BINATIONAL BORDER TRANSPORTATION PLANNING AND PROGRAMMING STUDY

Task 2:

U.S. Inventory of Existing and Programmed Binational Transportation Facilities

Barton-Aschman
La Empresa

March 13, 1998

FINAL DRAFT

Preface

U.S./Mexico Binational Border Transportation Planning and Programming Study implements a significant binational policy making document entitled "Memorandum of Understanding on the Planning Process for Land Transport on Each Side of the Border" signed by the federal governments of Mexico and the United States at the first "NAFTA Transportation Summit" held in Washington, D.C., April 29, 1994.

The purpose of this study is to provide policymakers with information needed to establish a continuous, joint, binational, transportation planning and programming process. A goal of this study is to improve the efficiency of the existing binational policy making planning procedures and funding criteria affecting our Border Land Transportation Systems (BLTS). The BLTS should be seen as a binational transportation system made of international bridges and border crossings and land connections to major urban and/or economic centers, principal seaports, airports and multimodal/transfer stations, and, ultimately, to national transportation facilities.

Disclaimer

The purposes of the Binational Planning and Programming Study and all of its reports were: to investigate current state and national transportation planning processes in both the United States and Mexico, to review available data on border transportation infrastructure and goods movement, and to recommend an ongoing, binational planning and programming process. The information contained in these reports was not developed to serve as the basis for making funding allocation or distribution decisions at either the federal or state level in the United States.

BINATIONAL BORDER TRANSPORTATION PLANNING AND PROGRAMMING STUDY
TASK 2 SUMMARY REPORT: U.S. INVENTORY OF EXISTING AND PROGRAMMED BINATIONAL TRANSPORTATION FACILITIES

International trade across the border travels by several different modes of transport on various land and sea transportation facilities. This report is an overview of the border transportation facilities located on the U.S. side of the border. The inventory of binational transportation facilities considers five modes of transportation: roadways, railroads, seaports, airports, and pipelines. In addition, the inventory documents the socioeconomic and demographic characteristics of the border region. Two other documents were prepared in conjunction with Task 2. One is a similar detailed inventory report prepared for the Mexican side of the border. The other is an executive summary which combines both U.S. and Mexican information into a single summary report.

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Source: Barton-Aschman Associates, Inc. and La Empresa S. de R.L.

Contacts: Barton-Aschman Associates, Inc.
100 Park Center Plaza, Suite 450
San Jose, California 95113
408-280-6600 phone
408-280-7533 fax

La Empresa S. de R.L.
Pallares y Portillo 174
Colonia Parque San Andreas, 04040, Mexico, D.F.
525-549-6814 phone
525-549-6813 fax

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2.1 Introduction

2.1.1 Introduction[1]

Overland trade between the United States and Mexico follows distinct routes, using both highway and railway rights-of-way. The binational highway and railroad network is shown on Figure 2.1. The pattern of flow of ground-transported trade is depicted on Figure 2.2. There are four major trade corridors, the Western, Midwestern, Northeastern and Southeastern. These corridors are defined as major trade corridors because they carry more than 40,000 trade trucks annually. Certain portions of these corridors do not meet the criteria for major trade corridors (i.e., the Seattle-San Francisco portion of the western corridor). Other corridors of importance of binational trade that do not meet the criteria for major trade corridors at the time of publication of this report, but are expected to increase in importance are the CANAMEX corridor and the northern portion of the I-35 corridor. The CANAMEX corridor runs between Nogales, Tucson and Phoenix, Arizona; Las Vegas, Nevada; on I-15 to Shelby, Montana; and into Alberta, Canada. The northern portion of the I-35 corridor extends from Oklahoma City to Duluth, Minnesota. These corridors are also shown on Figure 2.2. Although the depicted transportation corridors are designated as specific Interstate highways, both highway and rail transportation corridors are implied.

The dominant export shipments consist of products originating in the northeast, north central, and southeast regions of the United States. The same general pattern applies to ground-transported imports destined to the same regions of the United States. Figure 2.3 highlights these points by showing the amount of 1994 exports to Mexico originating in each state (the top figure) and the amount of 1994 imports from Mexico that are destined to each state (the lower figure). Based on the statistics published by U.S. Customs, Texas appears to play a prominent role in these trade flows accounting for $18.7 billion in 1994 exports to Mexico and for $14.2 billion in imports from Mexico. These flows account for approximately 30 percent of the total trade flow between the United States and Mexico. In fact, Texas is a primary point of origin, destination, and consolidation/distribution for transborder shipments. Moreover, the great bulk of trade moving to and from other regions of the United States and Mexico travels through Texas border gateways and on these transportation corridors.

2.1.2 Western Corridor

The Western Corridor for U.S.-Mexico trade follows Interstate 5 (I-5) from Seattle, Washington all the way into Southern California. Class 1 rail carriers which operate in this corridor are the Burlington Northern Santa Fe Railway Company (BNSF) and the Union Pacific Railroad Company (UP). In San Diego, I-5 divides, allowing a motor carrier to travel ether directly to the border (crossing into Tijuana), or to connect with I-8 for access to Mexicali, Nogales, southern Arizona, or to Mexico. In Tucson, Arizona, traffic along I-10 can either exit via Nogales on I-19 into Mexico, or continue along I-10 for travel into El Paso and West Texas. A motor carrier also has the option of continuing a trip along I-10 to San Antonio. A spur of this Western Corridor begins in Denver, Colorado, and moves directly south along I–25 through New Mexico, where it

[1] Source: *U.S.-Mexico Trade and Transportation Corridors. Logistic Practices and Multimodal Partnerships*. Lyndon B. Johnson School of Public Affairs, University of Texas, 1995 (Updated by the Binational Consultants).

Figure 2.1 Binational Highway & Railroad Network

Figure 2.2 Major U.S. Trade Corridors With Mexico

Figure 2.3 1994 U.S. Surface Exports to and Imports from Mexico by State of Origin and Destination

intersects with I-10 in El Paso. Rail traffic moving from California to Texas travels over either UP or BNSF rail lines. Finally, traffic entering Mexico through Tijuana, Mexicali, or Nogales connects with Mexico's Pacific Corridor, while traffic entering Mexico through Ciudad Juarez (the sister city of El Paso) connects with Mexico's Chihuahua Corridor.

2.1.3 Midwestern Corridor

The Midwestern Corridor links the north central region of the United States with Mexico. From Chicago, Illinois the corridor extends south along I-55 to St. Louis, Missouri, where it connects with I-44 and continues southwest until it reaches Oklahoma City. In Oklahoma City, motor carriers travel south along I-35 and move into Texas, via Dallas, until they reach the Texas-Mexico border. The BNSF and UP operate along this corridor.

2.1.4 Northeastern Corridor

The Northeastern Corridor has three spurs, two from Canada (Toronto and Montreal), and one from New York City. All three spurs converge in Nashville, Tennessee. The Toronto spur moves south through Detroit, Michigan, where it connects with I-75 until it reaches Cincinnati, Ohio. From that point, traffic moves along I-71 to Louisville, Kentucky, and then along I-65 into Nashville. The Montreal spur moves along I-90, I-71, and I-65 into Nashville. Finally, the New York City spur begins on I-80 and then extends southwest along I-81 into Nashville.

From Nashville, all three spurs follow I-40 through Memphis, Tennessee, to Little Rock, Arkansas. From Little Rock, traffic moves along I-30 into Texas, where it can take several alternative routes to reach the Texas-Mexico border. Traffic entering Mexico at Nuevo Laredo (the sister city of Laredo) connects with Mexico's Central Corridor, whereas traffic entering at Matamoros (the sister city of Brownsville) connects with Mexico's Gulf Corridor. No single rail carrier provides single-line service along the Northeastern Corridor extending from Canada through Texas. The three major eastern Class 1 rail carriers—ConRail, CSX Transportation, and Norfolk Southern Corporation—offer various combinations of interline connections with the four major western Class 1 rail carriers to provide through service to Mexico.

2.1.5 Southeastern Corridor

The Southeastern Corridor connects the southeast region of the United States with Mexico. In Charlotte, North Carolina, motor carriers can take I-85 through Atlanta, Georgia, to Montgomery, Alabama. At Montgomery, traffic moves along I-65 to New Orleans, Louisiana, where it connects with I-10 for travel through Houston, San Antonio, and El Paso. Again, while no rail carrier offers single-line service, CSX Transportation and Norfolk Southern Corporation offer interline connections with western Class 1 rail carriers.

This report describes in more detail each of the modes that serve these corridors. Chapter 2 describes the highway network, Chapter 3 describes the railroads, Chapter 4 describes ports, Chapter 5 describes airports, Chapter 6 discusses pipeline service, and Chapter 7 provides a demographic profile of the border region.

2.2 Highways

2.2.1 California[2]

The Southern California border area has a highly developed regional roadway system. Four Interstate freeways and 15 state highway routes traverse the area. They range in size from two-lane conventional highways to freeways with as many as six lanes in each direction. The 1996 ADT is as low as 1,500 vehicles per day on some rural routes and as high as 245,000 on Interstate 8 (I-8) near I-15. Moderate-to-heavy congestion occurs twice daily on the highways in the inner core of the metropolitan areas.

In the Imperial County portion of the area, the regional system is composed of one Interstate freeway and six state highway routes. Many of the state routes here are two-lane conventional highways. The remaining freeways and expressways are four to six lanes in width. The 1996 ADT ranges from under 1,000 on a few routes to as much as 32,000 vehicles per day on State Route 111 (SR 111) in Calexico. Most of the routes operate without congestion even during commute hours. However, due to the large volumes of trucks that travel through the area, queuing can cause delays and backups on many of the two-lane roads. The routes that pass through the urban areas experience some delay during commute hours, notably SR 111 in Calexico.

Border Crossings

Substantial cross-border traffic travel occurs between the State of California, U.S., and the State of Baja California, Mexico. This is demonstrated by the fact that the San Diego/Tijuana border crossing is reported to be the busiest land crossing in the world. Across the California/ Mexico border in 1995, there were over 27 million northbound auto crossings carrying an estimated 83 million passengers; over 690,000 northbound truck crossings; and nearly 16 million northbound pedestrian crossings.

There are six existing international ports of entry (POEs) between California and Mexico that are directly served by state highways on the U.S. side of the border: San Ysidro/Puerta Mexico, Otay Mesa/Mesa de Otay, Tecate/Tecate, Calexico/Mexicali, Calexico East/Nuevo Mexicali, and Andrade/Los Algodones. Two of these are in the San Diego metropolitan area: the San Ysidro and the Otay Mesa POEs. These two crossings account for the majority of the total crossings at all six POEs. Access to these two locations is discussed in the following sections.

<u>San Ysidro-Puerta Mexico[3]</u>

There are periods of extreme congestion at this border crossing. However, there are good highway linkages to this crossing, since I-5 connects directly to the crossing. Good connections are also present in Mexico as Puente Mexico crosses the Tijuana River and connects with several major arterials south of the port of entry.

<u>Otay Mesa-Mesa de Otay</u>

The area surrounding Otay Mesa has been developing rapidly, but the roadway infrastructure has not kept pace with the demand. The largest area of concern for this port of entry is the infrastructure on the U.S. side. This border crossing is served by California SR 905, a one-half

[2]Source: *1996 System Management Plan,* Caltrans District 11 System Planning Branch, January 1996. (Updated by Binational Consultant Team).

[3]Source: *Making Things Work: Transportation and Trade Expansion in Western North America*, Center for the New West, September 1993.

mile segment of state highway that connects to the City of San Diego's Otay Mesa Road (a four lane principal arterial). Otay Mesa Road is considered a safety hazard, as it is an undivided roadway and the traffic volumes are increasing every year. When accidents occur, depending on the location, the port of entry may effectively be closed, since there are no alternate routes, and the area becomes grid-locked. This condition is anticipated to only worsen as traffic volumes increase, although there is a road widening project scheduled to being in Fall 1997 that should provide some additional capacity. There are acknowledged infrastructure deficiencies on the U.S. side from the border crossing to the partially constructed SR 905.

In Mexico, access to the POE is provided by two major east/west facilities, Boulevard Aeropuerto and Boulevard Bellas Artes, which connect with Boulevard Garita de Otay, the port access facility. A grade-separated interchange is provided at Boulevard Bellas Artes/Boulevard Garita de Otay to reduce congestion and delay.

Crossing Activity

Table 2.1 summarizes the 1995 border crossing data at all the California ports of entry as provided by the United States General Services Administration (GSA) and the U.S. Customs Service.

According to a Caltrans survey of truck drivers and transborder shipping companies conducted in March 1993, it is estimated that there are nearly nine million tons of goods transported annually through California/Mexico POEs by truck and rail with 25 percent of this tonnage having origins and destinations in every state in the continental United States as well as Canada, Asia, and the Panama Canal Zone. Of the tonnage remaining in California, only 12 percent had origins and destinations in San Diego or Imperial Counties.

The rate of travel and trade between the two countries is increasing. Part of this increase is due to the continuation in the development of the maquiladora (twin-plant) industry on both sides of the border. In a typical twin plant arrangement, a company's warehouse/distribution center is located on the U.S. side of the border in a Foreign Trade Zone (FTZ), where goods are not subject to U.S. Customs duties or excise taxes; its products are assembled and packaged in a maquiladora plant in Mexico, where available local labor resources in Mexico benefit the company.

Table 2.1
1995 California Port of Entry Crossing Totals (Northbound)

Port	Vehicles	% Share	Trucks	% Share	Pedestrians	% Share
San Ysidro	13,908,000	50.7%	0	0.0%	7,468,000	46.8%
Otay Mesa	4,610,000	16.8	477,000	68.3	388,000	2.4
Tecate	1,043,000	3.8	41,000	5.9	273,000	1.7
Calexico	7,330,000	26.7	176,000	25.2	6,727,000	42.1
Andrade	528,000	2.0	4,000	0.6	1,114,000	7.0
Total	27,419,000		698,000		15,970,000	

Source: U.S. Customs Service. Data on fiscal year basis (October-September).

The current rate of travel and trade growth is expected to substantially increase once the implementation of the North American Free Trade Agreement (NAFTA) is coupled with a stabilized economy in Mexico.

To maximize the benefits of NAFTA for California and as part of the international border component, Caltrans intends to continue its work with the U.S. General Services Administration (GSA), their counterparts in Mexico, and the local agencies of San Diego and Imperial Counties to provide transportation services that will accommodate plans for improving existing POEs and

developing new border-crossing stations. The GSA has developed plans for increasing the number of new primary and secondary inspection lanes, and truck inspection docks at all POEs. Also included in the plans are the addition of new POEs. One new POE with state-of-the-art cargo facilities has recently been constructed in Imperial Valley 6.5 miles east of Calexico.

In addition, Caltrans intends to continue to work closely with all appropriate agencies to improve inspection methods and procedures, including weight, safety, licensing, and insurance compliance inspections by the state. State-of-the-art California Highway Patrol vehicle inspection and enforcement facilities have been constructed at the Otay Mesa POE and at the Calexico East POE.

In late 1992, the Federal Highway Administration (FHWA) and Mexico's Secretariat of Communications and Transportation (Secretaria de Comunicaciones y Transportes-SCT) requested assistance from Caltrans District 11 to propose some conceptual binational toll road projects that would be appealing to U.S. investors. As a result, discussions focused on the development of a possible future SR 11 that could provide a direct connection between SR 125 and a new privatized POE east of the existing Otay Mesa POE. Preliminary design and environmental clearance work on this project is pending. In 1994, the route was added to the state highway system.

In San Diego County, proposed highway improvements that will serve the POE facilities include the potential extension of SR 905 from I-805 to the Otay Mesa POE and the privatization portion of SR 125, south of San Miguel Road to SR 905.

Figures 2.4 and 2.5 illustrate principal highways along California's border region with Baja California and in the greater San Diego area. In addition, these figures indicate the conceptual alignments of proposed major transportation projects including public highways, private toll roads, and railroads.

Border Area Highway Deficiencies and Programmed Improvements

One aspect of the Binational Planning and Programming Study is the identification of highway infrastructure deficiencies and programmed improvements within the border region (100 kilometers north and south of the border). Each U.S. border state provided the Binational consultants information on the deficiencies and programmed improvements within their respective state. Depending on the state there were at least two categories of deficiencies and for some states as many as seven categories.

For the State of California, information on two categories of deficiencies were provided: (1) level of service deficiencies and (2) bridge rehabilitation and replacement. In California, a roadway is considered to have a level of service deficiency when it operates at or below Level of Service D, which corresponds to an approximate volume-to-capacity ratio of 0.9. Figure 2.6 shows the

Figure 2.4 Border Transportation Facilities—Eastern San Diego and Imperial Counties

Figure 2.5 Border Transportation Facilities—San Diego Metropolitan Area

Figure 2.6 Existing Conditions—San Diego Metropolitan Area

1995 Levels of Service for the major highways serving the ports of entry at San Ysidro and Otay Mesa.

Twelve bridge rehabilitation or replacement projects were identified for the border region in California. Seven of these bridge projects are in the greater San Diego area and the other five are located along I-8 between San Diego County and the Arizona border. While these projects are located on the highways serving cross border trade, most of the projects do not alter the main line capacity of these facilities. Instead they are related to maintenance or earthquake rehabilitation.

Figures 2.7 and 2.8 show both programmed and proposed transportation improvement projects for the California border region which would benefit trade with Mexico. These figures were prepared by CALTRANS to show the planned and programmed improvements which would impact NAFTA trade movements. Improvements such as bridge replacements and rehabilitation are not shown.

Additional supporting information relating to infrastructure deficiencies and programmed improvements for the State of California border region were provided to the Study Team. These data will be combined with other sources provided such as the list of border infrastructure projects from the "Building the Border Infrastructure of Tomorrow" conference held in San Antonio, Texas in August 1996. The complete list of programmed, planned and proposed projects will be used in the Phase II Task 6 analysis of the compatibility of programmed projects on both sides of the border. The Study Team will normalize the information provided by the four U.S. border states, the six Mexican states and any other sources into a format which can be entered into and displayed using GIS technology as a product of Phase II Task 6.

2.2.2 Arizona[4]

A comprehensive physical description of the state highway system in Arizona is available in the state's Highway Pavement Management System database. Data are categorized for the state highway system in multiple tabular arrangements. Information for each route number segment includes length, surface type, shoulder widths, and mileposts. Of the approximate 9,820 kilometers of roadway in the state highway system, there are 9,632 paved kilometers and 188 unpaved kilometers. Interstate highways comprise 1,887 kilometers, 1,645 of which are rural and 242 urban. Non-Interstate highways account for 7,933 total kilometers, including 7,259 rural highway kilometers and 674 urban highway kilometers.

Also, according to the Arizona Transportation Needs Assessment, 1995, there were over 3.1 million registered vehicles in Arizona in 1994 and 2.6 million licensed drivers.

