Technical Report Documentation Page

1. Report No. FHWA/TX-03/4083-2	2. Government Accession No.	3. Recipient's Catalog No.
4. Title and Subtitle INLAND PORTS: PLANNING SUCCESSFUL DEVELOPMENTS		5. Report Date October 2002 6. Performing Organization Code
7. Author(s) Jolanda Prozzi, Russell Henk, John McCray, Rob Harrison		8. Performing Organization Report No. 4083-2
9. Performing Organization Name and Address Center for Transportation Research The University of Texas at Austin 3208 Red River, Suite 200 Austin, TX 78705-2650		10. Work Unit No. (TRAIS) 11. Contract or Grant No. 0-4083
12. Sponsoring Agency Name and Address Texas Department of Transportation Research and Technology Implementation Office P.O. Box 5080 Austin, TX 78763-5080		13. Type of Report and Period Covered Research Report: September 2001 – August 2002 14. Sponsoring Agency Code

15. Supplementary Notes

Project conducted in cooperation with the U.S. Department of Transportation, Federal Highway Administration, and the Texas Department of Transportation.

16. Abstract

The consideration of multi-modal inland ports to enhance trade corridor performance and improve the efficiency of global supply chains is starting to emerge in the transportation community. Ultimately, it is believed that inland ports have the capability to create local employment, enhance corridor efficiencies and thus trade competitiveness, and reduce both public and private costs. The objective of 4083-1 was to create a classification methodology to better understand how different inland ports can support efficient supply chains and enhance corridor performance. The first year study recognized the importance of inland ports as international trade processing locations. In addition to this function, inland ports relieve congested traditional ports of entry, facilitate value-added services, and enhance local and regional development. The objectives of 4083-2 are to demonstrate the role and benefits of inland ports, provide a brief overview of the TxDOT highway planning and programming process, highlight the critical investments required and the level of TxDOT support that can expected as the inland port develop, consider the impacts of trade and trade truck flows on the locations of inland port developments, and finally, to propose an evaluation framework that allows TxDOT planners to review potential inland port investment requests from a transportation planning perspective. Given the multi-modal components of inland port developments, it is foreseen that the findings of this study can be used to inform transportation planners considering the location of multi-modal terminals on the proposed Trans Texas Corridors.

17. Key Words	18. Distribution Statement
Inland ports, supply chain management, transportation planning, critical investments, evaluation considerations	No restrictions. This document is available to the public through the National Technical Information Service, Springfield, Virginia 22161.

19. Security Classif. (of report)	20. Security Classif. (of this page)	21. No. of pages	22. Price
Unclassified	Unclassified	96	

Inland Ports:
Planning Successful Developments

Jolanda Prozzi
Russell Henk
John McCray
Rob Harrison

Research Report 4083-2

Research Project 0-4083
Impacts of Inland Ports on Trade Flows and Transportation in Texas

Conducted for
Texas Department of Transportation
in cooperation with
U.S. Department of Transportation
Federal Highway Administration
by the
Center for Transportation Research
Bureau of Engineering Research
The University of Texas at Austin

October 2002

Disclaimers

Robert Harrison
Research Supervisor

Acknowledgments

The authors wish to acknowledge the involvement and direction of the Texas Department of Transportation project monitoring committee, which includes Project Director Judy Friesenhahn (Advance Project Development Engineer) and Program Coordinator Luis A. Ramirez (District Engineer – Laredo). Thanks are also due to Dr. Khali Persad who provided valuable input in drafting the level of TxDOT support that can be expected at each of the various phases of the inland port development life cycle. The research team is also grateful for the assistance provided by Patricia Hord (CTR) and Maria Saenz-Farias (CTR) who provided editing and graphical assistance in the production of this document.

Research performed in cooperation with the Texas Department of Transportation and the U.S. Department of Transportation, Federal Highway Administration.

Table of Contents

List of Figures

List of Tables

1. Introduction and Background

Increasing global trade growth is putting pressure on the existing United States (U.S.) transportation system, resulting in increased truck vehicle miles traveled, air pollution, landside access concerns, and congestion at border ports of entry. Both the public and private sectors have expressed concern about the capacity of traditional ports and terminals to handle growing trade volumes. "*Congestion and delay at U.S. borders constitutes a 'non-tariff' barrier to trade that limits access to international markets. With trade volume projected to double over the next 20 years, solutions to border congestion must be found…*" (http://www.kcsmartport.com, Accessed April 3, 2002).

Trading requires a range of value-added services, including transport. The U.S. is recognizing that it competes in a global environment in which access to global markets and multi-modal transportation are critical parts of a systems approach to remain competitive. In the global market, "the performance of supply chains is vital to shippers, not only for the sake of bringing goods to market, but because logistics itself has become a source of market advantage" (Cambridge Systematics, Inc., n.d.). Due in part to increasing globalization, companies are increasingly trying to achieve higher levels of customer service at lower costs.

Information and communication technologies are expediting the way business is done in the 1990s. Ever shorter delivery lead times, shorter product development cycles, custom products tailored to the specific needs of customers and markets, and just-in-time (JIT) manufacturing and retail deliveries are becoming necessary to the success of businesses in the new global economy. Advanced communication and information technologies have improved shipment and asset management (i.e., the monitoring and tracking of shipments, ordering, and status checking), and have facilitated integration across the supply chain through the formation of strategic alliances among shippers, carriers, and carrier users—thereby improving efficiency (Rabah and Mahmassani, 2001).

Supply chain activities and management are, however, also being recognized as costly activities. During 1997, it was reported that American companies spent approximately $862 billion (10 percent of the U.S. Gross National Product [GNP]) on supply chain activities, including "the cost of movement, storage, and control of products across the supply chain" (Delaney in Rabah and Mahmassani, 2001).

One of the outcomes of improved supply chain management is facilities designed specifically for intermodal coordination. "Freight villages and inland ports [are examples] of this, where the staging, transfer and control of goods are supported by a local network of information systems and modal infrastructure, often with a major shipper or carrier at its heart" (Cambridge Systematics, Inc., n.d.).

1.1 Project Background

Inland ports complement global supply chains and can become an integral part of transportation trade corridors by providing opportunities for increased service levels, value-added assembly/processing of imports and lowering total supply chain costs. Two important aspects of supply chain management revolve around the minimization of transportation costs and the reduction of inventory. In the traditional supply chain, an emphasis on the reduction of inventory implied an increase in transportation costs—due primarily to frequent shipments and precise delivery scheduling. Inland ports offer a potential solution to the challenges of these two seemingly opposing goals of efficient supply chain management. Inland ports can also provide the means to eliminate transportation related waste by eliminating or reducing transportation links; reducing uncertainty related to customs and border delays, and thereby allowing for JIT manufacturing. Clustering also allows for synergetic relationships among companies involved in warehousing, light manufacturing, value-added assembly, and distribution at a central facility.

In 2000, the Texas Department of Transportation (TxDOT) commissioned the Center for Transportation Research (CTR) at The University of Texas at Austin to examine and define inland ports in a planning context to facilitate a better understanding of their contribution to corridor efficiencies and trade flows and to facilitate their inclusion in the state transportation plan.

1.2 Project Purpose

The objective of the first year report was to create a classification methodology to better understand how different inland ports can support efficient supply chains and enhance corridor performance. The first year report recognized the importance of inland ports as international trade processing locations. In addition to this function, inland ports relieve congested traditional ports of entry, facilitate value-added services, and enhance local and regional development.

The first year report defined an inland port as "… a site located away from traditional land, air, and coastal borders containing a set of transportation assets (normally multi-modal) and the ability to allow international trade to be processed and altered by value-added services as goods move through the supply chain" (Leitner and Harrison, 2001). The report developed an inland port classification methodology and development life cycle that can be used to support transportation planning functions related to inland ports. The objectives of the second year report are to:

- demonstrate the role and benefits of inland ports;
- provide a brief overview of the TxDOT highway planning and programming process as of July 2002;
- highlight the critical investments required and the level of TxDOT support that can be expected at each of the five phases of an inland port development life cycle;
- consider the impact of trade and trade truck flows on potential locations for inland port developments; and
- to propose an evaluation framework that will allow TxDOT planners to review potential inland port investment requests from a transportation planning perspective.

In this report, an inland port is defined as "a site located away from traditional land, air, and coastal borders with the vision to facilitate and process international trade through strategic investments in multi-modal transportation assets and by promoting value-added services as goods move through the supply chain."

By this definition, well-developed inland ports seem to exhibit the following characteristics:

- tend to be larger regional centers, serving larger markets;
- provide a means for facilitating international trade and expediting shipments in and out of the U.S.;
- have multi-modal capabilities/opportunities and have good access to the interstate and state highway systems;
- have Foreign Trade Zone status;
- serve certain niche markets, which tend to be higher valued commodities; and
- have access to sufficient labor or skills.

The International Freight Gateway in Kansas City, discussed at the end of this chapter, provides an example of a relatively, well-developed inland port.

1.3 Organization of Report

This report is structured as follows. Chapter 2 highlights the role and benefits of inland ports in terms of trade corridor efficiencies and facilitating global supply chains. Chapter 3 provides a brief overview of the TxDOT highway planning and programming process as of July 2002. Chapter 4 discusses the critical investments/activities required and the level of TxDOT support that can be expected at each of the various phases of the inland port development life cycle. Chapter 5 considers the impact of trade and trade truck flows on potential locations for inland port developments through a case study of North American Free Trade Agreement (NAFTA) trade and the inland port locations considered in Mexico and San Antonio. Chapter 6 outlines possible evaluation considerations that can be used by TxDOT planners to review potential inland port projects from a transportation planning perspective. Finally, Chapter 7 summarizes the report's findings and conclusions.

International Freight Gateway, Kansas City

International Freight Gateway is a 1,400-acre development site in south Kansas City, Missouri—located at the former Richards-Gebaur Air Force Base. The Kansas City region is a significant economic region. According to the Intermodal Freight Strategies Study, approximately 80 million tons of freight moved to and from the Kansas City region, and about 50 percent of all eastbound intermodal freight originating in California passes through the Kansas City area. Agricultural products are the leading export commodity originating in Kansas and Missouri. Over $2 billion of agricultural products are exported per state per year.

Kansas City Southern (KCS) is the anchor modal tenant of the Gateway, with its 127-acre automotive intermodal complex. The Gateway is centrally located at the intersection of three interstate systems. For north-south travel, I-35 cuts across Kansas City, linking Mexico with Canada. I-29 links central Canada and Kansas City and I-70 is a key part of the transcontinental, east-west corridor. Metro loops provide access to these highway systems. In addition, the Missouri Department of Transportation is investing tens of millions of dollars to improve and expand highway access to the International Freight Gateway.

Future developments planned include light industrial and commercial enterprises, as well as U.S. Customs clearance capabilities, and a high-quality modern business park. The site features at least 1,200 acres of undeveloped land. Foreseen benefits of inland trade processing at this site are increased trade flows, reduced paperwork, streamlined shipping systems, and improved distribution centers. This is seen to directly benefit the many transportation, logistics, and export companies in the region.

In June 2001, Kansas City SmartPort launched the Inland Port Demonstration Project to illustrate that inland port trade processing has time, cost, and efficiency benefits. As part of the project, any barriers—i.e., regulatory, procedural, infrastructure—to inland trade processing will be identified and documented.

Source: http://kcsmartport.com, Accessed April 3, 2002

2. The Role and Benefits of Inland Ports

In a typical supply chain, "raw materials are procured, items are produced at one or more factories, shipped to warehouses for intermediate storage and then shipped to retailers or customers" (Simchi-Levi et al., 2000). (See Figure 2.1.) To ensure competitiveness, supply chains need to perform in three key areas:

- service as translated in the ability to anticipate and fulfill customer demand with on-time delivery;
- assets, including transportation infrastructure; and
- speed as translated in responsiveness and swiftness of execution. Cycle time reduction is a performance measure for speed. Important supply chain benefits can be achieved if flow time is improved: reducing lead time, and inventory levels (Hausman, 2000).

Inland ports can potentially facilitate more efficient and lower cost movement of freight when compared with freight movements through traditional ports. The effect of a reduction in costs (including transportation costs) is immediate because it influences the price of the output and thus the competitiveness of a company. As shown in Figure 2.1, important benefits are associated with inland ports in terms of reduced inventory costs, reduced number of intermediate links, reduced length of transportation/distribution links, and reduced transportation/distribution time. Apart from the benefits directly accruing to tenants and local businesses, inland port investments also result in higher land values and more competitive services with benefits in the form of increased tax revenues, employment, and economic development. The objective of this section is to qualify the cost reductions and benefits associated with inland port developments. The cost reductions and benefits can be categorized in terms of broad societal benefits, private user benefits, and public agency benefits.

2.1 SOCIETAL BENEFITS

Dramatic growth in U.S.-Mexico trade has brought corresponding economic growth to the ports along the Texas-Mexico border. This economic growth is a result of the increase in value-added trade related activities. These activities translated into an increase in employment of government officials, such as U.S. Customs and the Immigration and Naturalization Service (INS), and increased employment in the private sector. Increased private sector employment relates to the growth of manufacturing, transportation, storage, distribution, and other trade related services. Inland port development is thus motivated in some instances because of potential economic development benefits, which has occurred at traditional border ports of entry.

2.1.1 Economic Development

One of the goals of many inland port developments (i.e., the Greater Columbus Inland Port, Ohio; KellyUSA, Texas) is to accelerate economic growth and create employment opportunities. Cambridge Systematics Inc. (1994) reported that development at the Rickenbacker Air Industrial Park/Rickenbacker International Airport resulted in investments of more than $150 million in 3.4 million square feet of warehouse, distribution, and related facilities, and about 3,000 additional jobs between 1992 and 1994.

The overall economic impact of AllianceTexas is estimated at $19.1 billion. This development houses more than 110 companies, which have built more than 20.8 million square feet of warehouse, distribution, and related facilities.

2.1.2 Employment Creation

Inland ports tend to be labor intensive because of the value-added services provided at the ports. Value-added services can take the form of manufacturing traded products, manufacturing intermediary components for traded products, component assembly, packaging, labeling, transportation, storage, distribution, or providing auxiliary services such as finance, accounting, marketing, legal advice, and customs brokerage. Some of these services require an educated or trained workforce to respond to changing logistics demands and advanced technologies.

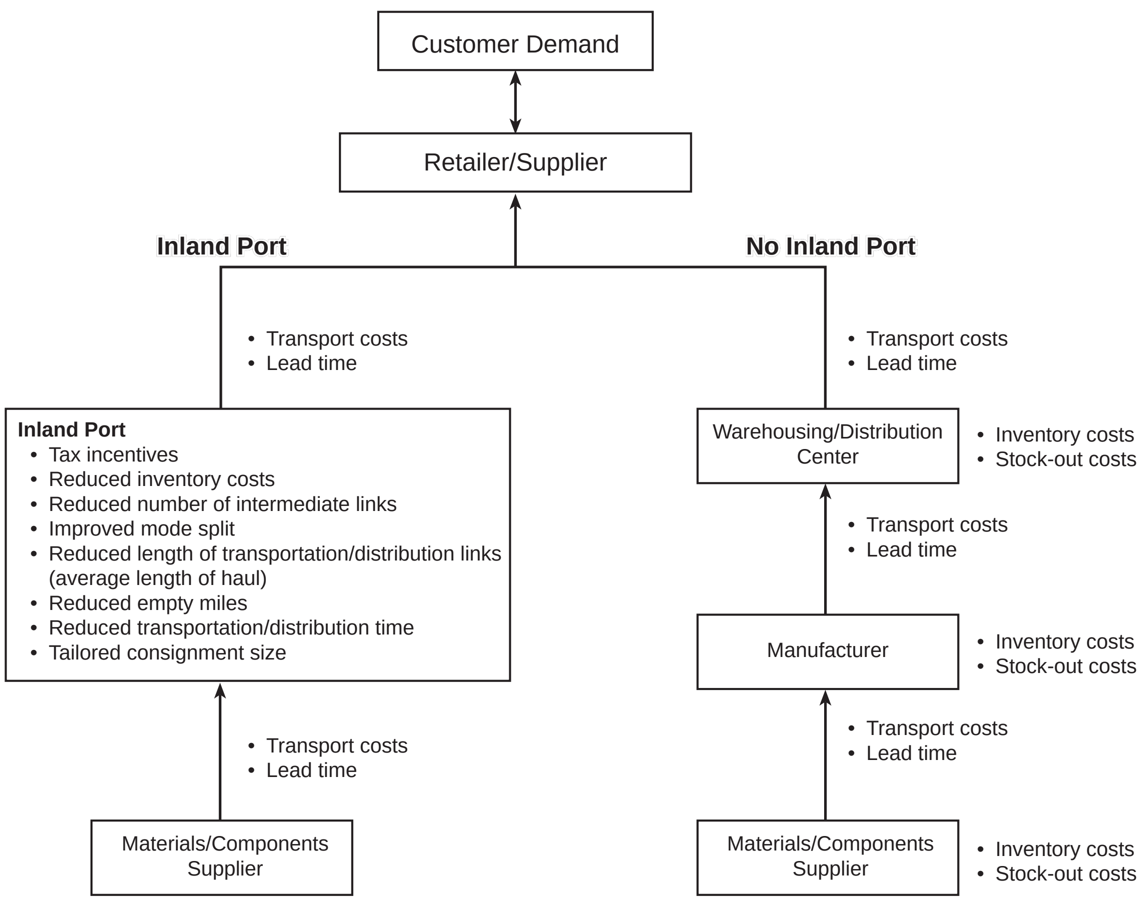


Figure 2.1 Spatial Organization and Management of Supply Chains

Cambridge Systematics Inc. (1994) estimated that the expansion of the Greater Columbus Inland Port could result in 25,000 additional jobs over a 15-year period. Many of these jobs were envisaged in the transportation and warehouse/distribution sector with opportunities for truck drivers, clerks, repair, maintenance, and other service workers. But improved transportation also results in the expansion of existing businesses as well as the attraction of new businesses, thus generating additional opportunities for workers with a broad range of skills. In addition, it was estimated that these 25,000 workers would earn approximately $73 million annually. Provided this money is spent in the local economy, additional jobs will be created in the retail and service sectors of the economy. The AllianceTexas development, for example, created more than 20,000 jobs (Deady, 2002).

2.1.3 Increased Tax Revenues

AllianceTexas spans four cities (Fort Worth, Haslet, Roanoke, Westlake), two counties (Denton and Tarrant), and two school districts (Northwest and Keller). Property taxes paid to these public entities by AllianceTexas tenants alone amounted to $45.7 million in 2000. Property taxes to the Northwest School District increased from $15 million in 1999 to $20 million in 2000. According to the developers, Northwest has received $62.3 million in property taxes from the AllianceTexas development. With the addition of 3 million square feet of space in 2001 and the continued construction of an additional 1.3 million square feet, property taxes are expected to increase accordingly (Deady, 2002).

2.1.4 Reduced Congestion and Environmental Pollution at Traditional Ports of Entry

Before September 11, 2001, inland ports were often quoted as part of the solution to reduce heavy vehicle truck congestion and the associated delay, fuel consumption, and emissions at traditional ports of entry—specifically Texas border crossings. The idea was that truck shipments would be allowed to cross the U.S.-Mexico border in-bond and only be inspected on arrival at the inland port facility. The benefits to shippers and importers were stated as improved efficiency and speed of time-critical deliveries. The benefits to society include reduced congestion and emissions in border regions.

2.2 PRIVATE BENEFITS

For the private sector to embrace inland ports, inland port supply chains must offer efficiency benefits superior to traditional supply chains. In this regard, location advantages and access to multi-modal transport (including highways, rail, and air) are keys to the eventual success of inland port developments.

As shown in Figure 2.2, the spatial organization of the inland port supply chain can bring about potential reductions in the number of intermediate transport links and various savings when compared to a traditional supply chain. First, reductions in border delays and border transaction costs are feasible if trade shipments are transported inbound through border crossings, or traditional ports of entry, to the inland port. By expediting these trade flows, the benefits come not only in the form of reduced delays for shippers—saving inventory and transportation costs—but congestion will also be alleviated at these ports of entry, thereby reducing border transaction costs in general.

Inland ports can also facilitate a reduction in the number of intermediate links and the average length-of-haul for distribution, thereby streamlining shipping systems and reducing overall transportation costs. Additional benefits include improved transit times, increased reliability, and the potential balancing of inbound and outbound freight movements to and from the inland port, thus reducing empty backhauls and decreasing transportation costs.

2.2.1 Multi-Modal Transportation Access

Commodity attributes largely determine handling and transportation requirements. Multi-modal options offer the private sector the flexibility to select the mode or combination of modes that best meet specific shipment requirements in terms of cost, speed, and reliability of service. The availability of multiple modes can facilitate more frequent, faster, more reliable, and competitively priced services. This allows for improved efficiency and response to varied customers, which empowers tenants to compete more effectively in the global economy.

Foreign Trade Zone (FTZ) status, for example, offers the following advantages to tenants:

- under the supervision of U.S. Customs, foreign goods may enter a designated FTZ[1] area duty and quota free for an unlimited period of time;
- foreign goods may be stored, manipulated, mixed with domestic and/or foreign goods, used in manufacturing processes, or exhibited for sale while in the FTZ;
- the finished products may be subject to a lower duty rate when imported goods are used in assembly or manufacturing, because duty is assessed on the value of the imported parts or applicable finished product, whichever is lower;
- merchandise may be stored for an unlimited time, without duty, until it is sold and moved out of the FTZ;
- damaged and defective goods may be destroyed without being subject to U.S. Customs duty;
- merchandise may be exported without being subject to U.S. Customs duty (http://www.kcsmart.com, Accessed April 3, 2002); and
- duty payment is delayed until products are sold, thereby allowing importers to retain their money for a longer period (Development, 2001).

In June 2000, a federal program titled the Weekly Entry Program, made FTZs even more attractive. The program allows importers to consolidate shipments entering a FTZ, requiring the payment of only one $485 "merchandise processing fee" per week, as opposed to the previous fee that was assessed on every entry (Development, 2001).

---

[1] Five large Foreign Trade Zones (FTZs) exist in Kansas City (on the Kansas side) under the authority of Greater Kansas Foreign Trade Zone, Inc.

