolls, and public-private partnerships to expedite project financing and implementation. These respective capabilities and approaches provide a starting framework for developing state finance plans for the Ports to Plains CDMP that reflect the different capabilities and constraints each state has with respect to highway project funding and finance. Equally important are the characteristics of the various projects that comprise the Ports to Plains CDMP and the benefits and interests demonstrated by local communities and businesses along the Corridor.

This section presents three finance plan scenarios developed for the Ports to Plains Corridor, and for each of the sponsor states along the Corridor. Also discussed are the assumptions and characteristics of each scenario and their implications on funding potential for the overall Corridor and those portions located in each participating state.

6.4.1 Finance Plan Assumptions

Finance plan scenarios were developed for each of the four sponsor states that reflect the nature of the Corridor project sections in each state and the statutory, regulatory, and institutional capabilities and constraints in each state. Several scenarios were developed for each of the state-based plans, based on different assumptions regarding the extent to which alternative funding sources and financial methods were used to arrive at the level of funding that would need to be provided by the state.

The development and evaluation of state finance plans by scenario were based on the following key assumptions:

- This is a program-driven financial analysis wherein the full costs of the program are assumed to be funded by whatever sources and methods are defined by the scenario.
- All capital expenditures are assumed to occur during the first 20 years of the Corridor development plan. The only exception is for Intelligent Transportation Systems (ITS) facilities and equipment, whose costs are incurred throughout the full 25-year development timeframe.
- Capital expenditures for the CDMP are staged so that the level of investment by each state is approximately the same in each of the construction phases, except for those sections in which the sponsoring state has already committed the funding through special funding programs.
- Exhibit 6.4-1 shows the final distribution of program capital costs by phase for each state, not including ITS capital costs. For New Mexico and Oklahoma, project priorities and current funding commitments accelerate the delivery of designated projects. This results in capital costs occurring primarily in the first two program phases for each of these states.

*Exhibit 6.4-1 Distribution of Program Capital Costs by Phase by State
Base Year 2004 (dollars in millions)*

Phase	COLORADO	NEW MEXICO	OKLAHOMA	TEXAS	TOTAL
2006-2010	\$164	\$80	\$80	\$518	\$842
2011-2015	\$162	\$50	\$72	\$388	\$672
2016-2020	\$129	\$10	\$0	\$470	\$609
2021-2025	\$116	\$10	\$0	\$446	\$572
Financing	\$571	\$150	\$152	\$1,823	\$2,695

Source: DMJM+HARRIS, October 2004

- Only eligible funding sources and financing methods that are appropriate for the kinds of projects comprising the Ports to Plains CDMP are considered in developing alternative finance plans for each state along the Corridor.
- The outcome of the finance scenarios for each state’s finance plan is the level of program funding for which the state is responsible, given the levels of federal, local, and private funding assumed for each plan by scenario.
- The costs for project development (design, environmental clearance, right-of-way acquisition, and construction) occur in the first 20 years of the program, whereas the costs of preservation, maintenance, and operations occur throughout the entire 25-year program timeframe.
- The maintenance and operations (M&O) costs of the program represent the change in costs between what would have been spent without the Corridor improvement and what will be required with the improvements made (i.e., with more lane-miles to maintain and operate, the M&O costs increase with completion of more project sections). In some instances, capital improvements defer the costs of M&O and preservation by several years, resulting in a cost savings in those years.
- Since this is a program-driven finance plan in which all capital improvement projects are scheduled to be completed over the period 2006-2025, there is no need or advantage in using debt to finance any portion of the program costs in order to expedite their availability. Instead, the use of pay-as-you-go financing avoids debt service costs.

6.4.2 Sources of Funds

Each finance scenario defines the sources of funds and the uses of these funds to pay for program activities. The following are the categories of funding sources considered in each scenario:

- ◆ Capital Funds (to pay for design, environmental clearance, right-of-way acquisition, and construction for road, bridge, ITS, and signing)
 - Federal Funds
 - Federal-Aid Highway Program (formula funded programs, especially the National Highway System program);

- Federal earmarks and discretionary grant programs (such as the highly relevant National Corridor & Border program or CORBOR); and
- Federal committed funding (federal portion of projects already committed by the sponsoring state transportation agency).
- State Funds
 - State highway program from each state's general highway fund or special programs such as Colorado's 7th Pot and the Texas Mobility Fund;
 - State committed funding (state portion of projects already committed by the sponsoring state transportation agency due to such programs as GRIP in New Mexico, Texas Trunk System, and Oklahoma Construction Work Plan). Exhibit 6.4-2 shows how general and special highway program funds by each state are distributed among committed and non-committed project funding; and

Exhibit 6.4-2 State Funding Programs for Committed and All Other Projects

	General Highway Program	Special Highway Program
Committed Project Funding	Texas Trunk System Oklahoma Construction Work Plan	New Mexico GRIP
All Other Project Funding	State Highway Programs	Colorado 7th Pot Texas Mobility Fund

- Toll credits (in those states which have toll roads and could apply toll facility investments towards the soft match of federal program funding).
- Local Funds
 - Funding commitments by local communities served by the corridor from general or special funds (the level of commitment should reflect community interest in and support for section improvements or relief routes that benefit their citizens and businesses);
 - Shadow tolls provided by local governments and/or private developers; and
 - Local match (local government coverage of soft match of federal program funding).
- Private and Other Funds
 - Right-of-way donations by local governments and private developers to expedite projects;
 - Toll revenue sharing for project sections directly or indirectly serving nearby tolled bridges;
 - Railroad cost sharing for grade separations required by the Ports to Plains CDMP; and

- Revenues from utility easements along the Ports to Plains Corridor rights-of-way (such as fiber optic cables, cell towers, pipelines, and power lines).
- ◆ Preservation Funds (Major pavement overlays for highway rehabilitation and renewal are the only preventive maintenance eligible for federal funding. Other preventive maintenance activities are funded by state highway programs.)
 - Federal-Aid Highway Program; and
 - State highway program.
- ◆ Maintenance and Operations Funds (to pay for maintaining and operating road, bridge, and ITS facilities)
 - State highway program.

Other Unused Funding Sources

Noticeably missing from this list of alternative funding sources are direct user toll revenues and advanced financing using grant anticipation bonds or notes (GARVEEs). These alternative financing approaches are included in the finance plans for five out of the nine case study projects discussed earlier in this chapter, several of which use both approaches.

- Direct User Toll Revenues – Tolling is gaining increasing attention at all levels of government as an important option to close the increasing gap between traditional funding sources (HTF) and highway infrastructure needs. In addition, tolling is used by each of the Ports to Plains Corridor states except for New Mexico. Despite this, tolling is not considered a viable option for funding the Ports to Plains CDMP for the following reasons:
 - Insufficient traffic volume to generate the level of revenues to support the construction, operation, preservation, debt service, and coverage requirements if the toll revenues are used to pay for revenue bonds – most of the Ports to Plains Corridor lacks sufficient traffic density to support a toll schedule to pay its costs.
 - Insignificant levels of traffic congestion– the extent of traffic congestion is primarily used to assess tolling potential for urban highway facilities where travel delay costs justify the payment of tolls by commuters seeking an alternative to highly congested non-tolled facilities. The Ports to Plains Corridor runs through mostly rural areas of four western states. Its component roads generally have a level of service rating of A or B, which suggests little or no congestion problems at the present time and into the foreseeable future. Potential exceptions to this are the relief routes to divert corridor traffic away from downtown areas with their cross-traffic and signalized intersections.
 - Availability of alternative non-tolled routes to which traffic could be diverted – the Ports to Plains Corridor has non-tolled state and interstate highways to which traffic could be diverted if tolls were applied along the Corridor, especially for long-distance truck movements. If these substitute routes also become tolled, there would be a greater potential for some form of direct user tolling to be applied along the Corridor to help pay for its improvement.

- Sensitivity of auto and truck users to paying a toll to use the Corridor, which has traditionally been available without requiring users to pay a toll.
- Legislative authority to place tolls on existing non-tolled highways, especially along the non-tolled Interstate System (this may change upon reauthorization of the Highway Trust Fund).
- Uncontrolled access along the Ports to Plains Corridor, including numerous cross roads and other forms of entry and exit, would make it relatively easy for users to avoid toll plazas or barriers. This is in contrast to controlled access highways where access can be gained only by using prescribed on and off ramps, as with most Interstate highways. While controlling access along the Corridor would prevent vehicles from exiting the highway before the tolling facilities, it would be prohibitively expensive to achieve relative to the potential toll revenues.
- Public opposition of tolling along rural state highways.
- Tolling in some form might become more viable in the future for selected sections of the Corridor if local communities are willing to support tolling, the potential for traffic diversion is minimized, and revenues from tolling exceed its costs.
- Grant Anticipation Notes or Bonds - The use of GARVEEs and similar funding advancement approaches are also popular for expediting large projects which have significantly shorter development timeframes than the Ports to Plains CDMP. Such projects have often been delayed for many years, sometimes decades, waiting for adequate federal and state highway program funding to accumulate so the project becomes fully funded and can proceed. Debt financing using GARVEEs is not used for the Ports to Plains Corridor, given the gradual 20-year development process assumed for the improvements. With such a long timeframe for program completion, pay-as-you-go is a more appropriate financing approach, since it avoids the debt service costs associated with bond financing, even with federal support.
- Other Inappropriate Funding Sources:
 - Private activity bonds – due to a lack of private interest in taxable bonds, especially when there is no dedicated revenue source.
 - TIFIA loans and credit supports – due to the anticipated lack of private sector interest in providing substantial direct funding to program projects.

