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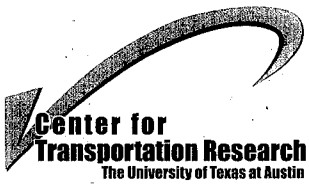

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THE IDENTIFICATION AND CLASSIFICATION OF INLAND PORTS

Sara Jean Leitner and Robert Harrison

CENTER FOR TRANSPORTATION RESEARCH
BUREAU OF ENGINEERING RESEARCH
THE UNIVERSITY OF TEXAS AT AUSTIN

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16. Abstract

This report presents a formal definition for inland ports and creates a classification methodology to promote familiarity with inland port operations and aid transportation planners interested in supporting inland port operations. Inland ports are sites away from traditional borders where international trade is processed and value-added services are provided. As the private sector becomes more focused on globalization and efficient supply chains, inland ports may become more important. Transportation planners need to recognize that inland ports may also promote more efficient multi-modal corridors. The classification methodology builds on the management product life cycle concept to create an inland port development life cycle. The stages of the development life cycle can assist planners in understanding what actions can be taken to best promote positive transportation impacts by inland ports.

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THE IDENTIFICATION AND CLASSIFICATION OF INLAND PORTS

by

Sara Jean Leitner and Robert Harrison

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Impacts of Inland Ports on Trade Flows and Transportation in Texas

Conducted for the

TEXAS DEPARTMENT OF TRANSPORTATION

in cooperation with

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FEDERAL HIGHWAY ADMINISTRATION

by the

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THE UNIVERSITY OF TEXAS AT AUSTIN

August 2001

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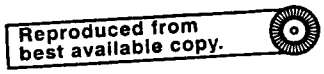

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CHAPTER 1: INTRODUCTION

1.1 BACKGROUND

The United States now competes in a global marketplace where intermodal transportation is recognized by the private sector as an integral component of a systems approach to conducting competitive and efficient business. Focus in many industries has shifted to international operations and supply chains, requiring transportation planners to evaluate the importance of multimodal corridors. Now researchers are considering the fundamental differences between trade corridors and transportation corridors in an effort to improve transportation planning and investment. Transportation corridors are the focus of much current United States interest, being the subject of both federal designation and statewide planning, and carrying the likelihood of priority funding for future improvements. Inland ports appear to offer a number of attractive attributes to shippers and may complement the transportation corridors they serve by raising service levels and lowering total costs.

1.2 INTRODUCTION TO INLAND PORTS

Traditional ports at land, air, and coastal borders are the primary locations where international trade is processed. However, it is now recognized that a growing amount of trade is being processed at inland sites. International trade processing involves all transactions and inspections that federal agencies require for goods entering or leaving the country. An inland port is a location where the processing of trade can be shifted from the national borders and where multiple modes of transportation and a wide variety of services are offered at a common location. International operations are supported at an inland port when customs clearance and Foreign-Trade Zone capabilities are available. Inland ports that provide value-added services in addition to trade processing will support industry efforts to create more efficient supply chains.

Transportation planners and policy makers now concentrate on multimodal corridors as part of their investment strategies. Inland ports provide an opportunity to enhance corridor investments because of the capability to balance truckloads on highway, air, rail, or water modes. Ultimately, inland ports have the capability to create local employment, enhance corridor efficiencies, and reduce costs—both private and social—at border points of entry.

1.3 Origin and Purpose of Research

The Texas Department of Transportation (TxDOT) has an established research program that in 1995 identified inland ports as a component of its long-range research plan. Subsequently, a 2-year study was awarded in the Fiscal Year 2001 program to undertake research into inland ports. The work was structured to include a literature review, a detailed trade analysis, descriptions of existing inland ports in both the United States and Europe, the development of a message to characterize and identify inland ports in Texas, and finally to measure the trade and transportation impacts. This is the first of two reports scheduled for this project. Also of critical importance to TxDOT is a manual, due at the end of the second year, which will allow all TxDOT planners to identify and characterize inland port sites and work closely on their transportation needs as they relate to TxDOT planning.

The team comprised members from three Texas universities. Rob Harrison (Research Supervisor) and Sara Jean Leitner (Graduate Research Assistant) were part of the Center for Transportation Research (CTR) team at The University of Texas at Austin; Dr. John McCray (Researcher) undertook a trade analysis at The University of Texas at San Antonio; and Russell Henk (Researcher) looked at transportation aspects based at the Texas Transportation Institute (TTI) office in San Antonio. The research project director was Judy Friesenhahn (Advance Project Development Engineer) and the project coordinator was Luis Ramirez (District Engineer-Laredo).

The primary purpose of this research is to create a classification methodology to better understand how different inland ports can support efficient supply chains and enhance corridor operations. Research findings should enhance transportation planners' understanding of inland ports and how their actions can best support inland port activities.

1.4 Organization of Report

This report offers a method to characterize inland ports and provide an approach for transportation planning agencies to employ when inland ports have been identified and support is sought from the agency.

Initially, international trade and supply chain management are investigated to understand current private-sector initiatives. The impacts of inland ports on supply chains are presented to show the relevance this topic has to private-sector interests. The interplay between private and

public sector decisions may be integral to the potential impact of inland ports on the transportation system.

Case studies are presented on International, United States, and Texas inland ports to provide information on all types of inland ports. The sites investigated were identified through literature and communication with inland port practitioners. The case studies are the primary means used to gain familiarity with inland ports. A formal definition was created after synthesizing the information gained from the case studies. Additionally, preliminary classes of inland ports were identified in the same manner. A literature review of critical needs at ports is provided. The most relevant critical needs for initial success at an inland port are described.

Finally, a classification model is presented to better understand how different classes of inland ports can support efficient supply chains and corridors through supporting efforts of transportation planners and policy makers.

This report is structured as follows: Chapter 2 provides a brief summary of international trade and how inland ports impact supply chains. Chapter 3 identifies International and United States sites in the form of case studies. Chapter 4 discusses two inland port case studies in Texas and an introduction to corridor impacts. Chapter 5 presents a formal definition of inland ports and provides preliminary inland port classes. Chapter 6 lists critical needs for success at an inland port. Chapter 7 presents a formal inland port classification methodology. The final chapter concludes the report with a summary of the findings from this research and recommendations for future research related to inland ports. An annotated literature review—an early task in the project—is also provided in the Appendices.

CHAPTER 2: INTERNATIONAL TRADE AND SUPPLY CHAINS

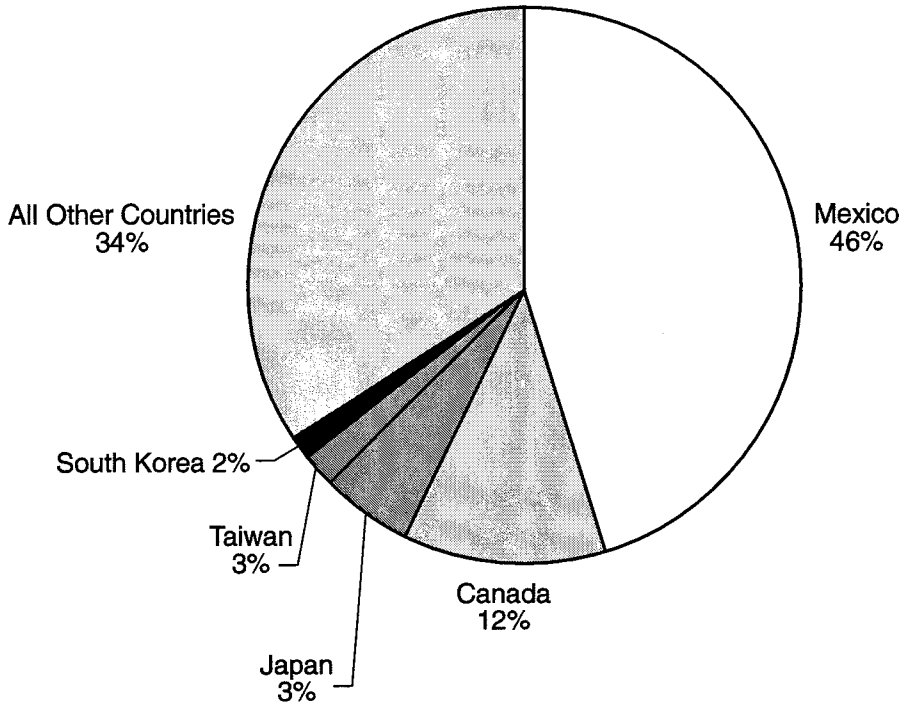
2.1 INTRODUCTION

International trade takes place among countries on the basis of a wide range of comparative advantages. Comparative advantages can be achieved through reduced costs associated with labor, resources, technology, market location, inventory, and transportation. Companies that participate in international trade pursue maximum benefits when comparing locations in which to operate or derive supplies. This chapter will explore the impacts that the globalization of trade has on supply chains and the potential impact that an inland port can make on international trade movements.

2.2 GLOBALIZATION OF TRADE

The globalization of the nation's economy has led to increase and change in transportation requirements. Economic and trade policies, including the North American Free Trade Agreement (NAFTA), have contributed to the increase in transportation demand as products move through international supply chains (Louis Berger 1999). NAFTA trade has resulted in a shift in international trade patterns in the United States. This shift has increased north-south movements, with a large fraction of the NAFTA trade centered in Texas.

During 1999, Texas exports totaled $91 billion, a 4.8% increase from 1998. Total exports in the United States were $692.8 billion, only increasing 1.8% from 1998 (Business and Industry Center 2001a). Movements between the United States and Mexico dominate international trade in Texas. Figure 2.1 shows the breakdown of international trade in Texas. Texas exports to Mexico from 1998 to 1999 increased 14%, while trade with Canada only increased 3.5%. Trade exports to Mexico totaled $41.4 billion during 1999; this represented 45.5% of total Texas exports. Canada was the second largest export market at $10.7 billion. Canadian exports represented 11.7% of the total Texas exports in 1999.



Source: Business and Industry Data Center

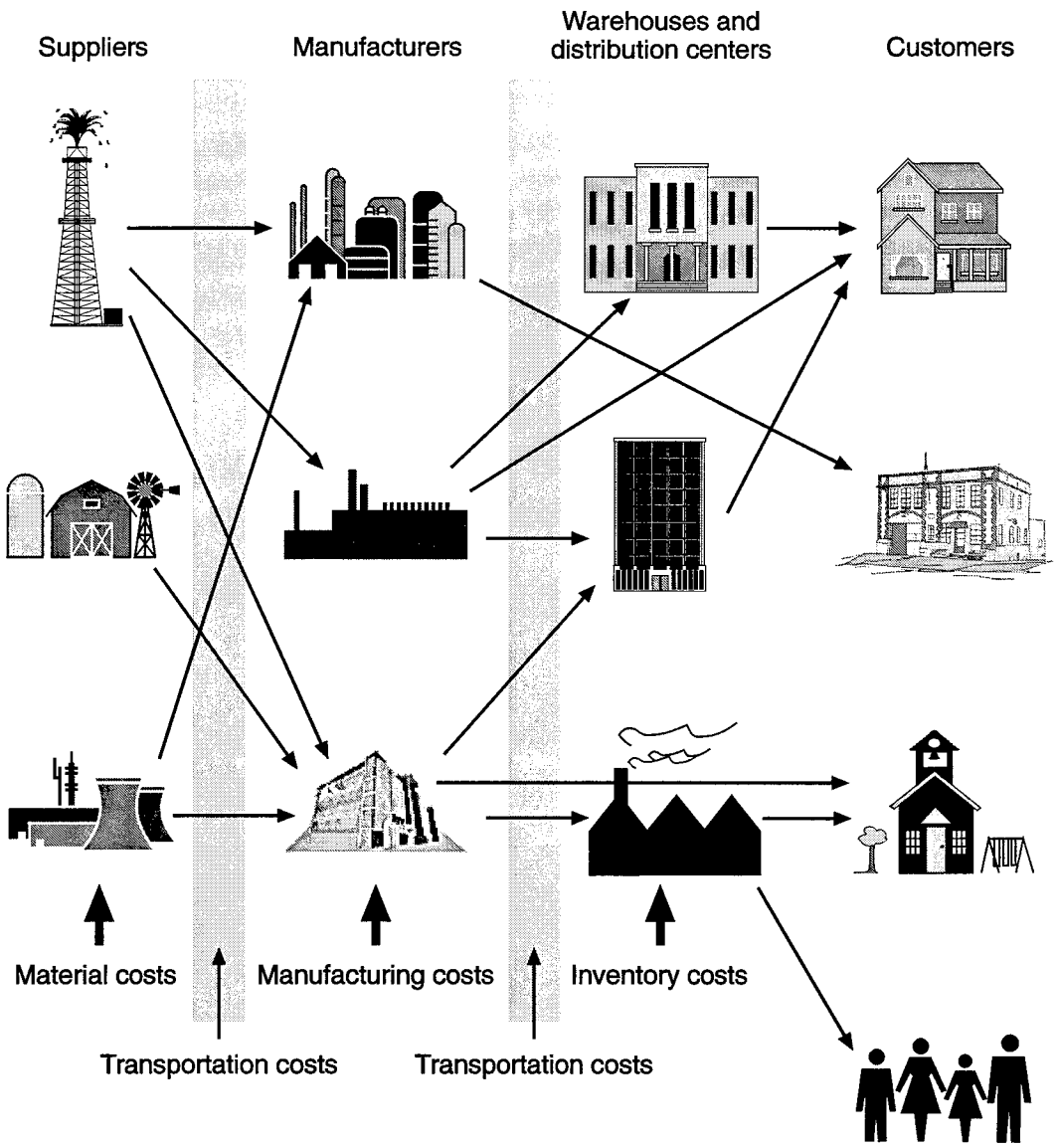
Figure 2.1 1999 Texas Export Destinations

Globalization of trade has been stimulated by changes in operating environment and intermodal service capabilities in addition to nationwide policies. Historically, many countries used tariff rates on import goods to protect new industry. Programs like the General Agreement on Trade and Tariffs (GATT), which started in the 1950s, provided a format to improve the international operating environment with its forum for tariff bargaining. The World Trade Organization (WTO) replaced GATT in 1995. The WTO incorporates all GATT agreements along with agreements on trade in services, intellectual property, and commodities (Harrison et al. 2000). Major changes in the transportation industry encompassing deregulation of all modes in the United States, increased use of containers, and new infrastructure investments have facilitated the efficient movement of goods with reliability and at a competitive price in the United States. These changes, combined with effective logistics management techniques practiced by shippers, have opened global markets to the United States in general and specifically to Texas.

Growth in the global economy over the last decade, incorporating new manufacturing and agricultural production techniques and markets, has increased the demand for efficient transportation service. This demand is a result of locating manufacturing worldwide in an effort to reduce labor cost and efficiently place distribution centers. Companies are beginning to rely more and more on Just-in-Time (JIT) and Time-Definite delivery systems. These systems require more frequent shipments and precise scheduling. Furthermore, focus has shifted to limiting the number of distribution facilities, which serve entire nations or at least large catchment areas. This inherently increases transportation costs because of the distance required to reach the customer. Requirements like these depend on reliable transportation services despite congestion in the network. With such high demand on transportation needs, companies focus on ways to minimize their transportation costs with respect to travel times and monetary costs (Morash 1999; Louis Berger 1999; Turnquist 1993).

2.3 Supply Chains and Logistics Management

In an effort to become globally competitive, shippers have begun to focus attention on streamlining production and distribution. The management of the streamlining process has been termed supply chain management. According to Simchi-Levi et al. (2000, p. 1) "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." Figure 2.2 schematically illustrates the supply chain network and its integral cost components. Each stage of the supply chain will be referred to as a link.



Adapted from: Simchi-Levi et al.

Figure 2.2 Supply Chain Network

A formal definition of supply chain management provided by Simchi-Levi et al. (2000, p. 1) states:

> Supply chain management is a set of approaches utilized to efficiently integrate suppliers, 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.

This definition emphasizes a systems approach and the impact of decisions upon the entire chain. Supply chain management emphasizes a full systems approach with a key component being logistics management. Logistics management can be defined as:

> Logistics is that part of the supply chain process that plans, implements, and controls the efficient, effective flow and storage of goods, services, and related information from the point of origin to the point of consumption in order to meet customers' requirements (Council of Logistics Management 2001).

Logistics management emphasizes the transport components (flow of goods) of the streamlining process; however, when considering the benefits of an inland port the entire system must be considered. Focus on supply chain management and its inclusion of manufacturing functions as well as distribution and inventory movement will be emphasized in this work related to inland ports.

A key facet of the supply chain concept important for transportation planners and policy makers to recognize is that transportation capabilities can be "a source of competitive advantage" (Morash 1999, p. 395) for companies. The two most important emphases in supply chain management are the minimization of transportation cost and the reduction of inventory. As seen in Figure 2.2, transportation costs factor into the supply chain at multiple points. In a supply chain, the emphasis on reduction of inventory implies transportation cost increases. These increases are due to more frequent shipments and precise delivery scheduling. The trade-offs associated with these two goals of efficient supply chains present challenges that can be assisted by high-quality transportation capabilities (Simchi-Levi 2000).

It is apparent that global supply chains are increasingly important for successful business operations and the reduction of "transportation-related waste that can add cost but no value" (Morash 1999, p. 396). By creating transportation policies that focus on the transportation capabilities demanded by efficient supply chain strategies, improvements would be made in national productivity, global competitiveness, and economic growth (Morash 1999).

2.4 Inland Ports Impact on Supply Chains

Inland ports can provide the means to eliminate some "transportation-related wastes" associated with inefficient supply chains. Provision of combinations of modes at inland ports can potentially provide opportunities to eliminate these inefficiencies. Additional opportunities can occur when value-added services are all commonly located at an inland port. An inland port can also provide "a shared location for partners" (Robinson 1999) who want to improve the efficiency of their supply chains.