2.2.2 Improved Supply Chain Management

Inland ports facilitate activity coordination and information sharing among different supply chain stakeholders at a shared physical location, resulting in improved supply chain

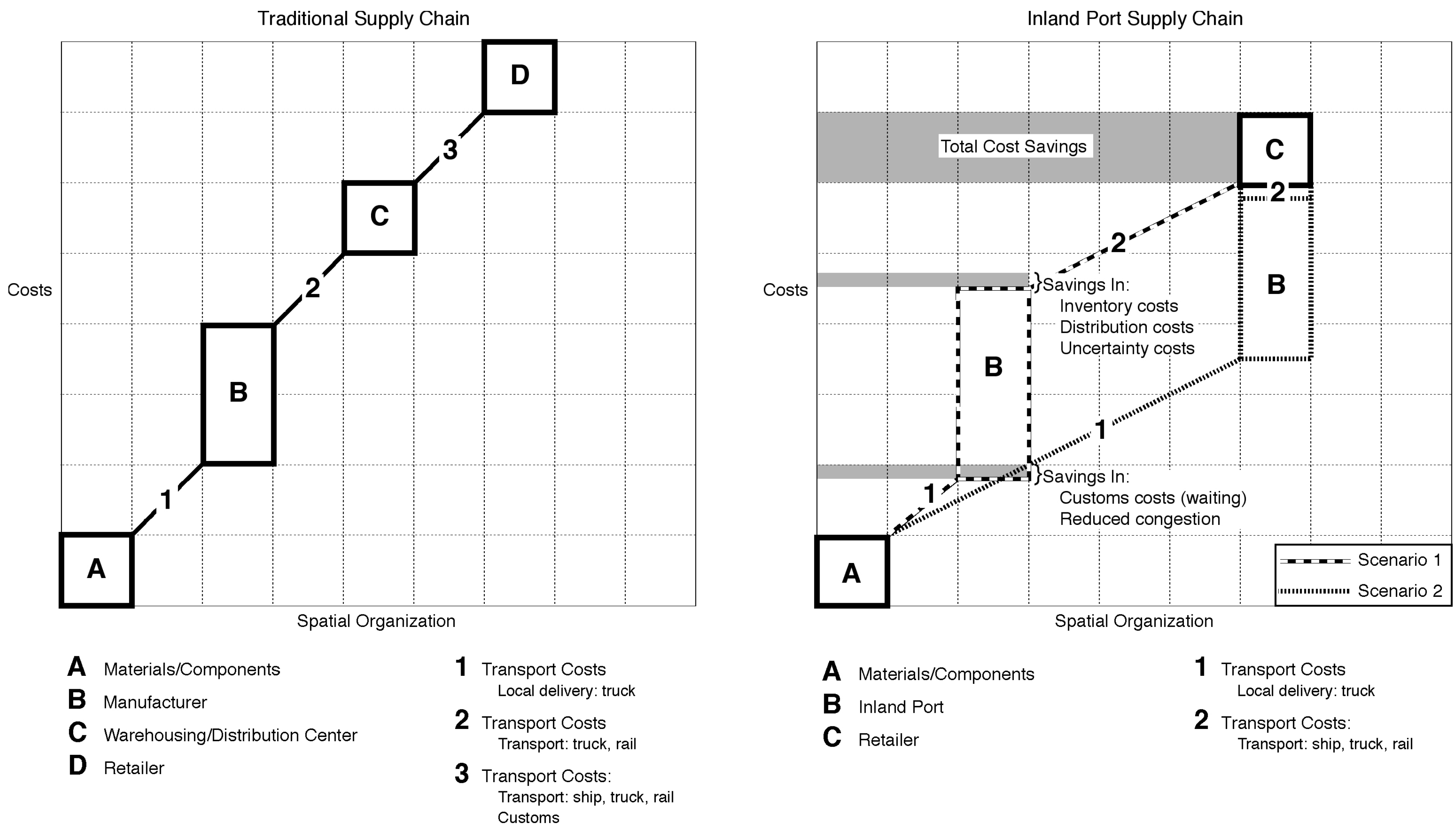


Figure 2.2 Supply Chain Scenarios

management. Expected benefits from improved supply chain management are cost reductions (lower inventory levels and inventory costs, eliminating some of the transportation links), risk reductions, committed relationships, and increased customer satisfaction. Cooperation among shippers, transportation companies, and other support services in a managed supply chain will translate into opportunities for business expansion and additional value-added services.

Additional Examples of Private Benefits Offered by Inland Ports

TranSystems Corporation (1999) found that **building and lease costs** for industrial park space at Greater Columbus Inland Port were approximately 33 percent lower than those in rival cities like Chicago, Detroit, and Indianapolis. In addition, taxes, utilities, and other operational costs are comparable to that of larger metropolitan areas.

The U.S. Customs Port of Battle Creek is an **uncongested, inland port of entry**: "Many Midwest corporations with Canadian operations avoid the congestion and delays encountered at major hub airports by seeking Customs clearances in Battle Creek" (Battle Creek Unlimited, n.d.).

2.3 PUBLIC AGENCY BENEFITS

2.3.1 Optimize Existing Port Capacity/Border Facilities

Before September 11, 2001, the expedition of trade trucks though traditional ports of entry to be Customs cleared at inland sites was viewed as an option to enhance the overall efficiency with which international trade enters/ exists the U.S. The most important benefit was foreseen to be a reduction in the time necessary to cross the border, thereby facilitating the processing of increased trade without additional capital investments to expand existing border facilities.

2.3.2 Leverage Private Funds

Increasingly state Departments of Transportation (DOTs) are faced with the challenge of narrowing an increasing gap between the cost of funding/maintaining the transportation system and available funding. Given the benefits of increased access to potential inland port developments to both the developers and the public, public-private-partnerships (PPP) to fund roadway enhancements seem appropriate. As part of a PPP, state Departments of Transport can leverage private funds if inland port developers share in the costs of providing roadway infrastructure by funding traffic studies, funding or donating right-of-way, or by partially funding the roadway construction.

2.3.3 Allow Modal Split away from Heavy Trucks

A mature inland port has the potential to improve transportation flows by facilitating a modal split away from heavy trucks. This will result in better utilization of road capacity and less damage to road infrastructure caused by increasing truck numbers and heavier axle loads. Other potential external benefits include a reduction in congestion delay, improvements in air quality, and noise alleviation.

Port Inland Distribution Network, Port of New York/New Jersey

The Port Inland Distribution Network (PIDN) for the Port of New York/New Jersey is foreseen to comprise a network of inland container terminals in locations like Albany, New York; Bridgeport, Connecticut; and Harrisburg, Pennsylvania. These inland sites will be linked to the port by dedicated rail, barge, or tandem trailer-truck shuttle. Projections of terminal productivity showed that, by 2040, modal split will be balanced among more modes, container dwell time will be reduced, and vehicle miles traveled (VMT) will be significantly reduce with the PIDN.

Terminal Productivity Projections: 2040

	Modal Split			**Terminal Dwell Time (days)**	**VMT (million miles)**	
	Truck	**Barge**	**Rail**		**0-75 Mile Zone**	**75 – 400 Mile Zone**
Without PIDN	86%	0%	14%	6	314	404
With PIDN	38%	39%	23%	2	116	75

Source: Ellis, 2001

3. TxDOT Highway Planning Process

The Texas Department of Transportation's (TxDOT) project development process (PDP) is a federally mandated, legally established method to ensure fair and equitable planning and funding of projects that will improve the transportation infrastructure through the use of public funds. This process is deemed necessary to ensure a fair, fiscally restrained program, and is regarded particularly important given the fiscal deficit of the state at present.

The process consists of two functions: planning and programming. To better understand the entire process, an awareness of the context and dynamics (both jurisdictional and technical) associated with the process is helpful. The objective of this chapter is to provide a brief overview of the TxDOT highway planning and programming process as of July 2002.

3.1 PARTICIPANTS IN THE PLANNING PROCESS

The many participants in the overall planning process for transportation projects are illustrated in Figure 3.1.

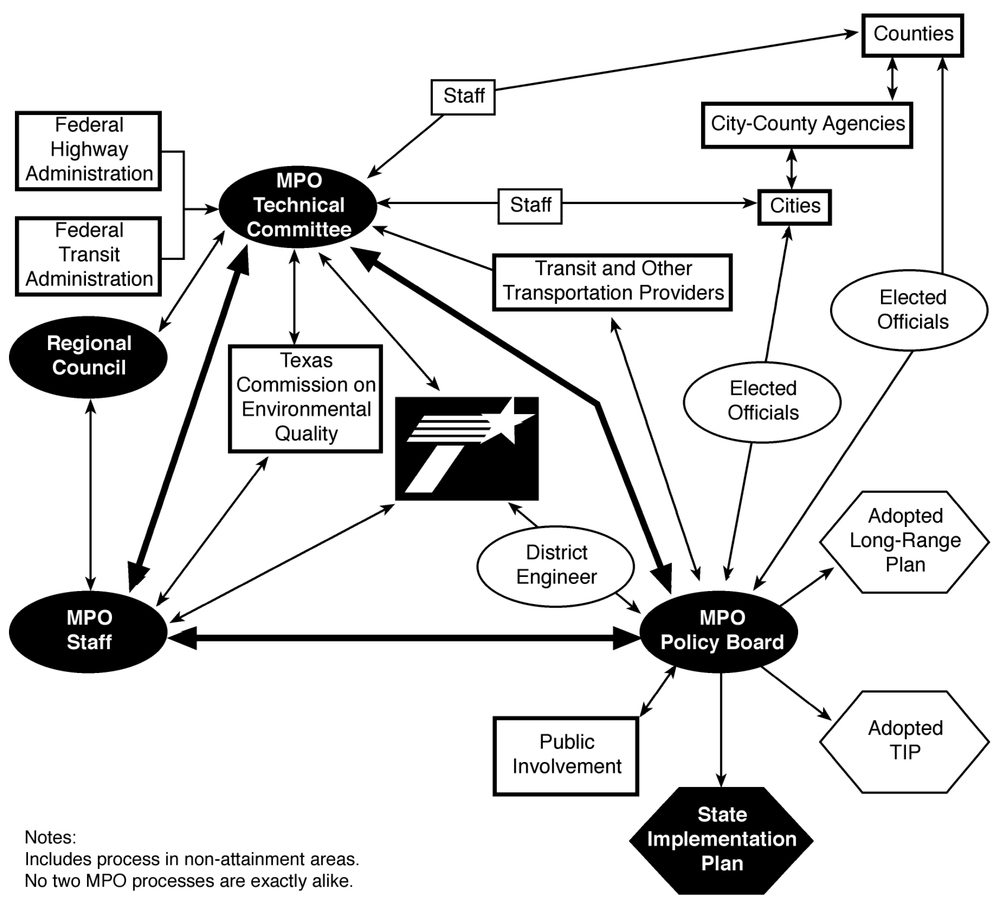


Figure 3.1 Participants in Planning Process

As noted therein, numerous entities are involved in the overall process in its broadest sense—including, but extending beyond, TxDOT. TxDOT and the relevant Metropolitan Planning Organization (MPO) will be particularly important participants in publicly funded transportation projects that might influence the development and/or operation of an inland port.

By comparison, TxDOT is responsible for the "state" roadway network, which is commonly referred to as the "state system." The state system includes: sections of the interstate system (IH), sections of the U.S. highways (US), state highways (SH), farm-to-market roads (FM), as well as spurs (SP) and loops (LP). These facilities are critically important in terms of provided roadway capacity and mobility throughout the state. As such, access to the state system will commonly be an important consideration for a proposed/planned inland port site.

Infrastructure requests by inland port developers related to TxDOT facilities would typically include the expansion of an existing state roadway(s) or the construction of a new roadway in the vicinity of the proposed development site. When such requests are made, the TxDOT PDP must be recognized and followed.

3.2 TxDOT PROJECT DEVELOPMENT PROCESS

The TxDOT project development process (PDP) entails two major phases termed "planning" and "programming" (as illustrated in Figure 3.2).

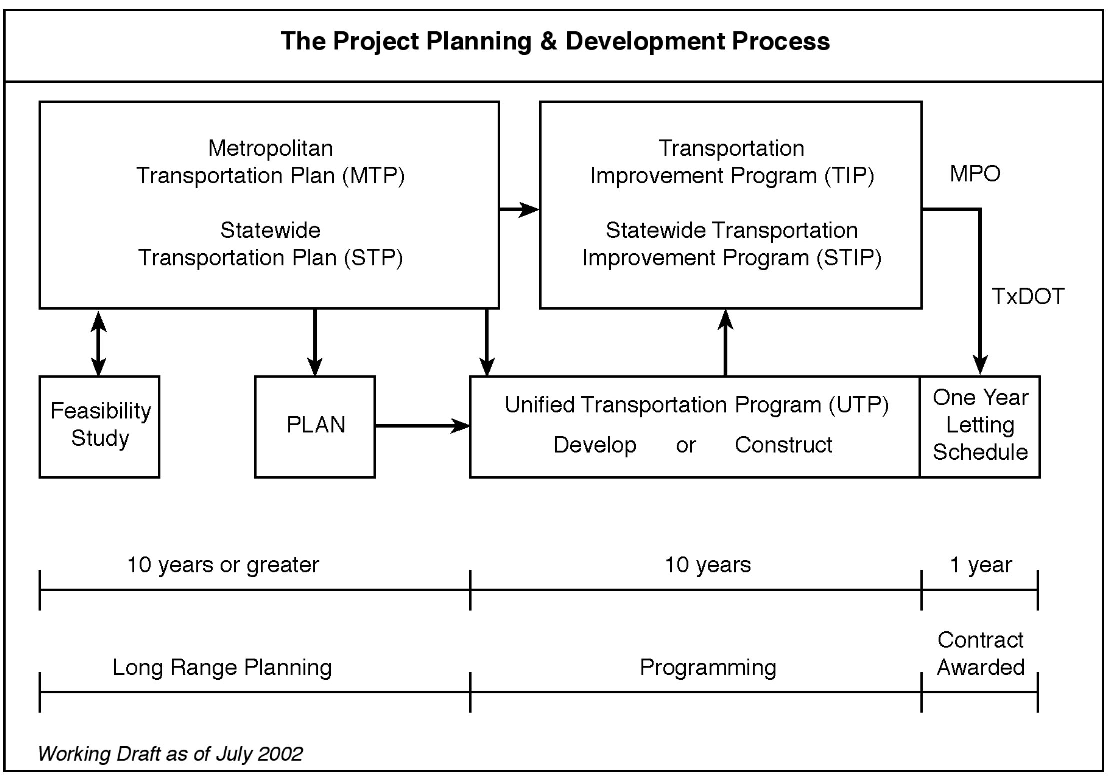


Figure 3.2 TxDOT Project Development Process

The planning phase consists of activities during the 10- to 20-year time frame when projects are considered to be in the initial stages of development. Planning status is reserved for projects with high capital costs where the route studies, environmental impact concerns, and right-of-way considerations can take a substantial amount of time. It is worth noting that the PDP does not only fund new construction and expansion of state roadways, but also rehabilitation and maintenance of the state system.

The following seven factors—established as part of the Transportation Equity Act of the 21st Century (TEA-21)—apply to the "planning" process. The process should:

- support the economic vitality of the metropolitan area, especially by enabling global competitiveness, productivity, and efficiency;
- increase the safety and security of the transportation system for motorized and non-motorized users;
- increase the accessibility and mobility options available to people and freight;
- protect and enhance the environment, promote energy conservation, and improve quality of life;
- enhance the integration and connectivity of the transportation system across and between modes for both people and freight;
- promote efficient system management and operation; and
- emphasize the preservation of the existing transportation system.

Another key element of the planning process is the requirement that project information be made available for public review and comment. This requirement is specifically noted in Sections 134, 135, and 5303 of TEA-21 legislation, which specifies that "interested parties" must be provided a reasonable opportunity to comment on the state and metropolitan long-range transportation plans. It is important for prospective inland port developers to note that this stipulation now includes freight shippers and providers of freight transportation services in addition to public transit interests.

The programming phase is characterized by the Unified Transportation Program (UTP), which is essentially the State's 10-year financial plan for implementing transportation projects. The Texas Transportation Commission (Commission) and TxDOT use the UTP to guide and track proposed projects through detailed development and on to construction. The UTP is divided into two basic stages termed "develop" and "construction." During the develop phase, a TxDOT District is authorized to prepare construction plans and acquire the necessary rights of way. During the construction phase, the construction plans are finalized, utility adjustments are made, and a construction contract (i.e., authorization for the project to be "let") is awarded.

3.3 FUNDING CATEGORY STRUCTURE

An important component of the UTP is the funding categories that help guide the financial planning activities. The Texas Legislature requested during its last session that the Commission consider a simplified procedure for the PDP. In response to this request, the thirty-four previous "funding categories" are being reduced and/or restructured to a proposed twelve categories. An overview of the proposed funding categories (a working draft as of July 2002) is illustrated in Figure 3.3. A complete explanation of these new funding categories is included in Appendix A.

1 Preventive Maintenance & Rehabilitation

2	IM
3C	NHS Rehab
4F	STP-Rehab
7	Preventative Maintenance
8A	FM/RM Rehab
10A	Traffic Control Devices
10B	TMS Rehab
14	State Rehab

2 Metropolitan Area (TMA) Corridor Projects

1	High Priority Interstate Corridors
3A	NHS- Mobility

3 Urban Area (Non-TMA) Corridor Projects

3B	Trunk System
3D	NHS- TMS

4 Statewide Connectivity Corridor Projects

8B	FM/RM New Locations
13A	State Mobility
13B	Hurricane Evacuation
13C	NAFTA Discretionary
13D	Urban Street Program
15	High Priority Projects
17	PASS Metro Match
18	Toll Projects

5 CMAQ

5	CMAQ

6 Consolidated Structure Rehabilitation

4G	STP-RRGX
6A	Bridges-On
6B	Bridges-Off

7 Metro Mobility

7	Metro Mobility

8 Safety

8	Safety

9 Enhancements

9	Enhancements

10 Miscellaneous

9	State Park Roads
16	Miscellaneous

11 District Discretionary

11	District Discretionary
3E	NHS- Miscellaneous
4D	STP- UM
4E	STP- RM

12 Strategic Priority

12	Strategic Priority

Figure 3.3 New Funding Category Structure (As of July 2002)

Project selection within these funding categories is accomplished utilizing various criteria. For example, mobility projects consider cost, traffic volume, roadway capacity, and other factors to evaluate the relative cost effectiveness of prospective improvements. Similarly, safety projects are evaluated considering factors such as accident rate, traffic volume, cost, and accident reduction factors. Rehabilitation projects are assessed based upon current pavement condition, traffic volume, and percent trucks among other factors. The funding allocation formulas are also in the process of being changed and/or otherwise refined.

Prospective inland port developers can increase the probability of securing funding for roadway projects, by:

- having a good, basic understanding of the TxDOT PDP;
- providing information to TxDOT on the proposed inland port activities in a timely fashion;
- assisting in gathering essential information needed by TxDOT planners to include the identified inland port project needs in the PDP;
- providing (i.e., funding or donating) right-of-way required for the project; and
- entering into or creating joint partnerships to partially fund the roadway construction requested.

KellyUSA Road Funding

KellyUSA/Inland Port San Antonio has managed to access a number of these new categories to fund current and/or prospective infrastructure projects associated with the facility. As of August 2002, the Greater Kelly Development Authority received roadway improvement funds for General Hudnell Drive (leading into KellyUSA) from “Category 9—Enhancement funds.” KellyUSA is also in the process of acquiring funds from “Category 7—Metro Mobility funds.”

Funding for the Kelly Parkway Project will eventually be sought from “Category 12—Strategic Priority funds.” The Parkway will also be eligible for funds from “Category 2—Metro Corridor Projects,” possibly “Category 4—Statewide Connectivity Corridor Projects” and/or “Category 11—District Discretionary funds.” The allocation and administering of these latter categories are yet to be approved. Conceptually, however, all of these categories are potential sources of funding for the Kelly Parkway Project.

It is evident from the KellyUSA example that prospective inland port developers might have access to a variety of state funding categories. It is thus both valuable and important for developers to be familiar with the TxDOT PDP and funding options, and to communicate early and often with the appropriate regional TxDOT staff.

3.4 CONCLUDING REMARKS

Prospective inland port developers are encouraged to become familiar with the TxDOT PDP. While it is not required to demonstrate a detailed understanding of the entire process, it is vital for those proposing inland port highway connections to understand that the PDP is a legally established process, which TxDOT planners use to evaluate competing project proposals throughout the region and state.

The information outlined in this chapter provides a broad overview of the PDP and the current status of the UTP. Interested parties are encouraged to visit the TxDOT web site or contact the regional TxDOT District Office for more detailed information.

4. Critical Investments and Support Required for Inland Port Development

Many entities promoting specific sites currently claim inland port status. These sites tend to vary in physical design, philosophy, institutional and organizational strategies, and ownership. This chapter attempts to provide a general model to describe the development phases of an inland port. The first year report distinguished five phases, analogous to the product life-cycle concept used in marketing studies. The current study builds on the first year report and elaborates critical investments/activities required for an inland port to move from phase 1 (preparation) to phase 5 (decline or innovation that results in transport driven communities), and the level of TxDOT support that can be expected at each phase of the inland port life cycle (see Figure 4.1).

It is important to realize at the outset that the boundaries between different phases tend to be somewhat vague. At the same time, the sequence and exact investments/activities that occur in each phase may vary, depending on the characteristics of the site. In this regard, a Brownfield site, such as an old military air force base, might already have certain infrastructure and critical multi-modal assets in phase 1. Also, the phases of project development in TxDOT are not necessarily sequential, and often overlap for critical projects. Consequently, the development of an inland port should be viewed as a long-term prospect. It can literally take half a decade or more to move from phase 1 to 2.