6.4.3 Uses of Funds

Each finance plan also defines how the funds provided by these sources will be used to pay for program elements. The following are the categories of funding uses considered for each plan:

- Capital Costs (design, environmental clearance, right-of-way acquisition, and construction for road, bridge, ITS, and signing improvements);
 - Capacity expansion projects;
 - Relief route projects;

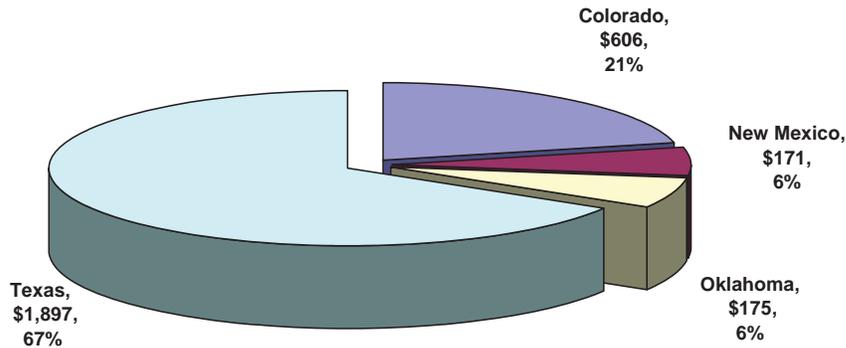
- Railroad grade separation projects;
- ITS projects; and
- Corridor signage (Corridor branding program).
- Preservation Costs (pavement renewal and rehabilitation)
- Maintenance and Operations Costs
 - Roadway (and bridge) facilities
 - ITS facilities

The level of costs associated with each of these use categories is based on the estimates of program costs presented in Chapter 2.

6.4.4 Alternative Finance Scenarios

The total life-cycle cost of the Ports to Plains Corridor improvement plan is projected to be \$2.87 billion (in 2004 dollars). Exhibit 6.4-3 shows the breakdown of Corridor life-cycle costs (in 2004 dollars) between the participating states, assuming full build out of the program.

*Exhibit 6.4-3 Total Program Costs by State
Base Year 2004 (dollars in millions)*



Source: AECOM Consult, Inc.

It is uncertain the extent to which the sponsoring states will be able to attract sufficient funding commitments from the federal government, local governments, and private stakeholders to complete the Corridor improvement plan. To account for this uncertainty, three finance scenarios were developed to provide a range of possible funding commitments from primary corridor stakeholders. The three finance scenarios postulated for this study include the following:

- Scenario 1 – this scenario consists of traditional funding sources and financing methods with reliance entirely on federal and state highway program resources.
- Scenario 2 – this scenario consists of a combination of traditional and alternative funding sources to extend federal and state highway program resources, including federal earmarks and discretionary grant funds and modest funding participation by local and private stakeholders.

- Scenario 3 – this scenario consists of an increasing level of alternative funding sources to further leverage available federal and state highway program resources, based in part on a higher level of federal earmarks and discretionary grant funds and increased funding participation by local and private stakeholders.

The level of funding by potential source associated with each of these scenarios is based on the following assumptions:

- Federal-Aid Highway Program Funding - would come primarily from the NHS Program. NHS funding for capital and preservation purposes is capped at 80 percent of eligible project costs, with the remaining 20 percent match coming from state and local sources.
- Congressional Earmarks and Discretionary Grants - provide direct funding for projects of special interest to members of Congress. The level of Ports to Plains earmarks to be included in future federal highway funding bills is unclear at this time. However, Exhibit 6.4-4 shows the proposed earmarks contained in the most recent U.S. House version of the six-year HTF reauthorization legislation known as TEA-LU (Transportation Equity Act: A Legacy for Users) .

Exhibit 6.4-4 Federal Earmarks for Ports to Plains Corridor Sections Proposed in TEA-LU

Corridor Segment	State	Earmark
US 287 from Oklahoma State Line to Limon, reconstruct highway with concrete and create two-lane super highway	Colorado	\$3 million
Improvements to US 87 from Raton to Clayton	New Mexico	\$2 million
Improvements to National High Priority Corridor #38 from the Oklahoma border south through Amarillo	Texas	\$14 million
Lamesa Relief Route, US 87 north to near US 180	Texas	\$6.5 million
SH 349 construction south of Lamesa from intersection of SH 137	Texas	\$4 million
US 87 Big Spring Relief Route	Texas	\$16 million
SH 158 from US 87 north of Sterling City to 9.5 miles west	Texas	\$1.5 million
Reconstruction of US 277 and curb and gutter from the San Felipe Bridge to the approach on Sycamore Creek Bridget in Del Rio	Texas	\$6.8 million
Total		\$53.8 million

As noted earlier, there are several federal discretionary grant programs with applicability to the Ports to Plains Corridor, including the Coordinated Border Infrastructure Program and the National Corridor Planning & Development Program (CORBOR). These two programs are aimed at enhancing the development of high-priority corridors throughout the United States and border regions near Canada and Mexico. Ports to Plains is one of the corridors eligible to receive federal discretionary funding support under CORBOR.

Program discretionary grants add federal-aid funds to a state’s highway program, while congressional earmarks take part of a state’s allocated federal-aid highway trust funds and designate them for specific projects, thereby reducing the amount of federal-aid funds available for other programs or projects. For the purposes of this study, varying levels of federal earmark and discretionary funds are assumed for each scenario.

- **Committed Federal and State Funding** - of specific Ports to Plains project sections represents the level of funding already committed by states for these projects in the timeframe in which they are currently planned. No further project funding commitments are assumed beyond this level. It is assumed that at least 80 percent of committed funding is from federal sources with the remaining 20 percent from the sponsoring states. In New Mexico, 100 percent of committed funds are from GRIP. In Colorado, no funds have been committed to the program by CDOT, partially due to the lack of adequate sales tax revenues to produce funds for the 7th Pot. This is consistent with Exhibit 6.4-2.
- **Maintenance and Operations Funding** - is assumed to come exclusively from the state DOTs responsible for Ports to Plains Corridor highways.
- **Toll Credits** - among the Ports to Plains states, Texas, Oklahoma, and Colorado are eligible for toll credits they have accrued. Oklahoma uses its toll credits to establish 100% federal match for all of its federally-funded projects. Among these three states, only Colorado has yet to request the use of toll credits from the Federal Highway Administration. This is a potential but very modest funding (cost reduction) source for the Ports to Plains CDMP.
- **Local Funding** - local funding can take the form of general funds, shadow tolls, or some kind of tax assessment or fee that applies to those businesses or property owners who directly benefit from the accessibility or safety improvements provided by the project. For the purposes of this study, modest levels of local government funding should be assumed for several of the scenarios.
- **Right-of-Way Donations** - from local governments or private sector groups interested in the Ports to Plains CDMP. Land donations are most likely to occur for relief routes, which are located closest to more urbanized communities whose development community may have the greatest interest and benefits from the projects. Modest levels of land donation should vary by funding scenario.
- **Bridge Toll Revenue Sharing** - is based on the cost of a project section built specifically to serve a tolled facility not on the Ports to Plains Corridor, whose toll revenues would likely increase due to added traffic volumes generated by the improvement project. Along the Ports to Plains Corridor, an example of this is the relief route to the Eagle Pass International Bridge, which is a tolled bridge border crossing. If this improvement enhances the attractiveness of the Eagle Pass toll bridge to automobiles and trucks traveling across the Mexican border, it could be argued that a modest level of shared funding could be provided out of the toll proceeds from the bridge. In this study, a modest level of toll funding should be assumed for several of the funding scenarios.

- Railroad Cost Sharing of Grade Separations - is based on the premise that both highway and railroad users benefit from the construction of grade separation facilities due to lower operating costs and increased safety for both groups. Therefore, it is assumed that there might be sharing of these costs between the state transportation agencies and the operating railroads where the Ports to Plains Corridor roadway and railroad main lines cross each other. For the purposes of this study, the level of railroad cost sharing would vary by funding scenario.
- Utility Easement Funds - represent revenues generated from providing access along corridor rights-of-way to private telecommunications, pipeline, and power companies. While this practice has declined since the late 1990s with the retrenchment of the telecommunications industry, there still may be potential for this along the Ports to Plains Corridor that should be explored.

The applicability and relative impact of each of these assumptions is listed in Exhibit 6.4-5, based on the number and size of the check marks shown.