Figures 2.9 and 2.10 show the Arizona and Sonora highway system and the roadway system serving the Arizona ports of entry, respectively.

[4]Source: *Arizona-Sonora Transportation Infrastructure Study,* Arizona Department of Transportation, December 1995.

Figure 2.7 NAFTA Net San Diego County

Figure 2.8 NAFTA Net Imperial and Riverside Counties

Figure 2.9 Arizona Highways

Figure 2.10 Arizona Ports of Entry

Border Crossings[5]

There are six ports of entry along the Arizona-Sonora border. From west to east, these include: San Luis/San Luis Rio Colorado, Lukeville/Sonoyta, Sasabe/Sasabe, Nogales/Nogales, Naco/Naco, and Douglas/Agua Prieta.

Nogales is the only Arizona-Sonora border port of entry with direct access to four-lane divided highways. Access to the north is provided by I-19, which connects with I-10 in Tucson. Access to the south is provided by Mexican Federal Highway 015 (MX-015), which passes through Sonora's capital, Hermosillo, and the Port of Guaymas. Further south, MX-015 passes through Sinaloa and the rest of Mexico's Pacific coast region and eventually links Nogales with Mexico City.

The remaining Arizona-Sonora border crossings have access to the main Interstate highways (I-8 and I-10 in Arizona and MX-015 in Mexico) via two-lane, undivided highways.

The three major Arizona ports of entry are Nogales/Nogales, San Luis/San Luis Rio Colorado, and Douglas/Agua Prieta; together, they account for more than 90 percent of all commercial, non-commercial and pedestrian border crossings.

Nogales-Nogales I

Nogales I processes the largest amount of pedestrian and private vehicle crossings between San Ysidro, California and El Paso, Texas. Most of the pedestrians are residents of Nogales, Arizona; Nogales, Sonora; and other nearby towns who cross the border to shop, as well as American tourists who prefer not to drive in Mexico. This port is served by I-19, a four-lane highway constructed to rural interstate standards from the north and by MX-015 from the south through the city of Nogales.

A Union Pacific rail line runs directly through Nogales, Arizona, and Nogales, Sonora. The current location of the rail line divides both cities, effectively blocking traffic and emergency vehicles from traversing from one side of town to the other when a train is present, and increasing the risk of toxic spills. The relocation of the rail line should be actively pursued to minimize congestion and increase safety. However, the UP and Ferrocarriles Nacionales de Mexico (FNM) have instituted operational changes that have significantly reduced the problems.

The intersection at the exit from the U.S. facilities in Arizona (Grand Avenue and Crawford) occasionally experiences excessive queues and delays due to its proximity to the inspection station. High volumes at the customs facility, combined with peak-hour traffic on Grand Avenue and Crawford, at times cause large delays and queues to extend into the inspection station. Similar queuing occasionally occurs on the Sonora side.

Nogales (Mariposa)-Nogales III

Nogales III is the main crossing for commercial vehicles in Arizona and is the largest produce port for winter fruits and vegetables in the United States. Highway linkages to Nogales III are in need of improvement. Adequate improvements need to be made to the Arizona SR 189 (Mariposa Avenue) a four-lane divided highway. A highway of limited access should be considered for safety considerations. MX-015 serves the port on the Mexico side via the Libramiento de Nogales, a two-lane highway with a limited shoulder.

[5]Source: *Arizona-Sonora Border Ports of Entry,* Office of Community and Public Service, University of Arizona, August 1993. (Updated by Binational Consultant Team)

San Luis-San Luis Rio Colorado

The Port of San Luis experiences its heaviest traffic and congestion during the peak of the winter produce season, usually December. Both American and Mexican officials expect the maquiladora industry and agricultural-related traffic to increase over the next few years.

The San Luis Border Crossing is served by U.S. 95, a rural, two-lane Arizona highway, which connects to I-8 in Yuma. Rail lines are located within approximately 25 miles of San Luis, but do not cross the international border.

Douglas-Agua Prieta

The Port of Douglas is connected by U.S. 191-B, an urban, four-lane highway, to Arizona SR 80. South of the crossing, MX-002, a two-lane road, connects Agua Prieta with four-lane MX-015 at Imuris, Sonora. A rail line, inactive since the late 1980's, crosses the border at Douglas. The portion of the line from Douglas to the Paul Spur has been removed.

Crossing Activity

The Nogales port of entry is the major commercial border crossing, accounting for more than two-thirds (68.8 percent) of all commercial traffic entering Arizona from Mexico. Second ranking San Luis accounts for 15 percent of the total commercial traffic entering Arizona from Mexico; while about 13 percent of all commercial traffic comes through the Douglas port of entry.

Table 2.2 summarizes the 1995 border crossing data for the Arizona Ports of Entry as provided by the U.S. Customs Service.

Table 2.2
1995 Arizona Port of Entry Crossing Totals (Northbound)

	Mode					
Port	**Vehicles**	**% Share**	**Trucks**	**% Share**	**Pedestrians**	**% Share**
Douglas	1,896,000	21.8%	38,000	12.9%	572,000	7.4%
Lukeville	266,000	3.1	3,000	1.0	73,000	0.9
Naco	268,000	3.1	6,000	2.0	67,000	0.9
Nogales	3,489,000	40.2	203,000	68.8	4,859,000	63.1
Sasabe	21,000	0.2	1,000	0.4	4,000	0.1
San Luis	2,739,000	31.6	44,000	14.9	2,121,000	27.6
Total	8,679,000		295,000		7,696,000	

Source: U.S. Customs Service. Data on fiscal year basis (October-September).

Border Area Highway Deficiencies and Programmed Improvements

One aspect of the Binational Planning and Programming Study is the identification of highway infrastructure deficiencies and programmed improvements within the border region (100 kilometers north and south of the border). Each U.S. border state provided the Binational consultants information on the deficiencies and programmed improvements within their respective state. Depending on the state there were at least two categories of deficiencies and for some states as many as seven categories.

For the State of Arizona, information on seven categories of projects (which might imply deficiencies) were provided: (1) Reconstruction/Widening, (2) Construction, (3) Pavement Rehabilitation, (4) Bridge/Drainage, (5) Safety, (6) Landscaping, and (7) Miscellaneous projects.

The categories of Reconstruction/Widening and Construction projects address most directly the capacity deficiencies identified by the states of California and Texas. Figures 2.11 and 2.12

identify the locations of the planned and programmed reconstruction/widening and construction projects for the State of Arizona provided to the Study Team. Figure 2.13 shows Arizona and Sonora highway improvement programs for the Years 1996 to 2000.

Additional supporting information related to programmed improvements for the State of Arizona border region were provided to the Study Team in a database. These data will be combined with other sources such as the list of border infrastructure projects from the "Building the Border Infrastructure of Tomorrow" conference held in San Antonio, Texas, in August 1996. The complete list of programmed, planned and proposed projects will be used in the Phase II Task 6 analysis of the compatibility of programmed projects on both sides of the border. The Study Team will normalize the information provided by the four U.S. border states, the six Mexican states and any other sources into a format that can be entered into and displayed using GIS technology as a product of Phase II Task 6.

2.2.3 New Mexico[6]

The New Mexico border area is served by two Interstates (I-10 and I-25), and three U.S. highways (U.S. 70, U.S. 54, and U.S. 180). Figure 2.14 shows the New Mexico highway system.

Border Crossings

The following crossings are located along the New Mexico border with Chihuahua, Mexico, and are shown on Figure 2.15: Antelope Wells/El Berrendo, Columbus/Palomas, and Santa Teresa/San Jeronimo.

The Santa Teresa/San Jeronimo crossing is considered to be a part of the El Paso, Texas POE system and handles the highest traffic volume of all the crossings in New Mexico. The following section describes the Santa Teresa port of entry.

<u>Santa Teresa-San Jeronimo</u>

The Santa Teresa Land Crossing (located approximately 11 miles west-northwest of the El Paso Central Business District) is immediately accessible from the U.S. side by means of a new, paved highway, New Mexico SH 136 (Artcraft Road); however, highway linkages between this facility and I-10 to the east are currently indirect and incorporate road segments that impose significant vehicular weight restrictions on commercial trucking. In Mexico, MX-002 serves the port. The combined effects of access limitations on both sides of the border have restricted the volume of traffic observed through this crossing since its opening. Roadway linkages are expected to improve with construction projects currently underway. The section of highway from the New Mexico, Texas state line to I-10 is being built in three phases, construction has started and is anticipated to be complete by the end of 1998. In addition to the roadway improvements are other infrastructure improvements in the area including new border crossing facilities completed at this location in 1997. Traffic at Santa Teresa has risen from the levels shown in Table 2.3 to 70,000 passenger vehicles and 30,000 trucks for fiscal year 1997.

[6]Source: *Making Things Work: Transportation and Trade Expansion in Western North America,* Center for the New West, September 1993.

Figure 2.11 Reconstruction/Widening Projects-Arizona DOT

Figure 2.12 Construction Projects-Arizona DOT

Figure 2.13 Arizona Highway Improvements

Figure 2.14 New Mexico Roadway Network

Figure 2.15 New Mexico Border Crossings

Crossing Activity

Table 2.3 summarizes the 1995 border crossing data at the New Mexico ports of entry as provided by the U.S. Customs Service.

Border Area Highway Deficiencies and Programmed Improvements

One aspect of the Binational Planning and Programming Study is the identification of highway infrastructure deficiencies and programmed improvements within the border region (100 kilometers north and south of the border). Each U.S. border state provided the Binational consultants information on the deficiencies and programmed improvements within their respective state. Depending on the state there were at least two categories of deficiencies and for some states as many as seven categories.

For the State of New Mexico, a copy of the 1994-1997 State Transportation Improvement Program was provided to the Study Team. (Information received from the State of Texas is discussed in the next section.) The information contained in the STIP was reviewed for the four counties located within the 100-kilometer border zone. Figure 2.16 was developed from the STIP considering the major construction, reconstruction, and special projects which potentially impact U.S.-Mexico trade flow.

These data will be combined with other sources such as the list of border infrastructure projects from the "Building the Border Infrastructure of Tomorrow" conference held in San Antonio, Texas, in August 1996. The complete list of programmed, planned and proposed projects will be used in the Phase II Task 6 analysis of the compatibility of programmed projects on both sides of the border. The Study Team will normalize the information provided by the four U.S. border states, the six Mexican states and any other sources into a format which can be entered into and displayed using GIS technology.

Table 2.3
1995 New Mexico Port of Entry Crossing Totals (Northbound)

	Mode					
Port	**Vehicles**	**% Share**	**Trucks**	**% Share**	**Pedestrians**	**% Share**
Antelope Wells/Columbus	328,200	88	2,100	28	101,100	9
Santa Teresa	44,600	2	5,400	72	15	6
Totals	372,800		7,500		101,115	

Source: U.S. Customs Service. Data on fiscal year basis (October-September). Some ports are combined because data are consolidated by the U.S. Customs Service.

Figure 2.16 Programmed Improvements New Mexico Border Region

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2.2.4 Texas[7]

The primary routes to Texas' border crossings from all U.S. markets are I-10, the southern route from California and Florida to Texas, and I-35, the central-midwestern route tying into other major Interstate highways from New York, Pennsylvania, Ohio, Illinois, et al. to Texas. Figure 2.17 shows the entire Texas roadway system including these primary Interstates and the U.S. Highways and State Routes.

Interstates

The basic Interstate system is in place and a few major extensions, such as the I-69 extension to McAllen, are expected. The ISTEA identifies two high-priority corridors consisting of three primary highway sections. The I-35 corridor bisects the United States running from Laredo, Texas, to Duluth, Minnesota, and passes through the San Antonio, Dallas-Fort Worth, Kansas City, and Minneapolis-Saint Paul metropolitan areas.

The second high-priority corridor follows the major trade routes between the industrial areas in the northeast/midwest and Mexico. This corridor, sometimes referred to as the I-69 corridor, from Flint, Michigan, continues to Indianapolis, Indiana. This corridor continues on a series of state highways from Indianapolis, and extends to the Texas border passing through Memphis, Tennessee; Shreveport, Louisiana; and Houston, Texas. In South Texas, this corridor divides into sections that serve the border city of Laredo and the lower Rio Grande Valley. The primary corridor through Texas is U.S. 59 that connects Texarkana to Laredo via Houston. Brownsville is connected to U.S. 59 by U.S. 77 which passes through Corpus Christi. McAllen is connected to U.S. 59 by U.S. 281, which passes through San Antonio.

As traffic volumes increase, it will be necessary to provide capacity expansions and maintenance in future years across the entire Interstate system. Also, it is likely that some improvements, especially interchanges with state highways, will be needed where roads serving border areas tie into the Interstate system. Specific such projects total $113.7 million on I-10 near El Paso, I-35 near Laredo, and U.S. 281 at Loop 410 in San Antonio.

Besides the modest direct needs outlined above, the Interstate system is undergoing a continual upgrading and renovation. More than $577 million is expected to be spent by the year 2000 on improvements to I-10 and I-35 alone. These are the major carriers of Mexico-related traffic. Many of these expenditures are aimed at improving mobility in presently congested urban areas such as the corridor between Houston and Beaumont, the Dallas-Fort Worth metroplex, the corridor between Austin and San Antonio, etc.

State Highways

In addition to the two Interstates, there are several state highways in the vicinity of the border that tie the local roadways to the Interstates and intermodal facilities. Key intermodal international trade routes included in this group that connect to the primary exporting seaports, Houston/Galveston and Corpus Christi, are U.S. 59 (Laredo to Houston), U.S. 59 and SH 44

[7]Source: *Trade Flows and Transportation Along the U.S. Mexico Border in Texas and Mexico.* Office of the Governor, State of Texas, August 1993. (Updated by Binational consultant Team with information from *Texas-Mexico International Bridges and Border Crossings, Existing and Proposed*, Texas Department of Transportation, February 1997.)

Figure 2.17 Texas Roadway Network

(Laredo to Corpus Christi) and U.S. 77 and U.S. 281 (Lower Rio Grande Valley to Corpus Christi). These routes need upgrades to improve international intermodal trade flows, and these improvements are estimated to cost $513 million.

In addition, the Texas Department of Transportation (TxDOT) has planned the Texas Trunk System, a four-lane divided rural highway system that includes and complements the Interstate System. Several component roadways of the Trunk System are critical to the movement of international trade. The total cost of intermediate scale (non-interstate) Texas Trunk System projects (excluding the intermodal links) within the four TxDOT border districts is $800 million. The total need for intermediate scale roadways is $1.3 billion.

Local Roadways and Bridges

Since the Interstate and State Highway routes do not provide direct access to all the international border crossings in this region, significant improvements are necessary on local roadways and the international bridges.

These less visible links are primary bottlenecks and detriments to enhanced exports to Mexico and other countries to the south. These routes will require approximately $644 million to improve 396 miles in the vicinity of the international bridges.

Roadway project needs include a vast cross-section of mobility enhancements, including:

- Additional lane miles along existing routes,
- New routes and loops,
- Upgrades to develop controlled-access routes,
- Interchanges, and
- Operational/traffic management improvements.

The needs mentioned above are for the construction of additional lane miles and do not include costs of maintaining the existing roadway infrastructure through rehabilitation, resurfacing, reconstruction, or restoration. Typically, this maintenance function has been allocated only $3,000 per lane mile per year for the entire system in Texas.

Another item of note is the fact that these improvements are normally for upgrading two-lane rural roadways to four-lane divided roadways, not the development of eight-lane super expressways such as those common to urbanized areas.

The average cost per mile of these projects is only $1.4 million/mile. Therefore, the funds can be stretched farther and used on multiple projects along the border, rather than spent on high-cost-per-mile super expressways. The money spent on these border roadways is intended to have a greater benefit-to-cost impact for the nation by expediting trade flows through these corridors.

Currently there are 20 international bridge crossings in the State of Texas, two crossings using Rio Grande dams (four total lanes), and one cable drawn ferry operating along the Texas/Mexico border. Some cities have more than one crossing, including El Paso (four) discussed in the previous section, Laredo (three), and Brownsville (two). The La Linda Bridge was closed on August 15, 1996. The Roma suspension bridge, closed to vehicular and pedestrian traffic in 1978, is being considered for rehabilitation.

The majority (70%) of these bridges were constructed before 1970, with the peak construction period during 1966 to 1969 (8 bridges, 29 lanes). The average age of the 23 operating bridges and crossings is 27 years, with the oldest built in 1909.

Two bridges, the B&M in Brownsville and Eagle Pass Bridge #1, are old rail bridges. They were constructed primarily for rail traffic with auxiliary vehicular service capabilities. Officials at the B&M

bridge, in fact, must stop commercial traffic to allow trains to pass on the only rail access in the Lower Rio Grande Valley.

Most, if not all, international bridges in Texas are experiencing some form of access problems. These problems include but are not limited to the following: congestion due to existing bridges and inspection facilities constrained by nearby downtown areas; rail crossings and switch yards nearby; narrow bridge widths; lack of sufficient access road lanes; and access restrictions.

Border Crossings[8]

The following crossings are located within the Texas Gateway: Santa Fe/Juarez, Stanton Street/Puente Lerdo, Bridge of the Americas/Puente Cordoba, Ysleta/Zaragoza, Fabens/Guadalupe Bravo, Fort Hancock/El Porvenir, Presidio/Ojinaga, Amistad Dam Crossing, Del Rio/Ciudad Acuña, Eagle Pass/Piedras Negras, Laredo III/Colombia, Laredo I (Convent Street Bridge)/Nuevo Laredo, Laredo II (Juarez-Lincoln Bridge)/Nuevo Laredo, Falcon Heights/Nueva Ciudad Guerrero (Falcon Dam), Roma/Miguel Aleman, Rio Grande City/Ciudad Camargo, Los Ebanos/Diaz Ordaz (ferry), Hidalgo/Reynosa, Progreso/Nuevo Progreso, Pharr/Reynosa, Los Indios/Lucio Blanco, B&M Bridge/Matamoros, and Gateway Bridge/Matamoros. These crossings are shown on Figures 2.18 and 2.19.

The crossings with the most volume are those of the El Paso Port of Entry system: Santa Teresa/San Jeronimo, Santa Fe/Juarez, Stanton Street/Puente Lerdo, Bridge of the Americas/ Puente Cordoba and Ysleta/Zaragoza; the Laredo Port of Entry System: Laredo III/Colombia, Laredo I (Convent Street Bridge)/Nuevo Laredo, Laredo II (Juarez-Lincoln Bridge)/Nuevo Laredo; and the Brownsville Port of Entry System: Los Indios/Lucio Blanco, B&M Bridge/Matamoros, Gateway Bridge/Matamoros, are described in the following sections.