4.1 PHASE 1: PREPARATION

4.1.1 Inland Port Developer

Marketing and Implementation Plan

The first critical activity for the developers of an inland port is to compile a marketing and implementation plan. The plan should define the goals and objectives of the inland port over the short, intermediate, and long term. In other words, the plan needs to define the direction toward which all marketing efforts would be targeted. An inland port will not achieve success without a clear direction and without marketing, funding, and community outreach initiatives. This marketing plan is also critical to demonstrate the benefits of locating at the inland port to potential anchor tenants initially, but also subsequently to prospective ancillary businesses.

Market Analysis

The marketing plan should contain a detailed market analysis, including demand forecasts and commodity-origin-destination type analyses. The Lynxs Group, for example, examines the Standard Industrialized Codes (SIC) of frequently shipped items in a proposed region when considering where to locate an air cargo facility. The top 20 codes shipped by air are examined to determine if supply exists in the region and the potential for increases in supply. It is quite possible that differences exist among the various classes of inland ports in terms of commodities, volumes, and modal preferences. In the case of

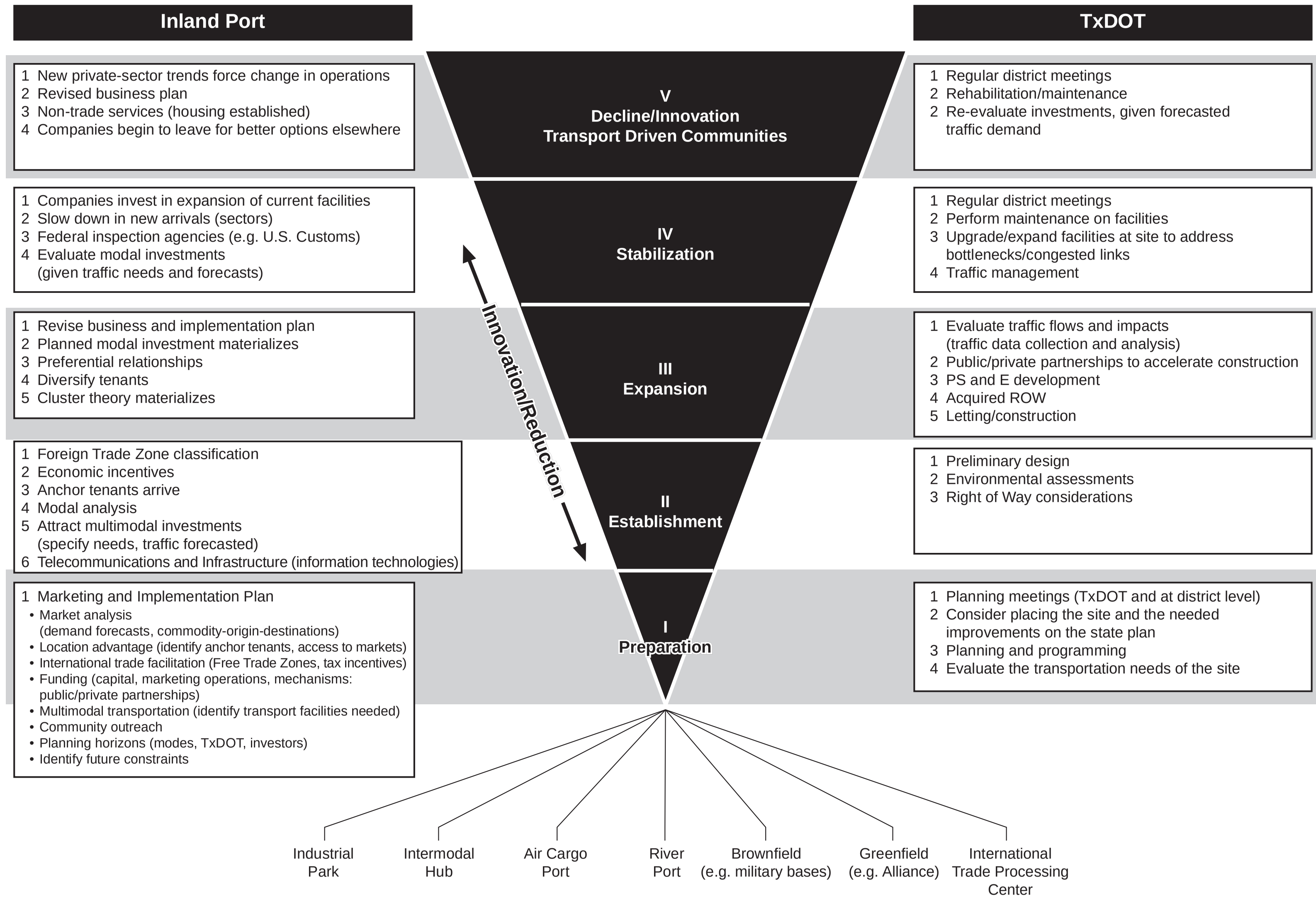


Figure 4.1 Development Life cycle of Inland Ports

inland river ports, some evidence suggests that mostly bulk commodities (i.e., steel and coal) are transported by barge and rail at these ports. While in the case of inland international trade and processing centers, containers and higher-valued commodities are mainly transported by truck.

Locational Advantage

The marketing plan should stress the locational advantage of the inland port to potential tenants. Locational advantage can take the form of favorable zoning/site classification, as well as access to existing markets in terms of large metropolitan areas (existing demand), NAFTA trading partners, potential shippers, skilled labor, or even transport access to the site (for example, whether located close to existing transportation infrastructure, such as priority highway corridors). In a paper by Anderson, Eley, and Schroeer (2001), it was stated that transportation access is one of the most important considerations for firms when evaluating new site locations. Although the importance of transportation seems to vary depending on the business, it was consistently found that transportation access is rated as the most important site selection factor. For manufacturing firms, transportation access was reported to be the most important site selection criteria, followed by "customer proximity, government support, access to labor, and real estate costs" (Anderson, Eley, and Schroeer, 2001).

Foreign Trade Zone Status

At a minimum, the marketing plan should stress the intention of the inland port to have Foreign Trade Zone (FTZ) status and U.S. Customs officials on-site to provide potential anchor tenants with an incentive to locate at the inland port. The availability of tax incentives to attract potential tenants should also be explored.

Funding (capital, operations, mechanisms)

Prospective inland port developers should assess the potential of government (i.e., public policy initiatives) and private business to invest in the infrastructure required for the successful development of the inland port. Inland port developers need to explore how to obtain access to economic development funds earmarked for employment creation projects, special tax incentives, and government financing programs. The implementation of public-private infrastructure improvements should be explored and encouraged early in the process.

Transportation Assets

Transportation planners will be interested in the transportation assets and the potential traffic impacts of the inland port at each phase of development (see Figure 4.2). The marketing and implementation plan should include an analysis of current rail, highway, and transportation facilities serving or nearby the proposed inland port site. Major routes, operators (such as rail, truck, and airline companies), and terminals should be identified, as well as the characteristics of these routes, operators, and terminals. In this regard, the capacity of the highways, rail lines, and runways are particularly important. An initial analysis of the shipping patterns of potential types of anchor tenants and ancillary businesses should also be included in the marketing plan (Cambridge Systematics Inc., 1994). An understanding of the transportation infrastructure investment requirements is necessary to determine whether the foreseen investments are within the funding capacity of the state and the development time frame of the inland port. This will be critical to the eventual success of the inland port.

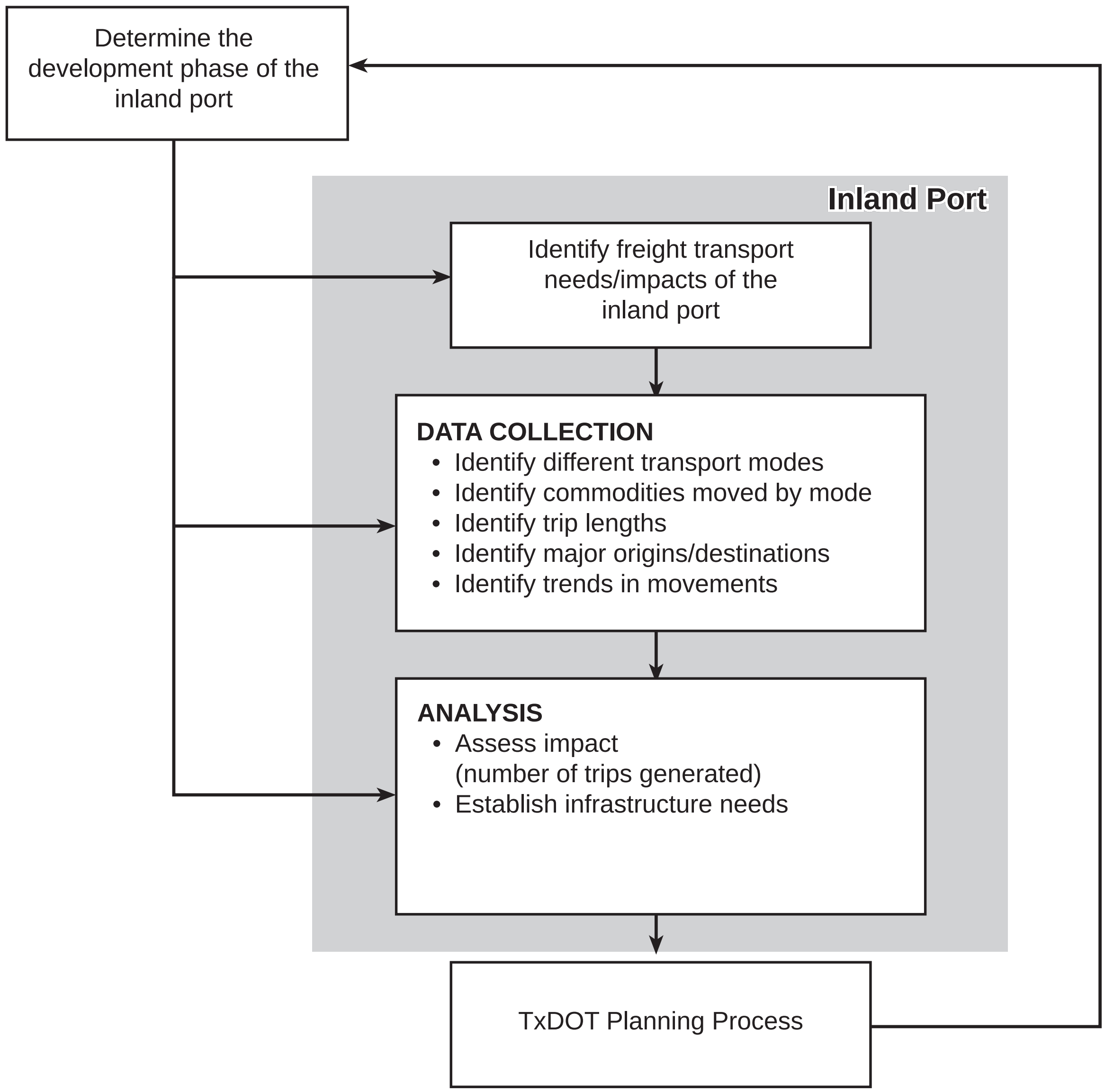


Figure 4.2 Transport Considerations in Different Inland Port Development Phases

Community Outreach

Community outreach in the development phase is critical. It is very important that an inland port acquires community and institutional support, including the support of neighboring residents, shippers, transportation modes, the business community, local institutions, and the state. Local development agencies and communities will be interested in the number of employment opportunities anticipated in transportation and related sectors, the increase in business, and the potential benefits to companies in the region (Cambridge Systematics Inc., 1994).

Planning Horizons

It is essential that the marketing plan includes perceived planning horizons and implementation steps, specifically the timing, scale, and expansion of existing and planned facilities. The planning horizons and implementation steps will be important for private sector modes (i.e., rail), TxDOT (i.e. access roads and highway improvements), and private investors (i.e., anchor tenants, logistics, and support services) to ensure that public investments are coordinated with developments undertaken by the private sector.

Future Constraints

The earlier the required road investments and future constraints on modal expansion are identified, the higher the probability of finding a timely resolution. Land use and development plans for expansion of the inland port, for example, should indicate the constraints imposed by nearby residential and commercial activities (Cambridge Systematics Inc., 1994). Night flight restrictions and constraints in terms of all weather landing capability might also become increasingly important as the inland port develops.

4.1.2 TxDOT Support

Planning Meetings

Local governments and civic organizations, as well as the general public, all have an input in transportation decisions. Inland port planners are advised to establish early contact with the local (Metropolitan Planning Organization) MPO to understand current planning efforts, and to coordinate their plans with MPO plans.

Evaluate the Transportation Needs of the Site

TxDOT district staff will initially estimate the project needs and scope once an inland port proponent identified desired links to the existing transportation system. Each solution can be identified as a project, e.g., an existing segment needs additional lanes, or an overpass is needed to eliminate truck conflicts. At this point, TxDOT staff will determine whether additional studies are required, e.g., a feasibility study or a major investment study.

Consider Placing the Project on the State Plan

TxDOT's Transportation Planning and Programming Division (TPP) requires that the district do an assessment of compliance with local transportation plans, as well as expected benefits and local support before placing the site and needed improvements on the state plan.

Planning and Programming

Projects that compete for state funds must be approved by TPP as Long Range Projects (LRP) in the Unified Transportation Plan (UTP), or they must be approved by the

Texas Transportation Commission Minute Order (MO). TxDOT district staff will review feasibility studies, route studies, corridor studies, major investment studies, and environmental documentation of the proposed and competing projects before including a particular project on the state plan.

4.2 PHASE 2: ESTABLISHMENT

4.2.1 Inland Port Developer

Foreign Trade Zone Classification

Foreign Trade Zone Classification must be secured early in the development of the inland port to attract anchor tenants involved in international trade and value-added services.

Economic Incentives

AllianceTexas offers a range of economic incentives to tenants in addition to Foreign Trade Zone Classification, i.e., Enterprise Zone classification, and Freeport tax exemptions. A portion of AllianceTexas falls within the North Fort Worth Enterprise Zone, which was designated in 1997 and expires September 1, 2004. As an Enterprise Zone, AllianceTexas receives various state and local economic incentives to create jobs and promote capital investment. AllianceTexas also offers triple Freeport tax exemption, which translates into all three primary taxing jurisdictions — school, city, and county — honoring the 175-day inventory exemption. The Freeport tax exemption is the highest level of inventory tax exemption available (Development, 2001).

Anchor Tenants Arrive

It is critical to the success of the inland port that certain anchor tenants are convinced to locate at the site very early in the port development process. AllianceTexas's major tenants operating large regional, national, or global warehouse distribution centers include: General Motors, Georgia Pacific, Hewlett-Packard, Honeywell, Nestlé, Nokia, Randall Foods, and Zenith.

Detailed Modal Analysis

Before considering roadway investments, a detailed modal analysis has to be undertaken. Transportation planners will be interested in how potential tenants will transport goods to and from the inland port, the commodity types, their origins and destinations, transportation characteristics (in terms of cost, speed, reliability and frequency of service), and the tons/volumes of freight handled by rail, truck, and air. These volumes will have to be forecasted in terms of daily numbers of originating and terminating trips by mode (rail, truck, and air). Finally, anticipated infrastructure investments (i.e., improvements to access roads and thoroughfares, bridges, traffic management systems) need to be determined by comparing the capacity of current transportation facilities with the projected demand at each phase of the development process (Cambridge Systematics Inc., 1994). Although good road access to major routes and highways are critical, community opposition can be expected if increasing truck traffic is diverted through residential areas.

Attract Multi-Modal Investments

By definition, access (and thus, multi-modal transportation assets) is considered a critical investment requirement for inland ports. The need for multi-modal capabilities in the form of highway, rail, air, and/or waterway access is critical.[2] To ensure the successful development of the prospective inland port, it is essential that agreement be reached in terms of the required multi-modal investments and infrastructure improvements required. This will ensure coordination between the timing of the multi-modal investments and the increase in inland port activity. Alignment decisions and location of new highways or major road investments can, however, only be motivated after considering traffic volumes, construction costs (including interchanges), environmental impacts, and inducement to development. At a minimum, the road right-of-way considerations should be addressed and approval for right-of-way acquisition should be secured during this phase. Agreements should also be reached with the railways responsible for the planning and/or expansion of new rail facilities.

Aviation facilities and infrastructure are usually available at ex-military bases, such as KellyUSA and Rickenbacker International Airport. Only minimal modifications or improvements are usually required to the runways, taxiways, air traffic control, and other airport facilities to accommodate commercial operations. In general, the existing air infrastructure is adequate to accommodate the short-term air cargo needs of the inland port.

Telecommunications and Information Technology

Since electronic means of information exchange (i.e., Electronic Data Interchange) are becoming more important in the facilitation and promotion of trade, an inland port must invest in electronic resources to facilitate trade. Optimum telecommunications connectivity requires investments in power and fiber optic connectivity.

4.2.2 TxDOT Support

Preliminary Design

The preliminary design phase includes:

- project staffing or consultant hiring;
- property ownership and utility data determination;
- analysis of need for agreements and contracts (funding, railroad, utilities, right-of-way, right-of-entry, Corps of Engineers, cultural resources, etc.);
- development of surveys, photogrammetry, mapping, geotechnical data, hydraulic studies, traffic data;
- preparation of typical section and pavement design;
- delineation of route alternatives and cost estimates for each; and
- preparation of preliminary schematics/ right-of-way needs/ utility impacts.

[2] Transportation assets, although critical, are not sufficient to the success of an inland port.

Environmental Assessments

Analysis of the emissions generated by traffic and impacts on the environment is needed. This is of particular concern in non-attainment and near non-attainment areas (regions that are not meeting Federal air quality standards). In addition, congestion impact analysis is necessary. Environmental assessment includes:

- assessment of environmental impact (land use, socioeconomics, biological species, wetlands, hazardous materials, historic sites, landscaping, aesthetics, noise, etc.);
- public involvement (advertising, locations, exhibits, presentations, recording, documentation and response);
- environmental mitigation plan; and
- environmental approvals (through TxDOT Environmental Affairs Division).

Right-of-Way Considerations

Before right-of-way (ROW) acquisition can be approved, the following considerations need to be addressed:

- ROW mapping/ property descriptions/ permits;
- ROW title reports/ appraisals;
- ROW hardship, and protective purchases;
- ROW donations and uneconomic remainders;
- ROW negotiations and condemnations;
- ROW relocations, demolitions, and sell-offs;
- utility relocations; and
- agreements with the railroad, if required.

4.3 PHASE 3: EXPANSION

4.3.1 Inland Port Developer

Revise Business and Implementation Plan

Different aspects of the marketing and implementation plan (especially the market and transportation analysis, funding options, and planning horizons) need to be revisited in light of the developments in phases 1 and 2 at the inland port site. During the expansion phase, special emphasis should also be placed on nurturing continued dialogue and coordination among current and potential tenants, governmental agencies (e.g., TxDOT) and other institutions (e.g., Trade Councils).

Planned Modal Investment Materializes

During the expansion phase the planned modal investments need to materialize. Multi-modal options benefit tenants because they can select the mode or combination of modes that best meet their specific requirements in terms of cost, speed, and reliability of service.

Multi-Modal Options At Alliance

AllianceTexas provides access to three modes of transport: rail, air, and truck. On the western border of Alliance, Burlington Northern Santa Fe (BNSF) operates a 735-acre "intermodal" rail yard where containers can be loaded, unloaded, or transferred between rail and truck. The facility handles approximately 40,000 containers per month for companies such as Daimler-Chrysler, Japans, Michael's, Hyundai, and Kea. JCPenny distributes merchandise to 1,200 retail stores from its distribution center near the BNSF intermodal yard. Union Pacific's tracks run along Alliance's far eastern border near Roanoke. Rail sidings serve companies such as DSC Logistics and Nestlé, but most of Union Pacific's AllianceTexas traffic is routed through the BNSF intermodal yard. Fort Worth AllianceTexas Airport is near the center of the park. The airport has two runways: currently 8,200 and 9,600 feet in length. On-site U.S. Customs offices reduce clearing times for international flights. Major highway routes include IH-35 and State Highways 170 and 114. IH-35W runs north-south and bisects Alliance. State Highway 114 provides direct access to DFW International Airport. Travel time between AllianceTexas and the DFW airport is estimated at about 20 minutes (Development, 2001).

Preferential Relationships

To expand business at the inland port, preferential relationships with the coastal ports or major ocean carriers should be considered. KellyUSA and the Port of Corpus Christi are exploring the feasibility of KellyUSA being the inland port for Corpus Christi. The objective of these relationships is to expand traditional port facilities by providing fast, reliable, and efficient transportation services between the traditional port and the inland port—thereby strengthening the inland port concept.

Diversify Tenants

Ancillary companies supplying anchor tenants and support or service companies, such as third-party logistics[3] companies, should find it efficient to locate at the inland port once the anchor tenants arrived. Typical tasks conducted by third-party logistics companies include: warehousing, distribution, packaging, and even assembly. Services might also include training and conference facilities. AllianceTexas provides a number of

[3] Third-party logistics companies at AllianceTexas include DSC Logistics, Ryder System, Inc., Trans-Trade, Inc., UPS Logistics and Value and Service Logistics (Development, 2001).

educational and technical training programs, at the AllianceTexas Opportunity Center, for employees of companies located at AllianceTexas. Services that facilitate international and domestic trade (such as insurance companies, financing institutions, accounting firms, law firms, international trade consultants, translation firms, freight forwarders, transportation consultants, customs brokers, specialty air services, specialized warehousing/distribution services) will add to the attraction of the inland port.

Ancillary Firms at AllianceTexas

At least five ancillary businesses located at AllianceTexas provide goods and services to one of AllianceTexas's anchor tenants, Nokia:

- *InteSys Technologies* produces plastic and metal-engineered assemblies;
- *Perlos* provides exterior parts;
- *Savcor Coatings* applies metal coatings to plastic parts;
- *Triple S Plastics* provides injection molding; and
- *Norampac* provides the final packaging for Nokia's cellular phones (Development, 2001).

Cluster Theory Materializes

By diversifying inland port tenants, the cluster theory materializes with benefits in terms of economies of scale and improved supply chain management.