Today's competitive global economy has forced businesses to focus not only on streamlining product manufacturing, but also on the efficiency of the entire supply chain process. An inland port can remove some link inefficiencies by focusing on secondary activities not directly related to production. At inland ports, transportation capabilities in the form of direct interstate highway connections, intermodal rail facilities, or air cargo operations can be building blocks for businesses looking for a competitive advantage (Morash 1999). The provision of all modes allows businesses to choose the best alternative for their needs. It is important for transportation policy makers to understand that reduction in transportation costs can be a significant competitive business advantage. For example, if a breakdown occurs in one mode, i.e., construction has caused long delays on the interstate making the use of trucks more costly and less efficient, other modes are available.

As supply chains become more complex, companies do not only look for ways to reduce the number of links in the chain to minimize transportation costs but ways to reduce links by other means. The elimination of links can also be accomplished at an inland port where value-added services are provided amidst strong transportation capabilities. When distribution, warehousing, and manufacturing work together at an inland port, uncertainty related to JIT systems will be reduced as well as other uncertainties integral to supply chain components. Other uncertainties related to customs and border delays can be eliminated at an inland port because these functions are all commonly located at one site.

Overall an inland port can be seen as a location where transportation capabilities, combined with value-added services, can allow business to compete more effectively.

2.5 Summary

Inland ports have the potential to impact local, regional, and national trade and transportation corridors. Transportation planning should recognize that reduction in congestion

on all corridor levels should be integral to the process of supporting international trade and efficient supply chains. A trade corridor "can be defined as a geographical area over which significant amounts of trade flow," while a transportation corridor is "a route along which trade travels" (Boske and Cuttino 2001, p. 4–5). Boske and Cuttino (2001, p. 5) state that "in and of themselves transportation corridors do not add value, but their interaction with the adoption of just-in-time production and distribution make an efficient transportation corridor an asset and a principal component of a firm's logistics matrix." Additionally, transportation corridors that utilize multiple modes and serve intermodal facilities, e.g., inland ports, may function more effectively for trade.

Global competition has caused shippers to focus on efficient supply chain strategies. Inland ports may provide an opportunity to alter supply chains by offering both modal capabilities and value-added services. The transportation requirements of industry should be considered in the framework of transportation planning. Consideration of the transportation needs of the industries that constitute local, regional, and national economies will allow them to remain competitive in a global economy.

This chapter serves as an introduction to inland port concepts and their relation to trade globalization and international supply chain management. Potential inland port functions along transportation and trade corridors were explained. The next two chapters will present International, United States, and Texas inland port case studies. Within these case studies, investigation is made into the operational aspects at an inland port.

CHAPTER 3: IDENTIFICATION OF SITES

3.1 INTRODUCTION

Many entities promoting specific sites currently claim inland port status. Each site varies in physical design and attitude toward development. Identification of these sites will provide a depth of information on both the classification of inland ports and the potential impact of each class on corridor efficiencies. This chapter will identify and describe International and United States sites that function as some type of inland port. The descriptions of existing sites, or site concepts, will help familiarize transportation planners with the various current inland port models.

3.2 INTERNATIONAL SITES

Several International sites have been identified as inland ports. These sites operate with similar concepts as sites in the United States but they have different operating procedures in relation to international trade processing. The European sites have less border constraints due to the European Union, and New Zealand is an island nation so all international trade arrives by sea or air, making trade procedures more uniform because there are no adjoining countries.

Information on these sites was primarily derived from Internet resources and trade journal publications. Electronic mail communication was made with staff at Metroport. Due to language barriers and lack of reliable information, some International sites that may claim inland port status were not included. However, the exclusion of these sites should not present concern at this research stage.

3.2.1 Logport, Duisburg, Germany

Logport is a comprehensive tri-mode logistics center developing at the former Duisburg-Rheinhausen ironworks site. Logport is located in the heart of central Europe at the intersection of north-south and east-west traffic. Logport is a site located in the city of Duisburg in the German state of North Rhine-Westphalia. This state is the most powerful federal German state and Europe's most important market for capital and consumer goods. The Port of Duisburg was established in 1716. Approximately 30 million consumers live within a 94-mile radius of

Logport. Germany's population of 80 million is considered to be the most important market in the European Union.

The Logport project was started in 1998 to offer new options as an optimum logistics location. Logport is situated on approximately 665 acres with access to its own river container terminal, road, rail, and nearby airports. The site is classed as "industrial space" and offers little or no land-use restrictions under German zoning laws. The transportation infrastructure directly connected to the site allows investors to choose among three modes that provide international orientation. Direct connection to Europe's most important waterway, the River Rhine, is available to Logport. This connection is enhanced by the direct link to Duisport, Europe's largest inland port.

Duisburg Harbor is an ocean port as well as an inland port. It is approximately 155 miles from the North Sea and is considered the hub of a 169-mile long system of inland waterways. At Duisport, 30,000 ships dock per year including 2,000 seagoing vessels. Unique to Logport is its exclusive container terminal that began operation in February 2001. To provide rail service to the site, the Duisport Group is entering into a joint venture with an existing rail operator. The initial phase of this modal effort will link the Port of Duisburg, Duisburg-Hochfeld (coal terminal), and Logport with a shuttle service. Three east-west and two north-south roads connect Logport to Europe. This provides an 8-hour travel time to reach 40% of the entire European Union population, approximately 150 million consumers. Even though this site is tri-modal, a fourth modal connection by air is available at the Duesseldorf International Airport located 10 miles from Logport.

The primary focus of businesses at Logport is planned to be logistics. The three target industries are logistics and the transportation sector, logistics-based manufacturing, and logistics-oriented services. The developers of Logport want to keep the site open for innovation and restructure the site into an international logistics center. This site is a former industrial center and presently 70% of the old facilities have been removed. All clearing work is expected to be complete by spring 2003. Investors have currently been allotted 40% of the site and new construction has begun on various structures. At Logport land plots will be allocated based on investor needs related to access to the port facilities, roadway network, or rail siding.

The information in this section was gathered from Duisburger Hafen AG's Web site "Welcome to the new duisport" and the Web site "Welcome to Logport." Additionally

information came from a March 2000 *Logistics Management and Distribution Report* article titled "Duisport: Europe's Largest Inland Port is Going Ahead."

3.2.2 Europort Vatry, France

France's Europort Vatry is located in the Champagne region approximately 90 miles east of Paris. The concept at this facility is to bring together on-site access to multiple transportation modes with a variety of services managed by a private company. European governments are interested in removing traffic from congested roadways and this site is actively pursuing this function. Europort Vatry is a freight platform planned to capture the needs of air cargo shippers.

Europort Vatry is located on the site of a former NATO military base that provides the base infrastructure for this multimodal inland port. Vatry includes a 24-hour all-cargo airport, road and rail connections, and a logistics center. Direct links to A 26, A 4, and A 5 motorways provide for efficient trucking. The airport has no night-flight restrictions, a 12,635-foot runway, and all-weather landing capability. Flight operations can occur during the night because Vatry is centered in a low-population density area with approximately 140 households in the immediate vicinity.

The cargo terminal has 45,200 square feet, with specialized perishable goods chambers. These chambers are claimed to be some of the largest and most modern in Europe. The associated logistics center is 1,040 acres with a potential to add 2,220 acres in the future. At the end of 1999, nearly 49 acres were sold and 62 acres were under negotiation. The main business sector locating at Vatry is warehousing. This business sector draws many benefits from the specialized cargo terminals already in place at the airport.

The information presented in this section was derived from two Web sites: the Economic Development Agency of the CCI of Chalons-en-Champagne site titled "Europort Vatry" and SEM Europort Vatry site "Europort Vatry – The victory of freight over time." An article published online by Sovereign Publications Limited (1999) was also used to gather information on Europort Vatry.

3.2.3 Metroport, New Zealand

Metroport Auckland is New Zealand's first inland port—officially termed dry port—focused on landside container flow. Tranz Rail links this inland port to the Port of Tauranga. Metroport is located in South Auckland's manufacturing region approximately 140 miles away

from the maritime port. Metroport operates by contracting with shipping lines that call at the Port of Tauranga. When the import cargo arrives, it is off-loaded and railed to Metroport. At Metroport, containers from those lines that contract with Metroport clear customs and are distributed to their final destination. The customs function at Metroport is an important feature of an inland port that will be explored later in this work. The reverse process also happens for exports arriving at Metroport. When an export arrives, it is consolidated with other shipments and railed to the Port of Tauranga where it is loaded onto an ocean vessel and shipped to its destination.

Metroport currently operates on 5 acres but will expand to 9 acres in June 2001. This will increase the number of container slots from 840 to 1,296 (three-high stacking). The main modal focus of the port-to-site trip is rail; however, the containers are picked up and delivered to the site by road. Metroport has one dedicated rail siding at 500 meters that can accommodate 30 wagons. The trip from Metroport to the Port of Tauranga takes approximately 4 hours on the main north-south trunk rail line in New Zealand.

This facility is a customs bonded site meaning that imports do not undergo customs transactions at the maritime port, but are brought to the inland port where the necessary federal transactions are made. Metroport does not have customs officials on-site, but paperwork is handled at the city office. Agricultural goods are handled in the same way at Metroport.

Tranz Rail owns the land that Metroport sits on, however, the land improvements and the computer system are owned by the Port of Tauranga. The port is publicly listed and the main source of funding for Metroport comes from the fee charged per container handled.

Information on Metroport was taken from their official Web site "Metroport Auckland." Electronic mail communication was made with Metroport staff member David Knowles on May 8, 2001, to gather more information. Additionally, a 1999 article titled "Metroport Offers Choice to Auckland Manufacturers" published in *New Zealand Manufacturer* was used.

3.2.4 ADNPlus Industrial Multiport, Monterrey, Mexico

This site was proposed as a Multimodal Logistics Center located in Monterrey, Mexico. The center proposed a port-like development where customs, cargo handling, logistics, and manufacturing were to occur. An investigation of the site in 2001 found that the project was canceled during the conceptual phase. However, a description of the concept is included because

it identifies a location of potential inland port implementation and linkage to the Interstate 35 transportation corridor in Texas.

ADNPlus was conceived to provide different modes of transportation to offer competitive advantage to manufacturers, exporters, and importers. The proposed site planned for 1,100 acres of development adjacent to Aeropuerto del Norte (Monterrey International Airport), on the Mexico-Laredo highway and connected to Mexican railways (TFM and Ferromex). The facility would have been the only authorized cargo terminal in northeast Mexico with Free Trade Zone designation. Its location in Monterrey presented a competitive advantage because Monterrey is cited as one of the fastest growing Latin American markets.

Benefits from electronic operations were at the forefront of the offerings at ADNPlus. Electronic integration of customs brokers, government agencies, and foreign trade specialists would provide clear communication benefits to companies at the site. Electronic Data Interchange (EDI) and International Trade Data System (ITDS) technology were the two systems proposed for use at the site. These technologies would have provided customs-clearing services at ADNPlus, enabling traffic to bypass the border and avoid delays.

The cancellation of this site indicates that a strong support structure is needed to back up conceptual inland port plans. Without economic and marketing support, inland ports will not be viable even with compelling conceptual plans.

This site was initially discovered in an article by Giermanski titled "Inland Port may Revolutionize Importing into Mexico." Additional information on the site was found on the ADNPlus Web site "Welcome to ADNPlus Industrial Multiport." Confirmation of the cancellation of this site was made through electronic mail communication with Maldonado on June 21, 2001.

3.3 United States Sites

In the United States, nine sites have been studied as potential or operating inland ports. These sites are presented as case studies that detail the site characteristics, development concept, and other important elements. The identification of various sites in the United States give planners a broad view of potential inland port models and the elements that create these sites.

Several sources were used to gather information on inland port sites in the United States. Internet resources, trade and academic journals, and electronic mail were used in the initial search for information. Many sites were contacted directly by electronic mail or telephone to

request printed information. Many sites delivered informational brochures and promotional packets that were used to derive information on operating concepts and site characteristics. Information was gathered at a site visit in Kansas City. This information came in the form of interviews, published brochures, and facility tours.

3.3.1 Chase Field, Beeville, Texas

The Base Realignment and Closure Commission recommended Chase Field Naval Air Station for closure in July 1991. There is no continuing Navy presence at the station and all property has been leased to the local Bee Development Authority (BDA). Chase Field consists of over 1,400 acres, three 8,000-foot runways, and four aircraft hangars. Three hangars have been remodeled, but they have center columns restricting their use by wide-body jets.

The BDA was created to promote industrial growth. Beeville currently has an unemployment rate of 6.2% and there is a strong community desire to use the Chase Field facilities to increase the number of jobs in the area. The BDA also desires to increase the local tax base and bank deposits with the industrial development of Chase Field.

The main assets of Chase Field are its proximity to Mexico, clear air space, and link to the future Interstate 69 corridor. Beeville is only 1 hour from Corpus Christi and 1.5 hours to San Antonio. The proximity to this seaport and large metropolitan area are assets to potential development at Chase Field. The seaport may provide easy access to goods directly off-loaded and the large metropolitan area may provide a destination for goods manufactured at Chase. Additionally, companies may choose to locate in Beeville because it is uncongested and has lower costs than a crowded metropolitan area or seaport.

A major proposal that the BDA has brought forth is to become a key member of a global network of closed military bases. Through their investigations into the airfreight industry, the BDA feels that the strategic positioning, aircraft handling capabilities, and large expanses of land area that closed military bases provide can serve the expanding needs of this industry. The BDA wants to promote the interface between air and truck modes through this network. If closed bases work independently, success in the airfreight industry will not happen according to the BDA. However, if the bases create a global network, the airfreight market can be exploited by the BDA's estimation.

Beeville and the BDA's plans are examples of small communities that have been given assets and now need a means to exploit them. This is an example case that transportation planning agencies may be presented. Transportation planning agencies must be aware of

potential proposals for support and need to have a set framework to equitably and consistently evaluate these proposals. Chase Field has not seen many successes since the closure of the Naval Air Station, however, if the BDA sets forth a strong plan to the appropriate agencies it may find the support it needs to succeed or further its plans for a global network of closed military bases.

The information presented in this section was taken from the BDA Web site (http://www.beedev.com). A meeting with the BDA and Franco Eleuteri of McClier, was held on June 22, 2001. Additional information on the global network of closed military bases was taken from a letter written by Marion Coffey on May 17, 2001, entitled "Closed Military Bases: Are they the gateway to the world?"

3.3.2 Global TransPark, North Carolina

Development of the Global TransPark came about through studies by researchers at the University of North Carolina and the North Carolina Department of Transportation. In November 1990, Dr. John Kasarda presented a conceptual outline for a new infrastructure concept that focused on supporting globalization, innovations in manufacturing, and the need to utilize air cargo. From the studies, the North Carolina legislature and governor approved the establishment of the North Carolina Air Cargo Airport Authority, now the Global TransPark Authority to develop and operate the North Carolina Global TransPark. The Global TransPark Authority initiated the creation of a Master Plan and selected the Kinston Regional JetPort as the project location site in May 1992.

The site is a transportation and industrial complex focused on meeting the needs of national and global commerce. The Master Plan was completed in January 1994 and called for 15,700 acres at full development with two parallel runways both exceeding 11,000 feet. The Global TransPark Authority has since modified the plan to extend only the current runway at the JetPort to 11,500 feet. The second runway will be constructed as needed. Identified in the Master Plan was the road and rail network that will serve the Park and connect it to maritime ports. To complement the strong transportation assets that will be located at the site, it has been designated as Foreign-Trade Zone #214 by the United States Department of Commerce.

The only current activity at this site is the operation of Mountain Air Cargo/Mountain Aircraft Services. In August 1996, Mountain opened a 65,000-square-foot maintenance hangar and office complex. They are a major contract carrier for Federal Express. The Global TransPark Authority and associated development organizations continue to market the site to prospective

companies. It is thought that infrastructure improvements, like extending the runway and improving roadway access by completing the Crescent Road connector, hold the key to success at the Global TransPark.

Information presented in this section was compiled from the North Carolina Global TransPark Partnership Web site and the North Carolina Global TransPark Authority Web site. Additional information was derived from Gardner's article "N. Carolina to open Global TransPark" in the May 28, 1996, issue of *AirCommerce.*

3.3.3 Greater Columbus Inland Port, Ohio

In Columbus, Ohio, the inland port is comprised of multiple components including three intermodal ramps, an all-cargo airport, an international passenger airport, and various industrial parks. This indicates that one central location is not a prerequisite for inland port status. The Greater Columbus Inland Port Commission, formed in 1992, is a coalition of businesses, government agencies, and economic development organizations that work to advance the region's goals by advocating quality rail access and highway development as well as building international awareness.

Columbus has used its natural location advantages to complement its strong transportation infrastructure. Located within a 1-day truck drive or a 90-minute flight is 58% of the United States population, 50% of Canada's population, and 61% of the manufacturing capabilities of the United States. Four interstates provide access to Columbus: Interstates 70, 71, 75, and 77. Fourteen major air carriers, 140 motor carriers and thirty-eight freight forwarders are located in the region. Additionally, 150 million square feet of manufacturing and distribution facilities are currently operating in Columbus. These assets help Columbus attract logistics-related business to support the goal of providing competitive port facilities and services to those who deal in international and domestic trade.

Three intermodal yards are operated by Norfolk Southern and CSX railroads. Nationwide rail service is provided through these ramps that handle more than 200,000 container lifts annually. Port Columbus International Airport serves as Columbus and Central Ohio's passenger airport. In addition to its passenger functions, it serves as a cargo handling facility. Total 2000 passenger activity at Port Columbus International Airport (enplaned and deplaned) was 6,838,047 passengers; its total freight activity (enplaned and deplaned) in 2000 was 14,639,532 pounds.