Exhibit 6.4-5 Summary of Key Assumptions for Finance Scenario

FUNDING SOURCE	Scenario 1	Scenario 2	Scenario 3
FEDERAL GOVERNMENT			
Federal Aid Highway Program -- Capital Projects	✓✓	✓✓	✓✓
Federal Earmarks & Discretionary Programs		✓	✓
Federal Aid Highway Funds -- Preservation Projects	✓✓	✓✓	✓✓
STATE GOVERNMENTS			
State Transportation Funds	Derived	Derived	Derived
State Committed Transportation Funds	As Funded	As Funded	As Funded
Toll Credits (Except New Mexico, 0%)		✓	✓
LOCAL GOVERNMENTS			
Local Funds		✓	✓
PRIVATE AND OTHER FUNDS			
ROW Donation (Applies to Relief Routes)		✓	✓✓
Bridge Toll Revenue Sharing (Applies to Eagle Pass South Relief Routes)		✓	✓
Railroad Funds (Applies to RR Grade Separation Projects)		✓	✓✓
Utility Easement Funds		✓	✓

Source: AECOM Consult, Inc., October 2004

6.5 Cash Flow Results by Finance Scenario

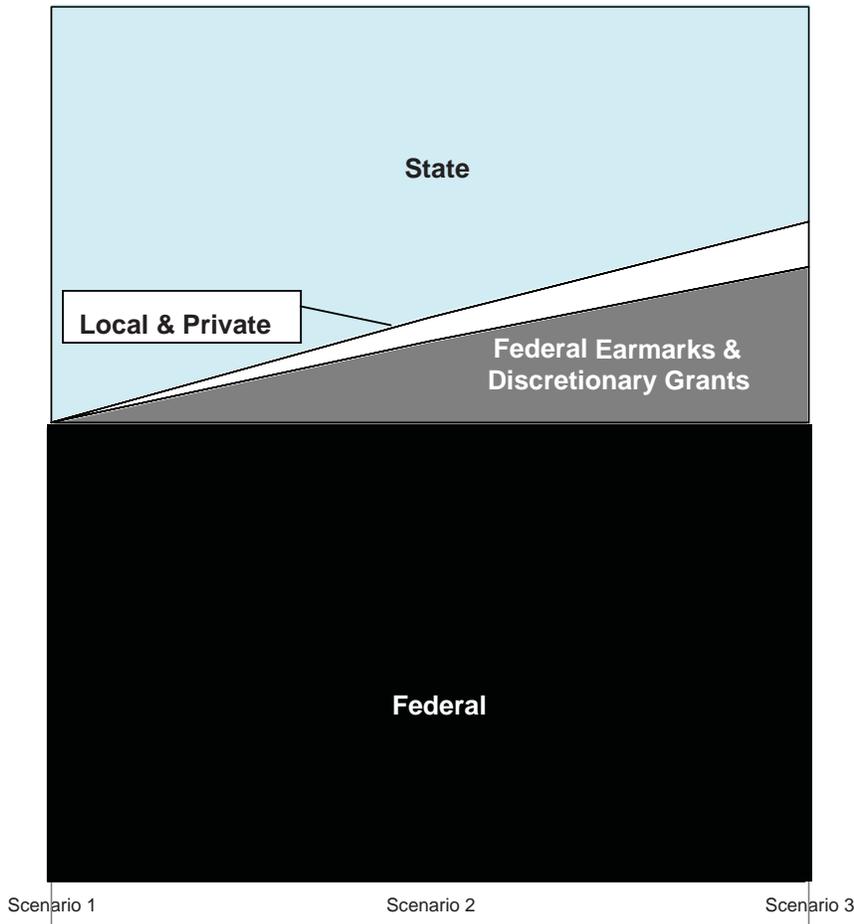
A cash flow model, using the funding scenarios noted above, produced ranges of the level of state funding resources needed to pay the 25-year life-cycle costs of the Ports to Plains Corridor improvements. The results of this analysis show that the level of state funding obligation can significantly change as more federal and local (private and public) stakeholders commit funding to the project, commensurate with the benefits they are expected to receive. Using the assumptions noted in Exhibit 6.4-5, the state share of the program costs drops by over fifty percent as alternative funding sources are added and increased for Scenarios 2 and 3.

6.5.1 Sources of Funds by Finance Scenario

Exhibit 6.5-1 shows the breakdown of total program sources of funds for the Ports to Plains CDMP for the three scenarios in base year 2004 dollars. This exhibit shows how the proportion of program costs that remain the states’ responsibility decreases as additional stakeholders (including federal, local, and private entities) take on more of the program costs.

Exhibit 6.5-1 illustrates the predominant role that the federal government is expected to play in funding the improvement program, given the federal interest in the Ports to Plains Corridor. The federal share may represent over half of the annual costs over the first 20 years of the program, when most of the capital projects are expected to be developed. The level of state highway program funding for the Corridor will depend on the extent to which additional funding can be committed from other alternative sources, such as federal earmarks, federal demonstration grants, local governments, and private sector commitments. Scenario 3 includes the greatest level of federal, local, and private funding to leverage state highway funds over the 25-year program timeframe to leverage state transportation program funds.

Exhibit 6.5-1 Illustrative Distribution of Program Funding Sources by Scenario



According to Exhibit 6.5-1, state funding obligations for the improvement program over its 25-year timeframe can be significantly reduced if federal, local government and private sector stakeholders commit funding resources consistent with the relative benefits they expect to receive from the program. Even a partial coverage of stakeholder benefits will reduce the level of funding that state transportation agencies would need to fully fund the project.

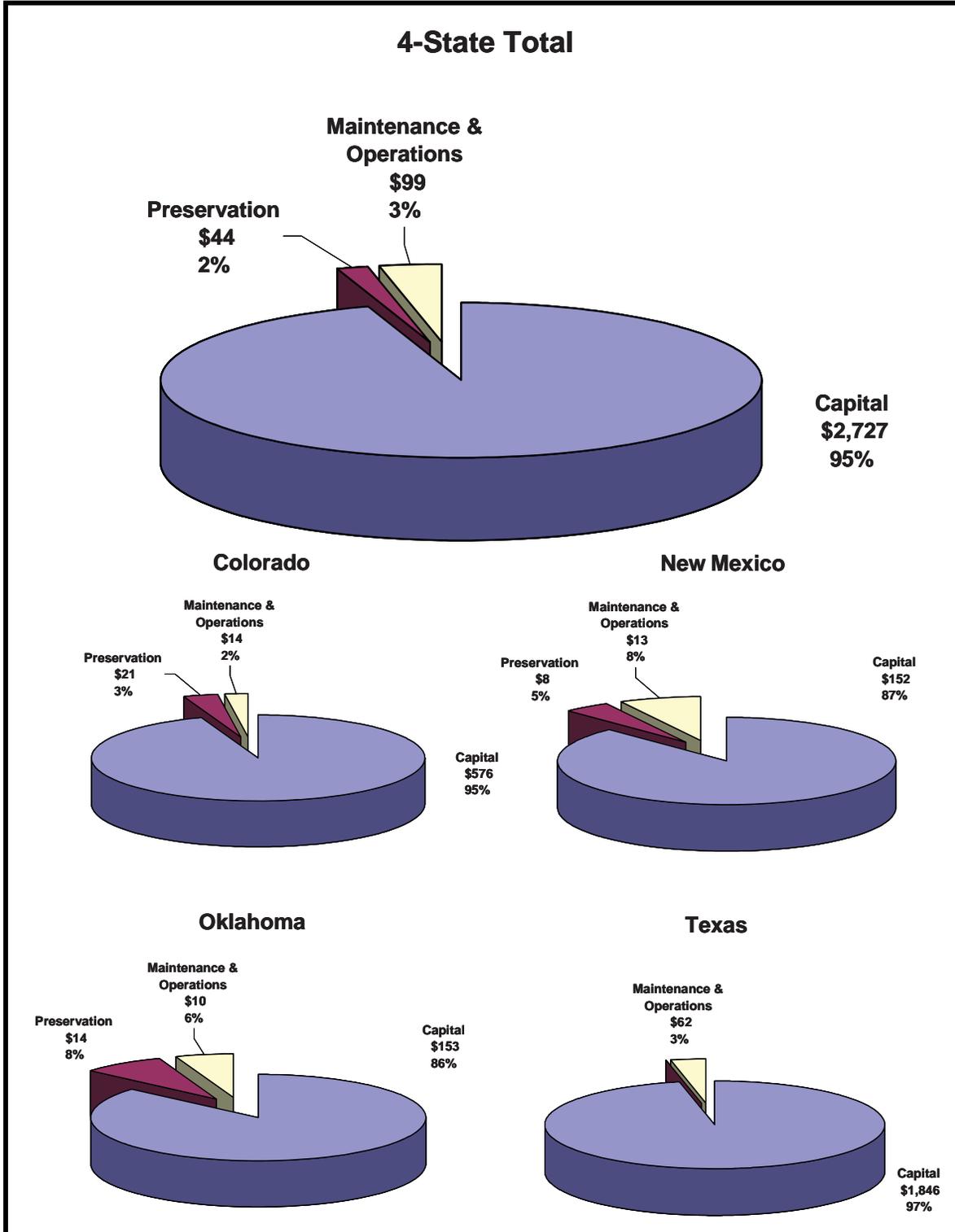
Among the most significant alternative funding sources are federal earmarks and discretionary grant programs. The level of funding designated to the Ports to Plains Corridor from these sources is problematic, since it depends on the influence and interest of congressional sponsors. However, both sources can offer significant assistance to unique programs such as the Ports to Plains CDMP. The success of each state in securing funding commitments through these two sources depends on the merits of the program and the ability of each state's congressional delegation to petition for and secure these funds through the next four HTF reauthorizations (24 years).

Other alternative funding sources, including various local (public and private) stakeholders, represent additional funding opportunities for the improvement program. The level of funding from these stakeholders will depend on their willingness and ability to provide funding commitments related to their expected benefits from the Corridor's improvement.

6.5.2 Uses of Funds by Finance Scenario

Exhibit 6.5-2 shows the relative distribution of improvement costs (uses of funds) by major category for the four-state total and each state's portion, in base year 2004 dollars. The charts in this exhibit reveal a consistent distribution of program costs by major category across the states, with capital costs comprising the vast majority of the 25-year program costs in each state (from 86 percent to 97 percent). Of particular note is the high proportion of program costs that are capital-related costs in Texas. This results in part from the ability of the state to defer preservation and some M&O efforts on the many roadways improved by the program. This lowers the costs of these activities in the years immediately following completion of the improvements relative to what would have otherwise been spent. The net result is that these cost reductions offset the preservation costs associated with new sections for Texas.