El Paso Port of Entry System

Santa Fe-Puente Juarez and Stanton Street-Puente Lerdo (Good Neighbor) Bridges

The Santa Fe-Juarez Bridge crosses the Rio Grande (Rio Bravo del Norte, or simply Rio Bravo) between the Central Business Districts of Ciudad Juarez and El Paso, linking Avenida Juarez with South El Paso Street for vehicular movements in the northbound direction and both north- and southbound pedestrian movements. The adjacent Stanton Street/Puente Lerdo Bridge accommodates the companion southbound vehicular and pedestrian movements from Stanton Street in El Paso to several streets in Juarez (Avenida Paso Del Norte, Calle Internacional, and Calle Lerdo Norte). The U.S. Customs Border Station is located at the Santa Fe/Juarez bridge, and regulates non-commercial entries to the United States. No companion U.S. border facility exists at the Stanton Street/Puente Lerdo bridge, which is dedicated to non-commercial (duty-free) export traffic. Vehicular and pedestrian tolls are levied on both facilities by the two cities, which are the two bridges' joint owners. Both bridge structures were constructed in 1967 by the International Boundary and Water Commission (IBWC) as a result of the Chamizal Treaty, which readjusted the border between the United States and Mexico; each bridge incorporates flush-set rail tracks which served a former urban trolley line that operated at that time (service was discontinued in the early 1970s).

Daily traffic congestion occurs in the northbound approach to the Santa Fe/Juarez bridge during peak-demand periods. Some degree of congestion is experienced beyond the station along South El Paso Street as a result of traffic signal operations, on-street parking and commercial activities

[8] Source: *Making Things Work: Transportation and Trade Expansion in Western North America,* Center for the New West, September 1993. (Updated by Binational Consultant Team.)

of the adjacent land uses. A somewhat lesser degree of daily traffic congestion is experienced on the Stanton Street approach to and at the vehicular toll booths for the Stanton Street/Lerdo bridge.

Bridge of the Americas-Puente Cordoba

Bridge of the Americas (BOTA) is located approximately 2-1/2 miles east of the El Paso and Juarez CBDs, and is also known as the Cordoba Bridge or Free Bridge (Puente Libre). It was constructed in 1967 by the IBWC after U.S.-Mexico border adjustments were ratified in the Chamizal Treaty. This bridge and the associated port of entry have direct linkage for non-commercial traffic and commercial export traffic to I-10 roughly 1-1/2 miles to the north through a controlled access spur highway (I-110/U.S. 54). This link also provides access to U.S. 62/180. In Mexico, this bridge is connected to MX-045 and MX-002, approximately 1-1/2 miles to the south of the bridge, through a one-way couplet of major arterial streets (named Avenida de Las Americas immediately south of the bridge and, south of Malecon Rio Bravo, Calzada las Americas-Calzada Abraham Lincoln).

As reflected in the local names for this bridge, BOTA is the only toll-free vehicular and pedestrian crossing within the populous El Paso-Juarez metropolitan area. This disparity with out-of-pocket charges imposed at other bridges is thought by many border station personnel to have significant influence in generating an imbalance in commercial and non-commercial traffic demands among the various crossings. Proximity to the greatest concentration of existing maquiladora sites in Ciudad Juarez and the high level of access to the Interstate highway system are also likely factors for the heavy usage of this bridge. As the most popular and heavily traveled crossing within the entire gateway, daily peak-period traffic congestion can be extensive for the northbound movements through this border station.

The bridge has experienced substantial deterioration and its U.S. owner, the International Boundary and Water Commission, has imposed a significant vehicular weight restriction on crossing traffic as a consequence of structural damage from vehicular loads in excess of its design capacity. It is estimated that 80 percent of unloaded truck traffic uses this bridge for border crossings to reduce travel times because they do not exceed the load restrictions. The United States section of the IBWC through the Texas Department of Transportation (TxDOT), let a construction contract in July 1996 to construct the U.S. portion of four new bridges to replace the U.S. portion of the existing bridge. The Mexican section of the IBWC also let a contract through the state of Chihuahua to construct the Mexican portion of the four replacement bridges. Construction is well underway and is expected to be completed by July 1998. At that time the existing bridge will be completely removed. A new turnaround will be constructed on U.S. 54 to provide better access to I-10. GSA has purchased additional property in order to expand the commercial facility.

At present, commercial traffic that exits the U.S. border station import lot does not have direct access to the spur highway leading to I-10, as does non-commercial traffic; the indirect access path followed by commercial vehicles to reach the I-110 spur includes several unsignalized left-turn movements and utilizes a roadway with abutting residential properties.

Ysleta-Zaragoza

The Ysleta-Zaragoza Bridge actually consists of two structures, one each for commercial and non-commercial traffic, which eliminates potential conflicts between the two types of flow. These toll bridges were constructed by the border cities in 1992 to replace an older, inadequate structure crossing the Rio Grande/Rio Bravo. Access on the U.S. side is provided by the Border Highway and Avenue of the Americas, both of which are multilane divided roadways (with varying degrees of access control) designated as a part of Texas Loop 375 which encircles much of metropolitan El Paso. Avenue of the Americas reaches I-10 approximately 4-1/2 miles north of metropolitan El

Paso, while the border highway provides access to central El Paso some 11 miles to the northwest. Roughly two miles south of the bridge, the connecting roadway reaches MX-002 near the community of Zaragoza.

The Ysleta port of entry buildings were completely replaced with a newly constructed facility in 1991 and 1992 concurrent with replacement of the previous bridge structure. The modern commercial import lot provides the only hazardous materials containment capability of any border station within the El Paso POE, and all inspections for the POE which involve hazardous materials take place at the Ysleta facility. There has been a significant increase in hazardous material shipment related to the growth in maquiladora activity. Despite its modern facilities and available processing capacity for both commercial and non-commercial traffic, tolls and the relative distance of the Ysleta facility from major concentrations of people on each side of the border and from the maquiladora sites closer toward Juarez have restrained the potential growth in traffic experienced at this crossing.

The remaining New Mexico-West Texas Gateway ports of entry, which lie outside the El Paso/Juarez area of influence, can be generally characterized as serving local or subregional demands. With the possible exception of Presidio, these rural ports generally do not contain a crossing that is situated on a principal international transport link. Most of these crossings have experienced moderate but manageable increases in demand. Commercial activity is marginal at most of these crossings but some potential for growth is possible. The infrastructure at these locations is a mix of old and new which is indicative of the relative importance of the traffic these stations serve compared to competing and in most cases greater demands at other points on the border. New border crossing facilities exist at the Presidio and Columbus crossings, but relatively poor conditions exist at Fabens and Fort Hancock. Connections from the border crossings to the Mexico regional highway system are in need of improvement as many of these roadways are composed of dirt or bladed gravel. Connections to the U.S. highway system are quite adequate in most cases particularly when the relatively low volume of commercial activity is considered.

Laredo Port of Entry System

Laredo III-Colombia (Solidarity) Bridge

This eight-lane toll bridge is located some 25 miles west of central Laredo/Nuevo Laredo, and is reached on the U.S. side by Texas Farm-to-Market (FM) 255; this short four-lane divided spur roadway links the bridge with the regional U.S. roadway network at the present time via FM 1472, also known as Mines Road. FM 1472 was recently reconstructed to a four-lane divided roadway/five-lane roadway between the FM 255 and Laredo proper. On the Mexican side, this crossing is presently accessible from the larger region only by a two-lane paved road that runs parallel to the Rio Grande (Rio Bravo) northwestward from Nuevo Laredo. Other than the connecting spur from the bridge southward to MX-002, planned major improvements to the

Figure 2.18 South Texas Border Crossings—Laredo Region

Figure 2.19 South Texas Border Crossings—Lower Rio Grande Valley

regional highway network in Mexico which would substantially improve access to this new border crossing are not yet realized. This state-of-the-art U.S. border crossing experiences limited traffic as a result of these deficient linkages and slow acceptance in the local transport institutions (government regulators, shippers, brokers, etc.). Consequently, the facility is substantially underutilized.

Laredo-Nuevo Laredo I (Convent Street) Bridge

The Convent Street Bridge (also known locally as Bridge No. 1) links the traditional "hearts" of the two border cities' commercial downtown areas. The undivided four-lane toll facility is owned by the adjoining cities and accommodates bi-directional non-commercial vehicular and pedestrian traffic. On the U.S. side, streets leading to and from the bridge are designated as a portion of U.S. 83; MX-085 leads to and from the bridge on the Mexico side.

Laredo-Nuevo Laredo II (Lincoln-Juarez) Bridge

The Lincoln/Juarez Bridge (also known locally as Bridge No. 2) is situated approximately three-quarters mile downstream (east) of the Convent Street Bridge, and one-quarter mile south of the terminus of I-35 as a controlled-access facility (near the Guadalupe Street/Matamoros Street (U.S. 83) at-grade intersection). San Dario Street provides access to and from I-35 through a widely separated one-way arterial couplet serving the border crossing station. This undivided six-lane bridge was opened to traffic in 1976 following completion of the I-35 extension to its current terminus several years previously. The crossing is used for commercial and non-commercial vehicular traffic; pedestrians are not allowed to cross at this location, as Mexico has never developed facilities to process pedestrian crossings on their side of the bridge. Although sidewalks are provided as part of the structure, they are blocked at the international boundary to prohibit non-vehicular crossings.

Brownsville Port of Entry System

Los Indios-Lucio Blanco

This is a relatively new crossing which opened on November 1, 1992. The bridge has pedestrian walkways on both sides and two standard vehicle lanes in each direction. The Los Indios Bridge is served primarily by U.S. 281, a two-lane rural highway that runs east-west along the border. A connection was constructed from U.S. 281 to the crossing. In addition, FM 509 was completed in June 1996 and provides a direct connection from the bridge to the US 83-77 Expressway. South of the crossing, the port access roadway extends south for about two miles where it connects with MX-002 which runs east-west along the border to Matamoros and Reynosa. Currently this facility is underutilized. It is anticipated that better connections on both sides of the crossing and development south of the border will improve the attractiveness of this facility.

B&M Bridge-Matamoros

A new port of entry facility was completed in 1992 and includes a new 12,000-s.f. administrative building and adjacent commercial import lot and docks with modern processing capabilities. This entire facility was designed for expansion in anticipation of the new crossing constructed parallel to the existing bridge. The existing commercial vehicle/rail bridge is very narrow and barely sufficient to allow one large commercial vehicle to pass another. Traffic is halted when a train crosses the facility. This occurs two times a day on average and it usually takes 10 minutes for a train to clear the crossing. UP maintains lines that connect to this facility. Rail traffic associated with the yards and crossing facility often interferes with at-grade vehicular traffic in this area. A second four-lane bridge was completed in May 1997. This bridge carries 2 lanes of automobile traffic in each direction, and northbound pedestrian traffic. Southbound pedestrian traffic uses the old bridge.

The B&M Bridge is served primarily by Sam Perl Boulevard, which runs immediately north to downtown Brownsville, and Mexico Street, which runs west from the port and connects with Palm Boulevard. Palm Boulevard traverses the western portion of Brownsville and continues north to Texas SH 48 and U.S. 77/83. Sam Perl Boulevard and Mexico Street/Palm Boulevard both traverse residential areas and would probably be characterized as urban local or collector facilities. South of the border the roadway proceeds into downtown Matamoros with options/connections to MX-040 and MX-101. In terms of spacing, the connections on both sides appear to offer better traffic flow opportunities then those serving the other urban crossing, Gateway. However there are still local concerns related to adjacent neighborhoods and potential increases in traffic. Ideally, this port would be better served with higher type facilities that offered more direct and compatible connections to highway infrastructure on both sides. The facility is new and relatively large given the single northbound lane it has to serve. In the event a four-lane crossing were constructed at this location the facility could be expanded as planned. With the completion of the second bridge, the facility will become better utilized by both commercial and automobile traffic.

Gateway-Matamoros

This facility handles large volumes of traffic, and although it was expanded significantly in 1994, it is often congested. Improving this facility to handle increased flows would probably require a sizable investment in both the facility and adjacent infrastructure.

The actual crossing consists of two overpasses, one inbound and the other outbound (two lanes in each direction). The Gateway Bridge is located in the heart of downtown Brownsville-Matamoros. On the north the facility is served by a pair of one-way streets (13th and 14th Streets) that run north/south directly to the facility. Both of these roadways are narrow and run through the middle of the downtown area. The crossing is also served by Elizabeth Street, which runs perpendicular to the border immediately north of the secondary area, and International Boulevard, which runs northeast from the port and connects to U.S. 77/83 and Texas SH 48. U.S. 77/83 continues west and connects to Harlingen and McAllen. Texas SH 48 continues northeast to the Port of Brownsville. Connections to this crossing in Matamoros are also less then ideal. Southbound traffic must travel directly through congested downtown Matamoros before connecting to MX-040, which parallels the border or MX-101, the main thoroughfare to Victoria. Given the heavy traffic volumes on this facility, the present infrastructure is not adequate to handle these crossings very efficiently. The construction of the Los Tomates bridge with planned capacity for commercial traffic inspection should reduce demand for the Gateway Bridge. The realignment of the International Boulevard to provide a more direct approach to the bridge is scheduled for fiscal year 1997. This project is expected to improve traffic flow at the facility.

Crossing Activity

Table 2.4 summarizes the 1995 border crossing data at the Texas ports of entry as provided by the U.S. Customs Service.

Table 2.4
1995 Texas Port of Entry Crossing Totals (Northbound)

Port	Mode					
	Vehicles	% Share	Trucks	% Share	Pedestrians	% Share
Santa Fe-Juarez[1]	4,489,700	11.0%	N/A[2]	--	3,656,800	23.2
Bridge of the Americas[1]	8,533,800	20.8	301,300	16.1	509,400	3.2
Ysleta[1]	2,918,200	7.1	281,700	15.1	265,500	1.7
Fabens/Fort Hancock	596,000	1.5	300	<0.1	42,300	0.3
Presidio	540,400	1.3	5,300	0.3	13,900	<0.1
Amistad Dam	32,000	<0.1	0	0.0	0	0.0
Del Rio	1,575,700	3.8	36,600	2.0	273,800	1.7
Eagle Pass	2,543,600	6.2	54,800	2.9	399,700	2.5
Laredo III (Colombia)	364,600	0.9	88,200	4.7	5,900	<0.1
Laredo I	2,349,600	5.7	0	0.0	3,218,800	20.4
Laredo II	3,163,500	7.7	645,500	34.5	0	0.0
Falcon Heights	144,600	0.4	900	<0.1	0	0.0
Roma	956,000	2.3	10,500	0.6	435,300	2.8
Rio Grande City	469,500	1.1	14,900	0.8	17,300	0.1
Los Ebanos	34,700	<0.1	0	0.0	0	0.0
Hidalgo	4,745,800	11.6	151,600	8.1	2,695,200	17.1
Progreso	922,300	2.3	23,000	1.2	876,800	5.6
Pharr	729,100	1.8	22,500	1.2	5	<0.1
Los Indios	358,400	0.9	35,000	1.9	3,700	<0.1
B & M Bridge	2,441,800	6.0	37,900	2.0	188,400	1.2
Gateway	3,049,900	7.4	160,700	8.6	3,160,400	20.0
Total	40,959,200		1,870,700		15,763,205	

[1] Data from the El Paso Planning Department Demographics Section (calendar year data)
[2] N/A-Trucks not allowed on this bridge.

Source: U.S. Customs Service. Data on fiscal year basis (October-September).

Border Area Highway Deficiencies and Programmed Improvements

One aspect of the Binational Planning and Programming Study is the identification of highway infrastructure deficiencies and programmed improvements within the border region (100 kilometers north and south of the border). Each U.S. border state provided the Binational consultants information on the deficiencies and programmed improvements within their respective state. Depending on the state there were at least two categories of deficiencies and for some states as many as seven categories.

For the State of Texas, information on two categories of deficiencies were provided: (1) Level of Service deficiencies and (2) pavement deficiencies. In Texas, “Operational Level of Service” maps are maintained for the major transportation facilities. Specifically, these maps highlight roadway segments which are operating at Level of Service C-D, E, or F. Figures 2.20 through 2.22 are the “Operational Level of Service” maps provided for the three port of entry systems described in this report. Operational Level of Service Maps are also available for other urbanized areas along the Texas/Mexico border, including McAllen, Eagle Pass, etc.

Figure 2.20 Operational Level of Service Map-El Paso

Figure 2.21 Operational Level of Service Map-Laredo

Figure 2.22 Operational Level of Service Map-Brownsville

In addition to the Level of Service maps, Texas provided a set of maps showing pavement deficiencies for counties along the border. These maps were similar to the state-wide map provided by the Arizona DOT. Figure 2.23 shows an example of the pavement deficiency information available.

At recent U.S. House of Representatives Subcommittee hearings held in Laredo and Pharr, Texas, testimony provided by Mr. David M. Laney, Chair of the Texas Transportation Commission, indicated that the State of Texas was currently working on or had completed approximately $360 million dollars worth of construction projects in the border region. In addition, by the end of Fiscal Year 1998 TxDOT will have begun work on an additional $435 million in highway construction projects in the border region. A detailed list of the Fiscal Year 1996 through 1998 projects has been provided to the Study Team.

A Presidential Permit has been issued for a new crossing in the Laredo Port of Entry System. This crossing, Laredo IV, will be located on a future extension of FM 3464 in northwest Laredo. Two new crossings have been proposed for the Brownsville Port of Entry System. The Los Tomates crossing is under construction and will be located on a future extension of U.S. 77. Construction on the U.S. side of the border began in June 1997 and is scheduled for completion in June 1998. Construction on the Mexican side is scheduled to begin in early 1998 and be completed one year later. Scheduled opening of the bridge is March 1, 1998. The Port of Brownsville bridge is still in the proposal stage. This bridge would connect the Port of Brownsville to SH 4, approximately 12 kilometers from the Brownsville central business district.

Additional supporting information related to programmed improvements for the State of Texas border region was provided to the Study Team including the 1996-1998 State Transportation Improvement Plan and the 1997 Unified Transportation Program. These data will be combined with other sources such as the list of border infrastructure projects from the "Building the Border Infrastructure of Tomorrow" conference held in San Antonio, Texas, in August 1996. The complete list of programmed, planned and proposed projects will be used in the Phase II Task 6 analysis of the compatibility of programmed projects on both sides of the border. The Study Team will normalize the information provided by the four U.S. border states, the six Mexican states and any other sources into a format which can be entered into and displayed using GIS technology as a product of Phase II Task 6.

Figure 2.23 Pavement Deficiencies

2.3 Railroads

2.3.1 Railroads[9]

Two Class I rail companies provide railroad freight and railroad intermodal service to Mexico: the UP and the BNSF. Railroad freight service consists of all freight moved by rail, whether by railroad car, trailer on a flat car (TOFC) or container on a flat car (COFC). Railroad intermodal service consists of only the latter two types of movements, essentially freight which came from or is going to another type of conveyance of goods. The Burlington-Northern purchased the Santa Fe railroad in 1995 and Union Pacific purchased Southern Pacific in 1996. Each company offers connection to the FNM, the Mexican-state-owned rail company and countless trucking companies. The service connections are rail-rail (for shipments to the interior of Mexico) and rail-truck (for shipments to the maquiladoras in the northern states).