The most successful and widely recognized component of the Greater Columbus Inland Port is Rickenbacker Air Industrial Park. Rickenbacker is a 5,000-acre, dedicated cargo international airport and Foreign-Trade Zone. This site was the former Rickenbacker Air Force Base that entered into a joint-use agreement with the Rickenbacker Port Authority (RPA) in January 1982. In October 1990, the government transferred full control of the airport to RPA. Rickenbacker features two 12,000-foot parallel runways, open 24-hours per day, 365 days a year. The total freight activity at Rickenbacker in 2000 was 212,094,348 pounds. Rickenbacker handled more than fourteen times the cargo handled at Port Columbus in 2000. United States Customs is located on site allowing for clearance of international cargo. Approximately twenty cargo planes are scheduled to land daily, along with numerous general aviation and corporate planes. The RPA is the grantee and operator of Foreign-Trade Zone #183, which allows businesses to reduce or eliminate customs duties on imported products. The adjacent industrial park currently houses fifty-five tenants with 90% focused on warehousing and distribution. The remaining tenants deal in light manufacturing.

The information in this section was taken from the Web sites of the Port Columbus International Airport, the Greater Columbus Chamber Inland Port, and the RPA. Electronic mail and telephone communication was made with James Mako of the RPA. Printed brochures provided by the RPA were also used as information sources (2000 Performance Report and Access to Markets).

3.3.4 International Trade Processing Center, Kansas City, Missouri

The Kansas City Mid-Continent Tradeway Study was conducted in Kansas City to determine the feasibility and national benefits of establishing an international trade processing center in the region. This comprehensive study was completed in February 1999 and concluded that Greater Kansas City would be a prime candidate to host an international trade processing center. An international trade processing center "would be a network of business services, technologies and facilities where activities and processes are carried out to facilitate international trade for all modes including air, water, rail and commercial vehicle" (TranSystems 1999a, p.2). The vision is to create a "Virtual Inland Port" where technology-based solutions would allow Kansas City to operate as an international port of entry by transporting freight in-bond and clearing customs at facilities located there. It is hoped that if all customs transactions are in

order, trucks can bypass the inland port and drive on to their destinations. However, inspections will take place randomly and if there are any incomplete transactions.

The study focused on analyzing freight flows, assessing technology needs, identifying institutional and organizational strategies, assessing policy and feasibility, and creating an implementation plan. The study recommended establishing one main trade processing center as well as satellite operations at air and rail centers that currently exist. Several sites were considered for use as the international trade processing center. Sites like the existing Kansas City International Airport or one of the intermodal rail facilities were considered. However, current emphasis is on the former Richards-Gebaur Air Force Base. The main center would house administrative staff and provide facilities for federal customs operations. It is also hoped that the international trade processing center would stimulate economic development in the form of distribution, warehousing, and manufacturing activities.

At present, the only activity at Richards-Gebaur is a car-sorting operation run by Kansas City Southern Railroad. A pending lawsuit concerning the operations of the Richards-Gebaur runway along with the delays in automating United States Customs have stalled further development of the international trade processing center in Kansas City.

The information presented in this section was derived from the Kansas City Mid-Continent Tradeway Study and a site visit made on April 16-17, 2001.

3.3.5 March GlobalPort, Riverside, California

The March GlobalPort is a 350-acre, all-cargo airport located at the former March Air Force Base in Riverside, California. In 1988, March Air Force Base was targeted for closure by the Department of Defense under Base Realignment and Closure (BRAC) legislation. March was realigned to reserve and commercial operations in 1993 and at this time the March Joint Powers Authority was formed to market and develop the site. In July 1996, the Lynxs Group was chosen to market and develop the inactive portions of the base. This group then formed the March Inland CargoPort LLC to market and convert the base into a cargo airport.

Several benefits of using the facilities at March GlobalPort are its location, intermodal capabilities, open airspace, affordability, and long-term growth. The GlobalPort is located in the Inland Empire region of Southern California. This region is a prime location for accessing major cities in Southern California and is home to many distribution and warehousing facilities. Most of the Southern California catchment can be reached in a 60-minute drive. March offers the

longest runway in Southern California at 13,500 feet in length and 300 feet in width. In addition to the air component, four major freeways and on-site rail service provide excellent intermodal transportation accessibility. The March GlobalPort currently operates under a joint-use military-commercial agreement making operations and fees much more affordable than other airfields. The area surrounding the GlobalPort is relatively free of development, providing room for expansion of cargo handling and distribution facilities. Currently, 330 acres are available for development adjacent to the runway.

The information presented in this section was taken from the Greater Los Angeles March GlobalPort Web site. Information related to the former March Air Force Base and its conversion to a cargo airport was taken from the March Inland Port Airport Web site hosted by the March Joint Powers Authority.

3.3.6 Port of Huntsville, Alabama

The Port of Huntsville is formed by the Huntsville International Airport, the International Intermodal Center, and the Jetplex Industrial Park. The mission is to "provide multimodal transportation services to a diverse regional customer base and to stimulate the economic growth and development of the Tennessee Valley Region" (Huntsville-Madison County Airport Authority 1996, p.1). In the 1960s Huntsville leaders created a vision for the Huntsville International Airport to become a premier multimodal gateway. The airport along with the International Intermodal Center, Jetplex Industrial Park, and Foreign-Trade Zone #83 has made Huntsville a principal transportation hub in the southeastern United States and a global inland port.

The Huntsville International Airport provides seventy daily passenger flights serviced by six major carriers. Many services are provided to business travelers including a business center, lounge, and hotel in the terminal building. These amenities can be attractive to businesses that deal with international cargo. Adjacent to the airport is the International Intermodal Center. This inland port is a central location for receiving, transferring, storing, and distributing by air, rail, and highway. The Center is located on 80 acres of airport property with direct access to the runways, interstate highways, and the Norfolk Southern Railroad main line. The rail intermodal yard can accommodate forty-four 100-foot railcars on four parallel tracks. Over 22,800 lifts were performed in 1998. The International Intermodal Center is designated as a United States Customs Port of Entry and the location of Foreign-Trade Zone #83. The final component of the Port of

Huntsville is the 1,700-acre Jetplex Industrial Park. One of the main attractions of the Park is its Foreign-Trade Zone status and the amenities provided by the adjacent airport and intermodal facility. Twenty distribution and manufacturing companies now operate at the Jetport site.

Contact was made with staff at the Port of Huntsville who sent promotional material that was used to present the information in this section. The "Port of Huntsville Economic Impact Report: Global Impressions Domestic and International" and the "1999 Annual Report: Putting the Pieces Together," were the primary sources of information. Information was also gathered from the Port of Huntsville Web site.

3.3.7 Port of Battle Creek, Michigan

The United States Customs Port of Battle Creek has operated since 1976 providing western Michigan with a competitive link to international business. This "uncongested" inland port of entry allows goods that arrive in the morning to be cleared by Customs and ready for further handling in the afternoon. This provides a competitive advantage over crowded coastal and border ports. This inland port is overseen by the BC/CAL/KAL Inland Port Development Corporation chartered by the City of Battle Creek. The vision is to make Battle Creek a regional freight hub through the addition of new transportation modes and improvements to existing infrastructure.

The Battle Creek Customs Port of Entry is located at the 3,000-acre Fort Custer Industrial Park. This Park is considered to be the largest modern park in Michigan. Approximately ninety-five companies are located at the park dealing with products ranging from auto supplies, pharmaceuticals, textiles, and food processing. Interstate 94, the most important transportation corridor between Windsor, Canada, and Detroit and Chicago, serves the port. Nearby is Interstate 69, a major north-south corridor. Adjacent to the port is W.K. Kellogg Airport, the fastest-growing general aviation airport in the United States in 1999. The 10,003-foot runway is capable of landing any aircraft made today.

The inland port in Battle Creek was built on the vision that the strategic location of the region and its proximity to Canadian and United States markets could be maximized if the transportation infrastructure was strongly developed.

Electronic mail communication was made with Battle Creek Unlimited staff member Jan Burland on April 30, 2001, to gather information presented in this section. Other information

was gathered from the Battle Creek Unlimited Web site and an article by Kemp in *Business Insight* magazine.

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

The Port Inland Distribution Network (PIDN) is an innovative component of the port redevelopment plan for the Port of New York/New Jersey (PONYNJ). It is expected that the port will see container volumes increase between 3.7% to 4.6% per year over the next forty years. With the potential to double the volume handled in ten years, a redevelopment plan has been created to address growth development issues related to land creation, modal split, environmental impacts, return on investment, and regional market share. The PIDN component of the plan looks to improve the landside distribution of the volumes of containers predicted by the port into the future.

The PIDN will comprise a network of inland container terminals in locations like Albany, New York; Bridgeport, Connecticut; and Harrisburg, Pennsylvania. These inland sites would be linked to the port by dedicated rail, barge, or tandem trailer-truck shuttle. The goals of this network are to reduce inland distribution costs, reduce truck trips, improve air quality, increase throughput capacity, and increase market share. One important benefit recognized by the Port Authority is that value-added distribution opportunities are possible if this component of the redevelopment plan is implemented. Value-added services are a key component to the definition of inland ports and this allows for the New York/New Jersey system to be classified as inland ports.

To determine the location of the various inland ports in the PIDN, dense trade clusters were first defined. A dense trade cluster is where location, area, and demand threshold exist and benefits in productivity can occur from the transfers of containers to the inland port from the maritime port. The feasibility criteria of a dense trade cluster involve outlining the freight transportation networks serving the cluster (road, water, rail), finding the cost savings from massing container transport between the port and the cluster centroid, and determining if the site facilitates the accomplishment of the goals outlined above.

Projections of terminal productivity in 2040 show that with the PIDN system modal split will be balanced among more modes, container dwell time at the port will be reduced, and vehicle miles traveled (VMT) within close and far range will be significantly reduced. Table 3.1 outlines the productivity projections made for the PIDN system.

Table 3.1 PONYNJ Terminal Productivity Projections

	Modal Split			Container Terminal Dwell Time	VMTs	
	Truck	Barge	Rail		0-75 Mile Zone	75-400 Mile Zone
Without PIDN	86%	0%	14%	6 days	314MM	404MM
With PIDN	38%	39%	23%	2 days	116MM	75MM

Source: Ellis 2001

The primary source of information for this section was Ellis's presentation at the 2001 Annual Meeting of the Transportation Research Board titled "PANYNJ Inland Satellite Ports Initiative." Additional information was derived from the "Building a 21st Century Port Fact Sheet" found on the Port Authority of New York/New Jersey Web site.

3.3.9 Virginia Inland Port, Front Royal, Virginia

The Virginia Inland Port (VIP) began operation on March 1, 1989, in an effort to create time and monetary savings for shippers and container lines using the Ports of Virginia. VIP is located in Front Royal, Virginia, 220 miles inland from the Hampton Roads marine ports. This essentially brings the marine terminals 220 miles closer to the target markets of the Northern Shenandoah Valley, West Virginia, and the Southern Ohio Valley.

This inland port has positioned itself to intercept container traffic that is trucked to other competing East Coast ports. Originally, operations at the VIP were intended to provide shippers with one-stop service. This meant that a truck was dispatched from the inland port to the customer where the cargo was picked up and returned for shipment to the marine terminal. Currently, only 10% of the cargo at the VIP is handled this way. Since the majority of shippers are transporting their own cargo to the VIP there is an indication that shippers are more comfortable with the reliable services at VIP. Due to the success of operations, shipping lines are offering a bill of lading to the VIP at Front Royal.

Currently, 45 acres of 161 available acres are developed. The facility contains 17,820 feet of on-site rail operated by Norfolk Southern. Five-day-a-week rail service is provided between the VIP and the marine terminals in Hampton Roads. Most cargo arrives at the VIP from the target markets by truck. Therefore, location within 1 mile of Interstate 66 and 5 miles of Interstate 81 provides ideal access for trucking. Foreign-Trade Zone #20 designation exists and a

truck assembly company is looking to utilize this zone to reduce costs associated with entry into United States markets. The area surrounding VIP has seen an increase in the location of distribution and manufacturing companies who utilize the fast connection to the maritime ports provided by the VIP.

The information in this section was taken from the VIP Web site and a telephone interview with James Davis, the Mid-Atlantic Regional Manager of the Virginia Port Authority. Additional information from trade journal articles by Harrington (1991) and MacDonald (1989) was used.

3.4 SUMMARY

The investigation of various inland ports around the world and in the United States has identified commonalities but has also discovered that there is no strict type. Table 3.2 provides a summary of key elements discovered in the case studies.

Through these case studies, and the in-depth case studies of Texas Inland Ports in Chapter 4, a classification system will be created to identify the types of existing inland ports. The classification will further familiarize planners with inland port operations and assist in understanding how transportation planning actions can support inland ports.

Table 3.2 Inland Port Case Study Summary

- Logport: This site exists next to one of Europe's largest river ports and will offer options as an optimum logistics location.
- Vatry: This site will have on-site access to multiple transportation modes with a variety of services managed by a private company.
- Metroport: This is New Zealand's first dry inland port linking the Port of Tauranga with South Auckland.
- ADNPlus: This failed concept illustrates the need for a strong support structure at a new site.
- Chase Field: The proposal for this closed Naval Air Station is to become a member of a global airfreight network to serve the needs of expanding air markets.
- Global TransPark: This site is a transportation and industrial complex focused on meeting the goals of national and global commerce.
- Greater Columbus Inland Port: This inland port is an entire city with a philosophy toward strong rail and highways and international awareness.
- Inland Trade Processing Center: This concept hopes to use automated border-crossing technology to draw trade to the Kansas City region.
- March GlobalPort: This former air force base is now to be used as an all-cargo airport with potential for cargo handling and distribution centers.
- Port of Battle Creek: This "uncongested" inland port of entry works to make Western Michigan more accessible to international business.
- Port of Huntsville: This inland port is comprised of an airport, intermodal center, and industrial park that make this a principal SE freight hub.
- Port Inland Distribution Network: The goal is to improve the landside distribution of containers by rail, highway, and barge.
- Virginia Inland Port: This site links Virginia marine ports by rail to an inland center.

CHAPTER 4: TEXAS INLAND PORT CASE STUDIES

4.1 INTRODUCTION

In Texas, two established inland ports have been studied to provide in-depth information on the potential impact they may have on transportation and corridor planning. These inland ports are both located on the Interstate 35 corridor identified by the United States Department of Transportation (USDOT) and Federal Highway Administration (FHWA) as a National Highway System High Priority Corridor. This designation elevates the importance of the impacts that Kelly USA in San Antonio and Alliance in Fort Worth have on trade and transportation in Texas and along the entire corridor. Figure 4.1 illustrates the location of Kelly USA and Alliance on the Interstate 35 High Priority Corridor.

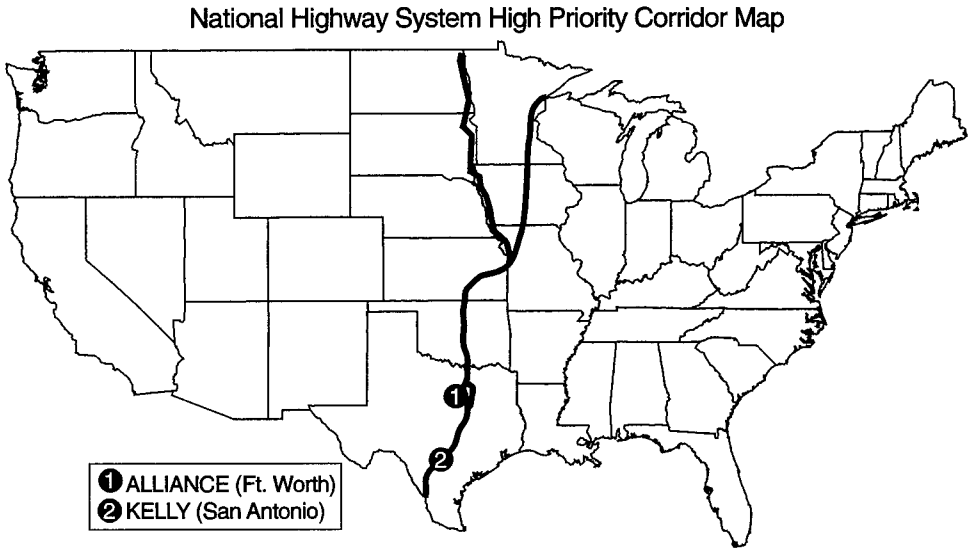


Figure 4.1 Interstate 35 High Priority Corridor

The two case studies in this chapter will describe the characteristics of each site including size, industry sectors, and development concept. Discussion of the impact that Kelly USA and Alliance may have on the Interstate 35 corridor is also included. A case study of Chase Field in Beeville, Texas, was provided in Chapter 3; this site is only in the idea stage so an in-depth analysis is not possible.

4.2 KELLY USA, SAN ANTONIO

Kelly USA is located at the former Kelly Air Force Base in southwest San Antonio, Texas. This master-planned aviation, business, and industrial center lies on the axes of Interstate 10 and Interstate 35. Kelly USA is designated as an inland port because of the Greater Kelly Development Authority's (GKDA) concept of integrating transportation and logistics with international development of small business and partnerships with existing ports.