4.3.2 TxDOT Support

Evaluate Traffic Flows and Impacts

Inland port projects will usually involve capacity improvements, which require traffic projections. TxDOT uses various tools for forecasting traffic over a 20-year horizon, and for modeling the traffic impacts of proposed improvements. Transportation planners will be interested in the number of trips generated. Inland port proponents are advised to estimate traffic volumes generated, but this information needs to be translated into a comprehensive assessment of initial and future traffic impacts on the TxDOT system.

Public-Private-Partnerships to Accelerate Construction

Identifying funding sources, including public-private-partnership (PPP) funds, would give desired projects a head start. As stated earlier, inland port developers can enhance the success of their prospective projects by donating right-of-way needed for the project or by entering into PPP that partially fund the desired roadway construction.

Plans, Specifications, and Estimates (PSE)

Once a particular project is authorized, a detailed construction cost estimate that includes engineering costs must be prepared. The development of plans, specifications, and estimates entails:

- final surveys;
- final schematics;
- permits and agreements;
- alignment, cross-sections, earthworks, bridge layouts;
- drainage design;
- construction traffic control plan;
- signage, striping, illumination;
- miscellaneous structures and details;
- quantities, estimates, specifications; and
- plan assembly and review.

Acquired Right-of-Way and Letting/Construction

Depending on priorities, a project may be authorized for design activities (PSE) and right-of-way acquisition, or may be authorized to proceed to construction. In the latter case it enters the letting schedule, which entails:

- contract letting/award;
- traffic control;
- environmental measures;
- earthworks;
- structures;
- pavement;
- signs; and
- landscaping.

4.4 PHASE 4: STABILIZATION

4.4.1 Inland Port Developer

This phase of inland port development is characterized by companies investing in the **expansion of current facilities** and **a slowdown in new arrivals**.

Federal Inspection Agencies

At this stage, a successful inland port development would reach volumes that warrant onsite U.S. Customs. It is thus critically important that inland port technology investments can interface with the systems developed by U.S. Customs to ensure expedited electronic clearance of in-bond shipments at border and other traditional ports of entry. State-of-the-art technology includes:

- technologies that automatically identify a carrier, vehicle/train, driver/engineer, and the cargo at the traditional ports of entry;
- clear transponder-equipped vehicles/trains;
- electronic seals; and
- shipment and vehicle tracking technologies that track the movement of the shipment to be cleared inland.

Evaluate Modal Investments

During the stabilization phase, the inland port developer should review available modal infrastructure to determine if improvements for meeting current demand and projected growth are required. It can be expected that expansion of rail terminals and tenants' warehouses and distribution facilities will be undertaken by the private sector. Road widening, rehabilitation and maintenance; bridge replacement; and expansion of air cargo facilities will be undertaken by the public sector or through public-private partnerships. At this stage, it is foreseen that additional capacity, such as widening of existing major roads, might be required to ensure continued, viable truck access as cargo activity increases and development continues.

4.4.2 TxDOT Support

TxDOT support during this phase will be limited to:

- regular district meetings;
- maintenance on the built facilities;
- upgrade facilities to address bottlenecks/congested links; and
- traffic management.

4.5 PHASE 5: DECLINE/ INNOVATION

4.5.1 Inland Port Developer

Revised Business Plan

During this phase, the business plan needs to be revised in anticipation of how **changes in private sector trends** will impact the development and future operations at the inland port.

Non-trade Services

Innovation can include developments in real estate, which benefit workers, at the facility. AllianceTexas's golf courses at Circle T Ranch and the residential community of Park Glen are examples of such innovations.

Companies Begin to Leave for Better Options Elsewhere

Given a lack of innovation and accommodation of new private sector trends, tenants will start to leave for better options elsewhere.

4.5.2 TxDOT Support

During this phase, TxDOT support can include:

- regular district meetings;
- rehabilitation/maintenance of built facilities; and
- the evaluation of required investments given forecasted traffic demand.

4.6 CONCLUDING REMARKS

The expected development pattern of inland ports is important to both the public and private sector. Characterization of the various phases of the development pattern can provide the basis for developing strategies by TxDOT to facilitate inland ports or to mitigate potential freight transportation system impacts.

5. NAFTA Trade and the Potential Impacts on Inland Port Locations

The dramatic growth in trade between the U.S. and Mexico from 1977 to 2001 (an increase in U.S. exports and imports from $4.82 billion to $101.51 billion and from $4.77 billion to $131.43 billion, respectively) has focused significant attention on the potential impacts of this trade on the Texas transportation system. Public advocacy groups in Mexico and San Antonio have seen the development of highway trade corridors, and inland ports along these corridors, as an opportunity for economic development. The objective of this chapter is to provide a brief analysis of the trade between the U.S. and Mexico, to define the U.S.-Mexico trade corridors in Texas and Mexico, and to discuss the potential development of inland ports along these corridors, specifically in Mexico and San Antonio. A detailed review of the available U.S.-Mexico trade data, source, usefulness, and reasons for selecting particular data are provided in Appendix B.

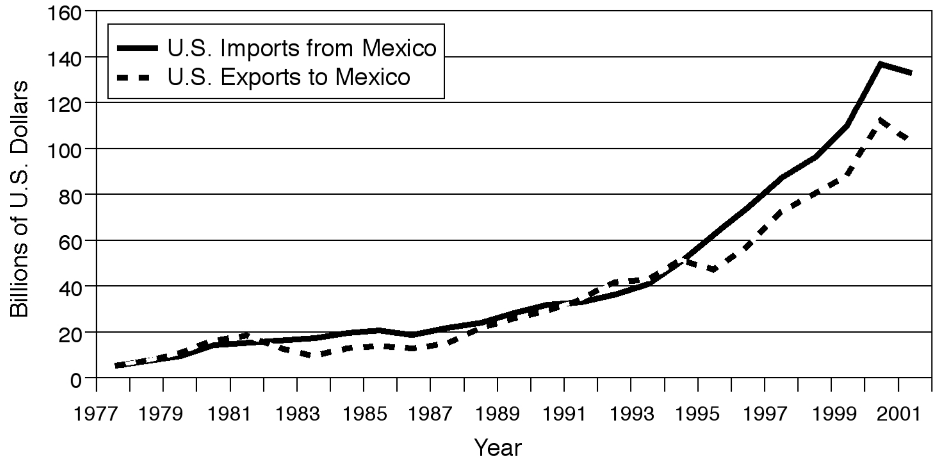
5.1 NAFTA TRADE

5.1.1 U.S.-Mexico Trade Growth

There has been growing concern over the past 16 years about the impacts of increased U.S.-Mexico trade on the Texas transportation system. Before 1986, Mexico had a policy of import substitution, which included high tariff barriers, difficult to obtain import permits, and severe restrictions on foreign investment. This policy was due in part to an abundance of oil that was exported to acquire the necessary foreign exchange and to protect the Mexican economy. When world oil prices dropped in 1981 and 1982, Mexico's oil exports could not generate the foreign exchange levels that it generated prior to the 1980s. Mexico was thus forced to devalue its peso. This devaluation resulted in U.S. products becoming relatively expensive and, as can be seen in Figure 5.1, U.S. exports to Mexico fell from $17.79 billion in 1981 to $9.08 billion in 1983, and did not exceed 1981 levels again until 1988.

Mexico subsequently abandoned the policy of import substitution and initiated policies to encourage competitive manufacturing and exports. In 1986, Mexico joined the General Agreement on Tariffs and Trade (GATT)—now called the World Trade Organization (WTO). The GATT/WTO required Mexico to reduce tariffs and remove other trade barriers (including import permits), which stimulated U.S.-Mexico trade growth. As can be seen from Figure 5.1, U.S. exports increased from $12.39 billion in 1986 to $33.28 billion in 1991, while U.S. imports increased from $17.56 billion to $31.89 billion during the same period. Trade growth was further stimulated by the negotiations and implementation of the North American Free Trade Agreement (NAFTA) on January 1, 1994, further reducing tariffs and other trade restrictions between the U.S. and Mexico.

Another important development that translated into increased U.S.-Mexico trade was the growth of the maquiladora factories in Mexico. Seventy percent of the maquiladora factories are located in the northern border states of Mexico. These factories primarily use U.S. components to manufacture products, which are imported back into the U.S. Employment in these factories grew dramatically from 119,546 in 1980 to 1.3 million at the end of 2001. By March of 2002 maquiladora employment has fallen to 1.1 million. This is largely symptomatic of a decrease in trade between 2000 and 2001. During this period, U.S. exports decreased from $111.72 billion to $101.51 billion, a 9.14 percent decrease. U.S. imports from Mexico also reduced marginally from $135.43 billion to $131.43 billion—a 3.3 percent decrease.



Note: Between 1977 and 2001, average annual growth of U.S. exports and imports were 15.6 % and 15.44 %, respectively.
Source: U.S. Department of Commerce (Data provided in Appendix C)

Figure 5.1 U.S.-Mexico Trade (1977–2001)

5.1.2 U.S.-Mexico Trade by Mode of Transportation

While the growth of U.S.-Mexico trade is important for transportation corridor and inland port planning, the mode used is also significant. Table 5.1 compares U.S.-Mexico trade by transportation mode for 1994[4] with 2001. It is evident from Table 5.1 that, although the value of trade transported by all modes increased dramatically, modal shares changed between 1994 and 2001. During this period, the value of truck export shipments increased from $41.95 billion to $78.5 billion, but truck export modal share decreased from 82.5 percent to 77.4 percent. Truck transport, however, remained the dominant mode for export trade crossing the U.S.-Mexico border. Rail exports increased from $4.16 billion to $10.39 billion—resulting in an increased modal share from 8.2 percent to 10.3 percent. Sea and air exports also increased significantly: from $2.09 billion to $5.9 billion and from $2.65 billion to $6.71 billion, respectively.

A similar trend is evident for U.S. imports from Mexico. Although truck import shipments increased significantly from $35.82 billion to $89.81 billion, truck import modal share decreased from 72.4 percent to 68.3 percent. Rail imports, on the other hand, gained significantly in shipment value and modal share—a $15.72 increase in shipment value that resulted in a modal share increase from 12.8 percent to 16.8 percent. The value of air imports increased by 360 percent between 1994 and 2001, resulting in an increased modal share from 2.3 percent to 4.0 percent.

[4] The first year in which mode values became available for truck and rail.

Table 5.1 1994 and 2001 U.S.-Mexico Modal Trade

1994 Estimated Dollar Value of U.S.-Mexico Trade by Mode of Transportation				
	U.S. Exports to Mexico ($ billion)	**% of Total Exports**	**U.S. Imports from Mexico ($ billion)**	**% of Total Imports**
Truck	41.95	82.5	35.82	72.4
Rail	4.16	8.2	6.34	12.8
Sea	2.09	4.1	6.18	12.5
Air	2.65	5.2	1.15	2.3
Total	*50.84*	*100.0*	*49.49*	*100.0*
2001 Estimated Dollar Value of U.S.-Mexico Trade by Mode of Transportation				
	U.S. Exports to Mexico ($ billion)	**% of Total Exports**	**U.S. Imports from Mexico ($ billion)**	**% of Total Imports**
Truck	78.54	77.4	89.81	68.3
Rail	10.39	10.3	22.06	16.8
Sea	5.88	5.8	14.27	10.9
Air	6.71	6.6	5.29	4.0
Total	*101.51*	*100.0*	*131.43*	*100.0*

Source: U.S. Department of Commerce and Bureau of Transportation Statistics

5.1.3 U.S.-Mexico Trade by Major Texas Border Ports

In 1994, $67.85 billion in U.S.-Mexico trade crossed the Texas border. By 2001 this figure had increased to $155.58 billion, representing an increase in the Texas share of U.S.-Mexico trade from 76.9 percent in 1994 to 77.5 percent in 2001. This is largely attributable to the increase in trade crossing the two dominant Texas border ports of entry: Laredo and El Paso. In 2001, 41.2 and 19.1 percent of all U.S.-Mexico trade crossed at Laredo and El Paso, respectively. A detailed analysis of U.S.-Mexico trade by border state is provided in Appendix D.

Four ports on the Texas-Mexico border have both rail and highway connections to Mexico: Laredo, El Paso, Brownsville, and Eagle Pass. Laredo is the largest multi-modal port on the Texas border. In 2001, the value of exports crossing at Laredo amounted to $30.02 billion for truck and $6.34 billion for rail. In addition, the value of imports amounted to $28.52 billion for truck and $17.86 billion for rail. El Paso is the second largest multi-modal border port in Texas with $36.7 billion of truck trade and $ 1.6 billion of rail trade crossing the border in 2001. At Brownsville, truck trade amounted to $10.7 billion and rail trade to $736 million. In both El Paso and Brownsville, rail-transported trade accounts for a small fraction of the total. Total trade crossing at Eagle Pass in 2001 amounted to $6.9 billion, of which approximately $3.8 billion was transported by truck and $3.1 billion by rail. A detailed truck and rail trade modal comparison for all the Texas border ports are presented in Appendix E. The following section presents truck and rail modal comparisons for the four multi-modal border ports. Monthly U.S.-Mexico trade data for 1999, 2000, and 2001 are presented to illustrate the modal values and shifts. The impact of this trade flow on the Texas transportation infrastructure along prominent highway corridors is regarded significant.

Laredo

Over a 39-month period (January 1999 to March 2002), monthly exports by truck at Laredo have ranged from less than $2 billion in January 1999 to over $3 billion in August 2000. As shown in Figure 5.2, truck imports have ranged from less than $1.5 billion in January of 1999 to over $2.5 billion in both August and October of 2000. Truck exports and imports rose until October 2000, after which truck exports have twice fallen to below $2 billion per month. Imports, however, remained in the $2 to $2.5 billion per month range.

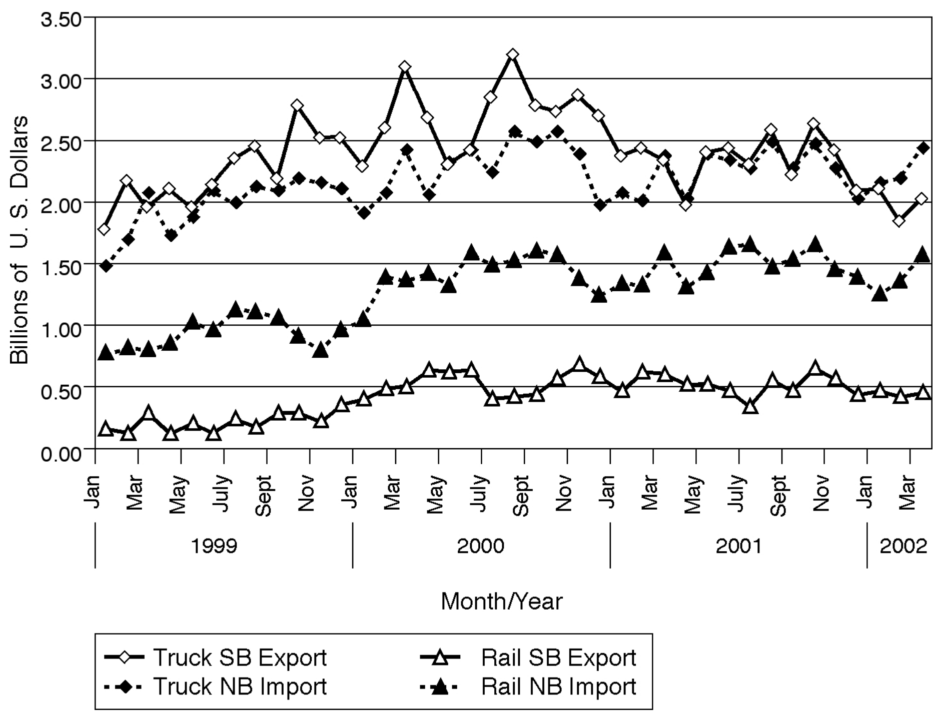


Figure 5.2 Laredo Truck and Rail Trade Flow

Rail exports at Laredo ranged from approximately $200 million in January 1999 to approximately $700 million in November 2000. Between November 2000 and March 2002, southbound rail export values remained relatively stable at approximately $500 million per month. Northbound rail values increased dramatically—from approximately $750 million in January 1999 to over $1.5 billion in July 2001. After mid-year 2000, rail imports fluctuated around $1.5 billion. Rail import values are now within about $500 million per month of truck export values at Laredo.

El Paso

During the period from January 1999 to March 2002, monthly truck export values at El Paso ranged from $900 million to over $1.8 billion in October 2000. Since October 2000, monthly truck export values have trended down to the $1.2 billion range. Truck imports have increased from $1.2 billion in January 1999 to $1.85 billion in October 2000. Since then truck import values have remained in the $1.6 billion per month range.

As shown in Figure 5.3, rail trade values (both imports and exports) have been significantly lower than truck import and export values at El Paso. From January 1999 until March 2000, rail trade values remained below $50 million per month. Since then, rail trade values have remained in the $50 million and $150 million ranges for exports and imports, respectively. It appears that, although southbound shipment values by truck have decreased, there had not been a succeeding rise in rail traffic values.

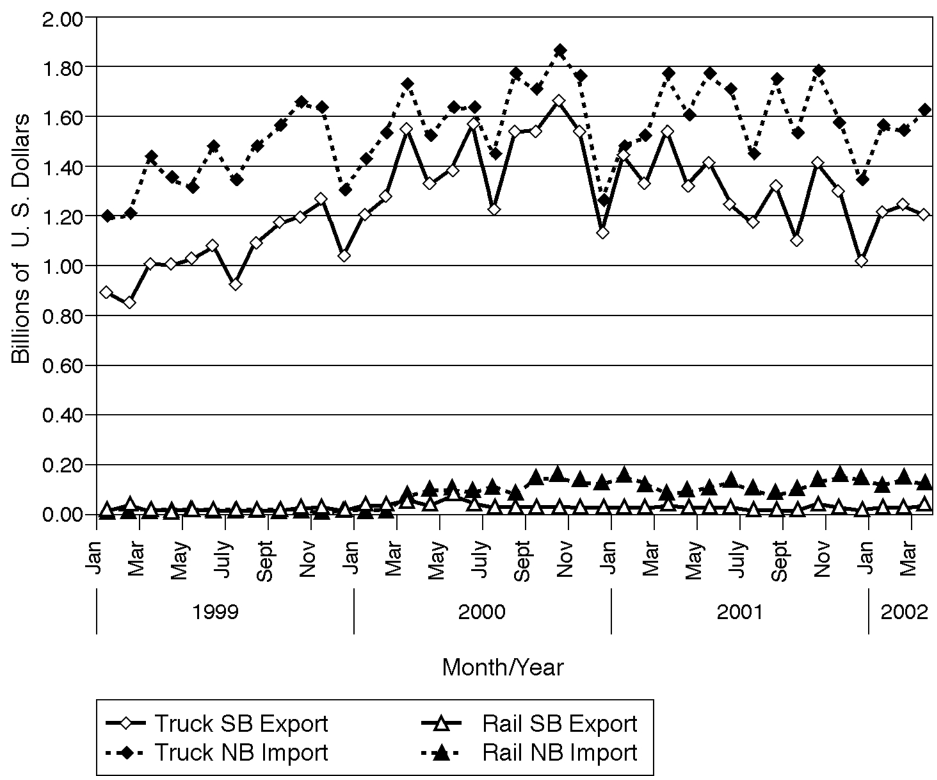


Figure 5.3 El Paso Truck and Rail Trade Flow

Brownsville

Although Brownsville is a multi-modal port, rail trade activity is very moderate — averaging approximately $60 million a month. Rail export values rose from about $20 million per month in January 1999 to a high of about $50 million per month in October 2001. Rail imports, however, remain low throughout the period, never exceeding about $30 million per month.

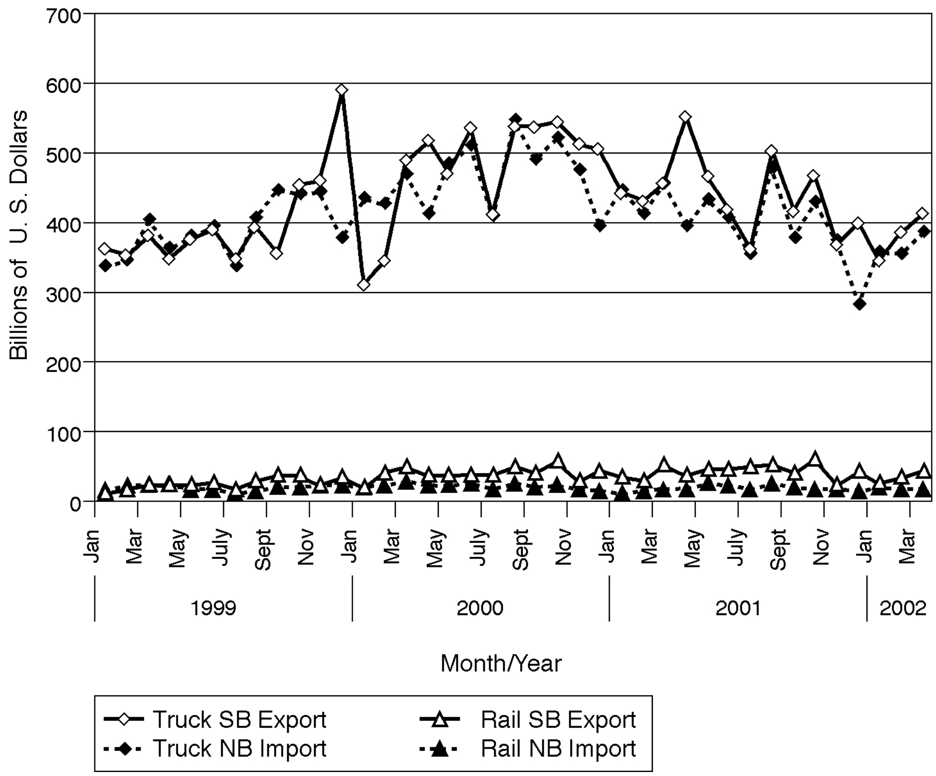


Figure 5.4 Brownsville Truck and Rail Trade Flow

As shown in Figure 5.4, truck export values range from a low $310 million in January 2000 to a high of nearly $600 million in December 1999. Truck import values range from a low $285 million in December 2001 to a high $550 million in August 2000.