The vast majority of the southbound rail movements serve the automotive industry. Traditionally there has been a well-documented imbalance between northbound and southbound movements, with most of the companies reporting a 3:1 imbalance in favor of southbound movements. Due to the current peso devaluation (beginning in late 1994) this balance is closer to 1:1. Some manufactured products and automotive parts move north, but apparently in smaller shipment sizes and to scattered destinations, which tend to favor truck transport.

The Union Pacific Railroad (UP)

Union Pacific is the largest U.S.-Mexico rail carrier, with an estimated 50 percent market share. UP earned $348 million in revenue from Mexican business in 1994. However, growth has slowed somewhat between 1994 and 1995 due to the peso devaluation. Their intermodal business is growing faster than their traditional bulk carriage. They offer both through rail and rail-truck intermodal services:

- The UP has an intermodal terminal in Laredo, Texas, which processes trailers on flat cars (TOFC, or piggyback) and has the capacity to process containers. The majority of the truck connections made in Laredo are for delivery to the maquiladoras in northern Mexico. Two-thirds to three-quarters of the intermodal traffic on the UP is estimated to be TOFC.
- An efficient rail connection with the FNM is offered through Laredo. Laredo is by far the most important rail crossing with Mexico. This service is streamlined to provide almost seamless double-stack container shipment to Mexico City from Chicago and St. Louis. A small number of high-volume customers, particularly the automotive sector, uses this service. The UP partners with an intermodal subsidiary as well as with the American President Line, Schneider National and J.B. Hunt, who arrange for pre-clearance of the shipment well before the train arrives in Laredo. They also provide trucking services at each end of the trip.

[9]Source: *Makings Things Work: Transportation and Trade Expansion in Western North America,* Center for the New West, September 1993. (Updated by Binational Consultant Team.)

UP is aggressively pursuing further opportunities in Mexico. UP is working to help modernize the FNM, primarily in the areas of communications and control systems. By assisting the FNM with an upgrade of their computer tracking system, they are able to offer continuous monitoring of shipments on both sides of the border.

UP maintains several other rail freight and intermodal facilities near the U.S.-Mexico border besides Laredo including Los Angeles, El Paso, and San Antonio. They are planning to construct a new rail bridge west of their existing crossing in Laredo to handle the anticipated increase in traffic and to construct a new intermodal facility in Harlingen. The capabilities of these facilities are outlined in Table 2.5.

A wholly owned Mexican subsidiary (of UP) was formed in 1992 in order to facilitate through rates into Mexico. The subsidiary acts as a broker, collecting and paying taxes in Mexico in order to reduce paperwork and delays at the border.

Union Pacific's acquisition of Southern Pacific has added approximately 40 percent of the U.S.-Mexico market share to that already operating on UP lines. The following section describes facilities and trade levels for those facilities formerly owned by SP and now operated by UP.

SP generated $232 million in revenue from Mexican business in 1994. UP, operating on former SP facilities, serves both General Motors and the Ford plants in Mexico and operates into Mexico through five border crossings: in Brownsville, Eagle Pass, and El Paso, Texas; Nogales, Arizona; and Calexico, California. They also provide service in Laredo in cooperation with the Tex-Mex Railway, a subsidiary of the Kansas City Southern Railroad. Primary intermodal services on the border, previously operated by SP, include:

- Container on Flat Car (COFC) and TOFC service from the West Coast to Mexico City (the Pantaco Terminal) through El Paso. This service includes a large amount of shipments from marine carriers calling in Southern California. They plan to be able to offer double-stack service to Monterrey and Mexico City in the near future.
- Double-stack container service through Nogales, Arizona (primarily serving the Ford factory in Hermosillo) and Eagle Pass, Texas (primarily serving the General Motors plant in Ramos Arizpe). Completed automobiles from the Hermosillo plant are being carried back into the United States.
- COFC and TOFC service through Calexico, California; Mexicali, Baja California; and Brownsville, Texas. Similar services are provided through their San Antonio intermodal hub.

Like the UP, the SP had been experiencing significant growth in rail freight and intermodal shipments to Mexico. With the acquisition, UP expects growth in intermodal traffic to continue and eventually become the dominant part of their business. Mexican traffic is expected to double by the year 2000.

New intermodal terminals are being built in Torreon, Monterrey and Celaya. These facilities will provide both COFC and TOFC loading facilities. The UP/SP's intermodal facilities in Los Angeles, Long Beach, Phoenix, San Antonio, El Paso, Rialto/Colton, and Tucson provide services near the U.S.-Mexico border. These facilities are profiled in Table 2.5.

Table 2.5
Intermodal Facilities

	Facilities					Railroads Serving	
City and State	**Airport**	**Bulk Transloader**	**Foreign Trade Zone**	**Intermodal Hub**	**Container-port**	**BNSF**	**UP**
Albuquerque, NM	▯		▯	▯	▯	▯	
Brownsville, TX	▯		▯	▯		▯	▯
Calexico, CA				▯			▯
Chihuahua, CH				▯		▯	
Eagle Pass, TX			▯	▯		▯	▯
El Paso, TX	▯	▯	▯	▯		▯	▯
Laredo, TX	▯	▯	▯	▯		▯	▯
Long Beach, CA				▯			▯
Los Angeles, CA	▯			▯		▯	▯
Monterrey, NL	▯	▯		▯			▯
Nogales, AZ	▯	▯	▯	▯			▯
Phoenix, AZ	▯	▯	▯	▯	▯	▯	▯
San Antonio, TX	▯		▯	▯		▯	▯
San Bernardino, CA				▯	▯	▯	
San Diego, CA				▯			
Tucson, AZ	▯		▯	▯	▯		▯

BNSF = Burlington Northern Santa Fe
UP = Union Pacific

Source: Barton-Aschman-La Empresa, 1997.

Burlington Northern Santa Fe Railroad (BNSF)

The estimated market share for the BNSF is 10 percent. BNSF revenue generated from Mexican trade in 1995 was $140 million.

The BNSF railroad offers rail freight and intermodal train service into Mexico through their El Paso facility. TOFC and double-stack container services to Mexico City are provided, primarily from shippers and international terminals on the West Coast. The BNSF also recently added intermodal train service through El Paso to Chihuahua that serves a Ford plant which opened in 1995. Plans have been made to incorporate double-stack service on both lines. As with the UP, the BNSF would like to expand their northbound service to reduce the imbalance in traffic.

The BNSF also offers rail-truck container transfers in San Diego and Laredo. These are primarily TOFC operations that serve the maquiladora industries in the Mexican border states. Like the other intermodal carriers, they have seen tremendous growth in intermodal traffic over levels a year ago.

Intermodal facilities near the border are located in El Paso, Albuquerque, Phoenix, San Bernardino, and Los Angeles. In addition, the State of New Mexico is currently studying the feasibility of an intermodal facility near Santa Teresa, New Mexico, to be known as the Camino Real Intermodal Facility. This facility would be located about seven miles west of El Paso and serve as a major hub for the Santa Fe and other railroads serving Mexico through El Paso. The proposed facility would combine truck, rail, and air service, and may possibly even include commuter rail service to surrounding communities.

The BNSF anticipates the need for a satellite intermodal facility in the San Diego area, but the demand is not expected to justify such a facility for several more years. The location, capabilities, and schedule for the new facility have not been determined.

2.3.2 Intermodal Rail Facilities[10]

An important advantage of the UP acquisition of SP is that the new system has both the financial resources and the traffic potential to construct or expand intermodal facilities at a number of locations. The new and expanded intermodal facilities are shown on the following map. At other locations, UP will assign specialized functions to existing intermodal ramps or combine UP/SP service at one facility or the other. The improvements specific to the binational border transportation process are described in the following paragraphs:

UP will construct a modern $67.5 million intermodal facility in the eastern Los Angeles Basin area known as the "Inland Empire." This is the growth area in the Los Angeles Basin, and the less-than-truckload motor carriers prefer to use inland Empire locations as distribution centers. SP operates a modest intermodal terminal at City of Industry, but this is too far west to serve the Inland Empire efficiently. Figure 2.24 shows the location of the major intermodal facilities.

New, although smaller, intermodal yards will be constructed at Harlingen, Texas, serving the lower Rio Grande Valley and the Mexican border crossing at Brownsville, and at Texarkana. The Texarkana facility, located at a rail junction with frequent service north and south, will replace intermodal ramps at Shreveport, Louisiana, and Marshall, Texas, that will be located on lines with service predominantly in one direction.

In addition to new facilities, UP will invest more than $150 million to expand parking, lift and gate capacity at a number of major intermodal terminals throughout the system. One of the more ambitious projects will be at Portland, Oregon. The present UP facility in Seattle will also be expanded. The UP Dupo intermodal terminal in the St. Louis area will be expanded to accommodate growth. As the map indicates, there are plans to expand intermodal facilities at Salt Lake City, Laredo, Denver, San Antonio, and Oakland.

The UP acquisition of SP has brought together the excellent intermodal facilities in Chicago created by CNW and UP with Southern California's premier facility, SP's intermodal Container Transfer Facility (ICTF) in Long Beach. In Chicago, SP's intermodal operations are dispersed among four facilities, all on the property of other railroads. Shipments to and from Texas, Louisiana, Arkansas, and Mexico will be consolidated in UP's Dolton facility, which will be expanded to accommodate 250,000 annual lifts.

For terminal yards, in every jointly served location, UP will combine or coordinate functions of the two carriers' primary freight yards. UP will consolidate manifest operations into SP's North Yard in Denver; SP's Roper Yard in Salt Lake City; UP's Barnes Yard in Portland; UP's Neff Yard in Kansas City, the A&S Gateway Yard in St. Louis; UP's yards in Stockton, Memphis, Texarkana, Elko, Shreveport, Topeka and the New Orleans area; SP's yards in Beaumont, Lake Charles, Oakland, El Paso, Dallas, and Reno; and, finally, UP's yards in Ft. Worth, Waco, Brownsville, and Harlingen in Texas. At all these locations, the combined traffic of the two carriers can be switched more efficiently in one yard than in two.

[10]Source: *Union Pacific-Southern Pacific Merger Application,* 1995.

Figure 2.24 Major U.S. Intermodal Facilities

In some terminals, neither freight yard will accommodate all UP/SP traffic, so both major yards will remain in use, each playing a tailored role. UP will expand current or construct new intermodal facilities at various locations. These projects will allow UP to absorb increases in traffic or obtain the efficiencies associated with consolidating currently separate facilities. UP plans for intermodal facilities include:

	Est. Cost (Millions)
• Construct a new Inland Empire facility in the Colton-Fontana area	$67.5
• Expand the SP ICTF facility serving the Ports of Los Angeles and Long Beach	27.2
• Expand the SP Oakland facility and reconfigure the UP facility	3.7
• Expand the Albina Yard facility at Portland	29.3
• Expand the UP facility at Seattle	3.8
• Expand the UP North Yard facility at Salt Lake City	7.7
• Expand the UP Denver facility	8.2
• Expand the UP Global-2 facility in Chicago	12.2
• Expand the UP Dolton facility in Chicago	9.8
• Construct a new facility at Armourdale Yard in Kansas City	16.7
• Expand the UP Dupo, Illinois, facility serving the St. Louis area	38.1
• Construct a new intermodal facility at Texarkana, Arkansas, serving the Texarkana, Shreveport, Marshall, and Longview areas	2.5
• Expand the UP facility at South San Antonio	6.1
• Construct a new facility at Harlingen, Texas, serving the Rio Grande Valley	2.0
• Expand the UP Port Laredo, Texas, facility	7.3
Total	$242.1

2.3.3 Rail Facilities by State

The following sections describe the rail facilities in each state in relation to providing the movements of goods to the border. Figures 2.25 shows the number of railroads operating for each U.S. state. Figure 2.26 shows the number of rail miles per state.

California[11]

San Diego lies south of the major BNSF and UP east-west rail trunk lines. San Diego's main rail link is the north-south BNSF line that connects in Los Angeles with these and other intercontinental trunk lines. Since the BNSF is the only major rail link serving the San Diego region, rail freight movement is not as substantial as truck goods movement. It is expected that freight service will be continued, under contract to BNSF on the now publicly owned former north/south SF line south of Fullerton.

The north-south BNSF line is primarily used for the shipment of automobiles, steel, soybean oil, lumber, grain and potash. In the year 1990, incoming freight totaled 2.9 million tons and outgoing shipment of freight was in excess of 2.3 million tons.

[11]Source: *1996 System Management Plan,* Caltrans District 11 System Planning Branch, January 1996.

Figure 2.25 Number of Railroads Operating in Each State-1994

Figure 2.26 Mileage Operated by State by Railroad-1994

The 146-mile San Diego, Arizona and Eastern (SD&AE) line connects San Diego via Mexico to the SP line in Plaster City (Imperial County), which then connects to the north/south UP line through the Imperial Valley. The SD&AE is owned by the Metropolitan Transit Development Board (MTDB) and its operation is contracted to the San Diego and Imperial Valley (SD&IV) Railroad. In Mexico, the SD&IV contracts for operation with FNM, the federal agency responsible for Mexico's nationally owned rail lines. Hurricane Kathleen severely damaged the Imperial Valley portions of the SD&AE line in 1976, making it not economically viable for SP's operation. SP filed for abandonment of the line, and MTDB subsequently purchased the line west of Plaster City with the primary intention of using the urban portions of the line in San Diego for LRT service.

Upon assumption of ownership of the SD&AE, MTDB reopened the line to freight service in 1981. However, in 1983, freight service was again suspended on the eastern portion of the line due to fires and tunnel cave-ins. Currently, the SD&AE is operational for approximately 33 miles from San Diego east to Campo, California, via Mexico.

Subsequent to the 1983 damage to the tunnels and bridges, additional fire damage has occurred. Insurance payments for the damage have been insufficient to complete rehabilitation of the line. In addition, the mere repair of the line may not put the railroad in an economically competitive position. For instance, current freight shipment procedures for double stacking of containers require greater vertical clearance than is present in the tunnels.

Rail freight service is provided in Imperial County on the UP Yuma line and the UP El Centro and Calexico branches south of the Niland Wye.

There is the potential for growth in rail freight activities in the future in San Diego. As an example, there are plans to increase rail freight movement of automobiles to San Diego from Canada and U.S. auto plants. The current rail-based auto shipment operation processes 22 auto carrier truckloads a day, the equivalent of 40,000 vehicles per year. American Honda recently announced the closing of their auto shipment facility at Richmond, California, and their expansion of the San Diego facility by 1997.

The San Diego Association of Governments, and the North San Diego County Transit District (NSDCTD) have purchased all of the BNSF Line in San Diego County. The BNSF has trackage rights over the public-owned portion of the line and full ownership of their freight yard and a short portion of the main line in San Diego. Freight rail service will continue to be provided on the line by BNSF or a short-line operator. Rail freight movements will need to be coordinated closely with the proposed increase in passenger rail traffic in the corridor to maintain efficient and safe operations of both services.

Northbound imports from Mexico into the United States at San Diego by rail are currently almost nonexistent due to long delays caused by U.S. Customs inspection procedures for rail cars. SD&IV estimates that 80 percent of its business is southbound exports into Mexico. Mechanisms need to be identified to increase the efficiency of freight rail service and customs inspection procedures at the border.

Figure 2.27 shows the geographical distribution of the major California Railroads. Table 2.6 outlines key railroad statistics for the California Railroads.

Figure 2.27 Major California Railroads

Table 2.6
Key California Railroad Statistics

Key 1992 Railroad Statistics and Rank Among the States		
Number of Railroads	30	5th
Total Rail Miles	6,530	3rd
Rail Carloads Handled	2,714,799	14th
Total Tons Carried by Rail	107,342,197	20th
Total Railroad Employment	13,477	3rd
Total Wages of Rail Employees	$624,241,300	3rd
Average Wages Per Rail Employee	$46,319	—
Average Fringe Benefits Per Rail Employee	$17,057	—
Railroad Retirement Beneficiaries	54,400	3rd
Payments to Railroad Retirement Beneficiaries	$497,207,300	2nd
1992 Top Commodities: Rail Tonnage Originated Within State and Percent of State Total		
Mixed Freight	14,079,601	34%
Food Products	6,160,312	15%
Chemicals	3,274,910	8%
Crude Petroleum	2,352,533	6%
Glass and Stone	2,157,444	5%
1992 Top Commodities: Rail Tonnage Terminated Within State and Percent of State Total		
Mixed Freight	14,335,346	20%
Chemicals	8,274,282	11%
Food Products	7,861,232	11%
Farm Products	7,389,732	10%
Coal	5,475,693	8%

Source: Railroads and States, Economics and Finance Department, Association of American Railroads, 1994.

Rail Access to Ports of Entry

San Ysidro

The South Line of the MTDB San Diego Trolley has been serving this Port of Entry (POE) since July 1981. This line is 16.5 miles long and includes 18 stations between Centre City and the international border. The trolley operates from 5:00 AM to 1:00 AM daily with service every 15 minutes, and every 10 minutes during peak periods. The San Diego Trolley System had an average daily ridership of approximately 47,000 passengers in 1996. A similar light rail transit service is being discussed in the City of Tijuana with possible direct connections to the Metropolitan Transit Development Board trolley service.

There is a rail crossing to the east of the POE. The San Diego and Imperial Valley Railroad (SD&IV) and the UP are the two rail freight operators that serve the California/Mexico border region. The Desert Line, the eastern section that continues on to Plaster City, was removed from service in 1983 when an arson-related fire destroyed two of its 19 wooden trestles in Carrizo Gorge. Today, freight is routed from San Diego to San Bernardino through Orange County and then south to Imperial Valley. The restoration of the Carrizo Gorge trestles would reduce the time needed to transport freight from San Diego to the Imperial Valley and it is estimated that it would also double the volume of cargo that could be transported. The total northbound volume of freight cars at San Ysidro/Otay Mesa has decreased from fiscal year 1989 to fiscal year 1995, according to the U.S. Customs Service. The rail volumes are credited to Otay Mesa since it is the commercial port of entry, though the physical crossing occurs adjacent to San Ysidro.

Calexico

There is approximately one freight train per weekday, excluding holidays, that handles both loaded and empty cars to and from Mexico. The UP is the primary rail freight operator in the Imperial Valley. There is currently no service from Calexico westerly beyond Plaster City to Tecate and San Diego because of the bridge and tunnel damage on the SD&IV Desert Line. The General Services Administration (GSA) has informally discussed rail line relocation with the Secretariat of Social Development (SEDESOL-Secretaria de Desarollo Social), but the railroad is privately owned and GSA has no formal jurisdiction over it. The number of containers has doubled over the past few years despite the relatively low utilization of double-stack trains.