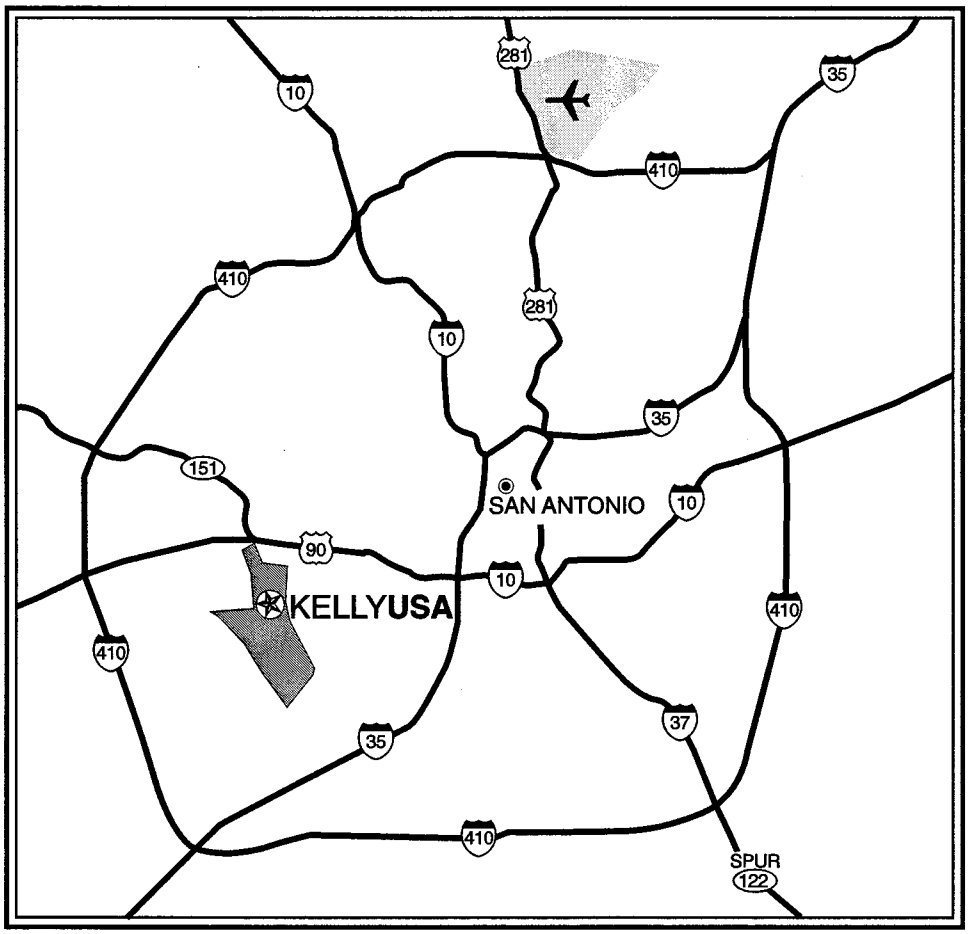


Figure 4.2 Kelly USA Location Map

4.2.1 Site Concept and Characteristics

Kelly Air Force Base was designated for closure under BRAC legislation in 1995. The base was officially closed on July 13, 2001, and a joint-use agreement with the United States Air Force (USAF) for use of the runway and associated airfield facilities went into effect on this day.

In January 1996, the Greater Kelly Development Corporation (GKDC) was created as the local redevelopment authority for Kelly Air Force Base. Later the GKDC was recharted as the GKDA. The GKDA is an entity of the State of Texas, which establishes the GKDA as a special district and political subdivision. The primary responsibility of the GKDA is economic development of the nonrealigned portions of Kelly Air Force Base. The two major goals of the GKDA are to create 21,000 jobs at Kelly USA by 2006 and develop Kelly USA into an industrial park to serve as an economic engine for San Antonio. To fulfill the second goal, the GKDA contracts with firms that direct the base conversion and market and lease the facilities. This allows the GKDA to maintain a small staff that focuses on promoting successful strategies. The redevelopment strategy at Kelly USA is to target certain industries that will act as anchors and encourage growth in supporting industries.

The Aviation Center at Kelly USA includes an 11,500-foot runway built to serve all-cargo aircraft. The airfield currently operates under a joint-use agreement with the USAF. Under this agreement the USAF still owns and operates the airfield, but commercial aircraft can land with an air force issued landing permit. Currently, several major anchor tenants focused in the aviation industry are located in the Aviation Center. The Kelly USA Logistics Center is designated as a general purpose site referred to as Site No. 10 and is connected to the Union Pacific rail line that supports its intermodal traffic. The City of San Antonio has designation as Foreign-Trade Zone #80 and this may allow Kelly USA to have full Foreign-Trade Zone capabilities in the future. The general purpose zone at Kelly is in competition with the Foreign-Trade Zone designation at San Antonio International Airport. This competition exists because the airport has full-time customs staff and Kelly USA does not. This creates a time and cost advantage for international shipments coming into the airport because they do not have to wait for customs officials to arrive at the site. Total freight handled at San Antonio International Airport from 1999 to 2000 was down 6.8%. However, international cargo increased 81.7% from 10,564,469 pounds in 1999 to 19,193,387 pounds in 2000 (San Antonio International Airport 2001). In June 2001, Ryder Integrated Logistics deactivated its Foreign-Trade Zone license at Kelly USA. It is speculated that Ryder is moving more of its operations to a location in Laredo, Texas, because of high-lease rates paid to the GKDA. Foreign-Trade Zone General Purpose status still exists at Kelly USA, but this deactivation is not a positive indicator of future success. (Hendricks 2001)

The Business Center provides commercial and office space including a new 80,000-square-foot office building. A unique feature of Kelly USA is the emphasis on small business support and international business development. The commitment to bring small business to Kelly USA will aid in fulfilling the goal of providing jobs and economic investment. A "mentoring" center will be established at Kelly USA to aid businesses interested in participating in international trade. The Industrial Center is a 350-acre site with direct rail access that can accommodate light-industrial development. This center is the location of the Union Pacific rail yard that is constrained by nearby residential and retail businesses. If the Union Pacific rail yard were to expand, more jobs would be created and the potential for growth in logistics and distribution at Kelly USA would be expected.

4.2.2 Challenges Faced at Kelly USA

The GKDA has taken beneficial occupancy of 50% of the 11-million square feet of space transferred to its control. Approximately 97% of this space has been leased. In 1998, Boeing Aerospace Support Center became the GKDA's anchor tenant. Boeing is under contract with the air force for the maintenance and modification of aircraft. Despite these successes, there are still many challenges at Kelly USA. When the air force base was closed, the San Antonio community felt the effects of a loss of over 10,000 jobs. The loss of jobs at Kelly Air Force Base has been a major concern of officials in San Antonio and the staff of the GKDA. At its peak, there were over 30,000 employees at Kelly Air Force Base. Today there are 4,300 individuals employed at the thirty-seven companies of Kelly USA. The goal of the GKDA is to provide or retain 21,000 good-paying jobs at Kelly USA by 2006.

Other challenges relate to the constraints of nearby developments, poor roadway connections, lack of stable funding sources, and continued military presence. The two sections of Kelly USA are noncontiguous with East Kelly and Main Kelly separated by a triangular area containing residential and commercial development.

This developed area poses constraints for expansion of the Union Pacific rail yard. There is a desire to expand the Union Pacific rail yard into an intermodal hub, but the nearby residential and commercial development could prevent this potential inland port element from taking place. The importance of rail expansion lies in the small number of jobs created directly at the rail facility, but more importantly in the expansion of rail-dependent businesses locating at Kelly

USA. In inland port planning it is very important to recognize existing constraints and the need for flexibility and innovative solutions, especially with brownfield developments.

The GKDA is currently focusing on improving the poor roadway connections to Kelly USA. The site is connected by major arterials to US 90, Interstate 35, Interstate 410, and Texas State Highway 16. The major arterials are facing a high-forecasted volume of commuter traffic and heavy truck traffic. The current capacity of the arterials will not handle the projected volumes, so the Kelly Parkway study is underway to determine the best linkages and upgrades to the road system that serves Kelly USA.

Funding for the Kelly USA project has proven to be one of the most important factors of success although it has been difficult to sustain a constant source of funding. The GKDA has been successful in securing $11 million in State and Economic Development Agency grants and $50 million in Housing and Urban Development and bank loans. Additional funding from the air force, the sale of site utilities, and a bond for Boeing has totaled over $32 million. In early 2000, the GKDA requested that the United States Department of Defense (USDOD) reduce the purchase price of Kelly Air Force Base. This request was accepted by the USDOD in March 2000; the purchase price was reduced to $5.2 million from $108 million. The largest loss in funding for Kelly USA was the defeat of the local 1/8-cent sales tax proposition in May 2000. This would have provided an additional $50 million in funding for the site.

Certain portions of Kelly Air Force Base were realigned to the neighboring Lackland Air Force Base when Kelly closed. This included the runway, which is hoped to be a major driver of development at Kelly USA. A joint-use agreement exists between the air force and Kelly USA to permit aircraft landing, but the details of this agreement limit the commercial and cargo use of the runway. This agreement may pose future problems for the expansion of air-related sectors at Kelly USA if the air force decides to withdraw the agreement. Careful monitoring of air operations and the joint-use agreement are needed at Kelly USA to ensure success of this major component of the development.

The information presented on Kelly USA was gathered during a site visit on May 9, 2001. During this site visit, GKDA staff provided an update on Kelly USA operations and printed material. Information from these printed sources was used in this section, however, the primary source of information was the Kelly USA Web site.

4.3 ALLIANCE, FORT WORTH

Situated on the Interstate 35W corridor north of Fort Worth, Texas, Alliance is a master-planned industrial development referred to by its developers, Hillwood, as a "transportation driven community." Alliance's status as an inland port is derived from the original vision of creating a reliever industrial airport, but evolved into a truly multimodal perspective offering many options for its customers as an inland port.

"Transportation driven community" is an appropriate description of the Alliance development. Alliance is not only an industrial development with air, rail, and highway transportation capabilities, but it has truly evolved into a community as a result of these transportation capabilities. The community aspect results from the new direction that Hillwood has taken in the development of two subdivisions, retail shopping areas, parks, and golf courses. Hillwood has also provided land for the creation of schools, churches, and community centers. In addition, a truck stop was built to accommodate the numerous drivers servicing the companies at Alliance. These are all elements that have built Alliance into a "transportation driven community."

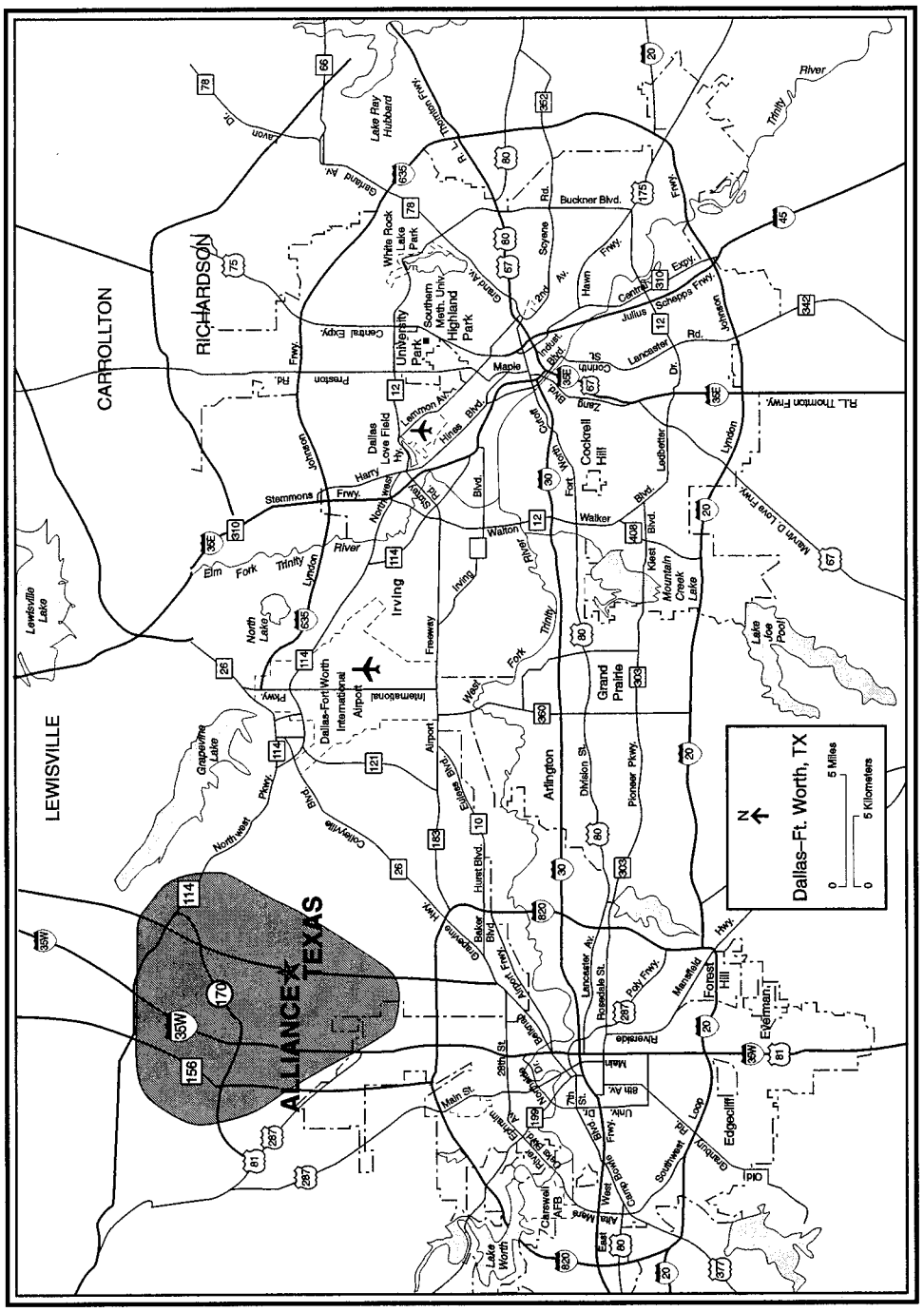


Figure 4.3 Alliance Location Map

4.3.1 Site Concept and Characteristics

Alliance is located north of Fort Worth, Texas, along Interstate 35W. Dallas-Fort Worth International Airport is 15 miles southeast of the development and the Dallas Metroplex can be

reached in an approximately 20-minute drive. Figure 4.3 shows the location of Alliance in reference to the Metroplex.

The Alliance vision was created by Ross Perot, Jr. in 1988. The initial driver for the development was the air transport component and the development of the airfreight business. It was thought that this component would be the main element in the strategic success of the Alliance development. It became evident to Hillwood that a focus solely on the air component was too narrow and a more dynamic strategy was needed. Alliance clearly benefited from the ability to change focus and adapt to customer needs. Determining customer needs and exploiting the natural logistics advantage provided by the confluence of transportation modes and hinterland of North Texas became the new Alliance focus.

The official groundbreaking for the Fort Worth Alliance Airport was held on July 9, 1988. Even before the airport was completed, strides were made to bring anchor tenants to Alliance. The first major tenant was Santa Fe Railway's 55-acre auto-loading facility in May 1989. Burlington Northern Santa Fe (BNSF) now operates a $155 million, 735-acre intermodal hub center in addition to the auto-loading facility. It was a surprise that rail was the first tenant; however, during this time negotiations with American Airlines were underway. Aggressive marketing tactics by Hillwood resulted in the June 1989 announcement that American Airlines would locate a $482 million maintenance facility at Alliance. This facility was projected to create 2,000 jobs at Alliance. These two major transportation components, along with the construction of Texas State Highway 170 in 1990, formed the transportation base for the Alliance development. With these major anchors, Alliance clearly positioned itself as a multimodal center and future inland port.

At Alliance, 9,600 acres have been reserved for industrial development. Currently, companies focusing on transportation, distribution, manufacturing, sales, and other industry sectors have developed 2,000 acres. Hillwood developers now have started to expand on the description of Alliance as a "transportation driven community" by integrating housing, recreation, and shopping. Currently, two subdivisions, Heritage and Circle T Ranch, have been built near Alliance. Two golf courses and abundant acres of parkland surround the industrial and housing developments. Future plans also include a 2-million square foot shopping mall. Alliance now focuses on sustainable smart growth and a range of development strategies that not only focus on industrial components but community features.

4.3.2 Development Life Cycle

There clearly has been a development life cycle associated with the growth at Alliance. Eight main sectors have been identified from the tenants located at Alliance. Table 4.1 enumerates the number of tenants in each sector.

Using these sectors and aggregating arrivals by year, the life cycle of Alliance's development can be investigated. Figure 4.4 shows the life cycle of Alliance from its ground breaking in 1988 to its operational status in 1999.

Table 4.1 Sectors at Alliance as of 1999

Sector	Number of Tenants
Distribution	26
Retail	19
Manufacturing	10
Office	10
Support	8
Manufacturing and Distribution	4
Transportation	4
Sales	3

Transportation was hypothesized as the determining element for success and this figure shows that transportation elements were established before other anchors. The support sector, one of the first sectors identified, includes the Hillwood group and various services like the fire department, police substation, and the United States Customs office. These supporting services help facilitate smooth operations at Alliance and key international trade components. It is also seen that when three transportation elements (rail, highway, and air) are located in one central area, distribution facilities will be present. After the establishment of strong distribution facilities, manufacturing facilities began to locate at Alliance. Throughout this time, various other sectors were locating at Alliance. From the beginning, the retail sector was positioned as an integral element. In the retail sector, businesses ranging from restaurants to medical offices were established. With 14,000 employees at Alliance by 1999, these retail entities provide sustainability and added attraction at the development.

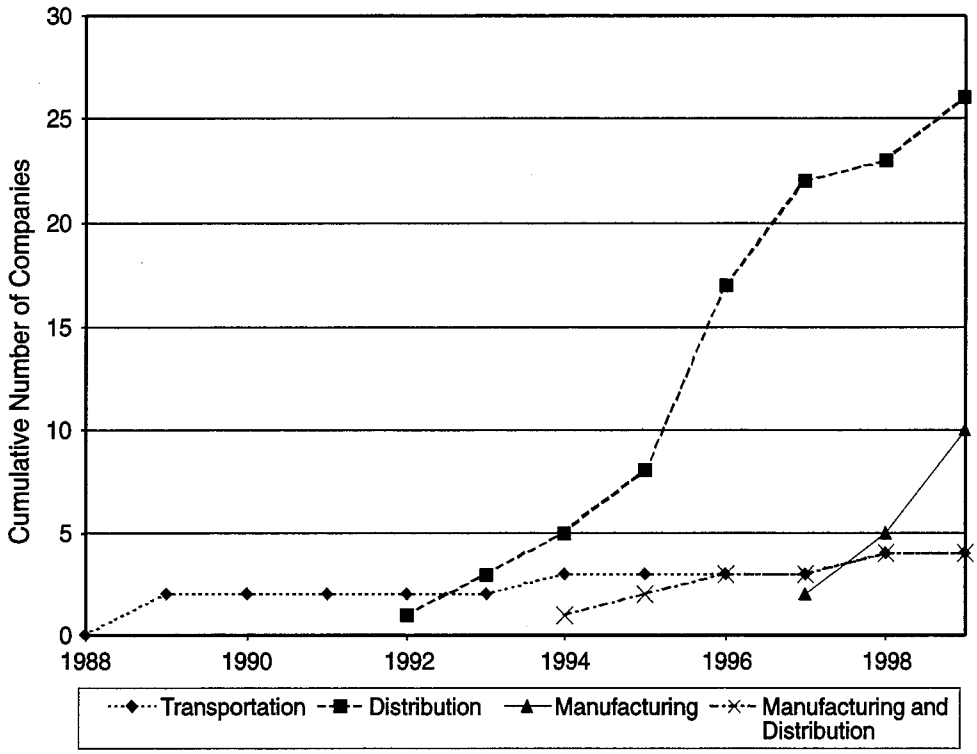


Figure 4.4 The Development Life Cycle at Alliance

There was a desire to capture the advantage of the cluster theory of manufacturing early in the development. As shown in Figure 4.4, the first sectors located at Alliance were transportation and distribution. The first manufacturing business that located there was Nokia, Inc. in November 1994. Nokia, Inc. spawned one of the earliest examples of the cluster theory at Alliance. Following the location of Nokia, Inc., plastics and high-tech industries needed to support production of cellular telephones began to locate at Alliance.