Eagle Pass

As shown in Figure 5.5, southbound rail shipment values into Mexico at Eagle Pass increased from $130 million in January 1999 to over $250 million in March 2002. During the same period, northbound rail shipment values declined from $160 million to $40 million. This change in northbound and southbound rail values is the most dramatic directional shift experienced at any multi-modal port on the Texas border.

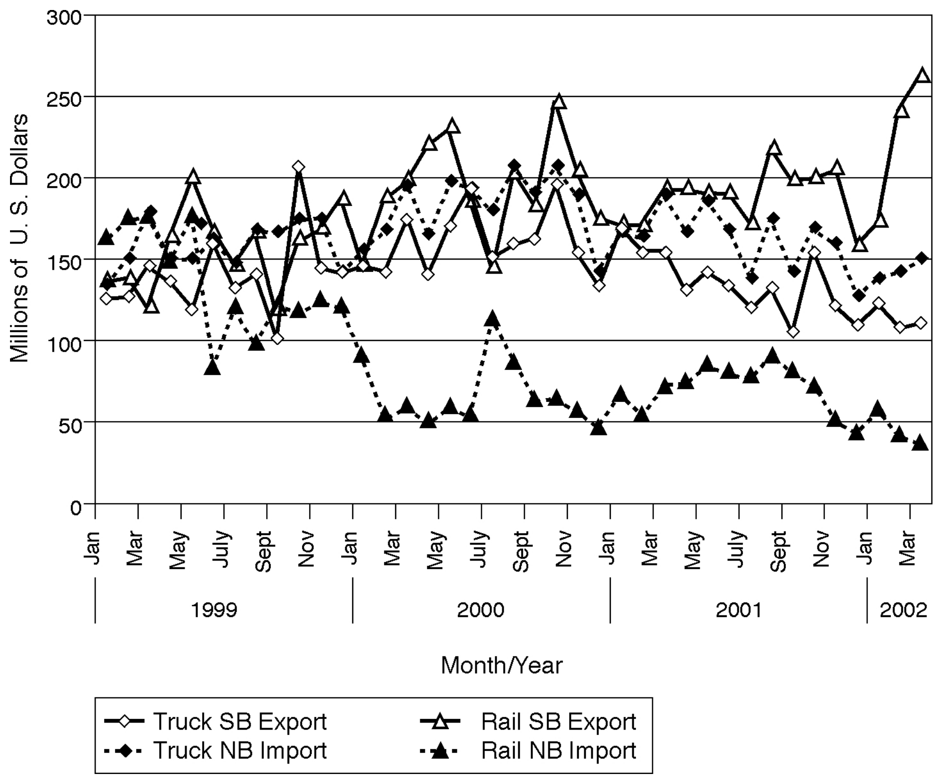


Figure 5.5 Eagle Pass Truck and Rail Trade Flow

Truck export values rose from $125 million a month at the beginning of the analysis period to a high of $205 million in October 1999, and subsequently declined to approximately $110 million by March 2002. Truck import values exhibit a similar trend, beginning in January 1999 at $130 million per month, increasing to over $200 million in October 2000, and ending the period at approximately $150 million a month.

5.2 TEXAS NAFTA TRADE CORRIDORS

Approximately 75 percent of the truck-transported U.S.-Mexico trade value entered the U.S. at a Texas border port of entry in 2001. This resulted in the development of well-defined truck highway corridors in Texas. The location of these corridors is determined largely by the geographical locations of population, manufacturing, and the highways connecting to the border ports. To determine the flow of U.S.-Mexico trade trucks along Texas highway segments, the following are required:

- Texas-Mexico trade information in terms of origins, destinations, border ports of entry, and Texas highways used;
- U.S.-Mexico trade information to or from other U.S. states flowing through Texas; and
- Locations where U.S.-Mexico trade enters or leaves Texas highways.

The U.S.-Mexico trade highway corridors in Texas defined in this report were established in earlier work of McCray (1998) and McCray and Harrison (1999). The corridors were defined using the national highway network (published by the Bureau of Transportation Statistics), a gravity model (with city regions in the U.S.), and TransCAD (a transportation analysis software package). The national highway network included all interstate and U.S. state highways. The gravity model included city regions that served as the origins and destinations for U.S.-Mexico trade entering through the border ports along the Texas-Mexico border. TransCAD was used to determine and display the number of U.S.-Mexico trade trucks on the Texas corridors. The U.S.-Mexico highway trade corridors in Texas are illustrated in Figure 5.6. Additional detail on the methodology used to develop the highway trade corridors and the calculation of truck density along certain highway segments is provided in Appendix F.

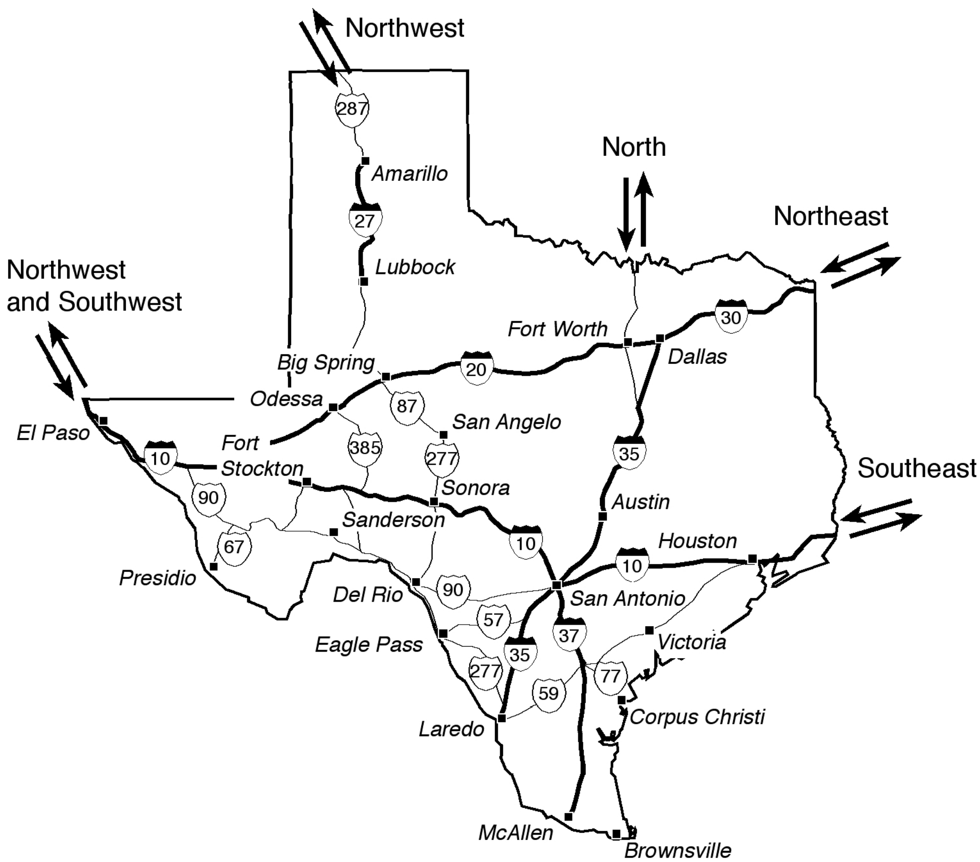


Figure 5.6 Texas U.S.-Mexico Highway Trade Corridors

One consideration for the location of inland ports in Texas is the density of U.S.-Mexico trade trucks on the nearest Texas highway trade corridor. While a large number of daily U.S.-Mexico trade trucks passing a given location does not guarantee development of an inland port, it could potentially provide an opportunity to add value to the flow of trade at that location. In other words, although an inland port can conceivably be developed along any highway, the prospects for development are greater where the density of trade trucks is higher.

Figure 5.6 illustrates the major trade corridor highway segments in Texas. Six of these segments have trade truck average daily traffic (ADT) greater than 2,000. Four of which are along Interstate (IH)-35: IH-35 from Laredo to the intersection of IH-35 and US 57 (trade truck ADT of 3,683); the intersection of IH-35 and US 57 to San Antonio (trade truck ADT of 2,871); San Antonio to Austin (trade truck ADT of 2,967), and Austin to Dallas/Fort Worth (trade truck ADT of 2,680). The other two segments are: I-10 from El Paso to the intersection of I-10 and I-20 (trade truck ADT of 2,615), and I-30 from Dallas/Fort Worth to the Texas-Arkansas border (trade truck ADT of 2,176). A location on or near these highway segments could potentially be considered for the development of an inland port. Additional detail is provided in Table F.2 in Appendix F.

5.3 POTENTIAL IMPACTS ON INLAND PORT LOCATIONS

5.3.1 Mexican Inland Ports

The development of inland ports as components of the U.S.-Mexico trade supply chain is being considered in both Texas and Mexico. In the future, it is foreseen that Texas inland ports would be required to coordinate with inland ports in Mexico to facilitate enhanced trade and value-added services across the U.S.-Mexico supply chain.

In Mexico, the development of inland ports is being considered close to major manufacturing and population centers, and along the major NAFTA highway trade corridor. Mexican inland ports are being considered in Monterrey/Saltillo, San Luis Potosi, Queretaro, Mexico City, and Ciudad Chihuahua. With the exception of Ciudad Chihuahua, all these inland port locations are along the main NAFTA highway that runs from Laredo to Mexico City, as shown in Figure 5.7. Ciudad Chihuahua is being considered because of a new highway, which connects the city to Presidio, Texas. Since this highway will result in both time and cost savings to move products from manufacturers in Ciudad Chihuahua to markets in the northeastern U.S., it is foreseen that the number of trucks crossing the border[5] at Presidio, Texas, will increase accordingly. The following section provides a brief overview of the Mexican inland port locations currently being considered. Mexican inland ports are, however, in the early stages of development.

Monterrey/Saltillo

Approximately 150 miles south of Laredo, Texas is the Mexican city of Monterrey, and 35 miles west of Monterrey is the city of Saltillo (see Figure 5.7). Similar to the Dallas/Fort Worth metroplex, the Monterrey/Saltillo metroplex is a large center of manufacturing, distribution, transportation, and commerce. An inland port in either Monterrey or Saltillo would likely serve businesses in both cities.

Monterrey has well-established highway, rail, and air transportation facilities. In recent years, Monterrey's highway infrastructure has been enhanced through a series of toll highway investments that bypass the city and "interstate class" highway connections to Laredo and Mexico City. The major rail connection between the U.S. and Mexico runs from Laredo through Monterrey and Saltillo to Mexico City. Monterrey also has large

[5] Another important development that will impact the growth of inland ports in Mexico is the opening by the U.S. of the U.S. -Mexico border to Mexican-owned trucks. More details on the opening of the U.S. border to Mexican trucks are provided in Appendix G.

private and international airports. Two or more large "inland port type" developments have been planned close to bypass highways and the private and public airports, but none of these initiatives have been able to secure adequate funding to date.

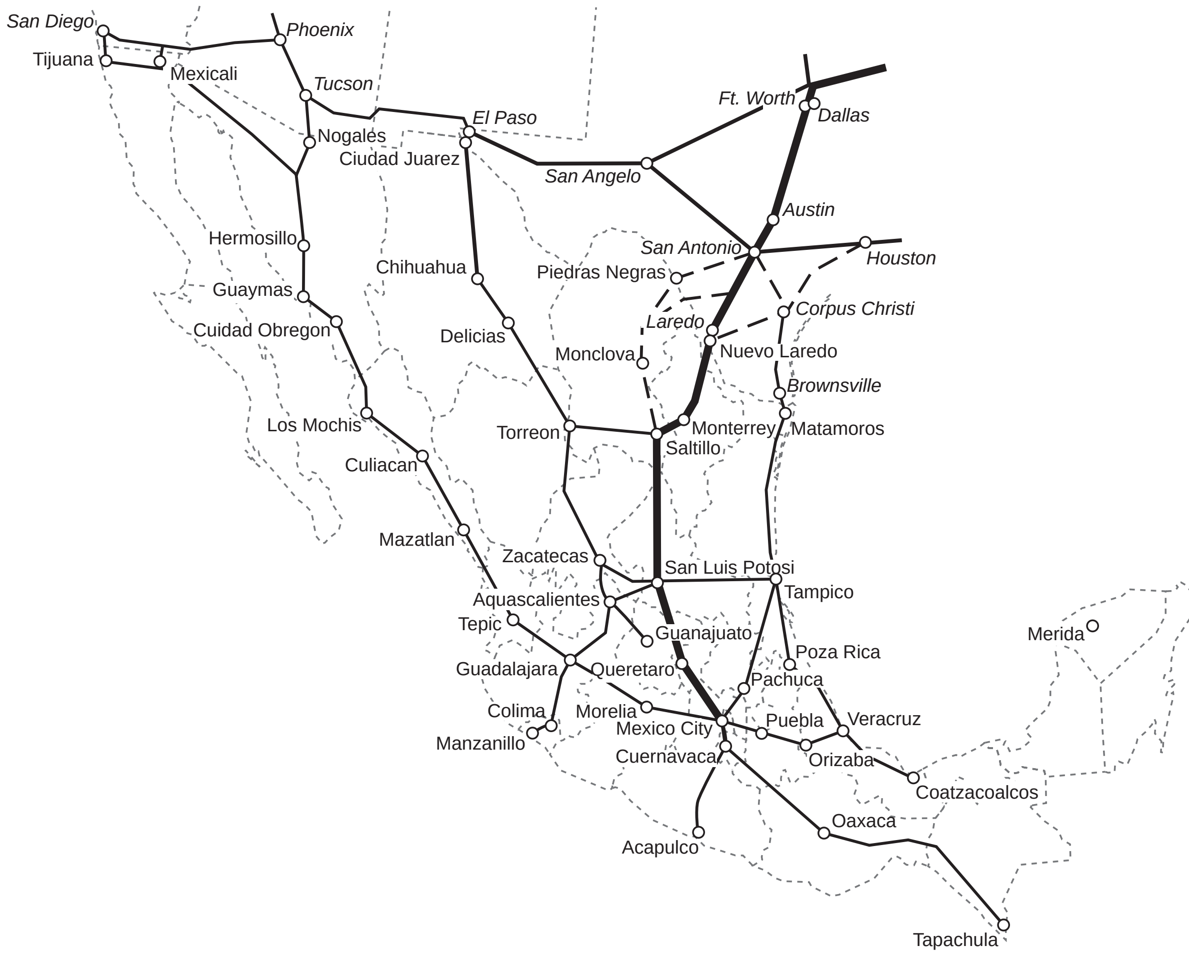


Figure 5.7 Mexico U.S.-Mexico Highway Trade Corridors

San Luis Potosi

Halfway between Saltillo and Mexico City on the NAFTA highway trade corridor is the City of San Luis Potosi. San Luis Potosi is a manufacturing, population, and distribution center with excellent highway infrastructure, a major airport, and good rail connections. San Luis Potosi is located at the intersection of the north-south NAFTA highway corridor and the major highway that connects Manzanillo (the largest port on Mexico's Pacific coast) with the two growing Mexican Gulf Coast ports of Altamira and Tampico. San Luis Potosi is investing in multi-modal truck/rail facilities to support NAFTA-related distribution. These facilities may be developed into an inland port if adequate investments are secured.

Queretaro

Queretaro, also a large local manufacturing and population base, is 110 miles north of Mexico City on the NAFTA highway corridor. The city is located at the intersection of the NAFTA highway and the major highway that links the two largest population centers in Mexico: Mexico City and Guadalajara. Queretaro is thus within 200 miles of half of Mexico's population and manufacturing base. Excellent rail facilities connect Queretaro to the Pacific port of Mazanillo and the Gulf Coast port of Altamira. Queretaro opened a major new intermodal facility in the summer of 2001, which has a dedicated unit train (containers) with weekly service directly to and from the port of Altamira. Queretaro also has an excellent airport.

Mexico City

Mexico City had an estimated population of 8.5 million in 2000, while Mexico state had a population of 13.1 million. The most significant "inland port" type development in Mexico is the Pentaco multi-modal facility. Pentaco is located close to the northern border of Mexico City and close to where the NAFTA trade corridor enters Mexico City. The facility has excellent rail connections to the major north-south rail line connecting Laredo to Mexico City, to the Pacific port of Manzanillo, and to the Gulf Coast port of Altamira. Construction began in the summer of 2001 to double the capacity of the facility and increase efficiency.

Ciudad Chihuahua

Ciudad Chihuahua is located 225 miles south of El Paso and is the capital of the Mexican state of Chihuahua. The city has a substantial factory base that produces for the U.S. market. Currently, products are shipped via Ciudad Juarez, across the border to El Paso, and then primarily along I-10 and I-20 to the U.S. northeastern markets. A new highway from Ciudad Chihuahua to Presidio, Texas, is currently under construction. This highway will increase the number of trade trucks crossing the border at Presidio.

All the potential Mexican inland port locations mentioned are significant centers of population and manufacturing with viable rail, highway, and air facilities. With the exception of Ciudad Chihuahua, all are on the NAFTA trade corridor. Although Mexican inland ports similar to the AllianceTexas development in Fort Worth are envisioned, no inland port of that magnitude is currently being developed in Mexico.

5.3.2 Texas Inland Port: KellyUSA

With respect to U.S.-Mexico trade, Texas inland ports are likely to develop at locations where value can be added to traded products, where there is a significant density of trade trucks on nearby highway trade corridor segments, and where good access exists to major, traditional ports of entry on the Texas border. San Antonio presents such a location.

KellyUSA is located in southwest San Antonio, Texas, at what was formerly Kelly Air Force Base (AFB). Leading up (and subsequent) to Kelly AFB's closure under Base Realignment and Closure (BRAC) legislation in 1995, actions associated with establishing and expanding international/industrial park business activities at KellyUSA have been an ongoing effort. As of August 2002, close to 50 companies call KellyUSA home. Some of the larger companies currently doing business at KellyUSA include: EG&G, Boeing

Aerospace Support Center, Rail Car America, Ryder Integrated Logistics, Fairchild Aircraft Inc., and Lockheed-Martin Corporation. A complete listing of the tenants and their activities can be found at http://kellyusa.com/busopps_tenants.asp.

Recent business developments at KellyUSA include a joint venture between Lockheed-Martin and GE Aircraft Engines, as well as a special program developed by the Free Trade Alliance (described in more detail subsequently) to help establish cross-border trucking and trade operations in San Antonio. The joint venture will be known as the Kelly Aviation Center and, in the near-term, is expected to employ the entire graduating class (approximately 90 students) of the Alamo Area Aerospace Academy. The special program is specifically designed to assist Mexican trucking companies in obtaining operating authority in the U.S., understanding U.S. state and federal regulatory requirements, and setting up operations in the San Antonio area. In May 2002, Fletes Industriales Regiomontanos, S.A. de C.V. (FIRSA) of Monterrey, Nuevo Leon, became the first Mexican company to join the program based at KellyUSA.

In addition, KellyUSA hired Bruce E. Miller as its new executive director (as of August 1, 2002). Miller served as CEO of the Rickenbacker Port Authority from 1995 to 2001. Similar to KellyUSA (previously Kelly Air Force Base), Rickenbacker was an Air National Guard base that closed in 1979. Under Miller's leadership, Rickenbacker Air Industrial Park became one of the most successful and widely recognized components of the Greater Columbus Inland Port in Ohio. Miller's arrival at KellyUSA has sparked renewed optimism as to the prospects of KellyUSA becoming a world-class international business park and a cornerstone for inland port activities in San Antonio.

The current collective vision[6] for an inland port and related activities in the San Antonio area is being termed "Inland Port-San Antonio" by those most closely involved in regional efforts, including the Free Trade Alliance[7], Freeport Business Center, and KellyUSA. Inland Port-San Antonio encompasses the transportation and logistics facilities, services and related activities that are involved in moving freight into, out of, and within the San Antonio area to and/or from destinations around the world. Similar to Rickenbacker Air Industrial Park (as a component of the Greater Columbus Inland Port), KellyUSA is currently viewed as the largest active component of Inland Port-San Antonio and a key in the realization of the regional business model/vision.

Illustrated in Figure 5.8 are examples of inland port-type activities in the San Antonio area. Key physical components of the inland port transportation infrastructure include: San Antonio International Airport, the Kelly Field's 11,500-foot runway, a major transcontinental railroad (Union Pacific), and track rights on Burlington Northern/Santa Fe rail infrastructure. The Freeport Business Center is a relatively new addition to business activities of this nature in San Antonio. This 500-acre Industrial Park is located near IH-35 and Loop 410 South—just south of KellyUSA (see Figure 5.8). The Center is a

[6] The current inland port business model being pursued in San Antonio appears to be similar to that of the Greater Columbus Inland Port.

[7] The mission of the Free Trade AllianceTexas is to lead the development of San Antonio to become a competitive international trade center and world-class inland port. The Free Trade AllianceTexas is a public-private partnership consisting of a broad coalition of community organizations, including the City of San Antonio, the Greater San Antonio Chamber of Commerce, the San Antonio Economic Development Foundation, and over 600 corporate and individual members. More information about the Free Trade Alliance can be obtained at http://www.freetradealliance.org.

distribution, warehousing, and manufacturing facility. More information on the Freeport Business Center can be obtained at http://www.freeportbusinesscentre.com.