Arizona[12]

The 1994 State Rail Plan Update provides a review and assessment of rail facilities and passenger and freight operations throughout the State of Arizona. The plan reviews 10 railroads which provide interstate and intrastate service in Arizona. The Arizona rail network, consisting entirely of private lines, has two interstate Class 1 railroads, one interstate Class 2 railroad, and seven intrastate Class 3 railroads. Class 2 and 3 railroads mainly serve natural resource industries in the State. Detailed information on railroad location, length, condition, and needs for Class 2 and 3 railroads is provided within the State Rail Plan.

[12]Source: *Arizona-Sonora Transportation Infrastructure Study, Arizona Department of Transportation*, December 1995.

The Class 1 railroads provide passenger and freight service east/west across Arizona in the northern and central to southern parts of the state. The Burlington Northern Santa Fe Railroad crosses the state roughly parallel to I-40 in northern Arizona and the Union Pacific Railroad parallels I-8 and I-10 in central/southern Arizona. Short-line tourist passenger railroads are also in operation serving the Grand Canyon, Clarkdale, and Benson areas. Annual tourist ridership for the Grand Canyon Railway Company is 125,000 passengers; for the Arizona Central Railway Company (Clarkdale area) is 75,000 passengers; and for the San Pedro and Southwestern Railroad Company (Benson area) is 45,000 passengers.

The State Rail Plan provides estimates for the gross freight tonnage shipped on Arizona railroad segments during 1993. The total amount of freight shipped on Class 1 railroads is proprietary information of the railroads; however, the Plan has estimated the type and percentage of tonnage moved based on available data and local knowledge.

Figure 2.28 shows the geographical distribution of the major Arizona railroads. Table 2.7 outlines key railroad statistics for the Arizona railroads. Estimated percentages of freight moved by Class 1 railroads are shown in Table 2.8, and graphically represented on Figure 2.29. Detailed data on freight movement on short line Class 2 and 3 railroads are available in the State Rail Plan.

Rail Access to Ports of Entry

The Nogales port is the only Arizona port served by a cross-border railroad, although Naco, Arizona, has a rail spur in place extending up to the border. The railroad through Nogales connects the Mexican Pacific coast rail system (including the Port of Guaymas) with the U.S. rail system running east/west from California through southern Arizona. San Luis-San Luis Rio Colorado does not have a direct rail connection, although the nearest railroads in both the United States and Mexico are within a 20- to 30-mile radius.

New Mexico

The New Mexico area rail network consists of two Class 1 railroads, the BNSF and the UP. The BNSF crosses the state from west to east and from north to south. The UP crosses the state from the north east to the south. Both the BNSF and the UP provide service to El Paso, the most prominent port of entry in this region. The New Mexico-El Paso, Texas, area rail network is shown on Figure 2.30. Key railroad statistics for the State of New Mexico are summarized in Table 2.9.

Railroad Access to the El Paso Port of Entry

The two single-track railroad bridges within the El Paso POE are physically located to either side west and east of the Paso Del Norte Bridge (upstream and downstream, respectively); shipments across these rail bridges are administered from an off-site U.S. border crossing station. The upstream bridge links the BNSF on the U.S. side with the Ferrocarril Chihuahua al Pacifico, an operating railway division of FNM. The downstream bridge links the Union Pacific lines with FNM. The FNM rail line traverses numerous at-grade street crossings as it passes through central Juarez southward from these two international bridges to a classification/holding yard. Operations over this connecting line in Juarez (and U.S.-Mexico railcar interchanges) have consequently become restricted to a period generally between 12:00 AM and 4:00 AM, in order to mitigate the severe traffic congestion in Juarez previously caused by daytime train movements. A consistent pattern of moderate growth in the volume of annual railcar interchanges over both bridges has occurred.

Figure 2.28 Major Arizona Railroads

Table 2.7
Key Arizona Railroad Statistics

Key 1992 Railroad Statistics and Rank Among the States		
Number of Railroads	10	31st
Total Rail Miles	1,855	36th
Rail Carloads Handled	1,901,145	21st
Total Tons Carried by Rail	69,789,879	31st
Total Railroad Employment	1,988	33rd
Total Wages of Rail Employees	$91,556,400	33rd
Average Wages Per Rail Employee	$46,055	—
Average Fringe Benefits Per Rail Employee	$16,960	—
Railroad Retirement Beneficiaries	13,800	22nd
Payments to Railroad Retirement Beneficiaries	$126,517,500	22nd
1992 Top Commodities: Rail Tonnage Originated Within State and Percent of State Total		
Metallic Ores	1,749,862	31%
Glass and Stone	793,892	14%
Primary Metal Products	725,464	13%
Chemicals	408,720	7%
Pulp and Paper	294,600	5%
1992 Top Commodities: Rail Tonnage Terminated Within State and Percent of State Total		
Coal	9,261,486	53%
Farm Products	1,079,096	6%
Lumber or Wood Products	1,003,360	6%
Food Products	942,952	5%
Metallic Ores	871,646	5%

Source: Railroads and States, Economics and Finance Department, Association of American Railroads, 1994.

Table 2.8
Percent Type of Tonnage Moved by Class 1 Railroads

	Containers, Trailers, Auto Racks, etc.	Coal/Coke, Lumber, General Merchandise, etc.
BNSF Routes		
Northern Route	85%	15%
Phoenix Route	45	55
UP Routes		
Yuma-Picacho-Lordsburg ML	60	40
Welton-Phoenix ML	40	60
Phoenix-Magma Jct ML	10	90
Magma jct-Picacho ML	10	90
Clifton Branch	0	100
Nogales Branch	50	50

ML = Mainline

Source: 1994 Arizona State Rail Plan

Figure 2.29 Arizona Freight Metric Tonnage

Figure 2.30 Major New Mexico Railroads

Table 2.9
Key New Mexico Railroad Statistics

Key 1992 Railroad Statistics and Rank Among the States		
Number of Railroads	6	40th
Total Rail Miles	2,006	35th
Rail Carloads Handled	2,300,244	18th
Total Tons Carried by Rail	99,903,375	22nd
Total Railroad Employment	1,455	39th
Total Wages of Rail Employees	$78,258,900	37th
Average Wages Per Rail Employee	$53,786	—
Average Fringe Benefits Per Rail Employee	$19,807	—
Railroad Retirement Beneficiaries	6,600	37th
Payments to Railroad Retirement Beneficiaries	$61,000,400	37th
1992 Top Commodities: Rail Tonnage Originated Within State and Percent of State Total		
Coal	9,824,824	61%
Chemicals	3,551,824	22%
Nonmetallic Minerals	1,105,380	7%
Petroleum or Coal Products	562,340	4%
Primary Metal Products	405,956	3%
1992 Top Commodities: Rail Tonnage Terminated Within State and Percent of State Total		
Nonmetallic Minerals	958,696	30%
Metallic Ores	763,933	24%
Food Products	298,084	9%
Glass and Stone	278,880	9%
Chemicals	199,580	6%

Source: Railroads and States, Economics and Finance Department, Association of American Railroads, 1994.

The BNSF intermodal/classification/holding yard is located immediately north of their bridge connection with FNM, and is situated west of the El Paso CBD between the downtown center and the Rio Grande. Intermodal loading and unloading capabilities for both containers and trailers exist at this terminal location. However, this yard is highly constrained by its location, size, and physical configuration, and is reportedly approaching the upper limits of its practical operating capacity. These physically induced restrictions are exacerbated by the operating constraints on interchanges with the FNM line through central Juarez. The BNSF secondary mainline which serves this yard and the international crossing is linked to their transcontinental mainline in Albuquerque, New Mexico, some 270 miles north of El Paso.

The UP holding yard is situated adjacent to the Rio Grande between the river and the Border Highway to the north; it lies beneath and to both sides of the Good Neighbor Bridge. The classification yards for the U.S. railroad's operations in El Paso presently contain no intermodal loading or unloading capability for containers; however, both provide ramps for loading and unloading trailers. These yards are located along the UP transcontinental mainline, which runs parallel to I-10 on the south, approximately 1-1/2 miles to the northeast of the bridge crossing. While the classification yard is reported to have adequate capacity for present traffic levels, the holding yard is restricted in size by the river to the south and the highway to the north. The lack of intermodal inspection facilities in these yards precludes on-site Customs inspections, and all cargo to be inspected must be trucked to the commercial lot at the Ysleta Border Station.

Texas[13]

The State of Texas ranks high among states in terms of rail infrastructure. In 1992, Texas ranked first in the nation with 11,285 miles of rail. Texas ranked second in the nation in railroad employment, with over 16,000 people employed by rail carriers. In 1992, Texas ranked fourth in the nation in tons of freight handled by rail. Three Class 1 rail carriers currently operate in the state: The BNSF, Kansas City Southern Railway Company (KCS), and UP. There were a total of 46 rail carriers in operation throughout the state as of 1994. Figure 2.31 shows the geographical distribution of these rail lines throughout the state. Table 2.10 summarizes key Texas Railroad statistics.

The demand for intermodal transfer facilities in Texas, and especially trailer-on-flatcar (or TOFC) service between the United States and Mexico has increased due to the passage of NAFTA. Highway access to intermodal facilities is an important issue facing the railroad industry in Texas. Tom Kelly, the Director of Intermodal Operations and Terminal Services for BNSF, indicated that the improvement and construction of feeder roads to intermodal facilities is a top priority for easing intermodal freight transfers, as well as decreasing truck traffic. Table 2.11 provides information on rail intermodal facilities by location, and Table 2.12 lists major rail carriers serving individual Texas ports.

There are currently five ports of entry for rail traffic to and from Mexico in the state of Texas: Brownsville, Laredo, Eagle Pass, Presidio, and El Paso. Most of these five ports of entry are at or near capacity. UP intends to complete an $85 million project to expedite rail car exchanges at the border, including a proposed new international rail bridge and rail yard. UP is also attempting to obtain a permit with the Mexican National Railways (or FNM) to link international

[13]Source: *U.S.-Mexico Trade and Transportation: Corridors, Logistics, Practices, and Multimodal Partnerships,* Lyndon B. Johnson School of Public Affairs, University of Texas, 1995.

Figure 2.31 Major Texas Railroads

Table 2.10
Key Texas Railroad Statistics

Key 1992 Railroad Statistics and Rank Among the States		
Number of Railroads	40	3rd
Total Rail Miles	11,285	1st
Rail Carloads Handled	4,535,582	3rd
Total Tons Carried by Rail	247,277,316	4th
Total Railroad Employment	16,263	1st
Total Wages of Rail Employees	$732,335,300	1st
Average Wages Per Rail Employee	$45,031	—
Average Fringe Benefits Per Rail Employee	$16,583	—
Railroad Retirement Beneficiaries	46,100	6th
Payments to Railroad Retirement Beneficiaries	$415,772,100	6th
1992 Top Commodities: Rail Tonnage Originated Within State and Percent of State Total		
Chemicals	27,870,736	30%
Nonmetallic Minerals	19,991,407	21%
Petroleum or Coal Products	6,928,005	7%
Farm Products	6,629,251	7%
Mixed Freight	6,353,646	7%
1992 Top Commodities: Rail Tonnage Terminated Within State and Percent of State Total		
Coal	39,518,083	26%
Nonmetallic Minerals	22,572,641	15%
Farm Products	22,189,955	15%
Chemicals	17,391,648	11%
Food Products	9,957,247	7%

Source: Railroads and States, Economics and Finance Department, Association of American Railroads, 1994.

Table 2.11
Rail/Truck Intermodal Facilities by Location

Location	Railroad*
Alliance Airport/Haslet, TX	ATSF
Amarillo	ATSF
Brownsville	ATSF, BN, UP
Dallas	KCS
	SP
	UP
El Paso	ATSF
	SP
Harlingen	UP
Houston	ATSF
	SP
	UP
Laredo	ATSF
	UP
	TM
Prosser	ANR
Marshall	UP
Texarkana	KCS
San Antonio	SP
	UP

* Note: Abbreviations for railroads are:

ANR:	Angelina & Neches River Railroad	KCS:	Kansas City Southern Railway
ATSF:	Atchison, Topeka & Santa Fe Railway	SP:	Southern Pacific Lines
BN:	Burlington Northern Railroad	TM:	Texas-Mexican Railway
MNR:	Mexican National Railways	UP:	Union Pacific Railroad

Source: Telephone communication by C. Toews, TxDOT, with Texas Rail Carriers, October 27, 1994. (At this time the ATSF and BN were separate railways, in 1995 the BNSF was formed and in 1996 SP was acquired by UP)

rail traffic. Improvement in rail facilities between the two countries is also underway at the Brownsville-Matamoros border crossing. New investment in the Texas border rail infrastructure depends on the growth in future demand for U.S.-Mexico bilateral trade.

Rail Access to Ports of Entry

Eagle Pass International Railroad Bridge

The Eagle Pass International Railroad Bridge is a single-track crossing of the Rio Grande/Rio Bravo roughly one-half mile downstream from the vehicular bridge, linking the UP lines and FNM. The UP branch line serving Eagle Pass connects with their transcontinental mainline at Spofford, Texas, 35 miles to the north. There is a small holding yard immediately north of the bridge, and a somewhat larger classification yard roughly one mile north of the crossing which provides an intermodal ramp for loading and unloading trailers. Rail car inspections are administered from the commercial office at the nearby border station on an as-needed basis.

Table 2.12
Major Rail Carriers Serving Texas Port Facilities

Port Facility	Rail Company
Beaumont	ATSF, KCS, SP, UP
Brownsville	FNM, SP, UP
Corpus Christi	SP, TM, UP
Freeport	UP
Galveston	ATSF, BN, SP, UP
Harlingen	SP
Houston	ATSF, SP, UP
Port Lavaca	SP, UP
Orange	SP, UP
Port Arthur	KCS, SP
Texas City	ATSF, BN, SP, UP

* Note: Abbreviations for railroads are:

ANR:	Angelina & Neches River Railroad	FNM:	Ferrocarriles Nacionales de Mexico
ATSF:	Atchison, Topeka & Santa Fe Railway	SP:	Southern Pacific Lines
BN:	Burlington Northern Railroad	TM:	Texas-Mexican Railway
KCS:	Kansas City Southern Railway	UP:	Union Pacific Railroad

Source: Port interviews and port questionnaires, 1994. (At this time the ATSF and BN were separate railways, in 1995 the BNSF was formed and in 1996 SP was acquired by UP)

Laredo International Railroad Bridge

The single-track Laredo International Railroad Bridge links two U.S. railroads: Texas Mexican Railway (TM, or Tex Mex) and UP with FNM. The Texas Mexican Railway is a Class II carrier whose mainline serves an east-west axis that connects this international crossing in Laredo with other railroad lines, and ultimately with the Port of Corpus Christi. The Union Pacific Railroad is a Class I carrier whose principal north-south mainline extends northward from this crossing in Laredo through San Antonio to ultimately reach St. Louis and Chicago; many other areas of the country are served by the UP system though connecting main- and branch lines, and by interchanges with other railroads.

The Tex Mex is the actual owner of the steel through-truss bridge, and a joint operating agreement exists with the UP for movements across this bridge. Although the age of the bridge is unknown, it was repainted in 1991 and is thought to be in good condition. A new international railroad bridge has been proposed in another location, has received a presidential permit, and is in the planning stages. Holding yards for each railroad are situated immediately to the north of the bridge, which are used by both Tex Mex and UP to spot train consists for international exchange with FNM. The primary Tex Mex classification yard (trailer ramps and a container crane for intermodal loading and unloading capability) is located some two miles east (downstream) of the international crossing holding yard. The UP constructed a major intermodal facility at their new classification yard adjacent to I-35 and their mainline some 13 miles north of Laredo. Extensive loading and unloading facilities for both trailers and containers are present at this new intermodal yard.

B&M Bridge

The UP railroad maintains lines that connect to this facility. In addition, the UP has yards just east of downtown Brownsville. Rail traffic associated with the yards and crossing facility often interfere with at-grade vehicular traffic in this area. There are plans to relocate these yards and the former SP line through downtown Brownsville in the near future. The line south of the crossing is owned and operated by the FNM.

2.4 Seaports

2.4.1 California[14]

California has eight major deepwater ports, those having a total cargo of approximately 1 million metric tons or more. Of these, the overwhelming majority of cargo uses four ports: Los Angeles, Long Beach, Oakland, and Richmond, with Richmond handling mainly liquid petroleum products. The ports of Los Angeles and Long Beach are contiguous and together constitute the largest port in the United States. Within the border region, The Port of San Diego, while small, also plays a role. Figure 2.32 shows the location of the eight major California commercial ports. Figure 2.33 shows the breakdown of cargo by port for 1994.

California Port Overviews

San Pedro Bay Ports: Los Angeles-Long Beach

When considered together, the ports of Long Beach and Los Angeles are the largest port complex in the United States. As such, their importance to the economy reaches far beyond the California borders. Figure 2.34 shows the ports of Los Angeles and Long Beach.

Port of Los Angeles

In August 1958, the first containerized cargo was loaded at the Port of Los Angeles. Matson Navigation Company began full containerized service in 1960, and the port handled 7,000 containers that year. By the late 1960s many Japanese container lines and automobile carriers were calling at the port.

During this same time frame, it had become financially unfeasible, as well as impossible, for some large ships to make the passage through the Panama Canal. One viable and economical solution to this problem was the creation of a landbridge from the port to destinations throughout the country via truck and rail. This innovation was made even more economical when the port developed its Intermodal Container Transfer Facility in 1986.

In 1983, the port completed dredging of the Main Channel to 45 feet (14 meters), enabling WORLDPORT LA to handle the most modern container vessels. In 1986, for the first time, the port handled 1,000,000 20-foot container equivalent units (TEUs) in a 12-month period. Only four years later, container throughput exceeded 2,000,000 TEUs. Table 2.13 documents some key statistics about WORLDPORT LA.

Port of Long Beach

Located only two miles from open sea, the entirely manmade port offers deep-water berths at the inner harbor (the original port area), the middle harbor, and the southeast basin. Modern equipment and facilities offer the degree of versatility needed to handle almost any type of cargo. The port is a leader in container cargo handling. Products shipped in containers include televisions, stereos, appliances, clothing, household goods, food, beverages, cosmetics, and footwear. Leading inbound cargoes include bulk petroleum, steel, electric machinery and parts,

[14]Source: *California Trade and Goods Movement Study, Interim Report*, Barton-Aschman Associates, 1995.