4.3.3 Unique Advantages at Alliance

Alliance is a unique inland port derived from its start as a barren cattle pasture and transformed by a desire to create a "transportation driven community." As a private development, Alliance has had the opportunity to change focus and adapt without the various constraints associated with public financing. Using private funding has also allowed Alliance to progress at a speed that is unparalleled by any other site in the United States. In one decade, Alliance has proven that it can succeed as a dominant inland port by capitalizing on its unique qualities.

A site visit was made to Alliance on March 26, 2001, to gain first hand information on this inland port. The information presented in this section was derived from sources gathered during this site visit and from various other literature sources. The book *Alliance: A Decade of Success, A New Century of Opportunity* by Mark Hanshaw was the main source of information. Additionally, the Alliance Texas brochure and Alliance Project Overview, written by Hillwood were used.

4.4 Corridor Impacts

Interstate 35 is the most heavily traveled roadway in Texas. This interstate is considered to be the nation's premier NAFTA highway because it links Laredo, Texas, to Duluth, Minnesota (Shiffler 2001). Nearly 4 million commercial truck crossings into the United States from Mexico took place in fiscal year 1998. The total truck crossings at Laredo, Texas, totaled 1,340,653. As many as 2,500 commercial vehicle crossings occurred at the Juarez-Lincoln Bridge in Laredo during the same year (USGAO 2000). These trucks utilize the Interstate 35 corridor to transport goods through Texas and the entire United States.

Little empirical data exist on the extent of border congestion and port of entry delays. The United States General Accounting Office (2000, p. 11) reports that "(t)rucking representatives in Nuevo Laredo, Mexico, said that truck drivers using the heavily traveled Lincoln-Juarez Bridge average 3 hours waiting to get into the United States from Mexico. The customs port director in Laredo, Texas, said the standard wait time at the Lincoln-Juarez Bridge is 2 hours." This process has caused time and monetary losses for shippers as well as an increase in emissions and system congestion. The system congestion is also a concern for border residents who feel that the congestion creates a public safety hazard for local traffic and pedestrians (USGAO 2000). The Lincoln-Juarez crossing cited above has been alleviated with the opening of the new World Trade Bridge in 2001, however, truck delays along the United States-Mexico border persist at a variety of locations.

All of these negative impacts of trucks at the land borders can also be seen at maritime ports. Maritime ports are now finding that expansion is nearly impossible due to surrounding development, the unavailability of land, and cost. Additionally, at some ports containers dwell at the terminal for 1–4 days awaiting pickup for delivery to the port's hinterland. Many maritime ports are also facing strict regulations from the Environmental Protection Agency concerning channel dredging and air quality.

Considering the congestion on the National Highway System corridors and at national borders, inland ports can potentially have an enormous impact on transportation efficiency and the environment. If automated border-crossing procedures, e.g., ITDS (see Appendix C), are implemented, trucks destined for San Antonio or the Dallas-Fort Worth Metroplex can be diverted in-bond to these locations. Railroad or barge connections can be made to inland sites to relieve maritime ports. These connections will immediately direct off-loaded containers rather than allowing them to dwell at the port.

A need exists for transportation planners to shift some focus away from improvements directly at the traditional ports to improvements on corridors with inland ports. If improvements to the transportation system are made considering the location of inland ports, more efficient and environmentally sound corridors will result. Shippers and daily users who find a cost savings because of less congestion resulting from the distribution of trade traffic over the entire system rather than concentrated at the borders, will also experience benefits.

The only way for Kelly USA and Alliance to truly be inland ports is to integrate more fully the international component. The existing air capabilities provide for their designation but the implementation of border preclearance at traditional ports will allow these sites to truly be fully functional inland ports. Implementation of these processes will also allow for innovative planning strategies that integrate inland port capabilities into the efforts to create a more efficient transportation system. Recognition of the corridor benefits that can be achieved through operation of an inland port will aid the entire transportation system.

CHAPTER 5: INLAND PORTS DEFINED

5.1 INTRODUCTION

A port is a location where international trade is processed and transportation facilities are provided to distribute goods. Historically, ports of entry were first located along land and coastal borders between countries. However, border location is not necessary to coordinate the distribution or transportation of international goods. One instance is the growing international air transportation, both passenger and freight, resulting in a number of large inland airport hubs throughout the world. For this reason, a port can be looked at as a site that "facilitates and engenders trade and transportation by virtue of its location, business climate and facilitating services and infrastructure, as well as its attitude toward development" (LaLonde 1997, p. 16).

As seen in several of the case studies, an inland port provides the means to move the processing of international trade to locations away from traditional ports of entry at land, air, and coastal borders. Existing traditional ports significantly impact supply chains, but their transportation-planning needs are already captured. Further definition of inland ports is necessary to allow the equitable evaluation of sites to determine their potential role in transportation planning.

5.2 DEFINITION

It is recognized that a substantial amount of trade is currently processed at inland sites including airports, intermodal hubs, and dedicated inland ports. A definition of these sites, which will be referred to collectively as inland ports, is important to enhance understanding and operational impacts on the transportation system. Defining the sites will also allow for understanding of how federal and state actions can best support the successful operation of inland ports and how these in turn impact the modal corridors (rail, waterway, and highway) along which they are located. Many terms have been identified to designate locations where international trade is processed. Such facilities are frequently named container freight station, freight hub, freight gateway, international trade processing center, river port and industrial park, among other terms. However, it is important to note that the names used to describe the sites are secondary to their function and are often chosen by individuals without regard to their technical definitions.

When defining inland ports, recognizing that their function as a location where international trade is processed is important. In addition to international trade processing locations, inland ports can be sites where congested ports are relieved, many services are provided at one location, or local and regional development is promoted.

Foremost, an inland port provides the means to move international trade to locations away from congested border and traditional maritime ports. Automating processes and procedures involved in transporting cargo across a border can allow these processes and procedures to occur at inland port sites (TranSystems 1999b). Once goods are received at the inland port, further inspection can occur or the goods can be transferred to a different mode, stored for future distribution, or assembled into other products. This consolidation of value-adding services away from the border will potentially allow for less congestion and fewer delays at border points of entry.

A complete range of services can be provided at an inland port, typically in one location. These services can range from all modes of transportation (highways, rail, air, water, and pipelines), distribution, warehousing, manufacturing and logistics-management services (Gooley 1997). This consolidation of services at one location makes an inland port more attractive to shippers and logistics managers concerned with promoting efficient supply chains. In today's global marketplace, it is important for shippers and logistics managers to lower costs and provide efficient and reliable movement of goods. On some supply chains this can be accomplished at a well-operated inland port. This consolidation will also benefit transportation planners concerned with raising the efficiency of the transportation system by creating multimodal corridors. Concentrating planning actions on trade and transportation corridors with established or planned inland ports may increase user benefits related to reduction of VMT or emissions when multiple modes are supported. This may be attractive to transportation planners concerned with system efficiency.

In addition to providing an atmosphere where international trade can be facilitated, an inland port can promote local and regional development. Local and regional development is a key benefactor in the formation of an inland port. Local employment opportunities may also be created at an inland port, especially when a wide range of value-added services are provided. Regional economics can be impacted by the shift of trade to the regional inland port. Inland ports will not only provide jobs through the direct processing of international trade, but they can

potentially attract distribution and manufacturing industries that can provide economic investment in the region.

The inland port concept uses information to coordinate business services, infrastructure, and development. Technological advances in information sharing and automated services are necessary to facilitate a seamless transfer of goods among international markets when the location is not along a border. Through technology, locational issues will no longer constrain international trade to traditional borders and inland ports can become viable alternatives.

The formal definition of an inland port, used in this work, is a site located away from traditional land, air, and coastal borders containing a set of transportation assets (normally multimodal) and with the ability to allow international trade to be processed and altered by value-added services at the site as goods move through the supply chain.

5.3 Preliminary Classification

It has become apparent through this investigation of both operational and proposed inland ports that not all sites follow the same model of development. To further define an inland port it is important to recognize that sites can fall into different categories, but still focus on the primary function of international trade processing. Each class provides facilitation of trade but through different physical means. The categories that have been determined from the case studies focus on inland waterway ports, the delivery of goods to a country by air, the relief of maritime ports by an inland consolidation, facility and the shift of border processing of trade to a inland site where value can be added to goods.

5.3.1 Inland Waterway Ports

Inland waterway ports are not a new concept in international and domestic freight movement. In the United States, 25,000 miles of navigable waterways exist on rivers, the Great Lakes, and intercoastal waterways (Muller 1999). Today's major inland waterway ports deal in specific bulk commodities like grain, coal, petroleum, and chemicals in addition to general cargo typically transported by barge. Inland waterways provide one of the most efficient means for transport of bulk cargo in the United States. According to the Maritime Administration, in terms of energy efficiency one ton of cargo travels 59 miles by truck, 202 miles by rail or 514 miles by barge per gallon of fuel. Figure 5.1 shows the capacity efficiencies of barge travel versus rail and truck travel for the line-haul portion of a trip.

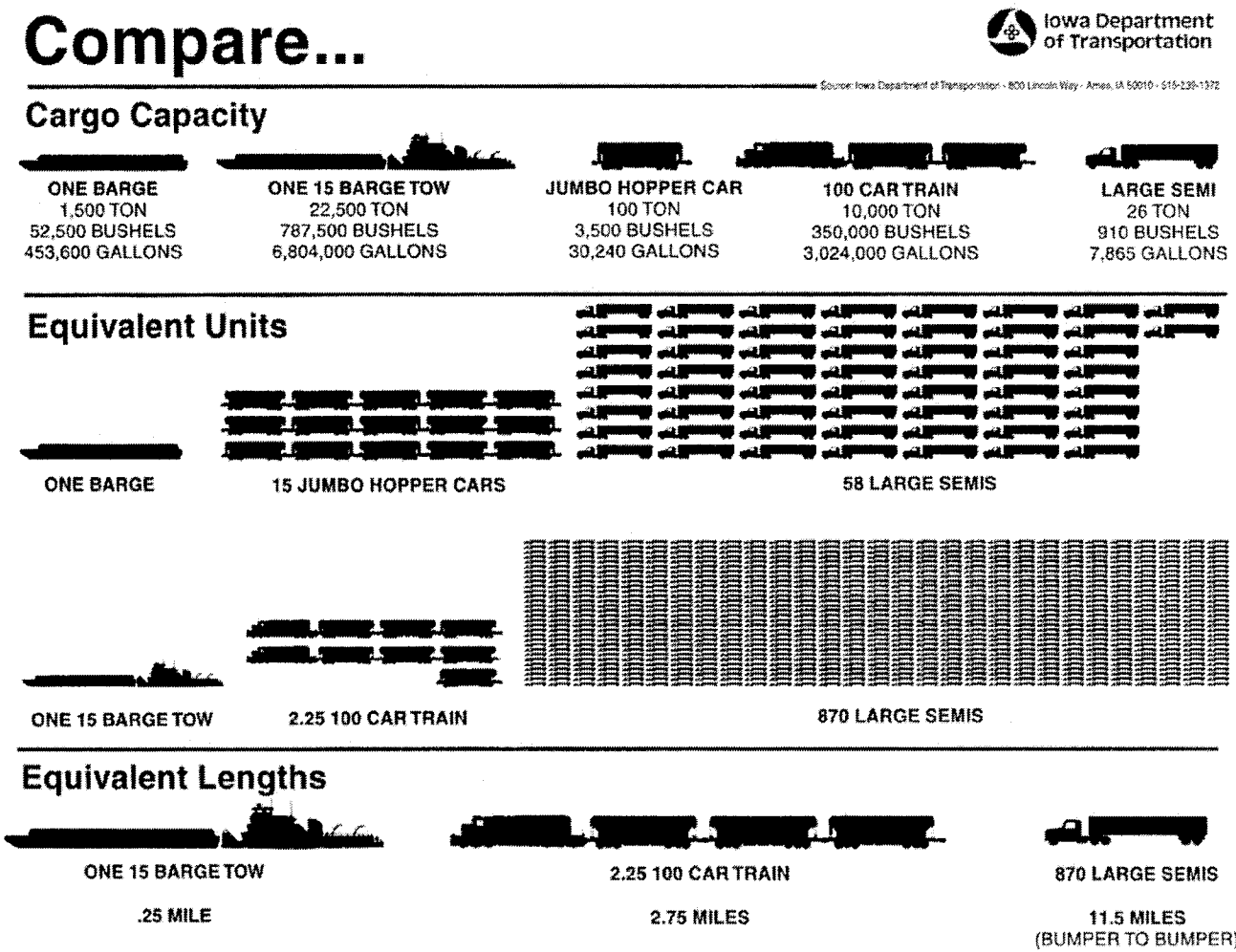


Figure 5.1 Barge Transportation Efficiencies

The classification of inland waterway ports into the general class of inland ports can be made by virtue of their inland locations and volume of goods transported into the United States market at these locations.

5.3.2 Air Cargo Ports

Airports have traditionally focused on the movement of people, but an increasing amount of freight is being handled at these facilities. From 1995 to 1998, the total number of passengers enplaned United States increased by 11.9%. At nine major airports in Texas, the total number of passenger enplanements increased by 3.8% during the same period (Business and Industry Center 2001).

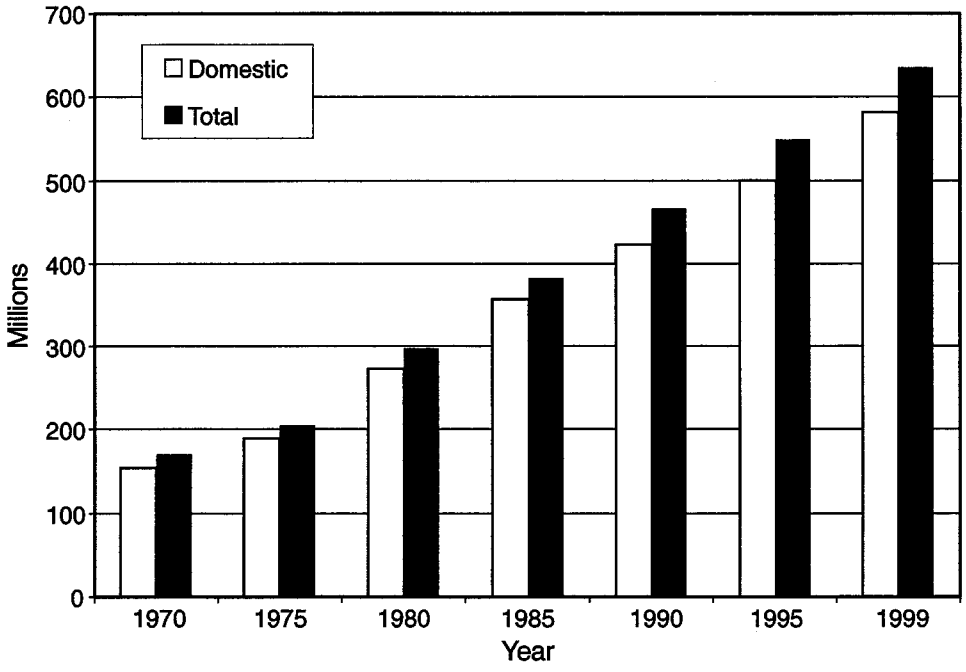


Figure 5.2 U.S. Scheduled Airlines Domestic and Total Enplanements: 1970-1999

In contrast, total freight and express cargo ton-miles increased by 24.4% in this period (Air Transport Association 2001).

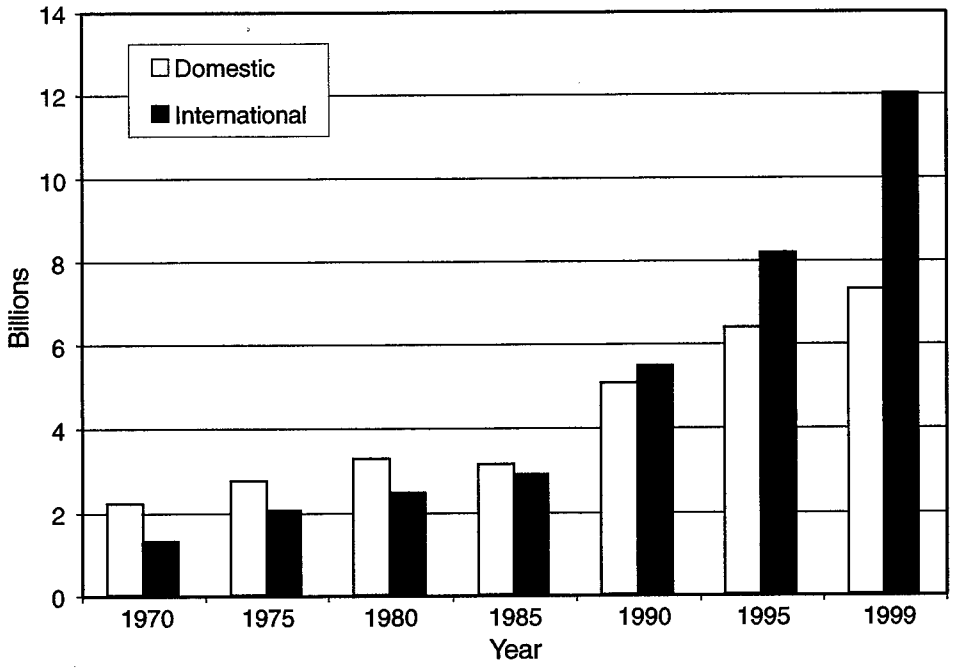


Figure 5.3 U.S. Scheduled Airlines Domestic and International Cargo Revenue Ton-Miles: 1970-1999

Frequently, integrated express carriers like Federal Express or United Parcel Service ship high-value, time-sensitive goods. Despite an extensive increase in service levels by dedicated freight carriers, passenger planes still carry about half of all air cargo (USDOT 2000). This creates a potential need to support interaction between passenger airports and dedicated air cargo inland ports.