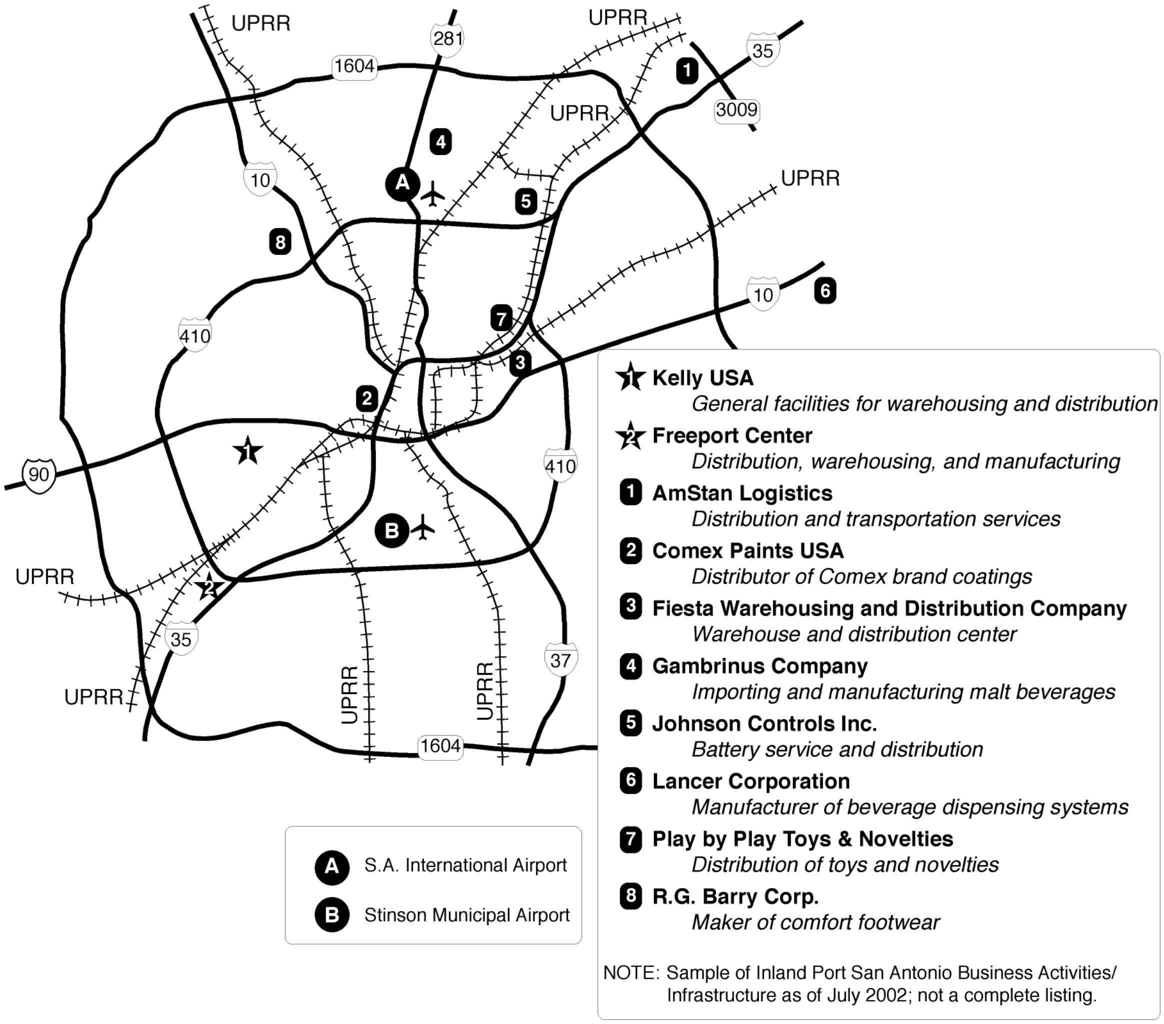


Figure 5.8 Examples of Inland Port-San Antonio Business Activities/Infrastructure, July 2002

With regard to Inland Port-San Antonio's progress in the area of air cargo, a recent Air Cargo Flow Report completed in January 2002 bears mention (Keiser Phillips Associates, 2002). The primary goals of the report were to identify strengths, weaknesses, opportunities, and threats relating to air cargo business activities in the region. The findings of the report are summarized in Table 5.2.

Based upon the definition of an inland port and its developmental phases, Inland Port-San Antonio appears to be a "phase 2" inland port. San Antonio is still in the early stages of development, but has moved beyond the "Preparation" phase (see Figure 4.1).

Table 5.2 Summary of Air Cargo Flow Study

Descriptive Category	**Related Characteristics of San Antonio/Transportation Infrastructure**
Strength	- Hub of South Texas Interstate System - Two transport-size airports - Aggressive marketing of the City and region - Availability of labor and community support - Proactive airport management
Weakness	- Limited manufacturing base - No existing wide-body service - Limited runway length (SAT) - No existing air cargo service (KellyUSA)
Opportunity	- Distribution center for South Texas - Continue to capitalize on NAFTA - Open Skies policy - International markets
Threat	- Competition from other communities - Limitations on Mexican trucks - Slowing economy and 9-11 events - Federal trade policy changes - Noise issues

Source: Keiser Phillips Associates, 2002

6. Inland Port Evaluation Considerations

As discussed in Chapter 3, the Texas Department of Transportation (TxDOT) has a legitimate role in planning and funding transportation infrastructure improvements with public funds. Accordingly, when approached to fund a roadway project to enhance access to a particular inland port site, TxDOT planners need to review and evaluate the infrastructure investment required by the inland port proponent from a transportation planning perspective. The evaluation framework suggested in this chapter does not compare the advantages and disadvantages of one inland port to those of another inland port. Rather, the objectives are to suggest a framework, which TxDOT planners can use to consider specific inland port road project requests, and to inform those proposing or supporting the development of an inland port of the parameters/criteria considered important. With this information inland port developers can anticipate and prepare data and supporting documentation to ensure that their requests are reviewed in a timely fashion.

6.1 EVALUATION FRAMEWORK

6.1.1 Fatal Flaw Analysis

The first critical activity in the development of an inland port is the preparation of a marketing and implementation plan. It would be regarded a fatal flaw if an inland port developer approaches TxDOT for funding prior to the development of a marketing and implementation plan. The first question to an inland port proponent could be:

Did you prepare a marketing and implementation plan?

If no marketing and implementation plan can be provided, it is suggested that the requested investment be eliminated from further consideration until such a plan can be provided. The advantage of the fatal flaw analysis is that it is effective and efficient in eliminating unprepared requests early in the process.

6.1.2 Preliminary Assessment

It is ultimately up to the potential inland port developer to convince TxDOT of the benefits of including the requested road project in the transportation plan. During the preliminary assessment it is suggested that the inland port project be assessed through a series of “yes” or “no” questions. An unsatisfactory answer to any of the questions will impact the consideration given to the particular project. Inland port projects that “passed” the preliminary analysis could be considered for inclusion in the state plan. This kind of evaluation provides an impetus for thoughtful debate and decision-making, while minimizing the pursuit of unreasonable goals.

During the preliminary assessment, it is recommended that TxDOT focus on major issues in project development, such as locational advantage, financing issues, infrastructure requirements, as illustrated in Table 6.1. A detailed marketing and implementation plan should address these major issues, which will enable TxDOT to evaluate the proposed project for inclusion in the state transportation plan.

Table 6.1 Marketing and Implementation Plan Parameters

	Yes	No
Market analysis		
Potential anchor tenants identified		
Commodity-origin-destinations		
Demand forecasts (potential market)		
Anticipated traffic impacts		
Locational advantage		
Favorable zone/site classification		
Access to existing markets (i.e., large metropolitan areas, NAFTA trade corridors)		
Proximity to existing highway infrastructure		
Existing infrastructure/assets		
Inventory of facilities (i.e., warehouses)		
Transportation assets (i.e., rail, road, air at or nearby site)		
Characteristics and capacity of assets		
Funding		
Available funding		
Access to economic development funds		
Community support		
Local/political support		
Expected benefits		
New employment opportunities		
Economic development (land values, income, etc.)		
Planning horizons		
Implementation steps		
Future constraints		
Nearby residential areas		
Required TxDOT support		
Infrastructure and investment requirements		

Based on the outcome of the preliminary evaluation, a decision could be made about including the inland port project in the state transportation plan. If included, TxDOT planners will be tasked to define the needs and scope of the desired investment. This will trigger a series of steps in the TxDOT project development process (PDP) as discussed in Chapter 3.

6.1.3 Suggested Parameters and Criteria

Once a project is included in the state plan, it can literally take 10 to 20 years for the project to materialize. For TxDOT to prioritize the inland port project to move to preliminary design and environmental assessment (ideally to be undertaken in phase 2 of the inland port development life cycle), it is critical for inland port proponents to work closely with TxDOT officials.

When prioritizing projects, it is suggested that TxDOT considers a number of parameters and criteria, describing the identified parameters. Obviously, simply reducing complex parameters like multi-modal investments to “yes” and “no” answers will limit the depth of analyses. It is suggested that TxDOT produce a scoring method after agreeing on the parameters and criteria. At the same time, not all the parameters and criteria might be of equal importance. Depending on costs, the regulatory environment, and public opinions and values, some might be considered more or less important than others. When issues of differing importance are combined into a single decision-making tool, a weight should be assigned to each of the parameters and criteria to prevent a large number of less important issues from driving the decision.

When prioritizing inland port projects for preliminary design and environmental assessment, it is suggested that TxDOT consider the parameters/criteria listed in Table 6.2. The information and data required to respond appropriately to these parameters, however, goes well beyond what is provided in this table. Inland port proponents are advised to gather as much project-specific data as possible to ensure the timely consideration and prioritization of the project.

Alignment decisions and location of major road investments can only be motivated after considering traffic volumes, construction costs (including interchanges), environmental impacts, and inducement to development. Ultimately, TxDOT needs to consider the capacity of existing infrastructure and the foreseen demand when decisions are made about the infrastructure needs at the proposed inland port site. It is important for proponents to demonstrate the benefits associated with the requested investment. Proponents of inland port developments can facilitate the expedition of the preliminary design and plans, specifications, and estimates (PSE) by funding traffic impact studies, developing traffic forecasts, and funding economic development studies that can be used by TxDOT in the evaluation process.

Letting/construction should ideally occur in phase 3 of the inland port development life cycle. To expedite construction and to ensure that construction occurs during phase 3, inland port developers can donate right-of-way and enter into public-private-partnerships to partially fund the construction—thereby reducing TxDOT’s risks. At this stage, it is recommended that TxDOT critically considers the parameters/criteria listed in Table 6.3.

Table 6.2 Suggested Parameters and Criteria when Prioritizing Project Design

	Score	Weight
Operations		
Facilities		
Number of tenants (anchor, auxiliary)		
Market area (population within 50 miles of inland port)		
Yearly throughput (TEUs, volumes, tons)		
Value of goods transported		
Land available for future development		
Detailed modal analysis		
Commodity types		
Preferred mode		
Origins and destinations		
Tons/volumes of freight handled by mode		
Forecasted daily trips by mode		
Multi-modal investments		
Multi-modal investments attracted (capacity)		
Number of tenants using rail, road and air		
Mode split		
Expected benefits		
Estimated inland port employment		
Economic development (land values, income, etc.)		
Environmental considerations		
Impacts on air quality		
Impacts on noise		
Inland port funding		
Port funding		
Legal authority to issue bonds		
Total government funding received		
Total non-government funding received		
Required TxDOT support		
Current modal capacity		
Existing and forecasted traffic volumes		
Percentage trucks		
Project scope and estimated costs		

Table 6.3 Suggested Parameters and Criteria when Prioritizing Letting/Construction

	Score	Weight
Traffic flows and impacts		
Traffic volumes (current and forecasted)		
Percentage trucks		
Impacts on state roadway network (congestion)		
Multi-modal investments		
Level of materialized multi-modal investments		
Mode split		
Project costs		
Right-of-way		
Construction, including engineering		
Leveraged private funds		
Traffic impact studies		
Funding/donating right-of-way		
Public-private-partnership—value of private sector Contribution		

6.2 CONCLUDING REMARKS

Once the desired project is constructed, interaction between TxDOT planners and inland port developers will be limited to regular interactions to discuss maintenance requirements, identified bottlenecks and traffic management. Consequently, it would be in the interest of inland port developers to maintain contact with TxDOT staff to ensure that congested links/bottlenecks, are addressed in a timely fashion. Inland port developers will have to make a convincing case to TxDOT staff if additional investments are required to upgrade facilities at the inland site. At this stage it is, however, foreseen that the proponents will be fully aware of TxDOT's needs and requirements to facilitate and accelerate the process.

7. Summary and Recommendations

The consideration of multi-modal inland ports to enhance trade corridor performance and improve the efficiency of global supply chains is starting to emerge in the transportation community. In 2000, the Texas Department of Transportation (TxDOT) commissioned the Center for Transportation Research (CTR) at The University of Texas at Austin to examine and define inland ports to facilitate a better understanding of their contribution to corridor efficiencies and trade flows and to support their inclusion in the state transportation plan. During the first year report a classification methodology was created to better understand how different inland ports could support efficient supply chains and enhance corridor performance. The first year report defined an inland port as "… a site located away from traditional land, air, and coastal borders containing a set of transportation assets (normally multi-modal) and the ability to allow international trade to be processed and altered by value-added services as goods move through the supply chain" (Leitner and Harrison, 2001). The report developed an inland port classification methodology and development life cycle. The first year study recognized the importance of inland ports as international trade processing locations.

The objectives of the second year report were to demonstrate the role and benefits of inland ports; to provide a brief overview of the TxDOT highway planning and programming process as of July 2002; to highlight the critical investments required and the level of TxDOT support that can be expected at each of the five phases of the inland port development life cycle; to consider the impacts of trade and truck flows on the potential locations for inland port development; and finally, to propose an evaluation framework that will allow TxDOT planners to review requested inland port projects from a transportation planning perspective. Given the multi-modal components of inland port developments, it is foreseen that the findings of this study can be used to inform transportation planners considering the location of multi-modal terminals on the proposed Trans Texas Corridors.

Two research reports document the findings: 0-4083-1, *The Identification and Classification of Inland Ports* and 0-4083-2, *Inland Ports: Planning Successful Developments*. In addition, an informational Guide was prepared that provides a brief overview of the TxDOT project development process and the role that TxDOT could play in addressing the transportation needs of a facility as it pertains to, specifically road infrastructure. The Guide specifies the support that can be expected from TxDOT planners and provides valuable information to both TxDOT planners evaluating inland port projects and inland port developers preparing investment requests.

In 4083-2, an inland port is defined as "a site located away from traditional land, air, and coastal borders with the vision to facilitate and process international trade through strategic investments in multi-modal transportation assets and by promoting value-added services as goods move through the supply chain." This report demonstrated the benefits of inland ports to society, private interests, and public agencies. Inland ports complement global supply chains and can be an integral part of transportation trade corridors by providing opportunities for increased service levels, value-added assembly/processing of imports and lowering total supply chain costs. Private sector benefits are mostly accrued from the fact that inland ports offer a potential solution to two seemingly opposing goals of supply chain management: a reduction in inventory and a decrease in transportation costs. Additional private sector benefits also include reducing uncertainty related to customs and border delays, and thereby allowing for just-in-time (JIT) manufacturing. Society can benefit in the form of increased employment, economic development, and tax revenues. Benefits to state transportation agencies include an opportunity to leverage private funds for roadway investments, and reduced maintenance expenditure if inland port developments facilitate a mode split away from heavy trucks, thereby lessening the damage to road infrastructure caused by increasing truck numbers and heavier axle loads. The objective of Chapter 2 was to qualify the cost reductions and benefits associated with inland port developments in terms of benefits to broad society, private user benefits and benefits to state agencies. It is proposed that future research should attempt to quantify the benefits and impacts associated with inland port developments.

It is critical that inland port proponents are aware of the TxDOT highway project development process (PDP) and the context and dynamics associated with road projects, when approaching TxDOT for road project funding. By demonstrating an understanding of the process and by facilitating the process through the provision of data/information or by donating right-of-way or funding for construction, inland port proponents can increase the probability of their project being constructed in a timely fashion. Chapter 3 provides a brief overview of the PDP and the status of the Unified Transportation Plan (UTP) as of July 2002. Inland port proponents are encouraged to obtain a copy of the Guide and to visit the TxDOT Web site before approaching TxDOT with specific funding requests.

In Chapter 4 the research team built on the general model describing the development phases of an inland port conceptualized in 4083-1. The research team identified the critical investments/activities required for an inland port to move from phase 1 (preparation) to phase 5 (decline or innovation), and the level of TxDOT support that can be expected at each phase of the inland port life cycle. The expected development pattern and the characterization of the various phases of inland port development is important to TxDOT as it can provide the basis for strategies to facilitate inland ports or to mitigate potential impacts on the "state" transportation system.

With approximately 75 percent of the truck-transported U.S.-Mexico trade value entering the U.S. at a Texas border port of entry, well-defined truck highway corridors have developed in Texas. Increasingly public advocacy groups in Mexico and San Antonio are looking at the potential to develop inland ports along these corridors to promote economic development in these regions. An important consideration for the location of inland ports in Texas is the density of trade trucks on the nearest highway trade corridor. While a large number of daily U.S.-Mexico trade trucks passing a given location does not guarantee the successful development of an inland port, it does provide the opportunity to add value to the flow of trade at that location. Chapter 5 includes a brief analysis of U.S.-Mexico trade, defines the highway trade corridors, and discusses the potential development of inland ports along these corridors in Mexico and San Antonio.

Finally, an evaluation framework is suggested in Chapter 6 that TxDOT planners can use to review and evaluate the infrastructure investment requests by inland port proponents from a transportation planning perspective. It can also be used to inform those proposing or supporting inland port developments of the parameters/criteria considered important during the different phases of the TxDOT PDP. Given this information, inland port developers can anticipate and prepare supporting documentation to ensure that their project requests materialize in a timely fashion. It is recommended that the proposed evaluation framework be tested during a subsequent implementation project in those Texas districts that have inland ports or have been approached by inland port proponents to determine the usefulness of the approach to TxDOT planners. This would be accomplished through a program of District workshops (probably one-day) where approximately half the time would be spent going through the study Guide, and the remainder working through actual/potential inland port sites within the District.

References

1. Anderson, G., C. Eley, and W. Schroeer. 2001. *Redeveloping Brownfields with Federal Transportation Funds.* Prepared for presentation at the 81st Annual Meeting of the Transportation Research Board, Washington, D.C., November 15.

2. Battle Creek Unlimited, Inc. No Date. *Battle Creek … A Great Place to Grow.* Michigan. Available at http://www.battlecreek.org./

3. Boske, L.B., and J.C. Cuttino. 2001. *The Impacts of U.S.-Latin American Trade on the Southwest's Economy and Transportation System: An Assessment of Impact Methodologies.* Special Project Report: Lyndon B. Johnson School of Public Affairs, The University of Texas at Austin, Austin.

4. Boske, L.B., and J.C. Cuttino. 2002. *The Impacts of U.S.-Latin American Trade on the Southwest's Economy and Transportation System: Case Studies of Coffee and Steel on the U.S.-Brazil Trade Corridor.* Special Project Report: Lyndon B. Johnson School of Public Affairs, The University of Texas at Austin, Austin.

5. Branca, V.L. 2002. *Supply Chain Governance: A Taxonomy and Introductory Essay.* Submitted to the Engineering Systems Division in partial fulfillment of the requirements for the degree of Master in Engineering in Logistics at the Massachusetts Institute of Technology, June.

6. Cambridge Systematics, Inc. No Date. *Trade: From National Markets to Global Markets.* Prepared for the Federal Highway Administration Office of Freight Management and Operations under contract DTFH61-97-C-00010, BAT-99-020. Available at http://www.ops.fhwa.dot.gov/freight/adfrmwrk/index.htm.

7. Cambridge Systematics Inc. in association with Transmode Consultants Inc., URS Consultants Inc, and Moody/ Nolan Ltd Inc. 1994. *Transportation Infrastructure Improvement Study for the Greater Columbus Inland Port Program.* Prepared for Mid-Ohio Regional Planning Commission, June 25.

8. Deady, D. 2002. *Study Shows Impact of AllianceTexas.* Wise County Messenger, June 16.

9. Hausman, W.H. 2000. *Supply Chain Performance Metrics.* Stanford University: Management Science & Engineering Department. Accepted for publication in The Practice of Supply Chain Management. Kluwer, Forthcoming.

10. Kansas City Smart Port. *Congestion at Traditional Ports and Borders Creates a Demand.* Available at http://www.kcsmartport.com/, Accessed April 3, 2002.

11. Keiser Phillips Associates in association with Ricondo Associates. 2002. *San Antonio Air Cargo Flow Study: Strategic Air Cargo Marketing Plan,* Preliminary Draft, January 28.

12. Leitner, S. and R.H. Harrison. 2001. *The Identification and Classification of Inland Ports.* Center for Transportation Research, The University of Texas at Austin. Research Report 0-4083-1, Texas Department of Transportation, August.

13. McCray, J. 1998. *North American Free Trade Agreement Truck Highway Corridors: U.S. – Mexican Truck Rivers of Trade.* Transportation Research Record 1613, pp. 71–78.

14. McCray, J. and R. Harrison. 1999. *North American Free Trade Agreement Trucks on U.S. Highway Corridors.* Transportation Research Record 1653, pp. 79–85.

15. Rabah, M. and H.S. Mahmassani. 2001. *Impact of Information and Communication Technologies on Logistics and Freight Transportation: Example of Vendor-Managed Inventories.* Prepared for presentation at the 81st Annual Meeting of the Transportation Research Board, Washington, D.C., and publication in Transportation Research Record, July.

16. Real Estate Center. 2001. *Alliance.* Development: Publication 1525, Texas A&M University, College Station, October.

17. TranSystems Corporation in association with TransCore, the ETC Institute, HNTB Corporation, and KPMG Peat Marwick. 1999. *Mid-Continent Tradeway Study: Kansas City—International Trade Processing Center Study.* Prepared for the Mid-America Regional Council (MARC), the Greater Kansas City Chamber of Commerce, and the U.S. Department of the Treasury, February.

18. Weisbrod, R.E., E. Swiger, G. Muller, F.M. Rugg, and M.K. Murphy. 2002. *Global Freight Villages: A Solution to the Urban Freight Dilemma.* Prepared for presentation at the 81st Annual Meeting of the Transportation Research Board, Washington, D.C.

19. Zografos, K.G. and I.M. Giannouli. 2001. *Emerging Trends in Logistics and their Impact on Freight Transport System: A European Perspective.* Prepared for presentation at the 81st Annual Meeting of the Transportation Research Board, Washington, D.C., and publication in Transportation Research Record, July.

Glossary

Enterprise Zones—The objective of the program, administered by the Texas Department of Economic Development, is to encourage job creation and capital investment in Texas areas of economic distress. Enterprise zones are designated for a period of 7 years. State incentives to firms locating in these zones include one-time refunds of state sales and use taxes, and franchise taxes. Local incentives include reduced development fees, permit fee waivers, and reduced investment requirements for tax abatement consideration (Development, 2001).