Exhibit 6.5-2 Total Uses of Funds
Base Year 2004 Dollars (millions)

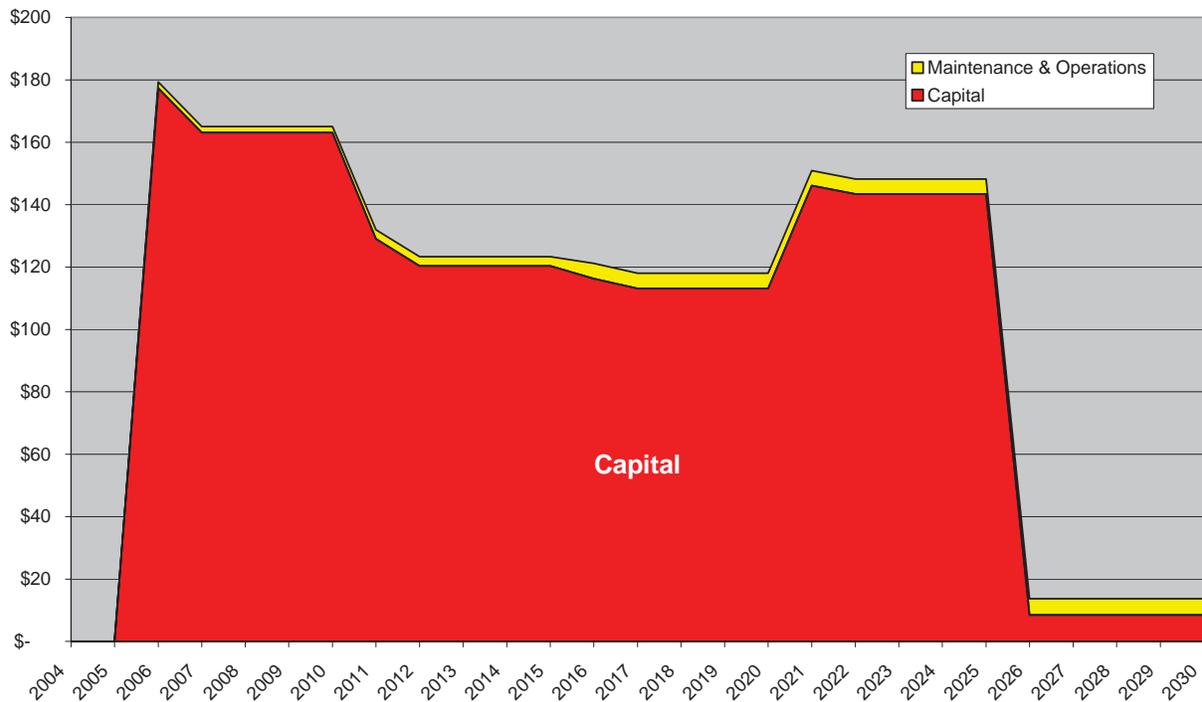


Source: AECOM Consult, Inc., October 2004 Note: Texas is estimated to have a savings in preservation over the given study timeframe, however, preservation costs will increase beyond the study timeframe.

6.5.3 Annual Cash Flows by Use of Funds

Exhibit 6.5-3 illustrates the annual cash flow for the primary cost items to which available funds would be applied over the 25-year program timeframe. As shown, capital costs represent the vast majority of program costs during the first four phases of the program. Total costs in the first three phases of the program are moderated by estimated savings in preservation and M&O costs.

*Exhibit 6.5-3 Annual Uses of Funds
Base Year 2004 Dollars (millions)*



Source: AECOM Consult, Inc.

As noted earlier, these result from the deferral of M&O and preservation activities in the years immediately following completion of expansion and relief route projects relative to what would have been spent had the projects not been undertaken. The last phase of the program reflects the ending of capital improvement projects and the continuation of preservation (capital), ITS, and M&O efforts along the completed Corridor.

6.6 Conclusions

Project funding and financing are among the most challenging aspects of getting a major program of projects, such as the Ports to Plains CDMP, from concept to the development stage. As discussed in the prior sections of this chapter, there are a large number of alternative funding and financing approaches now available to sponsors of highway improvements to expedite their development. These include programs designed specifically for corridors like Ports to Plains, such as the CORBOR discretionary grants programs.

In the case of the Ports to Plains Corridor, the nature and timing of the proposed improvement projects and the long-term benefits of the overall program suggest seeking a balanced approach to financing, including a benefits-based mix of federal, state, local, and private contributions. By going

beyond traditional funding sources, the Ports to Plains finance plan could benefit significantly from funds derived from congressional earmarks, discretionary grants, special state programs, local government funds, local/private contributions of right-of-way, and private sector participation through various public-private partnership arrangements. Together, these varied sources could leverage state funding and encourage sponsoring states to include Ports to Plains projects in their short and long-term work programs on a gradual, continuous basis. The level of local government and private stakeholder funding will demonstrate their interest and commitment to the program. This is a potentially important factor in how the Ports to Plains CDMP might be rated by state DOTs when determining priority projects to receive federal and state funds under each state's Transportation Improvement Plan.

The current commitments of state funding to selected sections of the Ports to Plains Corridor demonstrate the advantage of gaining state, local, and private sector funding commitments early in the program development process. These non-federal and non-state funding commitments also have the effect of enhancing the potential for candidate projects to access scarce federal and state highway program funds due to the leveraging affect on these funds. These are important reasons to aggressively and continuously pursue alternative funding sources in the proposed finance plans for the Corridor.

Given these considerations, the proposed finance plan for the Ports to Plains Corridor program offers the following key features:

- ◆ Significant reliance on federal funding support, from both the NHS Program and from earmarks and discretionary grant programs, including the CORBOR Program. This reflects the significant national interests that this multi-state Corridor would promote, including international trade with Latin and South America, regional economic development, enhanced national security through improved sections of several Strategic Highway Network routes and connectors in the Ports to Plains Corridor, and an alternative route for transporting goods and people between the heartland of the mountain states and the strategically situated border state of Texas.
- ◆ Tapping as many stakeholder groups along the Ports to Plains Corridor that are expected to realize direct benefits from the Corridor improvements to make funding commitments of some kind, including local communities and private parties, developers, railroads, bridge authorities, and utility companies. This would reflect the potential interest and benefits these stakeholders might have in promoting the Ports to Plains CDMP through direct sponsorship. For this to be successful, these additional stakeholders need to understand the consequences of the plan on their communities and businesses and become actively involved in promoting corridor projects that directly affect them.
- ◆ Significant level of state highway program funding to meet the full life-cycle costs of the Ports to Plains CDMP. This reflects the significant state and regional benefits of the program, as discussed in the prior chapter, including:
 - Improved transportation accessibility;
 - Lower transportation operating costs for users;

- Improved safety due to consistent highway geometrics and urban area relief routes along the Corridor;
 - Improved attractiveness of the Corridor for international, regional, and local movement of people and goods; and
 - Expanded economic development opportunities for the sponsoring states.
- ◆ A focus on realistic funding and financing methods which reflect the unique characteristics of the Ports to Plains Corridor and the kinds of improvements proposed by the program of projects. This includes federal earmarks and discretionary grant programs, special state funding initiatives, and demonstrated local/private support. These features provide a realistic basis for estimating the levels of funding needed for the Corridor, based on a comprehensive assessment of life-cycle costs. This includes not only the capital costs of proposed improvement projects but also the costs associated with maintaining, operating, and preserving the additional lane-miles of highway and ITS facilities to be created by the improvements. In addition, the three finance scenarios provide a range of funding responsibilities by stakeholder groups that reflect the uncertainty regarding the levels of funding participation by federal, state, local, and private stakeholders of the program.
 - ◆ The recently-announced Special Experimental Program 15 (SEP 15) by the Federal Highway Administration (contained in the Federal Register on October 6, 2004) provides project sponsors of Federal-Aid highway projects to use more cost-effective ways to develop and deliver highway improvement projects. These experimental freedoms might be used to enable sponsors of the plan to lower the costs of these projects through the application of streamlined procurement, environmental clearance, and project delivery methods.

Ultimately the challenge for the stakeholders of the Port to Plains CDMP is to determine whether there is sufficient long-term public and private interest to warrant investment in the program over time. This will be impacted by the willingness and ability of project stakeholders to develop and provide the level of resources needed to fund the projects comprising the program. Fortunately there are multiple approaches to develop project funding and enlightened stakeholders in the public and private sectors willing and able to consider and apply these alternative approaches. In addition, there is time to develop the program and the resources needed to fill in the gaps in the current composition of the Corridor. The success of the plan will be determined by the ability of the respective states to obtain sufficient commitments and resources from project stakeholders (especially among local and private beneficiaries) to complete the Corridor.

CHAPTER 7

Risk Assessment

Key Concepts:

- *A process was used to identify potential risks that might impede the development of the Corridor. Actions are prescribed to help minimize the risks.*
- *The primary tools in identifying risks included public involvement, questionnaires, and personal interviews.*
- *Continued action to develop the Corridor is necessary at all levels: Local, State, and Federal.*



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7 RISK ASSESSMENT

The Risk Assessment analysis is an evaluation of factors that may affect project feasibility. For the Ports to Plains Corridor Development and Management Plan (CDMP), four types of potential risk are evaluated: financial, environmental, social, and political. The evaluation is conducted using a variety of inputs, including applicability of potential and traditional funding sources (financial), inventories of environmental sensitivities (environmental), questionnaires distributed at public meetings and on the project website (social/political), interviews and personal interactions with businesses and residents (social/political), and research of the political setting surrounding the Corridor (political). The result of the assessment is a summary of opportunities that have created or could create momentum for Corridor improvement implementation, along with constraints that could create impediments to these Corridor improvements. The results are meant to highlight any issues that could affect Corridor improvements either positively or negatively. Whenever possible, action is prescribed that can help maintain momentum and manage potential risks.