Today passenger airlines and dedicated freight carriers provide means for shipment of international cargo. Customs, distribution facilities, and in some cases manufacturing centers are all components of airports that classify them as inland ports. Several dedicated air cargo ports have opened in the United States in the past several years, many at decommissioned air force bases. Air cargo ports can exist in conjunction with passenger airports or as dedicated cargo facilities. However, emphasis should be placed on dedicated cargo facilities when considering inland ports.

5.3.3 Maritime Feeder Inland Ports

A maritime feeder inland port is most closely related to traditional maritime ports. This class provides relief at overcrowded maritime ports. The concept of this class is to provide a consolidation or deconsolidation point for goods being shipped in or out of a congested maritime port. Typically, maritime feeder inland ports are located 50 to 250 miles away from the port (Harrington 1991). This distance will allow for fast delivery to the maritime port and potentially enough shift away from the highways serving the maritime port to be effective at relieving congestion. A maritime feeder inland port can be connected to the maritime port by major highways, inland waterways, and/or rail lines. A recent presentation by Ellis at the 2001 annual meeting of the Transportation Research Board illustrated a plan for a Port Inland Distribution Network (PIDN) for the Port of New York/New Jersey. This idea spawned from the need for the Port of New York/New Jersey to adapt to growth development issues. As illustrated in Figure 5.4, the PIDN will allow for the congested port to continue increasing the number of containers handled because of the satellite locations that can be accessed by rail, highway, or barge.

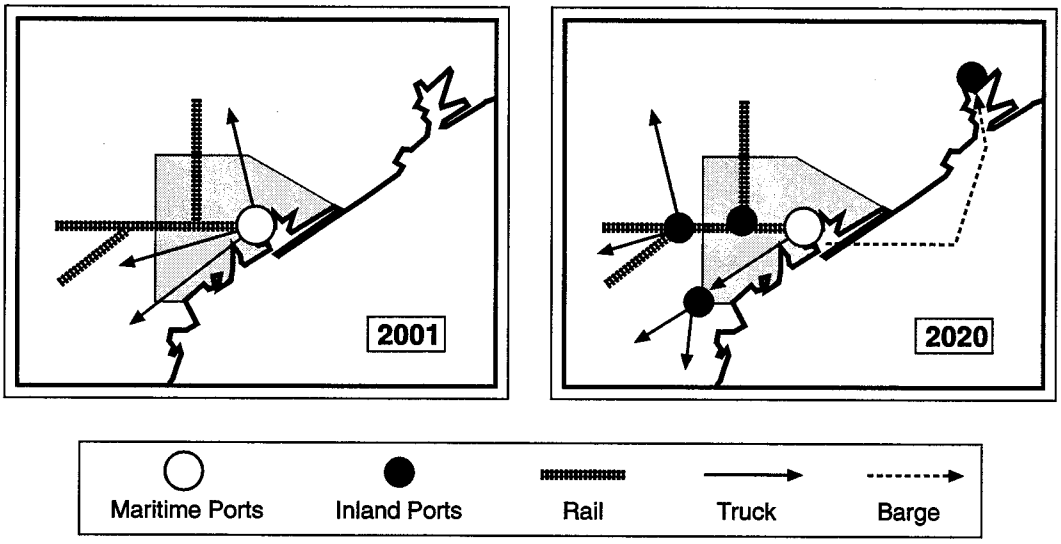


Figure 5.4. Port Inland Distribution Network Illustration

5.3.4 Trade and Transportation Center Inland Ports

Finally, inland ports can be placed in a general class of locations where border processing of trade is shifted inland and multiple modes of transportation are offered. An important distinguishing element of these trade and transportation-centered inland ports is their ability to be

at locations where value is added to goods. Many of these sites are located at air force bases that have recently been closed due to BRAC legislation. However, some of these sites have materialized at greenfield locations. Both approaches have differing perspectives on how best to facilitate international trade through their transportation assets. In the air force base case, the transportation assets currently exist, while at greenfield sites these assets need to be built. Each location provides differing benefits. A closed base already has significant infrastructure investment like runways, buildings, and telecommunications, which can be converted from military use to distribution or manufacturing functions. At a greenfield location, the most evident benefit is that the site can be tailored to the customers' needs. As seen by the various site options, this class of inland port is extremely variable. Variability is also attributed to unfulfilled goals of NAFTA. At this time, automated border-crossing procedures are not in place so the full potential of this class of inland port along NAFTA corridors cannot be realized. Therefore, a pyramid structure should be thought of in this class. Figure 5.5 illustrates the pyramid structure. This site can range from a single site where intermodal connections and manufacturing centers are located, to an entire city or region that facilitates international trade through the encouragement of inland port philosophies.

5.4 SUMMARY

This chapter provides a formal definition of an inland port and the preliminary classes of inland ports. Four main classes of inland ports are identified. These inland port classes are briefly summarized in Table 5.1.

The next chapter will introduce critical needs for inland port success. The critical needs can apply to any class of inland port. These inland port classes and the identified critical needs will be used in Chapter 7 to aid planners in determining how to best support operations at an inland port.

Table 5.1. Inland Port Classes

- Inland Waterway Port: These ports are not a new concept in international and domestic freight movement. This class is listed by virtue of its inland location and volume of goods transported.
- Air Cargo Port: Air cargo ports exist in conjunction with passenger facilities but are becoming more common as dedicated cargo ports.
- Maritime Feeder Inland Port: The concept behind this class of inland port is to provide a deconsolidation point for cargo shipped to a congested maritime port.
- Trade and Transportation Center Inland Port: This general class can be looked at as a location where border processing of trade is shifted inland and multiple modes of transportation are available in combination with value-added services.

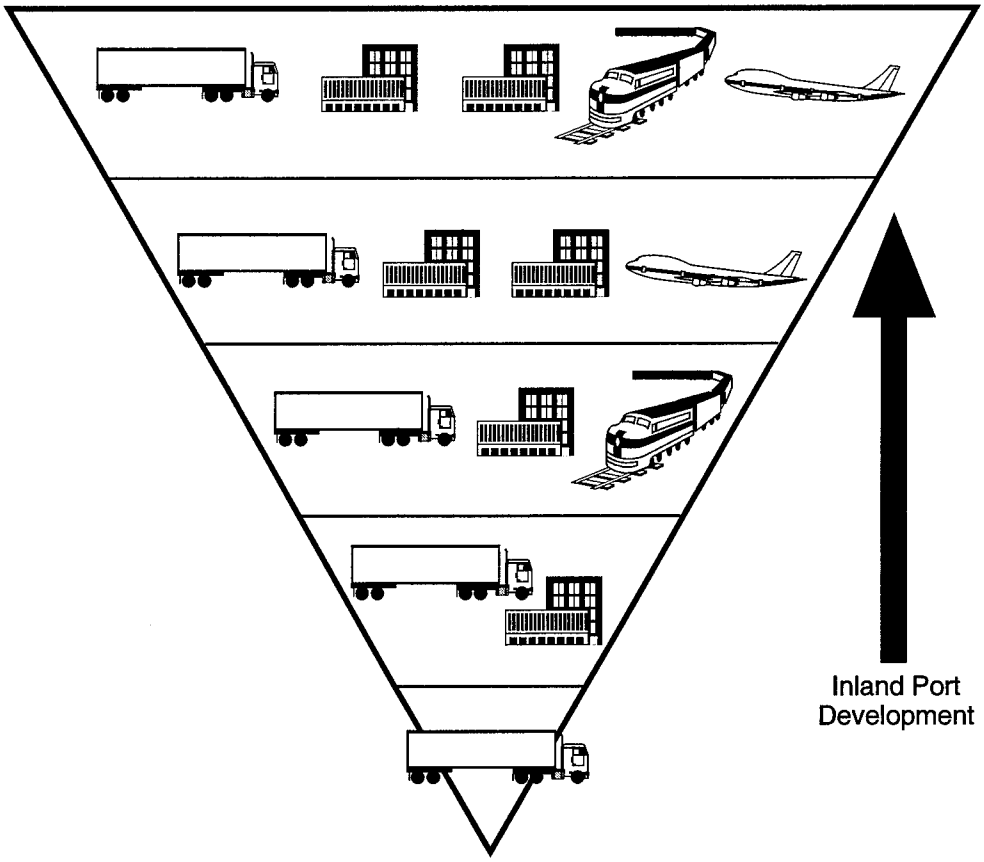


Figure 5.5 Trade and Transportation Center Development Pyramid

CHAPTER 6: CRITICAL NEEDS AT AN INLAND PORT

6.1 INTRODUCTION

Four classes of inland ports have been identified at this research stage and each has several elements necessary for success. It is hypothesized that the different inland port classes will make different impacts on corridors. Therefore, this review of inland port critical needs will provide transportation planners with a framework to further discover the impacts inland ports have on creating more efficient supply chains and trade and transportation corridors. This chapter will detail the elements of success revealed by studying existing inland ports and literature.

6.2 LITERATURE REVIEW

The following literature review details critical needs necessary for successful port operations that have been explored in many published articles and identified by individuals involved in port operations. These needs have been used to identify successful development strategies, location strategies for shippers, and site selection criteria among others. Since the operations of traditional ports are assumed at some inland ports, with added services the critical needs of traditional ports can be adapted to provide a list of critical needs at an inland port.

In a 1999 article on developing strategies for new intermodal terminals, Harder provided insight to communities on the factors the private sector uses to locate new intermodal terminals and how sites are selected. Harder indicates that the private sector is investing in large metropolitan areas because of a higher-expected financial return. For smaller communities, strong public promotion is needed to successfully draw private-sector development. Before beginning the steps to market a small community, Harder suggests that four objectives be investigated. These four objectives could also represent the critical needs of small communities considering inland port developments. The four objectives or critical needs are:

- Sufficient demand for intermodal freight transportation
- Local supply of competitive motor carrier service
- Practical basis for successful community relationships
- Adequate public/private-sector capital to fund development

Harder also stated that metropolitan planning organizations (MPOs) can influence terminal locations by direct action partnerships with shippers, state and local governments, or by

indirect action in improving highways, changing zoning and land use, and creating economic development agencies. Harder (1999, p. 44) states that the "challenge for MPOs and other public agencies is to understand these factors well enough to optimize use of direct and indirect influences in accomplishing public sector goals."

Gooley (1998b) looks at the critical needs from a company's need for strategic positioning. Companies locate where they can derive the most benefits and operational efficiencies. The factors Gooley outlines are for companies to consider when locating manufacturing and distribution facilities. These factors directly apply to inland port critical needs because an integral part of a developed inland port is value-added services like manufacturing and distribution. Gooley's site selection factors are:

- Physical infrastructure
- Proximity to suppliers and customers
- Political and tax considerations
- International trade considerations

Gooley (1998b, p. 65) states that "(w)ith site selection, perhaps the most important thing is to think in terms of a supply chain, recognizing that an entire, organic system is involved." This directly connects these critical needs to inland port development because one focus at inland ports is to integrate all supply chain components to create a more efficient system.

In Richardson's (1999) article, a checklist is provided to shippers so that the best port based on particular needs can be selected. Fifteen items are included in the checklist; all combined, the list provides the shipper with the total picture when selecting a port. This list provides brief descriptions of each item in the checklist provided in Richardson's article.

- Location: Closest port geographically or by transit time
- Cost: Actual cost, time, insurance, other legs
- Service: Which shipping lines, railroads, motor carriers service the port
- Reliability: Consistent transit time
- Time: Time cargo takes to move through the actual port facility
- Security: Protection from theft, proper handling
- Labor: Stable environment
- Infrastructure: Highway, rail, other modal access
- Market: Large or small consumer base

- EDI: Paperwork handled electronically
- Customs: Available and adequate
- Equipment: Specialized needs considered
- Facility: Can volume and large vessels be handled
- Environmental Issues: Are there dredging problems
- Foreign-Trade Zone: Does the site have Foreign-Trade Zone designation

This list is very comprehensive and easily identifies a wide range of critical needs. However, this checklist requires modifications, i.e., inland ports do not need dredging but there may be environmental issues, if used to determine critical needs at an inland port.

Private developers interested in creating inland ports have assembled critical needs that they feel are necessary for the creation of a successful site. The Lynxs Group, developers of the March GlobalPort and other air cargo operations in the United States, consider existing supply as the most critical need of a location. Before investing in a new air cargo operation, the Lynxs Group examines the SIC codes of frequently shipped items in the selected region. The top twenty codes shipped by air are examined to determine if supply exists in the region and if potential for increase in supply is evident. If the supply exists, the Lynxs Group will consider locating an air cargo facility in the examined region (Brimble 2001).

Hillwood, developers of Alliance, has a more extensive list of critical needs for an inland port development of Alliance's size and content. The list of critical needs is as follows:

- Base population of 3 million
- Multiple transportation modes
- 5,000 to 10,000 acres
- Tax and local incentives
- Strong employment base
- Telecommunications infrastructure
- Foreign-Trade Zone status

Hillwood staff believe that inland ports like Alliance can only succeed in four or five areas of the country. This is shown by the large-scale needs, especially because not many metropolitan areas have populations that large or available acreage of that size.

Robinson (1999) provided a list of assets necessary for a community to become an inland port that was derived from a list created by Trade Point USA. This asset list comprehensively

describes what a community can concentrate on to develop into an inland port. These assets can be considered the critical needs of an inland port. The following list is the nine assets and a description of each.

- Intermodal transportation capacity: Air, rail, highway, deep water access
- Demographic advantage: Close to large percent of national population
- Geographic advantage: Access to markets
- Presence of shippers: Does demand already exist
- Information technology infrastructure: Is the infrastructure in place
- Public/Private cooperation: Is there an established working relationship
- Councils: Address concerns of interested parties
- Aggressive marketing: Obtains community support and attracts business
- Capable program management: Leadership to move the inland port forward

6.3 Selected Critical Needs

It is evident from this literature review that many critical needs can be enumerated for the successful operation of an inland port. From the lists identified in the literature, five main categories have been selected as preliminary critical needs at an inland port. These are considered preliminary critical needs because they can be used for sites that are starting their operations or for governmental agencies investigating investment in these sites. It is thought that sites that have all of the critical needs have potential to succeed as a viable inland port with additional enhancements throughout their development. The selected critical needs, categories are:

- Modal capabilities
- Existing demand
- Locational advantages
- International trade facilitation
- Management plan

By definition an integral need at an inland port is transportation assets. Therefore, the need for modal capabilities in the form of highway connectivity and availability or proximity to rail, air, or waterway transport is necessary. This is the critical need that is of most interest to

transportation planning professionals. However, transportation assets are necessary but not sufficient for success at an inland port. This leads to the other required critical needs.

Demand, in the form of existing cargo shipped or motor carriers, logistics firms or freight forwarders, must exist for inland ports to survive. If a location does not have this asset base it will be difficult for an inland port to successfully operate at that site. This leads to the critical need for location advantages. Locations with a large population base within close proximity will provide workers and buyers for the companies locating their operations at the inland port. It is integral to have a strong population base so that various levels of workers are available for the wide range of jobs available at an inland port. According to Harder (1999), investments in large metropolitan areas have higher expected financial return, therefore indicating a higher level of success for inland ports located near large metropolitan areas.

International trade facilitation is another critical need that is integrally related to inland port philosophies. It is critical that a site have Foreign-Trade Zone status and United States Customs officials on-site or at a minimum, the intent to get these services. As business becomes more dependent on e-commerce and the exchange of information via electronic means, inland ports that deal in trade must also have electronic resources available to facilitate trade. According to the United Nations Electronic Data Interchange Working Group (2001) "trade facilitation deals with the requirements and procedures related to the flow of information needed for the international movement of goods." These requirements have traditionally been done on paper, however, focus has shifted to simplifying and standardizing through technology. Therefore, EDI or other technology systems are a necessary component of the international trade facilitation critical need.

Finally, a strong management plan is a necessary critical need at an inland port. An inland port cannot achieve success without capital funding, marketing, and public/private cooperation. A financial plan is a necessary element of an inland port's management plan. Many port and economic development authorities have taxation capabilities and bond issuance privileges. If an authority manages an inland port, these capital-funding sources may be used to sustain the inland port before tenants locate and begin paying rent. If a private entity manages an inland port, funding sources need to be secured before development begins so that the site can move to operational status. Marketing is an important element in any inland port management plan. Without successful marketing, businesses will not know what to expect at a site or what benefits can be derived from locating at the inland port. Marketing staff must successfully attract

businesses that will anchor the site and subsequently attract supporting businesses. Finally, partnerships have been mentioned in many literature sources as a key component of a successful management plan. For instance, when partnerships are created with metropolitan planning organizations, zoning and land-use changes can be made to benefit operations at the inland port (Harder 1999). Additionally, partnerships with local shippers' councils or professional organizations can aid governmental agencies with the promotion of the inland port.