Foreign Trade Zones—Foreign Trade Zones (FTZs) are areas designated by the U.S. Federal Government into which firms can import raw materials or components, store them, assemble them, or use them to manufacture new products. Companies can move products "in bond" (before U.S. Customs inspection) into the zone and only pay duty when the product leaves the FTZ (Development, 2001).

Freeport tax exemption—In 1989, the Texas Constitution was amended to exempt goods in transit (or "Freeport goods") from ad valorem taxation levied by local taxing authorities. Freeport goods are defined as goods acquired or brought into the state and held for no more than 175 days before being shipped out of state. Any business or industry that assembles, manufactures, processes, stores, maintains, fabricates, or distributes products in Texas and ships them out of state within a 175-day cycle can apply for this exemption (http://www.gceda.com/incentives_freeport.htm, Accessed July 17, 2002).

Global Freight Village—A global freight village is a cluster of quality industrial-intermodal-distribution-logistics companies within a secure perimeter—up to 150 acres in size—located on the periphery of metropolitan areas close to intermodal yards, seaports, or airports. Global Freight Villages focus on transportation, intermodal operations, and logistics activities. Tenants either own or lease their buildings, but management of the operations and support services rests with one organization or entity (Weibrod et al, 2002).

Inland Port—An inland port was defined in this report as "a site located away from traditional land, air, and coastal borders with the vision to facilitate and process international trade through strategic investments in multi-modal transportation assets and by promoting value-added services as goods move through the supply chain."

International Trade Processing Center—An International Trade Processing Center (ITPC) is a virtual network of business services, technologies, and facilities to facilitate international trade for all modes, including air, water, rail, and commercial vehicle. The idea behind the ITPC is to implement a program to allow processes and procedures involved in cross-border cargo movements to occur in-land instead of at the border through automation and technology. An ITPC differs from an inland port in that it represents a trade-processing center with virtual components. The center can be housed in one to four buildings that house administrative staff, federal inspection agencies, brokers, freight forwarders, etc. Adequate land is, however, necessary to provide access for commercial trucks arriving for inspection and to facilitate development opportunities in support of trade and transportation (TranSystems Corporation, 1999).

Logistics—"*Logistics is the process of planning, implementing and controlling the efficient, effective flow and storage of goods, services, and related information from point of origin to point of consumption for the purpose of conforming to customer requirements"* (Council of Logistics Management in Rabah and Mahmassani, 2001). Logistics is a holistic approach to integrating physical supply and distribution processes.

Metropolitan Planning Organization—In Texas, a Metropolitan Planning Organization (MPO) is an entity established (through agreement between the Governor and the units of local government(s) which represent 75 percent of the affected metropolitan population) to carry out the metropolitan planning process for areas with populations greater than 50,000 people.

Supply chain—"*The supply chain refers to all those activities associated with the transformation and flow of goods and services, including their attendant information flows, from the sources of raw material to end users"* (Branca, 2002).

Supply chain management—"*Supply chain management is a set of approaches utilized to efficiently integrate supplies, manufacturers, warehouses, and stores, so that merchandise is produced and distributed at the right quantities, to the right locations, and at the right time, in order to minimize systemwide costs while satisfying service level requirements"* (Simchi-Levi et al, 2000).

Trade corridor—A trade corridor is a *"geographical area over which significant amounts of trade flow. Such an area has a set of physical and operating characteristics that facilitate the movement of goods, services, people, and information"* (Boske and Cuttino, 2001).

Appendix A. Summary of New Funding Categories

Table A.1 Summary Of New Funding Categories Working Draft As Of July 2002

Categories Number, Name	Programming Authority	Funding	Bank Balance (Yes/No) Responsible Entity	Ranking Index Or Allocation Formula And Year Last Revised	Brief Summary, Restrictions, Etc.
1 Consolidated Rehabilitation	Commission allocation by formula. Projects selected by Districts.	Federal 90% State 10%; or Federal 80% State 20%; or 100% State	Yes, Districts	To be determined	Rehabilitation of the existing State Highway System. Interstate Highway System main lanes, frontage roads, structures, construction of HOV lanes, rehabilitation of signs, pavement markings, striping, etc. Funds may be used for the construction of interchanges, but may not be used for the construction of new SOV lanes.
2 Metropolitan Area (TMA) Corridor Projects	Commission approval. Corridors selected statewide based on criteria to be determined. Projects scheduled by consensus of districts.	Federal 80% State 10%; or 100% State	No, Commission	To be determined	Mobility (added capacity) projects on major State Highway System corridors located in Metropolitan Areas (TMA) Metropolitan Planning Organizations (MPOs).

Categories Number, Name	Programming Authority	Funding	Bank Balance (Yes/No) Responsible Entity	Ranking Index Or Allocation Formula And Year Last Revised	Brief Summary, Restrictions, Etc.
3 Urban Area (non-TMA) Corridor Projects	Commission approval. Corridors selected statewide based on criteria to be determined. Projects scheduled by consensus of districts.	Federal 80% State 20%; or 100% State	No, Commission	To be determined	Mobility (added capacity) projects on major State Highway System corridors located in Urban Areas (non-TMA) MPOs.
4 Priority Rural Corridors	Commission approval. Corridors selected statewide based on criteria to be determined. Projects scheduled by consensus of districts.	Federal 80% State 20%; or 100% State	No, Commission	To be determined	Mobility (added capacity) projects on major State Highway System corridors located in Rural Areas not represented by an MPO.
5 Congestion Mitigation and Air Quality Improvement	Commission allocation. Allocation based on percent of population in non-attainment areas. Projects selected by MPO.	Federal 80% State 20%	Yes, Districts & MPO	Non-attainment area population weighted by air quality severity; 1993 PDP.	Addresses attainment of national ambient air quality standard in the non-attainment areas (currently Dallas/Fort Worth, Houston, Beaumont, and El Paso). Funds cannot be used to add capacity for single occupancy vehicles.

Categories Number, Name	Programming Authority	Funding	Bank Balance (Yes/No) Responsible Entity	Ranking Index Or Allocation Formula And Year Last Revised	Brief Summary, Restrictions, Etc.
6 Structures Replacement and Rehabilitation	Commission approval. Selected statewide based on Texas Eligible Bridge Selection System (TEBSS) and evaluated statewide by cost- benefit	Federal 80% State 20%; or 100% State	No, Commission	Texas Eligible Bridge Selection System (TEBSS) and vehicle and train traffic, accident rates, vertical clearance, roadway characteristics.	Replacement or rehabilitation of eligible bridges on state highway system (functionally obsolete or structurally deficient). Replacement of existing highway-railroad grade crossings and the rehabilitation or replacement of deficient railroad underpasses on the state highway system. Specific locations evaluated by cost-benefits derived index (benefits such as improved traffic flow, accident/fatality reduction).
7 STP Metropolitan Mobility/ Rehabilitation	Commission allocation. Allocation based on population. Projects selected by MPO.	Federal 80% State 20%; or Federal 80% Local 20%; or 100% State	Yes, Districts & MPOs	Population (1990 Census); 1993 PDP	Transportation needs within metropolitan area boundaries with populations of 200,000 or greater. Projects selected by MPOs.
8 Surface Transportation Program (STP) Safety Federal Hazard Elimination Program	Commission allocation. Selected statewide by federally mandated safety indices.	Federal 90% State 10%; or 100% State	Yes, Traffic Operations Division	Safety Improvement Index (SII); 1993 PDP	Safety related projects - on and off state highway system. Projects are evaluated using 3 years of accident data and ranked by SII.

Categories Number, Name	Programming Authority	Funding	Bank Balance (Yes/No) Responsible Entity	Ranking Index Or Allocation Formula And Year Last Revised	Brief Summary, Restrictions, Etc.
8 STP Safety - Federal Railroad Signal Safety Program	Commission allocation. Selected statewide from prioritized listing.	Federal 90% State 10%; or 100% State	Yes, Traffic Operations Division	Railroad Crossing Index; 1997 UTP	Installation of automatic railroad warning devices at hazardous railroad crossings on and off state highway systems, selected from statewide inventory list which is prioritized by index (# of trains per day, train speed, ADT, type of existing warning device, train-involved accidents within prior 5 years, etc.).
9 STP Transportation Enhancements 1992	Commission selection and approval. Project Specific- approved by separate Minute Order. Recommended by local governmental entities. Committee review.	Federal 80% State 20%; or Federal 80% Local 20%	No	Committee Recommendation, 1994 PDP	Projects above and beyond what normally is expected for transportation enhancements - twelve general activities as outlined in TEA-21. Projects recommended by local government entities, reviewed and recommended by committee, selected by Texas Transportation Commission.
10 Miscellaneous - State Park Roads	Commission allocation. Projects selected by Texas Parks and Wildlife Department (TP&WD).	State 100%	Yes, Transportation Planning & Programming Division	None, Selected by TP&WD; 1993 PDP	Construction and rehabilitation of roadways within or adjacent to state parks, fish hatcheries, etc., subject to Memorandum of Agreement between TxDOT and TP&WD. Locations selected and prioritized by TP&WD.

Categories Number, Name	Programming Authority	Funding	Bank Balance (Yes/No) Responsible Entity	Ranking Index Or Allocation Formula And Year Last Revised	Brief Summary, Restrictions, Etc.
10 Miscellaneous - Railroad Grade Crossing Replanking Program 1992	Commission allocation. Selection based on conditions of riding surface.	State 100%	Yes, Traffic Operations Division	Condition of crossing's riding surface and cost per vehicle using crossing. 1993 PDP	Replacement of rough railroad crossing surfaces on the state highway system (approximately 140 installations per year statewide). Project selection based on conditions of the riding surface (highway, railroad and drainage) and cost per vehicle using the crossing.
10 Miscellaneous - Railroad Signal Maintenance Program 1992	Commission allocation. Contributions to maintain signals.	State 100%	Yes, Traffic Operations Division	Number of crossings and type of automatic devices present at each. 1993 PDP	Contributions to each railroad company based on number of crossings and type of automatic devices present at each crossing.
10 Miscellaneous - Construction Landscape Programs 1992	Commission allocation by formula. Projects selected by districts.	State 100%	Yes, Districts	Varies between programs. 1993 PDP	New landscape development projects such as typical right-of-way landscape development, rest area/picnic area landscape development, and erosion control and environmental mitigation activities.
10 Miscellaneous (Federal) 1992	Commission approval to participate. Federal allocations.	Federal 100%; or Federal 80% State 20%	No	None. Not Applicable.	Federal programs such as Forest Highways, Indian Reservation Highways, Federal Lands Highways, and Ferry Boat Discretionary.

Categories Number, Name	**Programming Authority**	**Funding**	**Bank Balance (Yes/No) Responsible Entity**	**Ranking Index Or Allocation Formula And Year Last Revised**	**Brief Summary, Restrictions, Etc.**
11 State District Discretionary	Commission allocation by formula. Projects selected by districts. Rider 41 to TxDOT's apportionments, minimum $2.5 million allocation to each TxDOT district.	Federal 80% State 20%; or 100% State	Yes, Districts	To be determined	Miscellaneous projects on state highway system selected at the district's discretion.
12 Strategic Priority 1992	Commission selection.	Federal 80% State 20%; or State 100%	No	None, Selected by Transportation Commission; 1993 PDP	Commission selected projects, which promote economic development, provide system continuity with adjoining states and Mexico, or address other strategic needs as determined by the commission.

Source: Texas Department of Transportation – Transportation, Planning & Programming (TP&P) Division

Appendix B. Trade Data

B.1 REVIEW AND SELECTION OF TRADE DATA

U.S. and Mexico Customs officials gather international trade data to ensure that the appropriate duties are paid and that the laws governing import and export trade are obeyed. Trade data is thus gathered from the information submitted on required customs forms. These forms can be submitted on paper, but most submissions are now made electronically. Raw trade data collected by Customs are not publicly available. Raw data are turned over to statistics agencies and, in some instances, to the National Bank to eliminate firm-specific information and for aggregation. Aggregated data is then distributed to other national government agencies, the public, and international agencies such as the United Nations (U.N.)

B.1.1 Review of Trade Data Sources

The United Nations collects trade data from about 200 countries, which account for approximately 90 percent of world trade. The data is made available on a CD-ROM titled *"Personal Computer Trade Analysis System (PC-TAS)."* The CD-ROM contains 5 years of data. Currently, the latest data available is for 1996 through 2000. Commodity descriptions can be specified at the five-digit Standard International Trade Code (SITC), consisting of about 3,800 different product classifications, or the six-digit Harmonized System (HS) code, which consists of approximately 5,000 different product classifications. Variables include the country of export or import, commodity classification, and value. Information about specific port of export or import is not available. The PC-TAS product costs $980 and can be reviewed and ordered on the Internet at www.intracen.org/pctas/pctas00.htm.

Mexican trade data is available from the Instituto Nacional De Estadistica Geografia E Informatica, the national statistics agency, and Banco Nacional de Comercio Exterior, the National Mexican Export Bank. Data from the statistics agency can be reviewed at www.inegi.gob.mx and data from the National Bank can be reviewed at www.bancomext.com. Variables captured include the commodity, country of export or import and value, but no port of entry information is captured. Since the analysis for this report required the entry point into the U.S., Mexican and U.N. data were not used.

The Foreign Trade Division of the Census Bureau, which is part of the U.S. Department of Commerce, aggregates the U.S. trade data and distributes the data to the public and other governmental agencies. In addition, the Bureau of Transportation Statistics distributes a different international trade data set that is useful in transportation analysis. The international trade data sets evaluated for this report analysis include the:

- annual and monthly data from the U.S. Department of Commerce CD-ROM;
- annual and quarterly U.S. State Export Series, which includes the Origin of Movement Series, State of Exporter Location Series, and World Trade Atlas–U.S. State Export Edition;
- Special Order Data from the U.S. Department of Commerce; and
- the TransBorder Data produced by the U.S. Department of Commerce for the Bureau of Transportation Statistics.

The annual and monthly U.S. Department of Commerce CD-ROM is published and distributed by the Foreign Trade Division of the Census Bureau. This is the most widely distributed U.S. international trade data as it is normally sent to all Federal Depository Libraries in the U.S. Almost all university and large public libraries are Federal Depository Libraries. The disks may also be purchased individually or monthly from the Foreign Trade Division for $100 per disk. Additional information can be obtained at www.census.gov/foreign-trade. There are two disks published each month. One disk contains U.S. exports data and the other contains U.S. imports data. Each disk contains information for the month and year-to-date. The December disk end-of-year files are used as annual files. These disks provide commodity detail at the 10-digit Harmonized System (HS) level. Variables include total value, vessel value, vessel weight, air value, and air weight. These disks are excellent for determining total trade by country, but lack either a port of export or import, or U.S. state of origin or destination.

The U.S. State of Origin of Movement Export Series and U.S. State of Exporter Location Series each have three different sets of trade data, containing the following export variables:

- set 1—total value, vessel value, vessel weight, air value, air weight, country of destination, port of export, and U.S. state of export;
- set 2—total value, vessel value, vessel weight, air value, air weight, country of destination, U.S. state of export, and 3-digit North American Industry Classification System (NAICS) commodity description; and
- set 3—total value, vessel value, vessel weight, air value, air weight, U.S. region of export (several states combined), country of destination, and port.

The major difference between the Origin of Exporter and the Origin of Movement Series is how the U.S. state of origin is determined. In the Origin of Movement Series, the U.S. state of origin is taken from the customs entry that captures *"where did the goods begin their export journey."* The entry requires a two-digit alpha entry for the U.S. state. In the State of Exporter Location Series, the origin U.S. state is taken as the address of the firm exporting the products. For this reason, the Exporter Location Series is seldom used in transportation research, because, for example, automobiles manufactured in Fort Worth and shipped to Mexico would show up with an origin in Michigan. Both series are available on a quarterly or annual basis. Because neither of these data sets captures imports, they could not be used in this analysis. The files are available for $200 each. Annual data cost $600 per set. Additional information can be obtained at www.census.gov/foreign-trade.

The World Trade Atlas–U.S. State Export Edition is a new data set that is produced monthly. It can be ordered annually, quarterly, or on a one-time basis. It is delivered on a CD-ROM and contains 3 years of monthly export data. Variables reported include U.S. state of export, country of export destination, six-digit Harmonized System (HS) commodity classification, total value, vessel value, vessel weight, air value, and air weight. Since this data does not contain the export port of exit it was not useful for this analysis. A single data issue costs $1,200, quarterly issues amount to $2,400, and a one-year monthly subscription costs $3,600.

Special orders for U.S. International Trade Data can be made to the Foreign Trade Division of the Census Bureau at www.census.gov/foreign-trade. Data for specific variables can be requested. The Foreign Trade Division will first determine if providing the data will break any of their confidentiality rules. If the rules of confidentiality are broken, the Foreign Trade Division will not furnish the data. If confidentiality rules are not broken, a price will be established for the requested data, which can then be ordered. Because the publicly available U.S. international trade data does not contain information about imports and exports or the port of export or import, special data was requested that would show the exports and imports at Texas ports, as well as complete U.S.-Mexico trade along the U.S.-Mexico border.

The TransBorder data, collected by the U.S. Customs Service and processed by the U.S. Department of Commerce for the Bureau of Transportation Statistics, has several different data sets. Each of these data sets contains variables that describe trade between the U.S. and Canada and the U.S. and Mexico. Data sets d5a and d11 were used in this analysis. D5a shows the U.S. state of export origin, value, and mode of ground transport for U.S. exports to Mexico. D11 shows the import U.S. state of destination, value, weight, and mode of ground transport for U.S. imports from Mexico. Some of the other data sets capture the commodity at the two-digit Harmonized System (HS) commodity level, but these files do not show the port of entry. There is no cost for the TransBorder data and it can be found at www.bts.gov.

B.1.2 U.S. International Trade Data Selected

The available U.S. international trade data sets were evaluated to determine which sets were appropriate for the current analysis. The following trade data sets were used:

- annual and monthly data from the U.S. Department of Commerce CD-ROM;
- specially ordered data from the U.S. Department of Commerce; and
- TransBorder data sets d5a and d11 produced by the U.S. Department of Commerce for the Bureau of Transportation Statistics.

The annual U.S. Department of Commerce CD-ROM was used to illustrate total U.S.-Mexico annual trade from 1977 to the present. The special order trade data was used to provide specific port information for the ports along the U.S.-Mexico border. TransBorder data sets d5a and d11 were used to develop a data set that would show annual U.S.-Mexico exports and imports by truck and rail by U.S. state for a specific port location.

The international trade data sets used and the variables in each of these data sets are shown in Table B.1. Each of these data sets is discussed in more detail to assist the reader in understanding why and how the trade data was used in the research.

The U.S. Department of Commerce CD-ROM was used to verify the total U.S. Mexico trade values in the available trade data sets. As shown in Table B.1, this data set includes commodity detail at the 10-digit HS commodity classification. Only the total, vessel, and air shipment values are available. Surface transported shipment values can be estimated by subtracting vessel and air shipment values from the total shipment value. No information is, however, provided to determine the mode of surface transportation and thus shipments by rail and truck. The U.S. Customs District (a collection of several ports) is captured in this data set, but not the port of export or import. Finally, the U.S. state of origin (for U.S. exports) and the U.S. state of destination (for U.S. imports) are also not provided. Consequently, this data set could not be used to estimate rail or truck mode shares or to provide origin or destination details.

Table B.1 U.S. International Trade Data Sets

Data Set	U.S. Dept. of Commerce CD-ROM	Special Order Data	TransBorder d5a	TransBorder d11
Published	Monthly or annually	Monthly or annually	Monthly	Monthly
Commodity Detail	10 digit HS Code	5 digit SITC	None	None
Port	No	Texas and U.S.-Mexico Border	All U.S. Ports	All U.S. Ports
Customs District	Yes	Yes	Yes	Yes
Origin	Only country	Only country	U.S. state	Border port
Destination	Only country	Only country	Mexican state	U.s. State
Exports	Yes	Yes	Yes (Mexico only)	No
Imports	Yes	Yes	No	Yes (Mexico only)
Mode	Total, sea, and air Ground=Total-(sea+air)	Total, sea, and air Ground=Total-(sea+air)	Breaks out ground modes of truck, rail, and others.	Breaks out ground modes of truck, rail, and others.
Truck Value	No	No	Yes	Yes
Truck Weight	No	No	No	Yes
Rail Value	No	No	Yes	Yes
Rail Weight	No	No	No	Yes
Total Value	Yes	Yes	No	No
Vessel Value	Yes	Yes	No	No
Vessel Weight	Yes	Yes	No	No
Air Value	Yes	Yes	No	No
Air Weight	Yes	Yes	No	No
Usefulness to the analysis	Total U.S. - Mexico trade. Verify other data sets.	Total U.S. - Mexico trade at the port level.	Used to establish southbound flow on Texas highways to Mexico.	Used to establish northbound flow on Texas highways from Mexico.

Special order U.S.-Mexico trade data contains variables for the monthly total value, vessel value, vessel weight, air value, air weight, and five-digit Standard International Trade Code (SITC) commodity description at ports along the U.S.-Mexico border. This data includes information for airports and seaports, which is consistent with the data for border ports. The data set does not provide the U.S. state of export or import nor does it separate rail and truck transported trade across the U.S.-Mexico border.

As shown in Table B.1, TransBorder data sets d5a and d11 were used to construct southbound and northbound flows over the principal Texas highway trade corridors, respectively. D5a contains the origin U.S. state for U.S. exports to Mexico, Mexican state of destination, mode of transport (truck and rail value), and the border port of export. D11 contains the destination U.S. state for U.S. imports from Mexico, mode of transport, value, weight, and the border port of import. In addition, this data set contains the weights of the shipments. Shipment weights are used to estimate the export weights not contained in d5a. Both data sets lack commodity details.

To conclude, international trade data was considered from the U.N., Mexico, and the U.S. Because the U.N. and Mexican data did not contain the specific port of export or import entry required for this analysis, U.S. trade data was used. The annual U.S. Department of Commerce CD-ROM was used to compile total U.S.-Mexico annual trade values, special trade data was ordered from the Census Bureau to specify trade at specific port locations, and TransBorder data sets d5a and d11 were used to construct a matrix of truck flows.