7.1 Evaluation Process

The evaluation is performed using a stepped matrix process. Using this method, major risks in the Corridor are identified, and criteria to evaluate their magnitude are developed. Each source of risk is characterized through a series of evaluation steps. These steps are shown in Exhibit 7.1-1 and are described as:

Source – The four major sources of risk identified are financial, environmental, social, and political. Sources are more specific.

Category – Categories are more specific types and descriptions of the sources of risk.

Target – The target further isolates the exact level that will be analyzed. For example, environmental risk will target both the environmental process and the anticipated duration and complexity of the process. Other targets will be analyzed based on geographical and geopolitical bounds at the local, state, and federal levels.

Measure – Measurement criteria are identified to evaluate each targeted risk. These tools include governmental actions, process requirements, and public outreach. For example, government actions could include proclamations in support of the Corridor; processes for project approval could require varying complexity of environmental documents; and public responses could highlight local concerns.

Risk Summary – Risk summary is expressed as the relative potential for each source of risk to affect project advancement. Effects on project advancement can be positive or negative. Each risk summary addresses the relative potential of the various opportunities or concerns. This summary also recommends actions that may improve the likelihood of project advancement.

Exhibit 7.1-1 Risk Assessment Matrix

Source	Categories	Targets	Measures	Risk Summary
Financial	Conventional Funding	Local	Current Municipal Budgets, Capital Improvement Programs, Long Range Transportation Plans	Issue Identification and Suggested Actions
		State	Transportation Improvement Programs, Statewide Transportation Improvement Programs, Long Range Transportation Plans	Issue Identification and Suggested Actions
		Federal	Legislative Earmarks	Issue Identification and Suggested Actions
	Alternative Funding	Local	Transportation Bonds, Toll Feasibility, Tax or Development Districts, ad valorem taxes	Issue Identification and Suggested Actions
		State	Toll Feasibility, Grant Anticipation Revenue Vehicles "GARVEE" Bonds	Issue Identification and Suggested Actions
Environmental	Clearance Process and Time	Process	Categorical Exclusion, Environmental Assessment, Environmental Impact Statement	Issue Identification and Suggested Actions
		Duration/Complexity	Level of effort necessary to complete the process.	Issue Identification and Suggested Actions
Social	Impact to "Way of Life"	All Stakeholders	Responses to questionnaire, interviews, public meetings, personal interactions, and research.	Issue Identification and Suggested Actions
	Importance to Transportation Options			
	Importance to Economy			
Political	Concensus - Agree with CDMP	All Stakeholders	Responses to questionnaire, interviews, public meetings, personal interactions, and research.	Issue Identification and Suggested Actions
	Support - Actively advocate for the CDMP			

7.2 Considerations and Summary

Risks exist in a variety of forms, some of which can be quantified more readily than others. The risk summary for this project is a qualitative assessment, based on the evaluation of the significance of the risks identified. To assess risk, comments and questionnaire responses were used in combination with other factual data, such as programmed funding.

7.2.1 Financial Considerations

Financial risks are summarized in two categories, conventional funding and alternative funding. Local, state, and federal targets are chosen for the conventional funding assessment. Funds for planning, design, and construction typically are programmed by and flow from these sources. Targets for alternative funding are assessed for local and state funding only, focusing on local participation and leveraging of local funds.

Local participation includes funding for portions of the projects supplied by cities and counties along the route. Leveraging local funds is one example of local participation. The local government agrees to pay a portion of the project cost, and, in turn, the project receives priority funding from the state department of transportation (DOT). The application of federal funds is typically programmed

through state DOT processes or earmarked legislation. For this reason, federal funds are not considered applicable to the alternative financing or leveraging strategies.

Conventional funding availability is measured by determining whether funds for projects have been identified through current budgets or other committed sources of funding. Alternative funding is measured by the presence of non-traditional funding mechanisms such as development districts, toll financing, or transportation bond funding.

For local government participation, a lower risk is associated if funds are budgeted in the current fiscal year. A medium level of risk is associated with projects included in a current capital improvement program. A higher risk level is associated with projects that are only included in a long-range and unfunded transportation plans.

A low risk in state government financial participation is associated with funding that is included in a short-term, financially constrained transportation program. A medium risk level is associated with a project that is included only as an unfunded element of a transportation plan. And if a project is neither programmed nor planned, a higher level of risk is assumed.

Federal funding opportunities are also evaluated. If there is a funding earmark in the currently proposed in house legislation--known as "Transportation Equity Act: A Legacy for Users" (TEA-LU) and senate legislation-- "Safe, Accountable, Flexible and Efficient Transportation Equity Act" (SAFETEA)--a lower risk is realized. If there are no earmarks, a higher risk is assumed.

Local government participation in alternative financing activities has a lower risk if transportation bond funds are approved or a project is considered "toll feasible." "Toll feasible" projects are those whose forecast toll revenues meet or exceed the funding necessary to pay back the revenue bonds sold to finance the project and to pay for ongoing project maintenance and operations. A medium level of risk can be associated with projects relying on tax or development districts or other sources of tax-backed funds. Tax or development districts use tax revenues generated in a designated area served by a project to pay back the cost of the project. A higher level of risk is associated with projects relying on property tax funds or conventional operating budgets.

Alternative financing opportunities from state government sources are also evaluated. A lower risk approach would include toll feasible projects or franchise agreements. Recently, state DOTs have explored the idea of granting a franchise to private developers for the construction and maintenance of toll road projects. In this approach, the state would allow the developer to build a roadway in the state system and collect tolls to recover the cost, and then turn the roadway over to the state in the future.

A medium risk level for alternative financing is associated with candidate projects for Transportation Infrastructure Financing and Innovation Act (TIFIA) or Grant Anticipation Revenue Vehicles (GARVEE) financing. A more detailed explanation of these financing mechanisms can be found in the Finance Plan, Chapter 6 of this report. These recently developed sources are currently being used in a number of states, including Texas and Colorado, and have proven records of successful use. A higher risk is associated with projects that have only conventional sources of funds programmed and are not considered promising candidates for alternative financing techniques.

7.2.2 Financial Summary

The results of the assessment of the expansion projects and the relief routes based on financial considerations are summarized in Exhibit 7.2-1 and 7.2-2. A section or relief route that has current funding availability at the state level is listed as being included in Transportation Improvement Programs (TIP), Statewide Transportation Improvement Programs (STIP), or Long Range Transportation Plans (Long Range). A section or relief route with potential funding availability at the federal level is listed as an earmark. A section or relief route with alternative financing available or feasible is listed as bond or toll feasible. The table shows that the risk assessment considered local funding. No committed local funding was found, however, that supported the projects. This gap in local funding currently represents a high risk to Corridor improvements.

Exhibit 7.2-1 Financial Risk Summary, Expansion Sections

Roadway	State	From	To	Finance				
				Conventional Funding Availability			Alternative Financing	
				Local	State	Federal	Local	State
US 83	Texas	I-35	Webb/Dimmit County Line					
US 83	Texas	Webb/Dimmit County Line	Catarina, FM 133					
US 83	Texas	Catarina, FM 133	Carrizo Springs Relief Route					
US 277	Texas	Carrizo Springs Relief Route	Dimmit/Maverick County Line					
US 277	Texas	Dimmit/Maverick County Line	Eagle Pass Relief Route					
US 277	Texas	Eagle Pass Relief Route	Maverick/Kinney County line					
US 277	Texas	Maverick/Kinney County line	Kinney/Val Verde County Line					
US 277	Texas	Kinney/Val Verde County Line	Del Rio Relief Route					
US 277	Texas	Del Rio Relief Route	Val Verde/Edwards County Line					
US 277	Texas	Val Verde/Edwards County Line	Edwards/Sutton County Line					
US 277	Texas	Edwards/Sutton County Line	Sonora Relief Route					
US 277	Texas	Sonora Relief Route	Sutton/Schleicher County Line					
US 277	Texas	Sutton/Schleicher County Line	Schleicher/Tom Green County Line					
US 277	Texas	Schleicher/Tom Green County Line	San Angelo Relief Route					
SH 158	Texas	Sterling City	Sterling/Glasscock County Line		STIP	EARMARK		
SH 158	Texas	Sterling/Glasscock County Line	Glasscock/Midland County Line		STIP			
SH 349	Texas	Midland	Midland/Martin County Line					
SH 349	Texas	Midland/Martin County Line	Martin/Dawson County Line					
SH 349	Texas	Martin/Dawson County Line	FM 2052			EARMARK		
FM 2052	Texas	State Highway 349	US 87					
US 287	Texas	Stratford	Sherman/Dallam County Line					
US 287	Texas	Sherman/Dallam County Line	Ok/Tx Border			EARMARK		
US 287	Oklahoma	Ok/Tx Border	Boise City Relief Route					
US 287	Oklahoma	Boise City Relief Route	Ok/Co Border		STIP LONG RANGE			
US 287	Colorado	Ok/Co Border	Springfield		LONG RANGE			
US 287	Colorado	Springfield	Baca/Prowers County Line		LONG RANGE			
US 287	Colorado	Baca/Prowers County Line	Lamar Relief Route		LONG RANGE	EARMARK		
US 287	Colorado	Lamar Relief Route	Prowers/Kiowa County Line		LONG RANGE			
US 287	Colorado	Prowers/Kiowa County Line	Eads		LONG RANGE			
US 287	Colorado	Eads	Kiowa/Cheyenne County Line		LONG RANGE			
US 287	Colorado	Kiowa/Cheyenne County Line	Kit Carson		LONG RANGE			
US 40	Colorado	Kit Carson	Wild Horse		LONG RANGE			
US 40	Colorado	Wild Horse	Cheyenne/Lincoln County Line		LONG RANGE			
US 40	Colorado	Cheyenne/Lincoln County Line	Hugo		LONG RANGE			
US 40	Colorado	Hugo	Limon		LONG RANGE			
US 87	Texas	Dumas	Moore/Hartley County Line		STIP			
US 87	Texas	Moore/Hartley County Line	Hartley/Interchange with US 385		STIP			
US 87	Texas	Dalhart Relief Route	Tx/NM Border			EARMARK		
US 64	New Mexico	Clayton	Capulin			EARMARK		GRIP-BOND
US 64	New Mexico	Capulin	Union/Colfax County Line			EARMARK		GRIP-BOND