Figure 2.32 California's Major Commercial Ports

Figure 2.33 Foreign and Domestic Commerce Through Eight Major California Ports, 1994

Figure 2.34 Ports of Los Angeles and Long Beach

Table 2.13
WORLDPORT LA Statistics

Founded:	1907 (Harbor Commission established)
Acreage:	7,500 (4,400 water; 3,100 land)
Waterfront:	28 miles
Cargo Terminals:	28 major facilities Liquid Bulk 11 Container 6 Automobile 3 Omni 3 Dry Bulk 3 Neo-bulk/breakbulk2
Shipping Lines:	80
Vessel Arrivals:	2,870 (FY 94); 2,919 (FY 93)
Cargo Tonnage:	65.0 MMRT (FY 94): #2 on West Coast 67.8 MMRT (FY 93): #2 on West Coast
Container Volume:	2.38 mil. TEUs (FY 94; +3%) 2.31 mil. TEUs (FY 93)
Cruise Lines:	9
Cruise Traffic:	849,237 (FY 94); #1 on West Coast 920,537 (FY 93): #1 on West Coast
Automobiles:	309,169 (FY 94) 336,104 (FY 93)
Trading Partners:	(Top 5, Short Tons, CY 93) Japan (6.3 mil. worth $22 billion) Taiwan (3.3 million worth $11.4 billion) China (1.9 million worth $8.1 billion) South Korea (1.5 million worth $3.2 billion) Mexico (1.2 million worth $185 million)
Imports:	(Top 5, Short Tons, CY 93) Petroleum oils (1.6 million) Crude petroleum (1.2 million) Iron and steel shapes (1 million) Motor vehicle parts (603,000) Bananas and plantains (603,000)
Exports:	(Top 5, Short Tons, CY 93) Coal (1.9 million) Petroleum oils (987,000) Petroleum coke (909,000) Scrap iron and steel (877,000) Waste paper (567,000)
Cargo Value:	$65.5 billion (CY 93): #1 in United States $63.0 billion (CY 92): #1 in United States

Source: Worldport LA, 1995.

electronic goods, plastics, clothing, furniture, vehicles, newsprint and food. Outbound shipments include bulk petroleum, petroleum coke, chemicals, cotton, coal, plastic and rubber products, wastepaper, scrap metal, and food. During the 1993-94 fiscal year, a total of 5,272 vessels called at the port, moving cargo valued in excess of $55 billion. Vessels representing 100 steamship lines served the port last year—with 68 on a regular call basis. This is the greatest number of ship calls and tonnage handled by a west coast U.S. port.

The developed area of the port covers approximately 3,007 acres of land (including 172 acres devoted to petroleum production), 1,177 acres of which are accounted for by 11 operating piers. As the needs of commerce prompted expansion of the port over the last eight decades, additional terminal facilities were constructed, first in the original inner harbor, and next in the open waters of San Pedro Bay. With the concurrent development of the ports of Long Beach and Los Angeles, the bay is now enclosed and protected by a three-section breakwater over eight miles in length.

Water depths throughout the harbor range from 76 feet in the main channel to 45 feet in the inner harbor and 55 feet in areas of the middle harbor. Bulk petroleum terminals provide berthing depths of 40 to 76 feet. The 700 foot wide main channel has a depth of 76 feet from the breakwater entrance to Berth 121. The Southeast Basin and Basin Six have a depth of 55 feet. Anchorage areas in the outer harbor on both sides of the main channel have depths of 36 feet to 70 feet. Ship movements between the ports of Long Beach and Los Angeles may be accomplished by traveling the intervening distance in San Pedro Bay or through the Cerritos Channel, a waterway 400 feet in width and 41 feet deep connecting the inner harbors of the two ports.

Port of San Diego

The primary cargo that passes through the Port of San Diego includes automobiles, canned fish, cement, chemicals, containers, dry bulk, general cargo, grains, lumber, newsprint, petroleum products, potash and refrigerated products. The port is also involved with cruise line service and home to U.S. naval facilities. Figure 2.35 shows the port locations in San Diego Bay.

Tenth Street Marine Terminal

The Tenth Street Marine Terminal contains nine berths and two transit sheds 18,000 square meters each). Berths 1 and 2 have 341 meters of usable berthing space; Berths 3, 4, 4A, 5, and 6 have a total of 786 meters of berthing; and Berths 7 and 8 have 98 meters of usable berthing. Tenth Street has two transit sheds of 18,000 square meters each. The terminal complex also has bulk silos with a total capacity of 31,000 metric tons and a 200,000-s.f. on-dock, cool/cold storage facility capable of accommodating temperature-sensitive cargo such as fruit, frozen meats, and seafood. For cargo loading and discharge, Tenth Street has an electric traveling bulk ship-loader, an elevated conveyor system, and a full complement of mobile material handing equipment.

National City Marine Terminal

The National City Marine Terminal has three berthing facilities: the North Wharf with two berths (427 meters total), the South Wharf with two berths (457 meters total), and the West Wharf with two berths (305 meters total).

Figure 2.35 Port Locations in San Diego Bay

The terminal has a total of 27,350 square meters of covered space and an extensive paved area for open storage and marshaling. The North Wharf has one transit shed (3,746 square meters) with two surface tracks on apron. For cargo handling, the National City terminal has one container crane (40-ton capacity), a bridge crane, and yard tractors.

2.4.2 Texas[15]

Texas has twelve deepwater ports of which nine have a total annual cargo of approximately one million metric tons or more, and with channels to the Gulf having depths of at least 35 feet. In addition, there are numerous shallow draft facilities along the Gulf Intracoastal Waterway and its tributaries. The Victoria Bridge Canal is the only shallow-draft port with more than one million metric tons or more. As such it is discussed below. Figure 2.36 shows the Texas major port network.

There are two distinctly different ways that Texas ports can benefit from increased trade with Mexico. First, the ports can be the sending or the receiving point for products or goods being traded between the continental United States and southern/central Mexico. These movements could be made by ocean shipping and move through Mexican ports such as Veracruz. Alternately, some Texas ports could serve as ports for northern Mexico. In this case, imports could be shipped through a Texas port, moved overland across Texas and into Mexico at one of the bridge crossings over the Rio Grande, and transported to their final destinations in Mexico. For Mexican exports, the process could be reversed.

Presently, the Port of Houston dominates both types of movements. This is due to the fact that Houston has established many liner services, both to Mexico and to other destinations (Northern Europe, Mediterranean countries, Latin America, etc.). Brownsville continues to handle some Mexican bulk movements and is undergoing a significant voter approved, locally financed $43 million capital expansion program and marketing effort. The Port of Corpus Christi, the sixth largest port in the United States, is pursuing a major cargo diversification program, a key element of which will be the initiation of a container liner service coupled with a major upgrade of the road system linking the Port of Corpus Christi to Laredo.

The GIWW runs across the entire Gulf beginning at Brownsville and ties into the vast inland waterway system of the Mississippi and Ohio Rivers, which are connected via the Great Lakes to Canada. Some cargo now moves along the Gulf Intracoastal Waterway from Mexico. Since the waterway stops five miles short of the Rio Grande, such cargoes travel overland to/from either the Port of Harlingen or the Port of Brownsville.

Texas Port Overviews[16]

Port of Houston

The Port of Houston, a deep-draft port, is a 50-mile-long complex of diversified public and private entities and is Texas' busiest and largest port in terms of tonnage and value. It is 400 feet wide and 40 feet deep. Authorization has been received from Congress to widen to 530

[15]Source: *Trade Flows and Transportation Along the U.S.-Mexico Border in Texas and Mexico,* Office of the Governor, State of Texas, August, 1993.

[16] Source: *The Texas Seaport and Inland Waterway System,* Lyndon B. Johnson School of Public Affairs, University of Texas, 1995.

Figure 2.36 Texas Deep-Draft Port Network

feet and deepen to 45 feet. In 1971, the Texas Legislature changed the name of the Harris County Houston Ship Channel Navigation District to the Port of Houston Authority and gave it expanded powers for fire and safety protection along the channel. Landside access is available from three Class I rail carriers and 130 trucking companies using Interstates 10 and 45, as well as U.S. 59.

The Port of Houston possesses the largest port facility infrastructure on the Gulf of Mexico. The port maintains facilities to accommodate the movement of petroleum, bulk minerals, chemicals, grain, containers, and general cargo. These facilities include a general-cargo complex, intermodal terminal, dry-bulk facilities, a bulk materials handling plant, public grain elevator, and a deep-water basin providing access to liquid-bulk cargo facilities. The banks of the turning-basin terminal accommodate 2.5 miles of wharves, transit sheds, and warehouses. There is also a foreign trade zone located at the port.

The Fentress Bracewell Barbours Cut container terminal is an intermodal terminal for container, roll-on roll-off vessels, and cargo. The terminal has five 1,000-foot container berths (a sixth berth is currently being constructed), 20 yard cranes, and 10 container cranes. Marshaling areas can accommodate more than 21,500 TEUs. For trucks, 24 exit lanes are provided.

Port of Texas City

The Port of Texas City is a private port. It has no affiliation with any government or public agency. The Texas City Railway Company acts as port authority and coordinates all port functions with the port users. The port is located on Galveston Bay, 11 miles inland from the Gulf of Mexico, and 5 miles north of Galveston. The channel to the port is approximately 6 miles long with 400-foot bottom width and 40-foot depth. Immediate landside access is available by any one of four rail carriers or I-45.

The great majority of the port facilities are used to support the main commodities going through—petroleum and chemical products. The port contains 43 berths, 22 of which are privately owned by such companies as Amoco Oil and Union Carbide. The port also provides two supertanker docks for crude petroleum and numerous tanker and barge docks. Additional features include a dry bulk cargo facility.

Port of Freeport

The Port of Freeport is a deep-draft port located on the central coast of Texas, approximately 60 miles southwest of Houston. The major trade areas of the Port of Freeport are Central America, South America, and the Middle East. Minimum dockside depth is 36 feet. The port has 7,000 acres of deep-draft, shallow-draft, and highway frontage land available for industrial development.

There is a significant amount of containerized cargo generated in the port's area, which is transported, not by water, but by either rail or track to a rail center in Houston. The port's challenge is to find a way to participate in this business, competing with the other transportation modes. Key issues facing the Port of Freeport today revolve around insufficient highway and rail infrastructure accessing the port, financing capital improvement projects, and increasing environmental impediments.

Port of Galveston

Galveston Island, situated two miles off the Texas coast, is approximately 50 miles south of Houston. The Port of Galveston facilities, located at the entrance to Galveston Bay, constitute a large portion of the greater port complex. The GIWW runs alongside the Port of Galveston, and the Galveston Channel provides access to the open gulf. This channel has an authorized minimum depth of 40 feet and is 1,200 feet wide at its narrowest point. The port owns and operates for hire public wharves, transit sheds, open and covered storage facilities, warehouses, and freight handling facilities. In addition, the port leases land and facilities to area industries.

Port of Brownsville

The Port of Brownsville, a deep-draft port, is located at Texas' southernmost tip at the end of a 17-mile channel that meets the Gulf of Mexico at the Brazos Santiago Pass. The channel is 42 feet deep. The port, with its dry- and liquid-bulk handling facilities is primarily a bulk freight industrial port. In 1994, the port moved over 3 million short tons. Of the port's total shipments, over one-third was transported via the GIWW.

The port's major transported products include petroleum and coal products, primary metal products, minerals, and food products. The Port of Brownsville can be characterized as a Northern Mexican port, as the majority of its traffic is between the port and the city of Monterrey, Mexico.

Victoria Barge Canal

The Victoria Barge canal extends 36 miles from the GIWW in San Antonio Bay to a point about 15 miles from Victoria. It is utilized by the oil and gas petrochemical industries, which are the region's main industries. The canal's biggest customers include Fordyce Sand/Gravel, Precon Structures, and Willard Fertilizer. Commodities moved on the canal are primarily sand and gravel, petrochemical products, and industrial chemicals.

In an effort to increase the canal's utilization and marketability, construction is currently underway to widen and deepen the canal. The $32.5 million project will expand the canal's dimensions from 9 feet deep and 100 feet wide to 12 feet deep and 125 feet wide. This expansion will extend the canal's dimensions equivalent to the GIWW's dimensions. This project is expected to be completed in 1998.

Matagorda Ship Channel (Port of Port Lavaca-Point Comfort)

The Port of Port Lavaca-Point Comfort is a deep-draft port with an operating depth of 36 feet. It is located at the end of the Matagorda Ship Channel on the eastern shore of Lavaca Bay. The port serves industries and manufacturers, which are generally petrochemical processing, primary metals manufacturing, oil and gas production, and agriculture. The port’s largest customer is Formosa Plastics Corporation, a chemical manufacturer.

A $62 million port-expansion project was completed in December 1994. The project was made possible through an agreement between Formosa Plastics Corporation and Calhoun County Navigation District, in which Formosa agreed to bear bond-financing responsibility. As a result of the agreement, the port now has a liquid-cargo ship terminal that includes bulkheads, pipe rack capabilities, and modern safety facilities. Port usage has been increasing, especially in the international trade arena.

Port of Corpus Christi

Operating for over 70 years, the Port of Corpus Christi Authority moves the second greatest amount of tonnage of all Texas seaports. This deep-draft port is located on the Corpus Christi ship channel, which spans approximately 36 miles with six turning basins at a depth of 45 feet. Immediate access is available by either of two major highways, the GIWW, or service by one of three railroad lines.

The port maintains facilities to accommodate petroleum, bulk minerals, chemicals, grain, containers, and general cargo movements. Those commodities moved along the GIWW include crude petroleum, petrochemicals, and refined petroleum products. Additional port features include a public grain elevator, an industrial park comprising over 300 acres, and a foreign trade zone with oil refineries, manufacturing sites, and warehouses.

Port of Port Arthur

The Port of Port Arthur is located on the Sabine-Neches waterway (Beaumont to Sabine Pass, Texas) near the City of Beaumont. This port is approximately 28 miles long at a depth of 40 feet. The majority of freight at this port consists of petroleum and petroleum products.

Port of Beaumont

The Port of Beaumont is located at the City of Beaumont, Texas, and is 20 miles long from the mouth of the Neches River to the Bethlehem Steel Company. The depth ranges from 32 to 40 feet. The majority of freight at this port consists of petroleum and all petroleum products.

Port Tonnages

In 1994 alone, Texas ports handled over 354 million tons of cargo, of which approximately 40 percent passed through the Port of Houston. The top four ports (Houston, Corpus Christi, Texas City, and Port Arthur) accounted for 88 percent of all tonnage handled by Texas ports. Over a six-year period, tonnage handled by Texas ports increased from 290 million tons to 378 million tons—a 30 percent increase. Figure 2.37 summarizes foreign and domestic commerce through the major Texas Ports.

Figure 2.37 Foreign and Domestic Commerce Through Ten Major Texas Ports, 1994

2.5 Airports

There are airports that serve binational traffic in all the border lands of the four U.S. border states. Table 2.14 shows enplaned passengers and enplaned cargo for selected airports in the border states.

2.5.1 California[17]

In California, there are six public airports in operation within 100 kilometers of the international border that serve the border area. They are: Brown Field Municipal Airport, Calexico International Airport, Gillespie Field, Imperial County Airport, Montgomery Field, and San Diego International Airport (Lindbergh Field). In addition, Los Angeles International (LAX), while more than 100 kilometers from the border, handles a significant amount of binational traffic. These airports are shown on Figure 2.38. LAX has the longest runway of these seven (12,091 feet). In 1994, LAX also had the most passenger enplanements (19,885,450) and the largest number of total freight revenue ton enplanements (409,374) of the above-listed airports.

The following selection lists general information for the seven airports and provides enplaned passenger and revenue ton statistics where available. If no regularly scheduled commercial service is provided at an airport, such data are not available from the Federal Aviation Administration's Airport Activity Statistics.

Brown Field Municipal Airport (SDM), located in San Diego, has an elevation of 524 feet above sea level. The airport is open for public use and has two runways. The longest, which is made of asphalt and concrete, is 7,999 feet long and 200 feet wide. SDM has an annual takeoff and landing capacity of 355,000.

Calexico International Airport (CXL), which is located very near the international border, is used as a public facility and has one runway. This strip is 4,330 feet long and 75 feet wide, and is constructed of asphalt. This airport is located approximately at sea level.

Gillespie Field (SEE), in El Cajon, is located 385 feet above sea level and has a total of five runways. The longest of the five is 5,341 feet in length and 100 feet in width. It is made of asphalt. The airport has a 230,000 takeoff and landing annual capacity and an hourly capacity of 50.

Imperial County Airport (IPL) is located 56 feet below sea level and is equipped with two runways. The longest of the two is 5,304 feet in length and 100 feet in width and is constructed of asphalt.

At this time, *Los Angeles International Airport (LAX)*, at an elevation of 126 feet above sea level, has five runways, the longest of which is 12,091 feet long and 150 feet wide. The airport is available for public use. LAX has an annual capacity of 675,000 and an hourly capacity of 105 in terms of takeoffs and landings.

Montgomery Field, is located in the City of San Diego at an elevation of 423 feet above sea level, and has four runways. The largest is 3,402 feet long and 150 feet wide. It is made of asphalt. The airport is open to the public, but had no scheduled commercial flights in 1994.

San Diego International Airport-Lindbergh Field (SAN) is a publicly operated facility with two runways. This airport is the region's main international airport. The largest runway is 9,400 feet long and 200 feet wide and is constructed of concrete and asphalt. This airport has an elevation of 15 feet above sea level. SAN had 6,168,430 passenger enplanements in 1994, and 23,312

[17]Source: *Making Things Work: Transportation and Trade Expansion in Western North America, Center for the New West*, September, 1993.

revenue ton enplanements. Takeoff and landing annual capacity is 225,000 at the airport, and the hourly capacity is 66.

Table 2.14
Selected 1994 Airport Statistics*

Airport	Emplaned Passengers	Enplaned Freight Revenue (Tons)
California		
Los Angeles International	19,885,450	409,374
San Diego International-Lindbergh	6,168,430	23,312
Arizona		
Phoenix Sky Harbor International	12,451,569	59,231
Tucson International	1,555,362	5,623
Yuma International	1,378	356
New Mexico		
Albuquerque International	2,938,786	11,967
Las Cruces Muni	345	—
Texas		
Dallas/Fort Worth International Airport	25,435,330	178,097
Houston International	9,680,708	85,083
San Antonio International	2,944,867	13,504
El Paso International	1,870,163	16,606
Harlingen Industrial Airpark	464,455	3,765
Corpus Christi International	459,388	367
McAllen-Miller International	315,370	654
Brownsville South Padre Island	64,259	4,679
International		
Laredo International Airport	28,835	2,891

* U.S. Department of Transportation, Airport Activity Statistics of Certificated Route Air Carriers, 12 Months Ending December 31, 1994, ISBN-0-16-047653-X.