CHAPTER 7: CLASSIFICATION METHODOLOGY

7.1 INTRODUCTION

In this chapter, a classification methodology for inland ports will be discussed to further understand how inland ports can be integrated into transportation planning. This formal classification process will aid planners in the decision about the site's status as an inland port and what needs should be addressed at different stages of inland port development. In Chapter 5, four classes of inland ports were identified from the various case studies. In Chapter 6, critical needs necessary for initial success at an inland port were summarized. These classes and critical needs will be used in this chapter to classify inland ports.

7.2 INLAND PORT CLASSIFICATION METHODOLOGY

In general, there is a lack of consistent understanding of what an inland port is and how it functions, which can be clarified using this classification methodology. The methodology begins by identifying sites that desire inland port status and describes their assets prior to classification. The second step of the methodology uses the five critical needs presented in Chapter 6 to determine if the identified site actually meets the criteria for inland port designation. If the site meets the five critical needs it will move on to the classification step. In this step, the four inland port classes identified in Chapter 5 are used. After the inland port has been classified, its development life cycle stage is determined. An introduction to the marketing product life cycle concept will then be discussed as it relates to the development life cycle of an inland port. The development life cycle stage will aid transportation planners in determining the level of assistance that is needed for individual inland ports. This assistance can be both in terms of stating the requirements that proponents of an inland port site must meet at each stage and the expected responsibilities of the transportation agency. Figure 7.1 is a flowchart that illustrates the steps that are followed in the classification methodology developed in this report. This flowchart provides a visual explanation of the process that will be explained more fully in this section.

The first step of this methodology is to identify the site under consideration for inland port classification. The site may currently be an area located away from a city and zoned for industrial or business purposes commonly called an industrial park. A major factor in rail cost reduction has been the creation of intermodal hubs where railcars and containers/trailers are

assembled or disassembled to form new trains (Muller 1999). These sites may also be considered. Locations where inland waterways (river or intercoastal) with facilities for loading and unloading are available should also be considered. Many times these sites are closed military bases (brownfields) or undeveloped sites (greenfields). Greenfield sites may lie along high priority corridors or in areas desiring an engine for economic development. The proponents of these sites may be private developers as in the case of Alliance or may be port authorities or economic development agencies. In this first stage, it is important to understand the current function of the site because it may already be absorbed into the planning process and not need classification as an inland port to be supported. However, as private sectors become more focused on efficient operations, inland ports may become more valuable to the transportation system and sites desiring this status should be equitably and consistently evaluated.

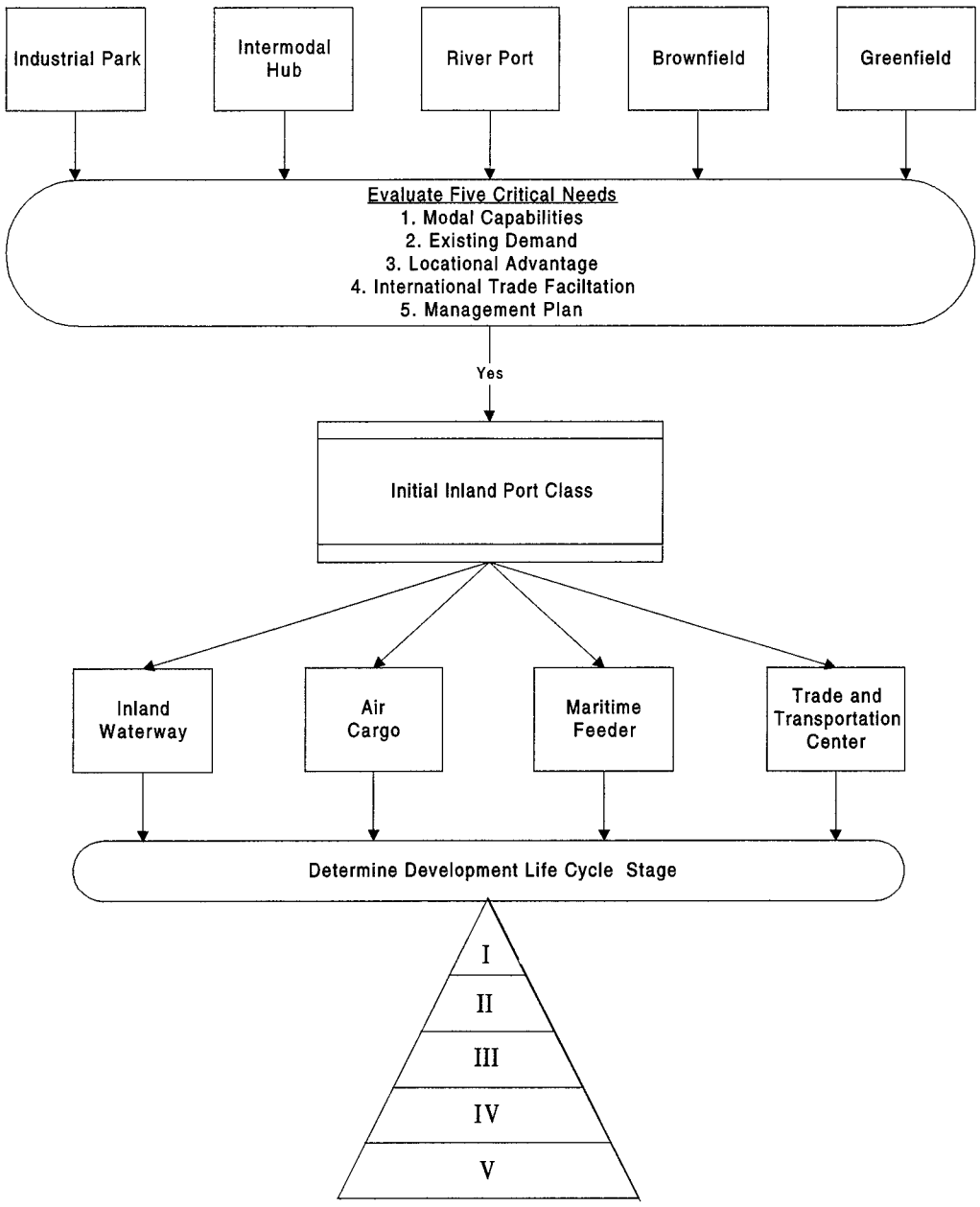


Figure 7.1 Sample Inland Port Classification Methodology Flowchart

Once the existing characteristics of the site have been determined, the second step of the methodology is to use the five initial critical needs of inland ports to determine if the site is actually operating as an inland port. If the site is not yet in operation, the five critical needs must be part of the site's proposal. As exhibited with the case study of ADNPlus in Monterrey, a strong management plan with financial backing is necessary to proceed. Each of the five critical needs should be evaluated to determine if the proponents of the site have clearly built a plan that will promote a successful inland port. Entities that are promoting a site for inland port designation should look at the five critical needs as elements of their proposals for support of transportation planners. At this stage, a weighted matrix may be utilized to rank sites and determine which will be considered first for support. Bomba and Harrison (1999) created an evaluation matrix for containerports that might be adapted for this stage of the inland port classification methodology. If all of the elements have been accounted for, the site under consideration can be designated as an inland port. This designation is possible because all of the necessary elements of the inland port definition have been integrated and it has exhibited that the development entity is serious about promoting the site as an inland port.

The next stage of the methodology is to determine the specific class of inland port. The four classes of inland ports identified in Chapter 5 are inland waterway port, air cargo port, maritime feeder, and trade and transportation center. Using the characteristics revealed in the previous steps, the class of inland port may be determined by inspection. The definitions of each class presented in Chapter 5 should aid in the site classification by inspection. Caution should be taken when evaluating brownfield and greenfield sites by inspection because the vision at these sites may evolve over time. The classes defined in this report should not limit the ability of an inland port to evolve into a larger vision, such as Alliance's drive to become a "transportation driven community." Focus may be mostly on the trade and transportation center inland port because of its integration of all classes of inland ports at its highest stage of development. This pyramid structure of the trade and transportation center inland port provides an option for developing inland ports, which leads into the need to identify the stage of development.

The stages of inland port development range from infancy to maturity. Brownfield and greenfield sites will fall into Stage I because of their lack of development. Sites like Alliance or the Port of Huntsville will be in the middle or later stages because of their age and success. Sites in Stages IV or V may need less support from transportation planners because of their maturity. These sites may need more focus on maintenance and rehabilitation of their transportation

facilities versus planning. These stages may be analogous to the product life cycle used in marketing. The following sections will describe the product life cycle and the adaptation of inland port stages into a development life cycle. Then the classification methodology will be continued to determine the development life cycle stage of the inland port and the support that can be provided by transportation planners at each stage.

7.3 Introduction to the Product Life Cycle

The product life cycle is a marketing concept that has been used for several decades. It tracks the course of a product's sales and profits over its lifetime. Not all products follow the general product life cycle; some die quickly while others last in the maturity stage. However, a general product life cycle has been studied and consists of five stages (Kotler and Armstrong 1999):

I. Product Development
II. Introduction
III. Growth
IV. Maturity
V. Decline

The product life cycle stages measured in terms of sales and profit are illustrated by the bell-shaped curve in Figure 7.2.

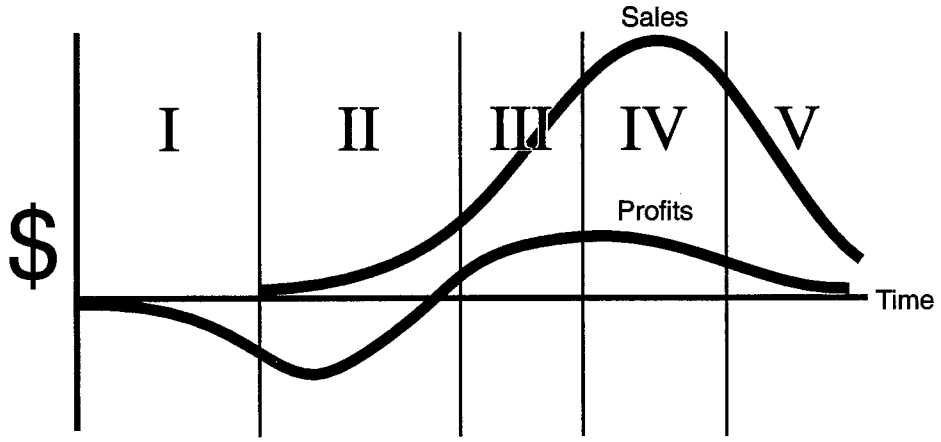


Figure 7.2 Product Life Cycle Curves

The first stage of the product life cycle is product development. In this stage, a company discovers a new product and develops the product idea. The sales are zero at this stage and the

company investment is high, so there is negative profit. The next life cycle stage is introduction. The introduction stage is a slow growth period as the product enters the market. Profits are not seen in this stage because the company is still heavily investing in the new product. The growth stage of the product life cycle is a period of rapid market acceptance and the first sign of positive profits. The fourth stage is maturity. Products at the maturity stage exhibit a decline in sales growth because most consumers have accepted them. Profits will level off or begin to decline at this stage. The final stage of the product life cycle is decline. In this stage, the product sales drop off and profits steadily decline. (Kotler and Armstrong 1999)

The product life cycle has been criticized because product patterns are too variable in shape and duration to standardize into one format. In reality, there is no fixed sequence or length for the identified stages. This can be shown with "fad" products that last for only a short time and have a very sharp increase in sales followed by a very sharp decline in sales (Kotler 2000). Therefore, this concept should be used as a planning tool to help managers characterize challenges in each stage and develop alternative strategies. This concept is less useful as a forecasting tool because of the variability in shape and duration. A valuable use of the product life cycle is as a control tool to measure the product against similar products, which suggests that a transportation planning agency could develop a portfolio of stages for all its potential inland port sites (Kotler 2000).

A broader concept has emerged from product life cycle concepts called the company/management life cycle. This concept opposes the assumption that a good manager performs well regardless of time, company, or other circumstances. It suggests that different management types are needed at different stages of the company/management life cycle. In the early stages, an entrepreneurial manager will promote the most success. The strong points of managers at this stage are "risk-taking, energetic drive, and the willingness to accept innovation" (Onkvisit and Shaw 1989, p. 132). As the product enters the maturity stage, the entrepreneurial manager becomes less effective and a more stable management style is desired. At this stage, a manager who "can cut costs, increase productivity, and provide stable sales and profits" (Onkvisit and Shaw 1989, p. 132) is more desirable and effective. To summarize the company/management life cycle concept, Onkvisit and Shaw (1989, p. 132) state "(i)t is wise to match managerial talent to the different stages of the company and its product in order to avoid disharmony and to increase performance."

7.4 Inland Port Development Life Cycle Stage Classification

The product life cycle is the base concept for the creation of the inland port development life cycle. The development life cycle is the method used to determine the five stages an inland port experiences in its lifetime. These stages are somewhat analogous to the product life cycle stages; however, they have been adapted to better fit the inland port concept.

The general development life cycle of an inland port can be described using these five stages:

I. Preparation
II. Establishment
III. Expansion
IV. Stabilization
V. Reduction

At each stage an inland port is expected to follow a general behavior, as in the product life cycle. However, the behavior may not always be measured by sales or profit. The development life cycle for Alliance exhibited in Chapter 4 used an aggregate value of companies that located at the site as a measure of the life cycle. Other measures, such as number of employees or total square footage built, may be used. Table 7.1 shows each of the stages and gives a summary of some of the potential activities that could occur at each stage.

As with the product life cycle, it is difficult to determine the exact sequence and the exact events that will occur in each stage. However, this table should provide a general model for the development life cycle at an inland port.

The company/management life cycle presented in the previous section can also be applied to the development life cycle of an inland port. This life cycle described the management styles necessary for success during different stages. The styles presented are very applicable to the inland port development life cycle. In Stages I, II, and III of the inland port development life cycle it is very important to have an entrepreneurial management style to aid in the natural adaptation that will take place and the potential risks that need to be taken. At Stage IV, it may be more important for the management style to become more stable. Stability will promote confidence in the tenants and will allow the inland port to remain successful. If the inland port moves to Stage V, a recovery management style will most effectively manage the potential decline.

Table 7.1 Development Life Cycle Stage Descriptions

Stage	Name	Description
I	Preparation	• Evaluation criteria fulfilled • Proponents begin to attract companies and local support
II	Establishment	• Modes established or planned • Anchor tenants arrive
III	Expansion	• More sectors begin to locate on site • Planned modal investment takes place • Cluster theory materializes
IV	Stabilization	• Companies invest in expansion of current facilities • Non-trade services (like housing) established • Slowdown in new arrivals
V	Reduction	• Companies begin to leave because of better options elsewhere • New private-sector trends materialize forcing change in operations

7.5 Transportation Planning Support Function

The development life cycle can be viewed as a planning tool for inland ports and an evaluative tool for transportation planners. In the evaluation of inland ports, transportation planners will take different steps at each stage to support the site and provide investment. The following table illustrates examples of different steps that can be taken if a department of transportation (DOT) provides the support.

Table 7.2 Development Life Cycle Stage Support Function

Stage	Name	DOT Support Function
I	Preparation	• Evaluate the transportation needs of the site
II	Establishment	• Place the site and its needed improvements on the transportation plan
III	Expansion	• Build the facilities planned for in Stage II
IV	Stabilization	• Perform maintenance on the facilities built in Stage III • Upgrade/expand the facilities at the site
V	Reduction	• Reevaluate investment in the site • Rehabilitate

When a site is in Stage I, it is important for transportation planners to be familiar with the plans at the site because if the site proceeds to the next stages there may be a great impact on the transportation system. However, caution should be practiced so that investment is not made too early in a site that may fail. Additionally, planners should recognize that inland ports might influence the shift in trade corridors. One example is the relocation of JC Penney's to Alliance. Originally, JC Penney had two distribution centers, one on the West Coast and one on the East Coast. The construction of the BNSF intermodal yard at Alliance allowed JC Penney to have a reliable connection to the West coast ports and a central distribution location in the United States. This change in the way JC Penney distributes its merchandise affected the trade corridors utilized. Ultimately, this results in more trucks loaded onto the transportation system, which is very important to a DOT. Departments of transportation must recognize private-sector decisions and their impact on public infrastructure.

At this stage in the research on inland ports, stages of development are not fully known. Most identified inland ports are still very young and there are no inland ports that have reached

Stage IV. Therefore, further study must be conducted to determine more exact stages of development and the support that planners can provide at each stage.

CHAPTER 8: SUMMARY AND RECOMMENDATIONS

8.1 SUMMARY

This report has formulated a definition of an inland port and a classification methodology that can be used to support transportation planning functions related to inland ports. An inland port is a site located away from traditional land, air, and coastal borders containing a set of transportation assets (normally multimodal) and the ability to allow international trade to be processed and altered by value-added services as goods move through the supply chain. The classification methodology begins with an attempt to characterize the existing site and moves on to evaluate the five critical needs of an inland port. If the five critical needs are met, the site is classified as an inland waterway port, air cargo inland port, maritime feeder inland port, or trade and transportation center. After the inland port is classified, its development life cycle stage is determined. At this stage, transportation planners can understand what support they can provide to assist the inland port.

This is the first attempt to integrate the new concept of inland ports into formal statewide transportation planning processes. As automated border-crossing procedures are implemented nationwide, inland ports may become more common and the importance of recognizing their impact on corridors will become more important. Therefore, this report may play a constructive role in the initial introduction of this topic to transportation planners.

8.2 RECOMMENDATIONS

Inland ports may provide valuable means for companies to reduce supply chain links, provide an avenue for community economic development, and allow transportation planners and policy makers to enhance corridor efficiencies through multimodal operations. Therefore, future research should focus on determining how an inland port can be evaluated to determine its potential for success and the support that can be provided by transportation agencies.

An evaluation matrix should be created to equitably and consistently determine if a site has fulfilled the five critical needs necessary for initial success. A weighting system may be introduced so that sites that are further along in their development receive higher priority than those in the initial stages. Transportation planners and policy makers can use this matrix when sites petition for support.

Further investigation should be made into the support that transportation planners and policy makers can provide during the five development life cycle stages. Inland port proponents will be interested in knowing what is potentially available and transportation planners need to understand what support is most valuable. A more robust framework will also aid in the equitable and consistent support provided by transportation planners.