Exhibit 7.2-2 Financial Risk Summary, Relief Routes

Roadway	State	From	To	Financial				
				Conventional Funding Availability			Alternative Financing	
				Local	State	Federal	Local	State
Carrizo Springs Relief Route	Texas	South of Asherton	North of Carrizo Springs					
Eagle Pass Relief Route	Texas	Eagle Pass International Bridge	US 277 East of Eagle Pass		STIP			
Eagle Pass Relief Route	Texas	US 277 East of Eagle Pass	US 277 North of Eagle Pass		STIP			
Del Rio Relief Route	Texas	US 277 East of Del Rio	US 277 North of Del Rio					
Sonora Relief Route	Texas	US 277 South of Sonora	US 277 North of Sonora					
San Angelo Relief Route	Texas	US 277 South of San Angelo	US 87 North of San Angelo					PARTLY TOLL FEASIBLE
Big Spring Relief Route	Texas	US 87 South of Big Spring	US 87 North of Big Spring			EARMARK		
Midland Relief Route	Texas	IH 20 West of Midland	Texas 349 North of Midland					
Lamesa Relief Route	Texas	US 87 South of Lamesa	US 87 North of Lamesa			EARMARK		
Dumas Relief Route	Texas	US 287 South of Dumas	US 287 North of Dumas					
Stratford Relief Route	Texas	US 287 South of Stratford	US 287 North of Stratford					
Boise City Relief Route	Oklahoma	US 287 South of Boise City	US 287 North of Boise City					
Lamar Relief Route	Colorado	US 287 South of Lamar	US 50 North of Lamar					
Dalhart Relief Route	Texas	US 87 South of Dalhart	US 87 North of Dalhart					

Conventional Funding Availability

At the local level, there are no sections or relief routes that are currently being funded through strictly local dollars. In the questionnaire distributed at open houses, public meetings, and via the project website the responses to three questions are relevant. (The entire questionnaire and results can be found in Appendix B.) The three statements and responses relevant to financial risk are as follows:

1. I would promote the Ports to Plains project through my methods of influence.

	Strongly Agree	Agree	Neither Agree or Disagree	Disagree	Strongly Disagree	Don't know/ N/A	No Response
# of respondents	39	23	7	1	3	0	4
% of respondents	51%	30%	9%	1%	4%	0.00%	5%

2. I will actively seek funding opportunities for Ports to Plains projects.

	Strongly Agree	Agree	Neither Agree or Disagree	Disagree	Strongly Disagree	Don't know/ N/A	No Response
# of respondents	17	15	26	5	3	5	6
% of respondents	22%	19%	34%	7%	4%	7%	7%

3. If some funding were available at higher levels, I would support trying to match those funds with local funds.

	Strongly Agree	Agree	Neither Agree or Disagree	Disagree	Strongly Disagree	Don't know/ N/A	No Response
# of respondents	16	31	16	4	5	1	4
% of respondents	21%	40%	21%	5%	7%	1%	5%

To summarize, answers of “strongly agree” and “agree” are classified as a strongly supportive response, while answers of “neither agree or disagree,” “disagree,” and “strongly disagree” are classified as not strongly supportive. The following summarizes this result:

1. I would promote the Ports to Plains project through my methods of influence.

	Strongly Supportive	Not Strongly Supportive
# of respondents	62	11
% of respondents	81%	14%

2. I will actively seek funding opportunities for Ports to Plains projects.

	Strongly Supportive	Not Strongly Supportive
# of respondents	32	34
% of respondents	41%	45%

3. If some funding were available at higher levels, I would support trying to match those funds with local funds.

	Strongly Supportive	Not Strongly Supportive
# of respondents	47	25
% of respondents	61%	33%

Strong local support is evidenced by over 80 percent of respondents being in strong support of utilizing “methods of influence” to affect implementation of the Ports to Plains project. When it comes to actively pursuing funding, the response remains good when considering that action is required. And finally, there is strong support for trying to match funds made available at higher levels with local funds. However, this strong active support is not evidenced by current local funding. Overall, activism at the local level remains a critical element in advancing the Ports to Plains Corridor improvements to implementation. It is generally understood that a passive stance at the local level will not result in a windfall of funding for local projects. It takes not only consensus, but active support as well, when trying to advance projects from the local “grass-roots” level. Therefore, a specific impediment or risk of not advancing corridor development is a lack of active support at local levels. Consensus about the project rings loudly in the communities along the Corridor, but for many it seems a daunting task to compete for funding against the urban areas within their states. Using a collective local/regional voice in state appropriations discussions will be critical in meeting this challenge.

At the state level, specific programs have advanced that are supportive of the Ports to Plains Corridor development. In Texas, the Texas Trunk System will continue as a strong source of conventional funding. In Colorado, the Strategic Transportation Projects program (7th Pot) will continue, depending on the economy, to be a valuable tool in acquiring funds for the Ports to Plains Corridor. Oklahoma has facilitated Corridor development by taking steps toward expansion of the roadway north of Boise City, and New Mexico has made large strides in alternative financing that will be discussed in Appendix B. The risk at the state level is largely placed on availability of and competition for funds. It is apparent that each of the four states has made the Ports to Plains Corridor a viable competing project within state appropriation discussions. A continued downturn in state economies and barriers at the state legislative and executive levels to prioritize investments in transportation infrastructure represent specific impediments or risks to Corridor development. State economies must be strong enough to support the programs that have been put in place to encourage Corridor development, balanced with an appropriate level of risk taken by state leadership to improve infrastructure.

At the federal level, the transportation reauthorization bill, known as TEA-LU in the House of Representatives, and SAFETEA in the Senate, has not been signed into legislation. Differences

between the two bills will be resolved by a conference committee representing the two bodies before the legislation is sent to the President for his signature.

From a state perspective, however, earmarks do not represent additional federal dollars. Rather earmarks specify how portions of the states' federal dollars are expended, and states must match these federal dollars to access the funding. Further, earmarked dollars to a specific project in an area affects funding for other projects in that area. Thus, earmarking can be controversial.

Earmarks, however, remain a demonstration of political support and a means of obtaining funds.

With limited abilities to fund projects creatively at the local and state levels, it is clear that the Ports to Plains Corridor must strongly leverage the Corridor consensus and federal legislative voice in order to succeed in Corridor development. This Corridor in many ways has created its own momentum by having active local support and with political voice, and by doing so, has advanced beyond more needs-based corridors. This momentum must be strengthened, not neglected, if development of the Corridor is to be realized. Therefore, a specific impediment to Corridor development would be not taking advantage of the Ports to Plains federal political voice for the next federal transportation reauthorization bill.

Alternative Financing

At the local level, it is apparent from Exhibits 7.2-1 and 7.2-2 that alternative financing is not currently a strong source of funding for the Ports to Plains Corridor. It is important for local stakeholders to take active roles in developing the Corridor, and it is equally important for those roles to include a constant search for creative ways to build financing options. As a corridor project, communities along the Corridor should work together to find partnering solutions that may help corridor development. This is perhaps crucial to meeting the future vision of the Corridor. Many alternative financing options are outlined in the Finance Plan chapter of this report. The ability to implement these alternative financing methods will enhance the likelihood of Corridor improvements.

At the state level, tolling has become a large focus in accelerating project development. To date, only one project (see Exhibit 7.2-2), a relief route project in Texas, has been found to be partially toll feasible. In Colorado, the state DOT created the Colorado Tolling Enterprise (CTE) in 2002. Recent feasibility reports of the candidate corridors for the entire state showed one overlaying project with the Ports to Plains Corridor. This project is in the Denver metropolitan area on I-70. There are no defined toll feasible projects in Oklahoma or New Mexico that overlay the Corridor.

7.2.3 Environmental Considerations

The environmental risk exposure is the potential for project delays due to complexity and time. Therefore, the targets chosen for this source are process and time. Environmental processes range in document development and processing difficulty from the relatively simple Categorical Exclusion (CE) to the most comprehensive, the Environmental Impact Statement (EIS). Project mitigation potentials also range in difficulty and cost, from relatively simple and inexpensive actions like noise walls, to the purchase of land to create habitat for impacted endangered species.

The process target is measured by the level of impact the project may have on the environment. In summarizing environmental risk, a lower risk is realized if a project requires a CE; a medium level of risk for an Environmental Assessment (EA); and higher level of risk for an EIS.