2.5.2 Arizona

There are seven public airports in Arizona within 100 kilometers of the international border. These airports are: Bisbee-Douglas International Airport, Cochise College Airport, Douglas Municipal Airport, Libby AAF (Sierra Vista Municipal Airport), Nogales International Airport, Tucson International Airport, and Yuma MCAS (Yuma International Airport). In addition, Phoenix Sky-Harbor International Airport, while more than 100 kilometers from the border handles a significant amount of binational traffic. These airports are shown on Figure 2.39. Of the Arizona airports included in this study, Phoenix Sky-Harbor International had the largest number of 1994 total passenger enplanements (12,451,569) and the largest number of total freight revenue ton enplanements (59,231).

Figure 2.38 Major California Border Airports

Figure 2.39 Arizona Airports

Phoenix Sky-Harbor International, Bisbee-Douglas International, Nogales International, Tucson International, and Yuma International are the airports in the State of Arizona designated as a port of entry by the U. S. Customs Service.

The following section lists general information for the eight airports and provides enplaned passenger and revenue ton statistics where available. If no regularly scheduled commercial service is provided at an airport, such data are not available from the Federal Aviation Administration's Airport Activity Statistics.

Bisbee-Douglas International Airport is a publicly operated facility with two runways. This facility has been designated by U.S. Customs as an official port of entry into the United States. The airport reported 32,000 operations in 1994 and is located at 4,151 feet above sea level. The nearest urban area is Douglas, Arizona, and the airport is operated by Cochise County, Arizona.

Cochise College Airport is a publicly operated facility with a single runway. This facility is located between Douglas and Bisbee, Arizona, along SR 80. The airport reported approximately 55,200 operations in 1994 and is located at 4,120 feet above sea level. The facility is operated by Cochise College.

Douglas Municipal Airport is a publicly operated facility with two runways. This facility is operated by the City of Douglas and is located 4,173 feet above sea level.

Libby AAF (Sierra Vista Municipal Airport), located in Sierra Vista at Fort Huachuca 4,716 feet above sea level, is open for public use and is equipped with three runways. The largest of the three has a length of 12,000 feet, a width of 150, and is made of asphalt and concrete.

Nogales International Airport, located 3,932 feet above sea level, is equipped with one asphalt runway 5,998 feet long and 90 feet wide. This airport is available for public use.

Phoenix Sky-Harbor International Airport has two runways. The longest of the two is made of asphalt and is 11,001 feet long and 150 feet wide. The airport is located 1,133 feet above sea level. The airport has an annual capacity of 300,000 and an hourly capacity of 105 in terms of takeoffs and landings. In 1994, there were 12,451,569 passenger enplanements and 59,231 tons of enplaned freight.

Tucson International Airport is operated as a public facility, and is owned by the Tucson Airport Authority. The airport is 2,641 feet above sea level and offers three runways. Of these three, the largest is 10,994 feet in length and 150 feet in width. The annual capacity in terms of takeoffs and landings is 285,000, the hourly capacity is 60. In 1994 there were 1,555,362 passenger enplanements and 5,623 freight revenue ton enplanements.

Yuma MCAS (Yuma International) located 213 feet above sea level has an annual takeoff/landing capacity of 230,000, and an hourly capacity of 40. The airport is co-owned by Yuma County and the United States Navy, and is used as a public facility. It is under the jurisdiction of the Port of San Luis. The longest of its four runways is 13,300 feet long, 200 feet wide, and is made of concrete. In 1994, this airport served 1,378 enplaned passengers and 356 freight revenue tons.

2.5.3 New Mexico

There are two airports in the state of New Mexico which lie within 100 kilometers of the international border—Las Cruces International and Doña Ana County Airport at Santa Teresa. The New Mexico airports are shown on Figure 2.40.

Figure 2.40 New Mexico Airports

Las Cruces International Airport is located at an elevation of 4,454 feet above sea level. It is a publicly operated facility with an annual takeoff/landing capacity of 286,000. The airport offers three runways, the longest of which is 7,503 feet in length and 100 feet in width. The airport is owned by the City of Las Cruces and had 6,173 total passenger enplanements in 1996.

Doña Ana County Airport at Santa Teresa, located at an elevation of 4,110 feet is owned by Doña Ana County and is used as a public facility. Its single runway is 8,500 feet in length and 100 feet in width and made of asphalt. This airport is primarily a freight airport.

2.5.4 Texas

There are 17 airports in Texas within 100 kilometers of the international border. They are: Brownsville-South Padre Island International, Cameron County Airport, Crystal City Municipal Airport, Del Rio International, Dimmit County Airport, Eagle Pass Municipal, Edinburg (Rio Grande Valley Reg. Freight Terminal), El Paso International, Laredo International, Maverick County Airport, McAllen-Miller International, Mid Valley Airport (Weslaco), Presidio-Lely International, Rio Grande Valley International (Harlingen), Starr County Airport, Terrell County Airport, and Zapata County Airport. In addition, while more than 100 kilometers from the border, Corpus Christi International, Dallas-Fort Worth International, Houston Intercontinental, and San Antonio International all serve a significant amount of binational traffic. The Texas airports are shown on Figure 2.41. In 1994, Dallas-Fort Worth International had the highest number of passenger enplanements and total freight revenue ton enplanements (25,435,330 and 178,097, respectively). Of these airports, the Texas airports with regularly stationed Customs/immigration/agriculture inspectors are Brownsville, Dallas-Fort Worth International, El Paso, Rio Grande Valley International (Harlingen), Laredo, and McAllen-Miller.

The following section lists general information for the 21 airports and provides enplaned passenger and revenue ton statistics where available. If no regularly scheduled commercial service is provided at an airport, such data are not available from the Federal Aviation Administration's *Airport Activity Statistics*.

Brownsville-South Padre Island International Airport is owned by the City of Brownsville and open for public use. The airport has an annual capacity of 260,000 to 275,000 and an hourly capacity of 121 to 145 under Visual Flight Rule conditions in terms of takeoffs and landings. The largest of its three runways is 7,400 feet in length and 150 feet in width. In 1995, the airport had a total of 71,000 passenger enplanements, and 8,470 revenue tons of freight enplanements. This airport is located at an elevation of 23 feet above sea level.

Cameron County Airport is owned by Cameron County and is available for public use. The airport is equipped with four runways. The largest of the four is 8,000 feet in length and 200 feet in width. Cameron County has an annual takeoff/landing capacity of 310,000. This airport is located at an elevation of 19 feet above sea level.

Corpus Christi International Airport is open for public use and offers two runways. The largest is 7,508 feet long and 150 feet wide and is made of asphalt. This airport has an annual takeoff/landing capacity of 270,000 and an hourly capacity of 60. In 1994, there were a total of 459,388 passenger enplanements and 367 freight revenue ton enplanements.

Crystal City Municipal Airport is owned by the City of Crystal City, and is open to the public. Its single runway is 3,550 feet long, 100 feet wide, and is made of asphalt. This airport is located at an elevation of 500 feet above sea level.

Figure 2.41 Texas Airports

Dallas-Fort Worth International Airport (DFW) is owned by the cities of Dallas and Fort Worth. DFW International Airport operates 24 hours a day, has seven runways and a foreign trade zone consisting of 2,500 acres (1,012 hectares). An eighth runway is currently in the planning stages. With an annual capacity of almost 1,000,000 operations, DFW reported 879,371 operations in 1995. In that same year, DFW report annual enplanements of 56,490,851 passengers and 857,438 short tons of cargo.

Del Rio International Airport has an annual takeoff/landing capacity of 215,000, and an hourly capacity of 50. Its only runway is 5,100 feet in length and 75 feet in width. This airport is located at an elevation of 805 feet above sea level.

Dimmit County Airport in Carrizo Springs is located at an elevation of 598 feet above sea level. The airport has an annual capacity of 215,000 in terms of takeoffs and landings. Its single runway is 4,977 feet long and 75 feet wide and is made of asphalt.

Eagle Pass Municipal Airport, owned by Maverick County, is a public facility. Its annual capacity for takeoffs and landings is 215,000. There is one runway at Eagle Pass Municipal that is 3,025 long and 60 feet wide. This airport is located at an elevation of 805 feet above sea level.

Edinburg (Rio Grande Valley Regional Freight Terminal) is owned by the City of Edinburg and is operated publicly. Its single runway is 5,000 feet long and 100 feet wide and is constructed of asphalt.

El Paso International Airport has an annual takeoff/landing capacity of 405,000 and its hourly capacity is 70. It is located at an elevation of 3,956 feet above sea level. Of the three runways in operation, the largest is 11,012 feet long and 150 feet wide and is made of asphalt. It has a saw-cut or plastic grooved surface treatment. In 1994, the airport had a total of 1,870,163 passenger enplanements and 16,606 freight revenue ton enplanements.

Houston Intercontinental Airport is owned by the City of Houston. It is used for public purposes and provides four runways. The annual takeoff/landing capacity is 240,000, while the hourly capacity is 52. Its largest runway is made of concrete. The airport is located 98 feet above sea level. In 1994, there were 9,680,708 passenger enplanements and 85,083 tons of enplaned freight.

Laredo International Airport, owned by the City of Laredo, has an annual capacity of 220,000 and an hourly capacity of 50 in terms of takeoffs and landings. The largest of its three runways is made of asphalt and concrete and is 8,201 feet in length and 150 feet in width. In 1996, Laredo International had 59,945 total passenger enplanements. While this airport also handles freight, enplaned revenue tons were not available from either the airport or the FAA. This airport is located at an elevation of 508 feet above sea level.

Maverick County Airport in Eagle Pass has one runway which is 8,430 feet long and 150 feet wide. This runway is constructed of asphalt. The owner is Maverick County. This airport is located at an elevation of 805 feet above sea level.

McAllen-Miller International Airport in McAllen has an annual takeoff/landing capacity of 195,000 and an hourly capacity of 50. In 1994, the airport had a total of 315,370 passenger enplanements and 654 freight revenue ton enplanements. The largest of its two runways is 7,108 feet long and 150 feet wide, and is constructed of asphalt. This airport is located at an elevation of 107 feet above sea level.

Mid Valley Airport (Weslaco) is located at an elevation of 70 feet above sea level. The airport is owned by the City of Weslaco and is open for public use. Its single runway is 5,000 feet long and 70 feet wide, is made of asphalt, and is reported to be in good condition.

Presidio-Lely Airport is owned by Presidio County. It is located approximately five miles from downtown Presidio. It is equipped with one runway. This airport is located at an elevation of 2,932 feet above sea level.

Rio Grande Valley International (Harlingen) Airport is owned by the City of Harlingen, and has an annual capacity of 390,000 and an hourly capacity of 60 (in terms of takeoffs and landings). Of its four runways, the longest is 8,300 feet long and 150 feet wide and is made of asphalt. In 1995, Rio Grande Valley International had a total of 487,507 passenger enplanements. In 1994, the airport had 3,765 freight revenue ton enplanements. This airport is located at an elevation 36 feet above sea level.

San Antonio International Airport is located 809 feet above sea level and is owned by the City of San Antonio. U.S. Customs provides full service 24 hours per day, seven days per week. There are four scheduled direct arrivals each day. The largest of its three runways is 8,502 feet long and 150 feet wide and made of concrete. In 1994, this airport had 2,944,867 passenger enplanements and 13,504 freight revenue ton enplanements. In terms of takeoffs and landings, the annual capacity of the facility is 330,000 and the hourly capacity is 65.

Starr County Airport, which is owned by the county of the same name, is located in Rio Grande City. It is open for public use, and is equipped with one runway. This runway is 3,200 feet long and 50 feet wide, made of asphalt and is reported to be in good condition. This airport is located at an elevation of 290 feet above sea level.

Terrell County Airport in Dryden is located at an elevation of 2,322 feet above sea level. The longest of its two runways is 4,525 feet in length, and 150 feet in width.

Zapata County Airport is owned by Zapata County and is located approximately four miles from downtown Zapata. It is equipped with one runway. This airport is located at an elevation of 422 feet above sea level.

2.6 Pipelines[18]

Seven pipelines cross the U.S.-Mexico border: one in Arizona and six in Texas. No active lines were identified in California or New Mexico; however, two additional lines are permitted but not yet constructed.

2.6.1 California

San Diego Gas and Electric Co. has received a Presidential Permit to construct a proposed natural gas pipeline into Mexico.

2.6.2 Arizona

El Paso Natural Gas has one natural gas pipeline that crosses the Arizona-Mexico border. This 8-inch outer diameter line crosses the border between Naco and Douglas, running to a copper mine. There are, however, numerous pipelines within 100 kilometers of the border.

2.6.3 New Mexico

Gas Company of New Mexico has received a Presidential Permit for a proposed natural gas pipeline which would cross into Mexico west of El Paso. Currently, the company is acquiring BLM right of way and permits for an 8-inch gas line that would branch off of El Paso Natural Gas' California line near Chamberino and run 18 miles south to the Santa Teresa Industrial Park. An additional 8-inch line is proposed that would cross into Chihuahua between the Santa Teresa/San Jeronimo port of entry and the cattle crossing five miles from the Industrial Park.

2.6.4 Texas

Six pipelines cross the Texas-Mexico border: one owned by Western Gas Interstate Company, two owned by Texas Eastern Transmission Corporation and three owned by Valero Transportation Company, L.P. Each pipeline conveys wellhead natural gas.

There are no known pipelines which convey crude petroleum or refined petroleum products.

Western Gas Interstate Company, a wholly owned subsidiary of Southern Union Co., owns one 12-inch natural gas line in El Paso that crosses the Rio Grande into Cd. Juarez, Chihuahua. One additional line has a federal permit and several lines are inactive. According to the U.S. Federal Energy Regulatory Commission (FERC), as an interstate carrier this line is not subject to regulation by the Railroad Commission of Texas (RRC).

The two Texas Eastern Transmission Corporation pipelines are both 20-inch diameter lines and provide a tie-in between the Texas Eastern 30-inch diameter McAllen-Vidor Line at Hidalgo, Texas, with the Petroleos Mexicanos plant across the Rio Grande in Reynosa, Tamaulipas. The two lines are configured as a loop, with one line (eastern or downstream) as the primary and the other (western or upstream) as an auxiliary line. Both lines are regulated under Permit No. 04143 by the Texas RRC.

[18] *Making Things Work: Transportation and Trade Expansion in Western North America, Volume 1 Summary Report,* Center for the New West, August 1994.

One of the Valero Transmission Company, L.P. pipelines that crossed the international boundary is also located near the Penitas community in Hidalgo County. This 24-inch diameter line runs from the Penitas Dehydrating Station southward into the State of Tamaulipas.

The other two Valero pipelines that cross the Rio Grande are located in Maverick County downstream from Eagle Pass. This pair of 8-inch diameter lines crosses into Mexico at the same location and is linked by a single line (variously 10 inches and 6 inches) to the Chittim Compressing Station some 20 miles to the northeast. All three Valero transborder lines are regulated by the Texas RRC under Permit No. 03883.

Several pipelines are proposed or under review in the state of Texas. Short descriptions of these projects follow.

> There are plans to add a new compression station at Reynosa to boost transmission capacity. The proposed plans should add approximately 500 million cubic feet of daily capacity to the cross-border flow.
>
> MAPCO, Navajo Refining Company, and AMOCO have a jointly owned pipeline that is nearly complete and will deliver propane and butane to a terminal south of Juarez from originating liquefied petroleum gas (LPG) plants in West Texas and New Mexico. It crosses the border about 15 miles east of El Paso and in Mexico is owned by PEMEX.
>
> Chevron Pipeline Co. has received a Presidential Permit and IBWC has issued a license allowing the construction of an 8-inch diameter pipeline to cross under the Rio Grande approximately 3.5 kilometers downstream of the Bridge of the Americas in the El Paso, Texas/Cd. Juarez area. The pipeline will transport gasoline, diesel, and kerosene between the Chevron Refinery in El Paso, to the PEMEX storage and distribution plant located in the city of Cd. Juarez along the highway to Nuevo Casas Grandes, Chihuahua.
>
> Rio Grande Pipeline Co. has received a Presidential Permit and IBWC has issued a license allowing the construction of an 8-inch diameter LPG pipeline to cross under the Rio Grande near the community of Clint, Texas/San Isidro, Chihuahua. The pipeline will transport LPG from Hudspeth and El Paso Counties, Texas to the PEMEX Mendez Terminal in Cd. Juarez, Chihuahua, Mexico.
>
> El Paso Energy Company has applied for a license to construct a 24-inch natural gas pipeline to cross under the Rio Grande near the community of Clint, Texas/San Isidro, Chihuahua. The pipeline will transport natural gas from the pumping station in the United States to the Commission Federal de Electricidad's Samalayuca power generation plant.

2.7 Demographic Profile

Demographic and socioeconomic data are collected and maintained at the national level by the United States. The Department of Commerce's Census Bureau is responsible for collecting and maintaining demographic and economic data collected for the decennial census. The Department of Commerce is also responsible for the preparation of projections of both demographic and economic statistics. Often state, regional, or municipal agencies may make area specific projections that account for specialized local conditions, however, these projections are commonly extrapolations of the Census data.

Along the 2,000-mile border between Mexico and the United States, there 10 border states, six in Mexico and four in the United States The six Mexican states are: Baja California, Sonora, Chihuahua, Coahuila, Nuevo Leon, and Tamaulipas. The four U.S. states are California, Arizona, New Mexico, and Texas.

Within the Mexican border states there are 39 municipalities which are located adjacent to the border with the United States. In the U.S. border states there are 23 counties that are adjacent to, and form the, border with Mexico. California has the fewest border counties with only two, while Texas has the most with a total of 14. Arizona and New Mexico have four and three border counties, respectively.

2.7.1 Demographic Growth—National versus Border Region

U.S. Census data indicate that the U.S. population has been growing at an average annual rate of approximately one percent since 1970. This growth rate has been constant and has not shown any significant variation during the most recent 25-year period.

All of the U.S. border states have been growing at a rate higher than the national average. During the 1970s and 1980s this rate was approximately double the national average. Table 2.15 shows the population and average annual growth rates for the U.S. border states for 1980, 1990, and 1995. Arizona has consistently had the highest growth rate of the U.S. border states over the past 15 years.

2.7.2 U.S. Border States

Table 2.16 shows the population for the four U.S. border states (Arizona, California, New Mexico and Texas) from 1970 through 1995. These data were obtained on a State by State basis from the U.S. Department of Commerce. California had the largest population in 1995 with 31.6 million, followed by Texas with 18.7 million, Arizona with 4.2 million, and New Mexico with 1.7 million. Together, these states represent almost 22 percent of the country's total population. Arizona has been the fastest growing border state in terms of population since 1970. The most significant increase in this state occurred between the years 1970 and 1975, when there was an average annual growth rate (AGR) of 5.17 percent. During the period from 1980 to 1990, the four U.S. border states had an AGR of approximately two percent which is about twice the national average. In the five years between 1990 and 1995, the growth rate of the border states slowed somewhat to just under two percent per year.