Appendix C. U.S.-Mexico Trade and Average Annual Growth

Table C.1 U.S.-Mexico Trade and Average Annual Export and Import Growth (1977-2001)

	U.S. Exports to Mexico ($ billion)	Annual Change (%)	U.S. Imports from Mexico ($ billion)	Annual Change (%)
1977	4.8		4.8	
1978	6.7	38.6	6.2	30.0
1979	9.9	47.6	9.0	45.1
1980	15.2	53.7	12.8	42.7
1981	17.8	17.4	14.0	9.1
1982	11.8	-33.6	15.8	12.6
1983	9.1	-23.2	17.0	7.9
1984	12.0	32.1	18.3	7.3
1985	13.6	13.8	19.4	6.1
1986	12.4	-9.2	17.6	-9.4
1987	14.6	17.7	20.5	16.9
1988	20.5	40.4	23.5	14.7
1989	25.0	22.0	27.6	17.3
1990	28.4	13.7	30.8	11.6
1991	33.3	17.3	31. 9	3.5
1992	40.6	22.0	35.2	10.4
1993	41.6	2.4	39.9	13.4
1994	50.8	22.3	49.5	24.0
1995	46.3	-9.0	61.7	24.6
1996	56.8	22.6	73.0	18.3
1997	71.4	25.8	85.8	17.6
1998	79.0	10.7	94.7	10.4
1999	87.0	10.2	109.7	15.9
2000	111.7	28.4	135.9	23.9
2001	101.5	-9.1	131.4	-3.3

Note: Average Annual Growth of US exports amounted to 15.6 % and US imports to 15.4 % between 1977 and 2001.

Source: U.S. Department of Commerce

Appendix D. Trade Flows

D.1 TRADE FLOWS ACROSS THE U.S.-MEXICO BORDER

Four U.S. states border Mexico: Texas, New Mexico, Arizona, and California. As shown in Table D.1, significant differences exist among these states in terms of total trade value crossing by both border port and mode. Table D.1 highlights only border ports that have a significant number of truck crossings per year. The value of U.S.-Mexico trade crossing at smaller ports was added to the trade values crossing at larger ports. In California, trade values are only given for Otay Mesa, south of San Diego, and Calexico. For Arizona and New Mexico, all trade was assumed to cross at Nogales and Columbus, respectively. In Texas, trade crossing at Fabens was added to that of El Paso; while trade crossing at Rio Grande City, Progresso, and Roma was included with that crossing at McAllen. Presidio, although a smaller Texas border port, is shown separately because it is some distance away from any other port and it is foreseen that the number of trucks crossing at Presidio will increase upon the completion of a new highway in Mexico, linking Ciudad Chihuahua to Presidio.

From Table D.1, it is evident that over three-quarters of the ground transported trade between the U.S. and Mexico crosses at the Texas-Mexico border. In 2001, trade to the value of \$155.6 billion crossed the Texas border, representing 77.5 percent of the total U.S.-Mexico trade value. More than 60 percent of the total U.S.-Mexico trade value crosses at Texas's two largest ports: Laredo (\$82.72 billion in 2001) and El Paso (\$38.3 billion in 2001).

The value of trade crossing the California border more than doubled between 1994 and 2001, increasing from \$12.1 billion to \$29.2 billion. California's share of total U.S.-Mexico trade, however, increased marginally from 13.7 percent in 1994 to 14.5 percent in 2001.

Although the value of trade crossing at Arizona increased from \$8.32 billion in 1994 to \$15.2 billion in 2001, Arizona's share of total U.S.-Mexico trade value decreased from 9.4 percent to 7.6 percent during the same period.

In terms of total U.S.-Mexico trade value, less than one-half percent crossed the New Mexico border in 2001. The value of trade crossing at New Mexico, however, increased significantly from 1994 (close to \$25 million) to 2001 (about \$828 million).

Table D.1 U.S.-Mexico Border Port Trade (1994 and 2000)

Estimated 1994 Value of U.S./Mexico Trade Crossing by State and Major Port ($ billions)						
Border Region	**Truck Exports**	**Truck Imports**	**Rail Exports**	**Rail Imports**	**Total Truck and Rail Exports and Imports**	**% of Total Truck and Rail Exports and Imports**
Otay Mesa, CA	3.51	5.35	0.00	0.00	8.86	10.04
Calexico, CA	1.65	1.50	0.05	0.01	3.22	3.65
Total California	5.16	6.85	0.05	0.01	12.08	13.68
Nogales, AZ	3.50	3.21	0.06	1.54	8.32	9.42
Total Arizona	3.50	3.21	0.06	1.54	8.32	9.42
Santa Teresa, NM	0.01	0.02	0.00	0.00	0.02	0.03
Total New Mexico	0.01	0.02	0.00	0.00	0.02	0.03
El Paso, TX	7.53	11.07	0.20	0.15	18.96	21.48
Presidio, TX	0.03	0.06	0.00	0.00	0.09	0.10
Del Rio, TX	0.72	0.78	0.00	0.00	1.50	1.69
Eagle Pass, TX	0.85	0.80	1.17	0.56	3.38	3.82
Laredo, TX	18.15	7.98	2.38	2.47	30.99	35.11
McAllen, TX	2.68	2.63	0.00	0.00	5.32	6.03
Brownsville, TX	3.32	2.41	0.29	1.61	7.63	8.64
Total Texas	33.28	25.74	4.04	4.79	67.85	76.87
Total U.S./Mx Border	41.95	35.82	4.16	6.34	88.26	100

Estimated 2001 Value of U.S./Mexico Trade Crossing by State and Major Port ($billions)						
Border Region	**Truck Exports**	**Truck Imports**	**Rail Exports**	**Rail Imports**	**Total Truck and Rail Exports and Imports**	**% of Total Truck and Rail Exports and Imports**
Otay Mesa, CA	9.12	12.29	0.00	0.00	21.42	10.67
Calexico, CA	3.26	4.37	0.13	0.01	7.77	3.87
Total California	12.38	16.67	0.13	0.01	29.19	14.54
Nogales, AZ	4.75	7.91	0.81	1.73	15.20	7.57
Total Arizona	4.75	7.91	0.81	1.73	15.20	7.57
Santa Teresa, NM	0.08	0.75	0.00	0.00	0.83	0.41
Total New Mexico	0.08	0.75	0.00	0.00	0.83	0.41
El Paso, TX	16.46	20.26	0.27	1.30	38.30	19.08
Presidio, TX	0.07	0.12	0.00	0.00	0.20	0.10
Del Rio, TX	1.30	1.22	0.00	0.00	2.51	1.25
Eagle Pass, TX	1.74	2.07	2.27	0.86	6.94	3.46
Laredo, TX	30.02	28.52	6.32	17.86	82.72	41.19
McAllen, TX	6.22	7.22	0.00	0.00	13.44	6.69
Brownsville, TX	5.61	5.12	0.51	0.22	11.47	5.71
Total Texas	61.41	64.55	9.38	20.25	155.58	77.48
Total U.S./Mx Border	78.61	89.88	10.32	21.99	200.80	100

Source: Basic Data – U.S. Department of Commerce and Bureau of Transportation Statistics Mode Estimates – John P. McCray

Appendix E. Modal Share and Shift

E.1 U.S.-MEXICO TRADE MODAL SHARE AND SHIFT AT MAJOR TEXAS BORDER PORTS

Table E.1 summarizes the value of U.S.-Mexico trade crossing at major Texas border ports by mode and direction for 1994 and 2001. As can be seen from the table, Laredo is the largest border port in Texas with $58.5 billion of trade crossing by truck and $24.2 billion of trade crossing by rail in 2001. Although Laredo's truck share of U.S.-Mexico trade value crossing at the Texas border remained fairly constant between 1994 and 2001 (38.5 percent compared to 37.6 percent), Laredo's truck share of the value of U.S. exports decreased from 48.6 percent to 42.4 percent during the same period. Between 1994 and 2001, the value of imports from/exports to Mexico by rail crossing at Laredo increased significantly: the value of rail exports increased from $2.4 billion to $6.3 billion, and the value of rail imports increased from $2.5 billion to $17.9 billion. This increase in rail import values crossing at Laredo is the largest of any location on the Texas border.

El Paso is the second largest border port on the U.S.-Texas border with $36.7 billion crossing by truck and $1.6 billion crossing by rail in 2001. It is worth mentioning that although the value of truck imports increased from $11.1 billion to $20.3 billion, El Paso's share of total truck import values crossing the Texas border reduced significantly from 36.3 percent to 23.9 percent.

Compared to Laredo and El Paso, Brownsville and Eagle Pass are relatively modest multi-modal border crossings. Approximately $11.5 billion in trade crossed at Brownsville ($10.7 billion by truck and $0.7 billion by rail) and approximately $6.9 billion crossed at Eagle Pass ($3.8 billion by truck and $3.1 billion by rail) in 2001. It is, however, worth noting that rail export values have exceeded truck export values in 2001 by more than 30 percent.

McAllen, Del Rio, and Presidio do not have rail connections to Mexico. McAllen is the largest of these ports. U.S.-Mexico trade crossing at McAllen increased from $5.3 billion in 1994 to $13.4 billion in 2001. The border ports of Del Rio and Presidio are relatively small, accounting for 1.6 percent and 0.1 percent of the value of trade crossing the Texas-Mexico border in 2001.

Table E.1 U.S.-Mexico Trade Modal Share at Major Texas Ports (1994 and 2001)

Estimated 1994 U.S.–Mexico Trade by Texas Crossing and Mode ($ Millions)							
Port	**Mode**	**Exports**	**Imports**	**% of Total Texas Exports**	**% of Total Texas Imports**	**Total Exports and Imports**	**% of Total Texas Exports and Imports**
El Paso, TX	Truck	7,531.8	11,073.4	20.2	36.3	18,605.2	27.4
	Rail	202.2	148.6	0.5	0.5	350.8	0.5
Presidio, TX	Truck	28.8	58.5	0.1	0.2	87.4	0.1
Del Rio, TX	Truck	718.4	777.3	1.9	2.6	1,495.7	2.2
Eagle Pass, TX	Truck	846.0	801.1	2.3	2.6	1,647.1	2.4
	Rail	1,171.7	556.3	3.1	1.8	1,728.0	2.6
Laredo, TX	Truck	18,147.9	7,984.6	48.6	26.2	26,132.5	38.5
	Rail	2,383.9	2,471.1	6.4	8.1	4,855.0	7.2
McAllen, TX	Truck	2,684.4	2,633.7	7.2	8.6	5,318.1	7.8
Brownsville, TX	Truck	3,319.8	2,410.6	8.9	7.9	5,730.4	8.5
	Rail	285.2	1,610.3	0.8	5.3	1,895.6	2.8
1994 Total Texas		37,320.2	30,525.6	100.0	100.0	67,845.8	100.0
Estimated 2001 U.S.–Mexico Trade by Texas Crossing and Mode ($ Millions)							
Port	**Mode**	**Exports**	**Imports**	**% of Total Texas Exports**	**% of Total Texas Imports**	**Total Exports and Imports**	**% of Total Texas Exports and Imports**
El Paso, TX	Truck	16,462.7	20,263.6	23.3	23.9	36,726.3	23.6
	Rail	272.9	1,304.4	0.4	1.5	1,577.3	1.0
Presidio, TX	Truck	73.2	123.9	0.1	0.2	197.1	0.1
Del Rio, TX	Truck	1,295.0	1,219.2	1.8	1.4	2,514.2	1.6
Eagle Pass, TX	Truck	1,736.1	2,073.5	2.5	2.5	3,809.6	2.5
	Rail	2,272.8	856.5	3.2	1.0	3,129.3	2.0
Laredo, TX	Truck	30,017.3	28,520.0	42.4	33.6	58,537.3	37.6
	Rail	6,317.9	17,861.1	8.9	21.1	24,179.0	15.5
McAllen, TX	Truck	6,215.3	7,224.5	8.8	8.5	13,439.8	8.6
Brownsville, TX	Truck	5,608.0	5,124.6	7.9	6.0	10,732.5	6.9
	Rail	512.1	224.1	0.7	0.3	736.2	0.5
2001 Total Texas		70,783.2	84,795.5	100.0	100.0	155,578.7	100.0

Source: Basic Data – U.S. Department of Commerce and Bureau of Transportation Statistics, Mode Estimates – John P. McCray

Appendix F. Development of Highway Trade Corridors

F.1 DEVELOPMENT OF TEXAS U.S.-MEXICO HIGHWAY TRADE CORRIDORS

Defining Texas highway trade corridors and truck flows requires a highway corridor network, trade analysis, a gravity model and professional judgment. Data used for the analysis included:

- U.S.-Mexico trade data from the Bureau of Transportation Statistics;
- 1999 Texas Truck Traffic Flow Map; and
- U.S.-Mexico truck trade routes defined in McCray (1998) and McCray and Harrison (1999).

The objective of this Appendix is to summarize the methodology used to determine the number of trade trucks on the U.S.-Mexico truck trade routes as defined earlier.

As explained in Appendix B, the TransBorder data sets d5a and d11 were used to develop an origin/destination matrix between the ports along the border and U.S. states of destination/origin. TxDOT publishes Texas Truck Traffic Flow maps periodically. The most recent available version is for 1999. This map shows the numbers of trucks on most interstate highways, U.S. highways, and state highways in Texas.

A "trade truck" was defined as a tractor with a fully loaded forty-eight-foot trailer, representing an average trade truck crossing the U.S.-Mexico border. Throughout this research document, the term "truck" or "trade truck" are used to indicate a tractor with an equivalent forty-eight-foot trailer load.

Out-of-state origins or destinations of U.S.-Mexico trade that flows through Texas, were grouped into five regions. Each of these regions was connected to a Texas highway corridor, which was assumed to be the point where these trade trucks enter or leave Texas. The U.S. regions and the Texas highway corridor connecting points are:

- southeast of Texas connecting at I-10 at the Texas-Louisiana border;
- northeast of Texas, connecting at I-30 at the Texas-Arkansas border;
- north of Texas connecting at IH-35 at the Texas-Oklahoma border;
- northwest of Texas, connecting at US 287 at the Texas-Oklahoma border and at I-10 at the Texas-New Mexico border; and
- southwest of Texas connecting at I-10 at the Texas-New Mexico border.

The connecting points are shown in Figure 5.6.

For U.S.-Mexico trade flows with an origin or destination in Texas[8], a gravity model based on employment was developed. Texas was divided into twelve regions, each region consisting of a number of counties with a dominant city. Total employment for each of the regions and for Texas was calculated. The percentage of U.S.-Mexico trade allocated to each region was based on the region's share of total Texas employment. As can be seen from Table F.1, based on employment, 38 percent of the U.S.-Mexico trade was allocated to have an origin or destination in the Dallas/Fort Worth region.

[8] None of the trade data sources captures origins/destinations in Texas.

Table F.1 Distribution of Texas Trade Flow

City	% of U.S.-Mexico Trade (based upon Employment)
Amarillo	2
Austin	8
Corpus Christi	2
Dallas	38
El Paso	3
Houston	28
Laredo	1
Lubbock	2
McAllen	3
Odessa	2
San Angelo	2
San Antonio	9
Total	100

All trucks were assumed to be loaded, yet it is known that some commodity moves entail empty return hauls. Extensive questioning of exporters/importers confirmed the reluctance to reposition empty trailers by road. It was found that empty trailers were frequently repositioned by intermodal rail. Although some empty hauls are undertaken, it was assumed that empty movements account for a small fraction of the total number of trade trucks.

To determine the U.S.-Mexico trade truck flows four different values are presented for each Texas highway segment on the identified U.S.-Mexico trade truck routes:

- the annual number of U.S.-Mexico trade trucks;
- the average daily U.S.-Mexico trade trucks;
- the average daily truck traffic (ADTT); and
- the percent of total truck traffic carrying U.S.-Mexico trade.

The total number of trade trucks on a particular highway segment was calculated by adding:

- the number of U.S.-Mexico trade trucks with an origin or destination in Texas traveling on that particular segment to
- the U.S.-Mexico trade trucks entering/exiting Texas from the southeast, northeast, north, northwest, and southwest that travel on that particular segment.

The total was divided by 365 to obtain the average daily trade truck volume.

The average daily truck traffic for the highway segment, including the trade truck traffic, was taken as the lowest segment truck count on the 1999 Texas Truck Traffic Flow map. The lowest value was chosen to provide an estimate of longer distance truck movements, thereby eliminating local trucks. These values are given in Table F.2.

As can be seen from Table F.2:

- one highway segment has more than 3,000 trucks per day carrying U.S.-Mexico trade;
- five highway segments have between 2,000 and 3,000 U.S.-Mexico trade trucks per day;
- eight highway segments have between 1,000 and 2,000 U.S.-Mexico trade trucks per day;
- three highway segments have between 500 and 1,000 U.S.-Mexico trade trucks per day; and
- four highway segments have between 300 and 500 U.S.-Mexico trade trucks per day.

Table F.2 U.S.-Mexico Trade Trucks on Texas Highway Corridors

Highway	Segment	Annual U.S. - Mexico Trade Trucks	Average Daily Trade Trucks	Average Daily Truck Traffic (ADTT)	Trade Trucks as a % of ADTT
IH-35	IH-35 US 57 Intersection to San Antonio	1,344,329	3,683	5,182	71
IH-35	Laredo to IH-35 US 57 Intersection	1,047,915	2,871	3,190	90
IH-35	San Antonio to Austin	1,083,074	2,967	12,746	23
IH-35	Austin to Dallas/Fort Worth	978,256	2,680	9,743	28
I-10	El Paso to IH-10 , IH-20 Intersection	954,636	2,615	6,094	43
I-30	Dallas/Fort Worth to Texas Arkansas Border	794,279	2,176	5,703	38
I-10	Sonora to San Antonio	601,607	1,648	2,167	76
I-10	IH-10 , IH-20 Intersection to Ft. Stockton	562,672	1,542	2,192	70
I-10	Ft. Stockton to Sonora	559,185	1,532	2,250	68
I-20	Big Spring to Dallas/Fort Worth	411,326	1,127	3,879	29
I-37	San Antonio to IH-37 US 281 US 57	395,840	1,084	4,688	23
I-20	Odessa to Big Spring	395,694	1,084	5,145	21
I-20	IH-10 , IH-20 Intersection to Odessa	391,963	1,074	4,493	24
US 281	McAllen/Brownsville to IH-37 US 281 US57	369,366	1,012	1,653	61
US 59	Victoria to Houston	290,338	795	3,307	24
I-10	San Antonio to Houston	288,466	790	6,749	12
I-10	El Paso to Texas/New Mexico border	241,068	660	6,094	11
US 59	Laredo to IH-35 US 57 Intersection	165,926	455	1,156	39
US 59	IH-35 US 57 Intersection to Victoria	157,315	431	1,220	35
US 77	McAllen/Brownsville to Corpus Christi	140,998	386	2,946	13
US 77	Corpus Christi to Victoria	133,023	364	3,333	11
US 277	Sonora to San Angelo	92,316	253	466	54
US 57	Eagle Pass to IH-35 US 57 Intersection	81,042	222	294	76
I-10	Houston to the Texas Louisiana Border	79,691	218	11,880	2
US 87	San Angelo to Big Spring	76,425	209	560	37
US 87	Big Spring to Lubbock	72,277	198	588	34
US 90	Del Rio to San Antonio	52,168	143	643	22
I-27	Lubbock to Amarillo	41,208	113	1,243	9
IH-35	Dallas/ Fort Worth to Texas Oklahoma Border	38,143	105	5,225	2
I-37	IH-37 US 281 US 58 to Corpus Christi	36,776	101	2,704	4
US 287	Amarillo to Texas Oklahoma Border	18,022	49	1,156	4
US 83	Laredo to McAllen/Brownsville	13,663	37	988	4
US 277	Del Rio to Sonora	11,079	30	314	10
US 277	Del Rio to Eagle Pass	8,993	25	687	4
US 67	Presidio to Fort Stockton	5,981	16	65	25
US 90	Del Rio to Sanderson	4,840	13	482	3
US 285	Sanderson to Ft. Stockton	4,840	13	176	8
US 67	Ft. Stockton to US 67 US 385 Intersection	3,782	10	171	6
US 385	US 67 US 385 Intersection to Odessa	3,782	10	507	2
US 277	Del Rio to Laredo	1,749	5	763	1

Appendix G. NAFTA Opening of the U.S.-Mexico Border

G.1 NAFTA OPENING OF THE U.S.-MEXICAN BORDER

NAFTA (Chapter 12) called for U.S. and Mexican trucking firms to be allowed free access into each other's territories when hauling international shipments. Since there were few restrictions on trucking between the U.S. and Canada the emphasis was placed on the U.S.-Mexico border. NAFTA, however, specified that trucks have to meet the safety, driver, licensing, and operational requirements established in each country in which they chose to operate. The first phase of the opening called for international transport across the border between origins and destinations in the border states of Mexico and the U.S. Under these provisions Mexican truckers would be able to carry products from Monterrey, Mexico, to Dallas, Texas, and pick up products in Dallas bound for Mexico. NAFTA did not permit local haul, for example, for a Mexican carrier to haul commodities from Dallas to San Antonio. These provisions were to take effect on December 18, 1995.

On December 17, 1995 the U.S. Secretary of Transportation announced that the U.S. would not adhere to the NAFTA cross-border trucking provisions because of safety reasons. Drayage carriers thus continue to move trailers across the border and Mexican tractors are restricted to a commercial zone in the U.S.

Officials of the U.S. DOT were planning to open the U.S.- Mexico border to Mexican carriers by the end of August 2002, but as of October 2002 the border is still closed to Mexican carriers. Under the NAFTA provisions Mexican carriers would be able to haul from a Mexican origin directly to a destination in the U.S. and from a U.S. origin to a Mexican destination. The same would be true for U.S. carriers. Many complexities, however, exist in cross-border international truck operations under the NAFTA rules, which are currently not well understood. It is, however, foreseeable that the requirement for drayage might reduce in the future and that trade trucks might move between inland ports in Mexico and inland ports in the U.S.