Length of environmental clearance time is considered when evaluating the time target. Process refers to the type of environmental document assumed necessary to clear the project environmentally. A lower risk is associated with projects that require a shorter environmental clearance time, and a higher risk level is associated with projects requiring a longer environmental clearance time. These levels of risk are based upon consideration of the time required to prepare and process the environmental document. As document preparation time increases, the risk to the project also increases.

7.2.4 Environmental Summary

Corridor wide, there are 41 roadway sections identified for expansion. These sections are shown in Exhibit 7.2-3 and are listed with both the anticipated environmental document in the process column as well as an estimate of whether or not the duration of the process will require a longer period of time. Of the 41 sections, 23 will require at least an EA document. Ten will require at least an EA and may require an EIS. Four may be cleared through a CE, and four are either ongoing or have completed an environmental clearance process. In considering the time necessary to complete the environmental clearance process, 23 sections have been identified as significantly complex and could require environmental clearance processes of longer duration, whether it be through an EA or EIS.

There are 15 relief routes identified, and these relief routes along with environmental process and time measures are also listed in Exhibit 7.2-4. Of the 15 relief routes, 11 are anticipated to require EAs, and four have environmental clearance processes either ongoing or completed. Of the 11 potential EAs, four are considered to be significantly complex and could require environmental clearance processes of longer duration.

The environmental chapter and Appendix A of the document provide more thorough descriptions of each section and relief route environmental considerations.

Exhibit 7.2-3 Environmental Risk Summary, Expansion Sections

Roadway	State	From	To	Environmental	
				Likely Clearance Process and Time	
				Process	Time
US 83	Texas	I-35	Webb/Dimmit County Line	EA	LONGER
US 83	Texas	Webb/Dimmit County Line	Catarina, FM 133	EA	
US 83	Texas	Catarina, FM 133	Carrizo Springs Relief Route	EA	
US 277	Texas	Carrizo Springs Relief Route	Dimmit/Maverick County Line	EA	LONGER
US 277	Texas	Dimmit/Maverick County Line	Eagle Pass Relief Route	EA	
US 277	Texas	Eagle Pass Relief Route	Maverick/Kinney County line	EA/EIS	LONGER
US 277	Texas	Maverick/Kinney County line	Kinney/Val Verde County Line	EA/EIS	LONGER
US 277	Texas	Kinney/Val Verde County Line	Del Rio Relief Route	EA/EIS	LONGER
US 277	Texas	Del Rio Relief Route	Val Verde/Edwards County Line	EA/EIS	LONGER
US 277	Texas	Val Verde/Edwards County Line	Edwards/Sutton County Line	EA	
US 277	Texas	Edwards/Sutton County Line	Sonora Relief Route	EA	
US 277	Texas	Sonora Relief Route	Sutton/Schleicher County Line	CE	
US 277	Texas	Sutton/Schleicher County Line	Schleicher/Tom Green County Line	EA/EIS	LONGER
US 277	Texas	Schleicher/Tom Green County Line	San Angelo Relief Route	EA/EIS	LONGER
SH 158	Texas	Sterling City	Sterling/Glasscock County Line	EA	LONGER
SH 158	Texas	Sterling/Glasscock County Line	Glasscock/Midland County Line	EA	LONGER
SH 349	Texas	Midland	Midland/Martin County Line	EA	LONGER
SH 349	Texas	Midland/Martin County Line	Martin/Dawson County Line	EA	LONGER
SH 349	Texas	Martin/Dawson County Line	FM 2052	EA	LONGER
FM 2052	Texas	State Highway 349	US 87	CE	
US 287	Texas	Stratford	Sherman/Dallam County Line	EA	LONGER
US 287	Texas	Sherman/Dallam County Line	Ok/Tx Border	CE	
US 287	Oklahoma	Ok/Tx Border	Boise City Relief Route	CE	
US 287	Oklahoma	Boise City Relief Route	Ok/Co Border	CE COMPLETE	
US 287	Colorado	Ok/Co Border	Springfield	EA/EIS	LONGER
US 287	Colorado	Springfield	Baca/Prowers County Line	EA/EIS	LONGER
US 287	Colorado	Baca/Prowers County Line	Lamar Relief Route	EA	LONGER
US 287	Colorado	Lamar Relief Route	Prowers/Kiowa County Line	EA/EIS	LONGER
US 287	Colorado	Prowers/Kiowa County Line	Eads	EA	
US 287	Colorado	Eads	Kiowa/Cheyenne County Line	EA	LONGER
US 287	Colorado	Kiowa/Cheyenne County Line	Kit Carson	EA	
US 40	Colorado	Kit Carson	Wild Horse	EA	LONGER
US 40	Colorado	Wild Horse	Cheyenne/Lincoln County Line	EA	
US 40	Colorado	Cheyenne/Lincoln County Line	Hugo	EA	LONGER
US 40	Colorado	Hugo	Limon	EA/EIS	LONGER
US 87	Texas	Dumas	Moore/Hartley County Line	EA	
US 87	Texas	Moore/Hartley County Line	Hartley/Interchange with US 385	EA	
US 87	Texas	Dalhart Relief Route	Tx/NM Border	EA	LONGER
US 64	New Mexico	Clayton	Capulin	EA COMPLETE	
US 64	New Mexico	Capulin	Union/Colfax County Line	EA COMPLETE	
US 64	New Mexico	Union/Colfax County Line	Raton/I-25	EA COMPLETE	

Exhibit 7.2-4 Environmental Risk Summary, Relief Routes

Roadway	State	From	To	Environmental	
				Likely Clearance Process and Time	
				Process	Time
Carrizo Springs Relief Route	Texas	South of Asherton	North of Carrizo Springs	EA	
Eagle Pass Relief Route	Texas	Eagle Pass International Bridge	US 277 East of Eagle Pass	EA COMPLETE	
Eagle Pass Relief Route	Texas	US 277 East of Eagle Pass	US 277 North of Eagle Pass	EA COMPLETE	
Del Rio Relief Route	Texas	US 277 East of Del Rio	US 277 North of Del Rio	EA	LONGER
Sonora Relief Route	Texas	US 277 South of Sonora	US 277 North of Sonora	EA	
San Angelo Relief Route	Texas	US 277 South of San Angelo	US 87 North of San Angelo	EA	LONGER
Big Spring Relief Route	Texas	US 87 South of Big Spring	US 87 North of Big Spring	EA	LONGER
Midland Relief Route	Texas	IH 20 West of Midland	Texas 349 North of Midland	EA	LONGER
Lamesa Relief Route	Texas	US 87 South of Lamesa	US 87 North of Lamesa	EA	
Dumas Relief Route	Texas	US 287 South of Dumas	US 287 North of Dumas	EA	
Stratford Tx Relief Route	Texas	US 287 South of Stratford	US 287 North of Stratford	EA	
Boise City Relief Route	Oklahoma	US 287 South of Boise City	US 287 North of Boise City	EA ONGOING	
Lamar Relief Route	Colorado	US 287 South of Lamar	US 50 North of Lamar	EA ONGOING	
Dalhart Relief Route	Texas	US 87 South of Dalhart	US 87 North of Dalhart	EA	
Clayton Relief Route	New Mexico	US 87 East of Clayton	US 64 West of Clayton	EA	

7.2.5 Social Considerations

The considerations for this source of risk are "Impact to Way of Life," "Importance to Transportation Options," and "Importance to the Economy." Assessment of targets is accomplished by using several measures. One measure is the response to specific statements in a project questionnaire that was distributed at public meetings and on the project website. Statements specifically written to align with each of the three social issues were used to elicit a level of response that could range from strongly agree to strongly disagree. In addition, interviews were conducted with businesses and economic leaders to clarify the significance of roadway improvements for the economic future. A series of public meetings was held, and questions and answers were recorded and reviewed by the project team.

Risk levels are determined through responses to the project questionnaire, and public meeting input. Outliers in response to questionnaires and public meeting inputs are isolated and analyzed as potential sources of social sensitivity, and therefore risk. Please refer to Appendix B for a listing of statements and their associated alignment with social and political risk measurements.

7.2.6 Social Summary

This category of risk assessment is best summarized first at the corridor level, then more specifically at the local level.

Corridor Response

The number of responses to the general questionnaire and the economic impact interviews are not high enough to gain significant insight into a particular community or region in the Corridor. However, the level of response that is realized can be used to assess overall Corridor issues. The framework for assessing risk is focused on the following primary considerations: the impact of the Ports to Plains improvements on 1) way of life, 2) transportation options, and 3) the economy.

With regard to impacting way of life, responses to two specific statements in the questionnaire are revealing and are summarized as follows:

- Improvements to the roadways on the Ports to Plains Corridor will improve my way of life.

	Strongly Agree	Agree	Neither Agree or Disagree	Disagree	Strongly Disagree	Don't know/ N/A	No Response
# of respondents	27	29	11	3	3	1	3
% of respondents	35%	38%	14%	4%	4%	1%	4%

- Increased truck traffic through or around my community will adversely impact my community.

	Strongly Agree	Agree	Neither Agree or Disagree	Disagree	Strongly Disagree	Don't know/ N/A	No Response
# of respondents	6	9	18	22	17	1	4
% of respondents	8%	12%	23%	29%	22%	1%	5%

Again to summarize, responses to statement 1 of “strongly agree” and “agree” are classified as a strongly supportive response, while answers of “neither agree or disagree,” “disagree,” and “strongly disagree” are classified as not strongly supportive. For statement 2, responses of “disagree” and “strongly disagree” are classified as strongly supportive, while responses of “strongly agree,” “agree,” and “neither agree or disagree” are classified as not strongly supportive. The following summarizes this result:

- Improvements to the roadways on the Ports to Plains Corridor will improve my way of life.