Table 2.15
Population and Average Annual Growth Rate for the U.S. Border States

State	1980	1990	1995	Growth Rate 1980-1990	Growth Rate 1990-1995
Arizona	2,718,215	3,665,228	4,217,940	3.03%	2.85%
California	23,667,902	29,760,021	31,589,153	2.32	1.20
New Mexico	1,302,894	1,515,069	1,685,401	1.52	2.15
Texas	14,229,191	16,986,510	18,723,991	1.79	1.99
Total	41,920,182	51,928,818	56,218,480	2.16	1.60

Source: U.S. Census, 1995.

Table 2.16
Population for the Four U.S. Border States

State	1970	1975	1980	1985	1990	1995
Arizona	1,775,399	2,284,847	2,718,215	3,183,538	3,665,228	4,217,940
California	19,971,069	21,537,849	23,667,902	26,441,109	29,760,021	31,589,153
New Mexico	1,017,055	1,159,944	1,302,894	1,438,361	1,515,069	1,685,401
Texas	11,198,655	12,568,843	14,229,191	16,272,734	16,986,510	18,723,991
Total	33,962,178	37,551,483	41,918,202	47,335,742	51,926,828	56,216,485

Source: U.S. Department of Commerce, 1996.

2.7.3 Border County Population

Population and projections from 1973 through 2040 are shown in Table 2.17 for the U.S. border counties of Arizona, California, New Mexico and Texas. These data are obtained from county level statistics from the U.S. Department of Commerce.

As with overall state population, the two California border counties, San Diego and Imperial Counties, have historically had the largest combined population (as compared with totals for other border counties within the border states) with a projected total of 2.8 million in 1995. This represents 51 percent of the total U.S. border county population.

In Texas, the total border county population projection for 1995 was 1.6 million. This represents approximately 29 percent of the total U.S. border population. In 1995, the three Texas counties with the largest populations were El Paso County, Hidalgo County (major city McAllen), and Cameron County (Brownsville/Harlingen), with populations of 617,300, 407,700, and 271,300, respectively.

Arizona's border county population is 975,000 or 17 percent of the total U.S. border population. The most populated border county in Arizona has historically been Pima County. In the 1995 population projection, Pima's population comprised 74 percent of the total of Arizona's four border counties. Santa Cruz County has the least population of Arizona's border counties, with a projected 1995 population of 32,200. The combined population of the four border counties within this state have shown a steady increase since 1973, with an AGR of 2.2 percent.

New Mexico's total border county population is 1.7 million persons or 3 percent of the total U.S. border county population. New Mexico's most populated border county is Doña Ana, which in the 1995 projection, comprises 85 percent of the state's total border population.

It should be noted that in both Arizona and New Mexico, due to the physical size of the counties, a significant portion of the border county population is not located immediately adjacent to the border. For example in Pima County, Arizona, the largest population center is Tucson which is located 100 kilometers (60 miles) north of the border and accounts for more than 60 percent of the county's total population. In contrast for the states of California and Texas, the majority of the border county population is located immediately at the U.S.-Mexico border.

2.7.4 Border County Employment

According to the U.S. Department of Commerce, San Diego County in California has historically had the highest total employment of any border county in the four U.S. border states and is projected to remain the leader into the year 2040. These figures are shown in Table 2.18. In terms of 1995 projections, San Diego County was estimated to have 1.5 million jobs which represents 54 percent of total employment for all U.S. border counties.

Pima County (Tucson) has the second largest total employment estimated at 358,000 or approximately 13 percent of the total U.S. border employment. As noted earlier, the concentration of population, and therefore employment, in Pima county is within the City of Tucson.

El Paso County is the third largest employment center within the border region with an estimated 266,000 jobs. This is approximately 10 percent of the total U.S. border employment. Employment along the Texas border is concentrated in four counties: El Paso, Hidalgo, Cameron, and Webb.

The highest employment in New Mexico is located in Doña Ana County and represents slightly over two percent of the total U.S. border employment. Again, the major population centers in the border counties of California and Texas tend to be situated adjacent to the border, while the population centers in Arizona and New Mexico are farther away from the border. Therefore, the largest employment centers on the border are in California and Texas.

2.7.5 Border County Per Capita Income

Table 2.19 provides historical and projected per capita income data for the four U.S. border states. The four counties with the largest population and the highest total employment do not necessarily coincide with ranking in terms of per capita income. In the case of income, San Diego County is still the leader in California, as is Pima County in Arizona; but in Texas, the lead shifts to Terrell County, and in New Mexico, the highest per capita income historically occurs in Hidalgo County. Terrell County, Texas is sparsely populated and has no port of entry into Mexico.

Generally, the per capita income of the border counties is below the state average. In 1995, the estimated average per capita income in California was $15,923. San Diego County was slightly below that average at $15, 031 while Imperial County was well below the average at $10,911. In Texas, the difference between the state average income and the border counties was more dramatic. With the exception of Terrell County, which was above the state average, the remaining 13 counties have a per capita income of $7,605 compared to the state average of $12,976.

The greatest range between individual border counties occurs in the case of Starr County, Texas, versus San Diego County, California, which had projected 1995 per capita income values of $3,713 and $15,031, respectively. Starr County is located in the agricultural region of south Texas. On the other hand, San Diego County is a large metropolitan area located on the Pacific coast with diverse economic activities.

Table 2.17
Historical and Projected Population U.S. Counties Bordering Mexico

	Population in (000's)	1973	1979	1983	1988	1990	1995	2000	2005	2010	2020	2040
	State Totals	*20867.7*	*23255.1*	*25307.9*	*28314.1*	*29760.0*	*32000.2*	*33792.9*	*35332.9*	*36672.2*	*38480.1*	*39848.6*
California	**Border Counties**											
	San Diego	1499.6	1827.6	2021.8	2370.4	2498.0	2734.1	2927.5	3098.3	3249.4	3459.6	3625.1
	Imperial	79.6	90.1	100.8	112.8	109.3	115.2	119.6	123.3	126.4	130.6	133.4
California Border Total		**1579.2**	**1917.7**	**2122.6**	**2483.2**	**2607.3**	**2849.3**	**3047.1**	**3221.6**	**3375.8**	**3590.2**	**3758.5**
	State Totals	*2125.3*	*2638.6*	*2951.8*	*3487.4*	*3665.2*	*4016.5*	*4295.4*	*4537.4*	*4748.5*	*5098.3*	*5437.0*
Arizona	**Border Counties**											
	Yuma	68.7	83.5	82.2	93.0	106.9	116.6	124.4	131.2	137.4	148.0	158.3
	Pima	428.6	523.3	569.4	636.0	666.9	722.6	766.3	803.8	836.2	891.5	946.2
	Santa Cruz	16.5	19.7	21.4	24.4	29.7	32.2	34.2	36.0	37.6	40.2	42.8
	Cochise	74.6	86.3	91.0	100.4	97.6	103.6	108.3	112.5	116.4	123.7	130.6
Arizona Border Total		**588.4**	**712.8**	**764.0**	**853.8**	**901.1**	**975.0**	**1033.2**	**1083.5**	**1127.6**	**1203.4**	**1277.9**
	State Totals	*1104.2*	*1280.5*	*1402.5*	*1507.0*	*1515.1*	*1605.4*	*1674.9*	*1732.8*	*1782.6*	*1859.4*	*1908.3*
New Mexico	**Border Counties**											
	Hidalgo	5.1	6.1	6.4	5.9	6.0	6.2	6.3	6.4	6.5	6.6	6.7
	Luna	13.5	15.5	16.7	18.1	18.1	19.0	19.7	20.2	20.6	21.2	21.6
	Dona Ana	76.9	93.7	109.0	132.0	135.5	146.4	155.1	162.6	169.1	178.5	184.8
New Mexico Border Total		**95.5**	**115.3**	**132.1**	**156.0**	**159.6**	**171.6**	**181.1**	**189.2**	**196.2**	**206.3**	**213.1**
	State Totals	*12019.0*	*13887.3*	*15813.8*	*16837.2*	*16986.5*	*17598.3*	*18039.1*	*18400.8*	*18725.2*	*19317.4*	*19540.0*
Texas	**Border Counties**											
	El Paso	398.2	472.3	528.4	585.9	591.6	617.3	636.5	652.8	667.9	694.3	706.6
	Hudspeth	2.5	2.6	2.8	2.5	2.9	2.9	2.9	2.9	2.8	2.9	2.8
	Jeff Davis	1.5	1.6	1.7	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9
	Presidio	7.9	7.5	8.1	7.8	8.7	8.7	8.7	8.7	8.7	8.8	8.8
	Brewster	7.9	7.5	8.1	7.8	8.7	8.7	8.7	8.7	8.7	8.8	8.8
	Terrell	1.9	1.6	1.6	1.5	1.4	1.4	1.4	1.4	1.4	1.4	1.4
	Val Verde	30.5	35.3	39.8	40.2	38.7	39.7	40.3	40.8	41.3	42.6	43.3
	Kinney	2.0	2.2	2.3	2.6	3.1	3.2	3.3	3.4	3.4	3.5	3.5
	Maverick	21.4	29.8	36.1	39.6	36.4	38.2	39.6	40.8	41.9	43.7	44.6
	Webb	83.1	96.8	115.9	128.9	133.2	140.0	145.0	148.9	152.4	158.1	160.4
	Zapata	4.7	6.4	7.9	8.8	9.3	9.7	10.2	10.5	10.9	11.4	11.6
	Starr	20.6	26.0	32.4	39.2	40.5	42.7	44.4	45.8	47.1	49.1	49.8
	Hidalgo	217.0	275.5	335.2	387.9	383.5	407.7	425.6	440.2	453.0	473.3	482.5
	Cameron	166.9	205.5	242.3	264.0	260.1	271.3	279.1	285.3	290.5	299.9	303.8
Texas Border Total		**966.1**	**1170.6**	**1362.6**	**1518.5**	**1520.0**	**1593.4**	**1647.6**	**1692.1**	**1731.9**	**1799.7**	**1829.8**
U.S. Border		**1973**	**1979**	**1983**	**1988**	**1990**	**1995**	**2000**	**2005**	**2010**	**2020**	**2040**
Counties Total		**3229.2**	**3916.4**	**4381.3**	**5011.5**	**5188.0**	**5589.3**	**5909.0**	**6186.4**	**6431.5**	**6799.6**	**7079.3**

Source: County Projections to 2040 (1992); U.S. Department of Commerce

Table 2.18
Historical and Projected Total Employment U.S. Counties Bordering Mexico

Employment in (000's)		1973	1979	1983	1988	1990	1995	2000	2005	2010	2020	2040
	State Totals	*9638.8*	*12231.0*	*12958.2*	*15711.5*	*n/a*	*17759.7*	*19070.4*	*19979.0*	*20539.0*	*20496.5*	*20230.5*
California	**Border Counties**											
	San Diego	689.6	931.1	1020.0	1309.3	n/a	1517.7	1650.1	1747.7	1813.7	1834.3	1830.2
	Imperial	36.8	46.6	40.2	46.9	n/a	51.5	54.4	56.1	57.0	56.0	54.5
California Border Total		**726.4**	**977.7**	**1060.2**	**1356.2**	**n/a**	**1569.2**	**1704.5**	**1803.8**	**1870.7**	**1890.3**	**1884.7**
	State Totals	*909.6*	*1221.3*	*1365.4*	*1803.6*	*n/a*	*2090.8*	*2285.5*	*2428.3*	*2521.8*	*2549.5*	*2558.7*
Arizona	**Border Counties**											
	Yuma	30.9	38.8	37.5	47.2	n/a	53.7	58.0	61.1	63.1	63.6	63.6
	Pima	174.3	220.7	250.4	314.3	n/a	358.7	389.3	411.1	424.6	426.6	426.3
	Santa Cruz	7.7	9.0	8.6	11.8	n/a	13.4	14.5	15.3	15.8	15.9	15.8
	Cochise	29.9	32.6	34.2	39.3	n/a	42.7	45.2	46.9	47.8	47.5	47.0
Arizona Border Total		**242.8**	**301.1**	**330.7**	**412.6**	**n/a**	**468.5**	**507.0**	**534.4**	**551.3**	**553.6**	**552.7**
	State Totals	*454.7*	*586.7*	*620.5*	*700.0*	*n/a*	*780.2*	*829.4*	*861.4*	*878.8*	*868.5*	*846.3*
New Mexico	**Border Counties**											
	Hidalgo	2.3	2.5	2.5	2.7	n/a	2.9	3.1	3.2	3.2	3.1	3.0
	Luna	4.8	5.2	4.9	5.6	n/a	6.2	6.6	6.8	6.9	6.7	6.5
	Dona Ana	30.3	39.6	43.2	52.6	n/a	59.5	63.8	66.8	68.7	68.3	66.9
New Mexico Border Total		**37.4**	**47.3**	**50.6**	**60.9**	**n/a**	**68.6**	**73.5**	**76.8**	**78.8**	**78.1**	**76.4**
	State Totals	*5500.1*	*7075.4*	*7905.1*	*8525.5*	*n/a*	*9205.0*	*9653.4*	*9922.2*	*10053.8*	*9842.4*	*9471.2*
Texas	**Border Counties**											
	El Paso	168.2	203.6	215.1	246.9	n/a	266.5	279.5	287.3	291.4	285.9	275.6
	Hudspeth	1.2	1.2	1.2	1.2	n/a	1.3	1.3	1.3	1.3	1.2	1.2
	Jeff Davis	0.7	0.8	0.7	0.8	n/a	0.8	0.8	0.8	0.8	0.8	0.7
	Presidio	3.1	3.7	4.0	4.1	n/a	4.3	4.5	4.6	4.6	4.5	4.3
	Brewster	3.1	3.7	4.0	4.1	n/a	4.3	4.5	4.6	4.6	4.5	4.3
	Terrell	0.8	0.9	0.9	0.7	n/a	0.8	0.8	0.8	0.8	0.7	0.7
	Val Verde	11.7	14.0	14.4	14.4	n/a	15.0	15.4	15.6	15.6	15.1	14.5
	Kinney	1.0	1.0	0.9	1.0	n/a	1.1	1.1	1.1	1.1	1.1	1.0
	Maverick	6.0	8.3	8.2	9.0	n/a	9.8	10.3	10.7	10.9	10.7	10.4
	Webb	28.3	35.9	37.0	45.3	n/a	50.5	53.7	55.8	57.0	56.4	54.5
	Zapata	1.1	1.8	2.1	2.3	n/a	2.6	2.8	2.9	2.9	2.9	2.8
	Starr	5.0	6.5	7.4	8.3	n/a	9.1	9.6	9.8	10.0	9.8	9.4
	Hidalgo	69.0	94.1	107.3	126.5	n/a	141.1	150.3	156.2	159.7	157.8	152.7
	Cameron	58.4	76.7	82.5	89.0	n/a	97.5	102.8	106.0	107.6	105.5	101.7
Texas Border Total		**357.6**	**452.2**	**485.7**	**553.6**	**n/a**	**604.7**	**637.4**	**657.5**	**668.3**	**656.9**	**633.8**
U.S. Border		**1973**	**1979**	**1983**	**1988**	**1990**	**1995**	**2000**	**2005**	**2010**	**2020**	**2040**
Counties Total		**1364.2**	**1778.3**	**1927.2**	**2383.3**	**n/a**	**2711.0**	**2922.4**	**3072.5**	**3169.1**	**3178.9**	**3147.6**

Source: County Projections to 2040 (1992); U.S. Department of Commerce

Table 2.19
Historical and Projected Per Capita Income U.S. Counties Bordering Mexico

Earnings in U.S. $'s		1973	1979	1983	1988	1990	1995	2000	2005	2010	2020	2040
California	*State Totals*	*11766*	*13460*	*13378*	*15070*	*n/a*	*15923*	*16795*	*17516*	*18150*	*19298*	*22514*
	Border Counties											
	San Diego	11030	12207	12493	14117	n/a	15031	15867	16560	17169	18268	21328
	Imperial	10552	13235	9840	9817	n/a	10911	11433	11874	12276	12994	14955
Arizona	*State Totals*	*9780*	*10636*	*10658*	*12035*	*n/a*	*12912*	*13734*	*14418*	*15014*	*15960*	*18626*
	Border Counties											
	Yuma	8276	9644	8592	9889	n/a	9561	10053	10454	10797	11359	13090
	Pima	9556	10044	10414	11536	n/a	12310	13086	13733	14297	15194	17716
	Santa Cruz	8973	8862	8262	9520	n/a	8814	9371	9841	10255	10906	12714
	Cochise	8587	7956	8187	8752	n/a	9794	10331	10784	11185	11839	13745
New Mexico	*State Totals*	*8220*	*9540*	*9449*	*10034*	*n/a*	*11273*	*12062*	*12724*	*13314*	*14313*	*16939*
	Border Counties											
	Hidalgo	8168	9850	8446	9416	n/a	10429	11126	11716	12253	13163	15552
	Luna	7224	7249	7080	7496	n/a	8316	8870	9338	9759	10474	12339
	Dona Ana	7326	7893	7988	7864	n/a	8522	9018	9429	9797	10441	12259
Texas	*State Totals*	*9381*	*11296*	*11474*	*11719*	*n/a*	*12976*	*13877*	*14634*	*15300*	*16283*	*19035*
	Border Counties											
	El Paso	7541	7897	7772	8038	n/a	8795	9325	9764	10142	10712	12455
	Hudspeth	6307	8622	7387	10589	n/a	9633	10148	10572	10955	11513	13122
	Jeff Davis	9675	14572	10677	9634	n/a	9707	10339	10854	11300	11982	13963
	Presidio	6904	10107	8460	9177	n/a	8992	9608	10128	10598	11292	13140
	Brewster	6904	10107	8460	9177	n/a	8992	9608	10128	10598	11292	13140
	Terrell	8761	10503	12691	13379	n/a	14903	15784	16516	17168	18097	20788
	Val Verde	6715	6973	6745	7129	n/a	8121	8645	9088	9478	10074	11764
	Kinney	6863	8621	8321	9374	n/a	8689	9340	9890	10376	11079	12905
	Maverick	4421	4844	4640	4472	n/a	5339	5657	5923	6156	6496	7500
	Webb	5380	6143	5610	5986	n/a	6538	6996	7379	7712	8204	9576
	Zapata	5764	6130	5865	5920	n/a	6353	6769	7117	7424	7883	9202
	Starr	4049	3609	3971	3464	n/a	3713	3925	4100	4252	4479	5187
	Hidalgo	5212	6063	5881	5865	n/a	6690	7140	7514	7836	8312	9699
	Cameron	5769	6699	6306	6319	n/a	7303	7870	8351	8771	9383	11011

Source: County Projections to 2040 (1992); U.S. Department of Commerce