	Strongly Supportive	Not Strongly Supportive
# of respondents	56	17
% of respondents	73%	22%

2. Increased truck traffic through or around my community will adversely impact my community.

	Strongly Supportive	Not Strongly Supportive
# of respondents	39	33
% of respondents	51%	43%

The strong support to statement 1 is of no surprise, because at every step of the public involvement process there was overwhelming response from communities in support of the Ports to Plains Corridor improvements. A “not strongly supportive” response to statement 1 does not necessarily reveal any risks to Corridor development. The responses to statement 2 are also interesting with over 50 percent of respondents “disagreeing or strongly disagreeing” that truck traffic would adversely impact their communities. However, the response was more split with 43 percent responding negatively to the statement. From the open houses, public meetings, and discussions with local transportation officials, various concerns in communities about truck traffic were documented, and this issue could pose risk, particularly in specific communities.

Specific Local Response

Overall, it was observed that the most significant social response was in relation to constructing relief routes. Exhibit 7.2-5 highlights the community responses recorded, the issues of concern, and suggested actions in moving forward. The various concerns associated with constructing relief routes included increased truck traffic and associated safety concerns, impacts to business on the existing route, right-of-way acquisition, alignment of the relief route, and access management. These types of concerns are not out of the ordinary when developing a relief route around a community and should not be minimized or excluded from the development process. However, as a risk to the Ports to Plains Corridor improvements, it will be critical for communities to understand the greater vision of the Corridor in becoming a more efficient transportation system for the movement of people and goods both locally and regionally. To achieve this vision, it will be necessary to minimize the points of delay and congestion that make the Corridor less attractive to drivers than alternative routes. Therefore, as communities move forward in the development of relief routes, a strong message should be carried forward in meeting the vision of the Corridor and the importance of that vision for each community.

When considering social input in determining the level of risk, it is not credible to try to gauge community input and attach a certain level of risk. For this reason, only issues are identified, along with possible actions that may help reduce the risks associated with those issues.

Exhibit 7.2-5 Specific Local Response to Relief Routes

Relief Route Community	State	Response	Issue	Action
Carrizo Springs Relief Route	Texas	No Response		
Eagle Pass Relief Route	Texas	Public Involvement for relief route completed		
Eagle Pass Relief Route	Texas	Public Involvement for relief route completed		
Del Rio Relief Route	Texas	Impact on agricultural community was voiced, specifically in regards to access management.	Potential restriction of access and ability to move agricultural goods and equipment.	Actively engage the agricultural community in design discussions.
Sonora Relief Route	Texas	Delayed selection of a relief route alignment may increase the risk of securing a clear path.	Increase of the number of oil wells per acre may make it more difficult to establish a clear alignment.	Rapid location determination and ROW acquisition.
San Angelo Relief Route	Texas	Homeland security, border controls and tracking, specifically related to implementation of ITS features.	Security and coordination of projects and agencies.	
Big Spring Relief Route	Texas	Initial community response not entirely positive.	Uncertainty of community impact by implementing a relief route, specifically economic/business impacts.	Additional public forums to address concerns and engage the community.
Lamesa Relief Route	Texas	Impact on agricultural community was voiced, specifically in regards to access management.	Potential restriction of access and ability to move agricultural goods and equipment.	Actively engage the agricultural community in design discussions.
Dumas Relief Route	Texas	Response to increased congestion and delay in driving through town.	Successive traffic lights and dense business access impedes traffic flow.	Rapid public involvement and advancing alternatives that relieve congestion.
Stratford TX Relief Route	Texas	Supportive of reducing rail/highway conflict.	At-grade railroad and highway intersection in town.	Continue positive dialogue with public, and advancement of alternatives that address reduction of rail and highway conflicts.
Boise City Relief Route	Oklahoma	Improved flow of traffic in town, and improved understandability of route to unfamiliar drivers.	Congestion/Confusion near city center.	Continue positive dialogue with public, and advancement of alternatives that address reduction of congestion and confusion near the city center.
Lamar Relief Route	Colorado	Public Involvement for relief route completed		
Dalhart Relief Route	Texas	Initial community response not entirely positive.	Uncertainty of community impact by implementing a relief route, specifically economic/business impacts.	Additional public forums to address concerns and engage the community.
Midland Relief Route	Texas	Alignment of relief route in question by some local land owners.	ROW acquisition	Additional public involvement as the alignment is finalized.
Clayton Relief Route	New Mexico	No Response		

7.2.7 Political Considerations

Political risk addresses two basic issues. The first, "consensus," is defined by those who respond to the project questionnaire and through public meetings and whether they agree to the purpose and need for the project. The second, "support," ascertains the level of action that could be expected from advocates of the CDMP. The idea is that simply agreeing to a project is different than actively supporting the project. Persons advocating for the project include those who have appeared at meetings to show their support as well as those who have indicated they have taken steps to contact decision makers regarding the project. Both of these are measured by analyzing questionnaire and personal interview information for any results that indicated strong attitudes for or against the project and whether the respondent had contacted others regarding these attitudes and interests.

7.2.8 Political Summary

This summary will provide an overview of the results from public outreach through distribution of questionnaires, conducting interviews, documentation at public meetings, and personal interactions with stakeholders during the development of the CDMP. The results are local political responses and the associated levels of risk; a broad overview of the regional, state, and federal political environment and the associated levels of risk; and a list of politically influenced actions and decisions that will help with continued advancement of Corridor improvements. As with the social section of this chapter, it is impossible to attach a level of risk to political risk. Therefore, a general format is followed that focuses on highlighting issues and actions.

As the project staff visited with elected officials at local levels, an overwhelming positive response was voiced, and is evidenced by the strongly supportive results of questionnaires and interviews. The questionnaire and economic interview results can be found in Appendix B of the report. The general questionnaire respondents are classified in several groups of interest and are summarized in Exhibit 7.2-6.

Exhibit 7.2-6 General Questionnaire Response by Category

Category	# of respondents	% of respondents
Local Decision Makers	18	22%
Business Owners	11	14%
Local Residents	20	25%
State	0	0%
DOT Employees	7	9%
Truckers	0	0%
Land Owners	7	9%
Media	0	0%
Special Interest Group	5	6%
Other	13	16%

A large number of local decision makers were present at each of the open houses and public meetings that were conducted for the project. This represents strong advocacy and interest in Ports to Plains Corridor from local levels, and it is expected that this local support will continue with the

implementation of the CDMP. Also of interest is the distances attendees traveled to attend meetings from across state lines and various regions within states. As the CDMP is implemented, these types of regional relationships can help to strengthen the political voice of the Corridor. Community leaders working with their neighbors to establish a stronger coalition is a primary strategy in gaining political momentum. The Ports to Plains Coalition is an engine of this collective effort and is a vital component in unifying all levels of support for the CDMP.

At the regional, state, and federal levels, direct response was recorded less than at local levels. However, regionally, the Ports to Plains Coalition was a driving influence in promoting public involvement for the study. Representatives from the coalition were engaging and helpful in distributing study results and presentations. The Ports to Plains message is being actively broadcast through the coalition and, as such, provides a unique example of a self-promoting Corridor.

Support for the Corridor at higher legislative levels of government is evidenced by attendance at the public meetings. A list of each meeting and the officials and elected officials or representatives of elected offices that attended is shown in Exhibit 7.2-7.

A list of the regional, state, and federal governments that directly represent the geographic boundaries of the Ports to Plains Corridor are listed in Exhibit 7.2-8. To understand the magnitude of the political voice directly attached to the Ports to Plains Corridor, Exhibit 7.2-8 allows a comparison to be made to the total number of counties and elected legislative officials in each state. The list represents a total of 38 counties, 32 voices of state legislatures, and 17 voices in the U.S. Congress. This tabulation result can be interpreted two ways; 1) in no case is there a majority and this would seem to show a significant disadvantage in gaining political support for Ports to Plains, 2) very few transportation projects can show this broad level of political representation and therefore there may be significant advantage in gaining political support when compared to competing projects.

Exhibit 7.2-7 Local, State, and Federal Government Participation at Public Meetings

Public Meeting	Local Officials	State DOT Officials	State Legislator/Or Spokesman	US Congressman/Or Spokesman
Lamar	11	5	-	-
San Angelo	7	8	2	-
Limon	13	5	-	1
Midland	8	8	1	1
Lubbock	22	5	1	1
Denver	11	7	-	-

Note: Local and State officials include elected and appointed positions. List includes City, County, and DOT staff.

**Exhibit 7.2-8 Regional, State, and Federal Government Representation
(Ports to Plains Corridor/Total)**

State	Counties	State House Representatives	State Senators	US Congressional Representatives and Senators
Colorado	9/64	6/65	6/35	5/9
New Mexico	2/33	2/70	1/42	3/5
Oklahoma	1/77	1/101	1/48	3/7
Texas	26/254	11/150	4/31	6/34
Totals	38/427	2/386	12/156	17/55

Note: Table only reflects representation and not support or opposition to Ports to Plains.

Across the Corridor, it will be the responsibility of the above list of government officials and staff to facilitate and make decisions that will directly impact the Ports to Plains CDMP. The actions necessary to properly plan and reduce risks to the Corridor will be largely political in nature. The true political risk and demonstration of support lies in action, either positive or negative.