Finally, investigation should be made into the locational aspects of inland ports on macro and micro levels. On the macro level, existing trade corridors should be determined and forecasts should be made taking into account potential corridor shifts. Transportation planners evaluating sites can use the identified corridors when considering existing demand in the evaluation matrix. If the site lies along a strong corridor, transportation planners can be confident that an inland port will be initially successful. If the site does not lie on a corridor or is on a weak corridor, the site should be required to provide a convincing argument about its future plans for success.

On the micro level, the locational aspects in a city or region should be studied. Most central business districts are congested and it would not be appropriate to locate an inland port in an already congested area. Research should be made into the impacts of the exact location in a city and the impact the entrance/egress points of an inland port have on the city or region's congestion levels. This is especially relevant to a site like Kelly USA that is located near a residential area.

This report recognizes that inland ports are very dynamic and should be incorporated into an ongoing transportation planning process. As this report has shown, almost all of these sites are supported by groups based in the area where the site is located. The method developed in this report needs to address the spectrum of locations likely to be addressed at all levels of TxDOT planning. Proponents in Texas, whether they are an established site like Alliance, in the early stages of the inland port development life cycle like Kelly USA, or just an idea like Beeville, can be accommodated by the proposed approach. It should also be capable of application and calibration to other North American sites, including those that are NAFTA-related in Canada and Mexico.

The next phase of the research will undertake a thorough analysis of trade data in order to establish trade flows, focusing on those that appear to utilize inland ports. In addition, attention will be given to the various modal flows associated with inland ports, particularly the truck utilization of related highway systems because this is a direct TxDOT responsibility. These efforts will be summarized in the next report, together with a guide that will be developed from

the results of the entire 2-year project, for use in TxDOT planning at both the central and district levels.

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APPENDIX A: BASE REALIGNMENT AND CLOSURE OVERVIEW

United States military requirements have been fundamentally altered with the end of the Cold War. In light of this event and Federal budget deficits, the United States has been compelled to reduce and realign its military installations. Congress enacted the Defense Base Closure and Realignment Act of 1990 (Public Law 101-510, as amended) to reduce the number of military installations and ensure an impartial decision-making process regarding the specific bases to be closed.

This Act established the Defense Base Closure and Realignment Commission (DBCRC). This Commission was charged with the task of providing a fair process resulting in the timely closure or realignment of military installations. The DBCRC met in 1991, 1993 and 1995 (previously legislation provided the first round of meetings in 1988). In each of these years the Secretary of Defense presented a proposed list of base closures and realignments to the DBCRC. Using a set of selection criteria approved by the Secretary of Defense and formal public hearings, the Commission reviewed the proposed list.

Since 1988, four DBCRC have met and recommended the closure of 352 military installations and the realignment of 145 military installations. The DBCRC recognized that the base realignment and closure process is difficult for the affected communities. In an effort to help these communities maintain or restore economic stability the Department of Defense Office of Economic Adjustment (OEA) was established. The OEA can provide local and state governments with technical and financial assistance to aid in planning and the reuse of the closing bases.

Additional information on military base closure can be found at the Office of Economic Adjustment Web site (http://emissary.acq.osd.mil/oea/home.nsf) and in "The Report of the Department of Defense on Base Realignment and Closure" published in April 1998 as required by Section 2824 of the National Defense Authorization Act for Fiscal Year 1998, Public Law 105-85.

APPENDIX B: FOREIGN-TRADE ZONE OVERVIEW

A Foreign-Trade Zones (FTZ) is specially designated site in or adjacent to a United States Customs Port of Entry. The FTZ Board, chaired by the Secretary of Commerce, licenses the sites. Merchandise in the FTZ is considered outside Customs territory of the United States, however the operations within the zone are supervised by United States Customs. Both foreign and domestic merchandise may be brought into the zone and held there free from duties and taxes. This same merchandise may be brought into zones for storage, exhibition, assembly, manufacture and processing without being subject to entry procedures or duties until the merchandise enters the United States for domestic consumption.

A General Purpose Zone is a FTZ site that accommodates any number of firms; it is only constrained by the physical space of the zone. A General Purpose Zone can be a single building, industrial park or other area such as an inland port. A FTZ may have several non-contiguous General Purpose zone sites. A FTZ Subzone is an existing or new company that cannot be accommodated in a General Purpose Zone. Subzones are authorized when a significant public benefit will result.

FTZ are established based upon application made to the FTZ Board. Grants are issued based on statutory and regulatory criteria established under federal law. Applicants must submit a plan including provisions for facilities and financing. Public interest criteria must be satisfied for a General Purpose Zone or Subzone to be approved.

FTZ encourage United States investment and jobs as opposed to similar activity in foreign countries. Users benefit by paying no duties or quota charges on re-exports. For imported merchandise duties and taxes are deferred. When manufacturing occurs in the zone, the finished product has a lower duty rate than the rates on the individual foreign inputs.

Many public benefits are felt when a FTZ is established. FTZ provisions encourage the creation of local employment opportunities. State and local economic development results when offshore activity is attracted and domestic activity is retained due to the benefits of a FTZ.

Information on FTZ can be found on the Web site of the Foreign-Trade Zones Board (http://ia.ita.doc.gov/ftzpage) or the United States Customs Import and Export Web site (http://www.customs.ustreas.gov/impoexpo/impoexpo.htm). The National Association of Foreign-Trade Zones provides detailed information on FTZ procedures, application processes and FTZ benefits (http://www.naftz.org).

APPENDIX C: INTERNATIONAL TRADE DATA SYSTEM OVERVIEW

The International Trade Data System (ITDS) is a Federal government initiative to implement a government-wide system for the electronic collection and dissemination of international trade data. The United States Customs system, Automated Commercial Service (ACS), currently uses automated processes that accommodate some federal agencies. ITDS will be designed to accommodate over 100 federal agencies that need international trade data.

Individuals involved in international trade importing and exporting are required to submit data to the appropriate agencies to determine, for example, duties, admissibility or safety. Traders must provide data to each agency regardless of redundancy. With ITDS, traders will submit one standard electronic form for imports and exports. This form will include all information needed by the agencies involved in that specific trade transaction.

An ITDS Pilot was launched in August 2001 at the Peace Bridge and Lewiston Bridge in Buffalo, New York. The United States Customs Service on behalf of the ITDS Board of Directors is developing the Pilot. Over 100 federal agencies are involved in the development of ITDS and four have been selected to participate in the pilot:

- United States Customs Service
- Food and Drug Administration
- Immigration and Naturalization Service
- Federal Motor Carrier Safety Administration

The Pilot will be the first of a series of initiatives to develop an all-inclusive international trade processing system.

Pilot participants will file two electronic documents to release cargo. The carrier files the Manifest Declaration document and the importer or customs broker files the Goods Declaration document. Manifest Declarations will be filed for each truck prior to its arrival at the international border. A Pro-Bill number links the Manifest Declaration to the Goods Declaration. These documents will be sent via the Internet before the truck arrives at the border. By accepting the documents prior to the truck arrival, the participating agencies can review the documents and determine their actions before arrival. With pre-arrival processing, trucks can expect fewer delays at the border.

Information on ITDS can be found on the United States Treasury Department's Web site (http://www.itds.treas.gov). An article was posted at Journal of Commerce Online, June 11, 2001

by Edmonson about the Pilot program in Buffalo. The article was titled "Customs to Launch ITDS."

APPENDIX D: ANNOTATED BIBLIOGRAPHY

INTRODUCTION

This annotated bibliography provides summaries and abstracts of sources of information related to TxDOT study 0-4083, entitled "Impacts of Inland Ports on Trade Flows and Transportation in Texas" research project. Included are peer-reviewed journal articles, trade journal articles, conference papers, professional reports, newspaper articles, and relevant Internet sites that the search team considers to make a contribution to the main focus of this study. The sources are listed by the heading that best represents the source's main emphasis and relation to this research project. For each entry, a complete source reference is provided, which sometimes includes an Internet site. If an abstract is available, it is generally given, together with comments on the relevance of the work written by the project authors. In addition, a series of Internet sites containing material pertinent to the study tasks is provided to reflect the growing use of Internet sources in transportation planning.

The thrust of this work is to focus on sources that provide significant direction on inland ports, corridors, and trade flows; it does not include all sources that merely mention inland ports. Many corridor studies, major investment studies, and articles mention inland ports or related topics but generally do not shed valuable information on this research. Therefore, only sources that clearly identify topics related to this research study were included in this annotated bibliography.

INLAND PORTS

Bowman, R.J. "Special Report: Networks That Work." *World Trade* 6, no. 7 (July 1993): 89.

Bowman provides an overview of new logistics strategies undertaken in eleven states. Emphasis is put on inland sites that are not focused on traditional seaports or airports. Many of the sites investigated can be designated as inland ports.

Abstract: Numerous state and cities offer US companies attractive alternatives to congested transportation networks. Today, the emphasis is on logistics. States are developing rail and truck networks that hook up with ports or airports hundreds, and thousands, of miles away. Massachusetts is challenging the primacy of New York-New Jersey as a gateway for international freight. The Greater Columbus Inland Port, in Ohio, claims to be able to transport to any international gateway in the country. When completed, North Carolina's Global TransPark will offer 2 runways for big jets, as well as fast road and rail connections to the sea. Savannah, Georgia, is benefiting from state construction of a new bridge and massive highway projects. Florida is becoming a thriving conduit for Latin American trade. Other states with growing transportation networks include Tennessee, Illinois, Michigan, Texas, Nevada, and Washington.

Burrows, G. "Inland Ports a Loser, Welch Says." *American Shipper* May 1991, 72.

Burrows' article explains the move to open inland container freight stations (CFS) to lure business from rival ports. The main advantage to a CFS is that it offers reduced freight charges and lessens congestion. Although, W. Don Welch, executive director of South Carolina State Ports Authority, feels that it is an unnecessary function that adds cost. Welch feels that it is a movement going to point A-and-a-half rather than directly from A to B. Some ports have met with varying success: Gulfport, Mississippi; North Carolina; South Carolina; Virginia and Maryland. Information is presented on Gulfport's New Orleans CFS, the Virginia Inland Port, and the North Carolina Inland Terminal at Charlotte.

Abstract: Trade Journal - None Provided.

Cambridge Systematics, Inc. "Transportation Infrastructure Improvement Study for the Greater Columbus Inland Port Program." Mid-Ohio Regional Planning Commission, June 1994. http://www.bts.gov/smart/cat/TS.html. INTERNET.

The objective of this study is to recommend actions that can strengthen the competitive position of Columbus in terms of faster, more efficient and lower cost transportation of freight. Acceleration of economic growth in Columbus through transportation service and facility improvement is the goal of the Greater Columbus Inland Port. The report gives background on the conceptual idea of an inland port while providing findings on Columbus and its attractiveness to shippers, manufacturers and retailers. Future freight forecasts are made and the implications of these forecasts on the Columbus infrastructure are discussed. Finally, recommendations are made on how to increase freight and intermodal traffic in Columbus, critical infrastructure improvements, and regulatory and institutional considerations.

Abstract: Professional Report – Executive Summary Available.

Ellis, W. E. "Port Authority of New York and New Jersey Inland Satellite Ports Initiative." Presented at the Eightieth Annual Meeting of the Transportation Research Board, Washington, D.C. January 2001.

In their efforts to build a 21st Century Port, the Port of New York and New Jersey has identified the need to build a Port Inland Distribution Network (PIDN) to become a total logistics provider. The goals of the PIDN are to reduce inland distribution cost, reduce truck VMT, improve air quality, and increase throughput and market share. The PIDN will be located by determining dense trade clusters. These clusters will be served by liner rail service or barge service. This presentation provides valuable information on one inland port concept being applied at a congested seaport.

Abstract: Presentation – None Provided.

"Duisport: Europe's Largest Inland Port is Going Ahead." *Logistics Management and Distribution Report* March 2000.

Description of Duisport, the Rhine-Ruhr Port in Duisburg, Germany is provided. Location, markets encompassed and industrial components are explained. The strategy is to establish Duisport as a central hinterland hub for major European seaports.

Abstract: Trade Journal - None Provided.

Dupin, C. "NY-NJ Port looks Inland." *Journal of Commerce* September 25, 2000, 20-21.

The Port of New York/New Jersey has proposed a network of inland satellite ports to help relieve the congestion and increase in throughput at the port. These satellites will be anywhere from 75 to 400 miles from New York and be served by barge, stack-train or tandem trailers. The goal of the network is to move the containers closer to their destinations and reduce costs incurred by long waits, rising fuel prices and driver shortages.

Abstract: Trade Journal – None Provided.

Gardner, R.R. "North Carolina to Open Global TransPark." *AirCommerce* May 28, 1996, 35.

A description of the creation of the Global TransPark is provided. This facility will serve as the state's vision of the future and is planned to become North Carolina's intermodal transportation complex with air, highway and rail connections as well as close proximity to seaports.

Abstract: North Carolina will soon open the Global TransPark intermodal transportation complex at the Kinston Regional Jetport. The facility will include a 15,300-acre transportation complex combining industrial manufacturing sites, an 8,400-ft-long runway, and rail and trucking service. Mountain Air Cargo (Denver, CO) is the TransPark's first tenant. The TransPark is also expected to soon be designated a Foreign Trade Zone, permitting the inbound movement and storage of foreign products without the imposition of customs duties.

Gessner, P., D. Ismart, M. Ismail, and J Reed. "Intermodal Freight Management Systems: The Columbus Case Study." Proceedings of the Thirty-Sixth Annual Meeting of the Transportation Research Forum, Daytona Beach, Florida November 1994.

Provides a description of the process Columbus underwent to define and establish the city as an inland port and determine the value of this description to Columbus. Specific information was provided in regards to ISTEA's requirements for intermodal management systems developed by states and MPOs. This intermodal management system will provide a systematic process to assist decision makers in improving productivity and efficiency and area economics.
The objectives of the Columbus study were to move freight economically, efficiently and reliably; to estimate future freight movement; and to enhance economic development in the Columbus area. Overall, the scope of the project was to develop a concept for the inland port. Specific portions of the study were discussed including facilities inventory, locational advantages, private involvement, forecasts and service improvement recommendations. According to the Columbus study an inland port "involves improving service on each of the modes – rail, truck and air – and also enhancing the intermodal relationship."

Abstract: The Intermodal Surface Transportation Efficiency Act (ISTEA) mandates that the private and public sectors work in partnership to integrate their freight transportation planning efforts. This paper describes a major freight study recently concluded in Columbus, Ohio entitled "Inland Port Infrastructure Improvement Study", which was undertaken as an integral part of a greater effort to encourage economic development through local emphasis on the effectiveness of regional, national, and international freight movements. The main objective of the study was to enhance economic development in the Columbus area - to generate jobs and business by improving transportation, by making it a better location, by helping firms that are located in Columbus to be more competitive. The study also focused on making Columbus more of a wholesale distribution center. By improving transportation, Columbus becomes a better location for transportation dependent industries. Further study objectives were to move freight economically, efficiently and reliably; to estimate future freight movements based on the growth of regional economy; and to recommend infrastructure improvements. Costs by industry were analyzed to determine the type of freight likely to be generated. A doubling of the number of containers handled through intermodal terminals was projected.

Giermanski, J. "Inland Port May Revolutionize Importing into Mexico." *Logistics Management and Distribution Report* February 2000.

Trade between Mexico and North America has created a need for more efficient processing of imports into Mexico. ADNPlus Multipuerto Industrial, a multimodal Foreign Trade Zone hopes to address this need. The complex will focus on agriculture, automobiles, dry bulk, chemicals, grain, intermodal transportation, public warehousing, and steel. It is located on the main highway to Laredo, next to Monterrey's Northern Airport with direct access to rail. With access to these three modes, shippers will be able to transfer freight between modes efficiently. If this facility is built, US shippers may receive an enormous cost benefit in forwarding and customs clearance costs.

Abstract: Trade Journal - None Provided.

Gogoll, T. "Rickenbacker Airport offers Model for Successful Conversion." *AirCommerce* March 25, 1996, 13.

A summary of the operations at Rickenbacker is provided in this article.

Abstract: Rickenbacker International Airport is considered by many to be the model for converting a former military-owned air force base into a commercial airport. Being located in Columbus, OH, puts it within 500 miles of 60% of the US population. The sprawling facility has attracted many shippers to set up distribution centers in the area, including Spiegel, Whirlpool Corp and Sun Television. The airport's cargo landed weight in 1994 was 478,580,695 lbs, up from 187,857,800 lbs in 1990. In 1995, it had a total of 2,299 cargo aircraft landings, with many coming from foreign sources.

Gogoll, T. "A Different Drumbeat." *AirCommerce* March 25, 1996, 12.

This article highlights several military base closures and the options for conversion. General information on facilities, cost of conversion and operations is given, no specific information on success or methods is provided.

Abstract: Several former US military bases are converting to commercial airports, including the soon-to-be-completed San Bernardino International Airport, formerly Norton Air Force base (San Bernadino, CA). The facility expects to be able to provide full-cargo service and cargo charters by late spring or early summer 1996. Another former Air Force Base that was closed after downsizing efforts on the part of the Pentagon, Robert Bergstrom Air Force Base is in the midst of an expansion and conversion into a commercial airport. Now known as the Austin-Bergstrom International Airport, its conversion is expected to cost $500 million. According to the airport's director, Charles Gates, $5 million will be spent on expanding the cargo ramps at the facility. The airport's cargo terminal, located 6 miles away, is expected to be completed in the fall of 1996. According to Gates, the airport expects a 10% increase in cargo weight over 1995. Other Air Force bases, scheduled to close, are expected to be converted into commercial airports.

Gooley, T.B. "Air Freight Hits the Rails." *Logistics Management* March 1996, 111a-113a.

Airfreight provides shippers fast transit times and reduced damage for fragile goods. Although there are clear benefits, air service is costly for some goods. This cost forces shippers to decide if speed and geographic advantage outweigh price. This article focuses on combining airfreight with other modes to utilize the speed of air and the economy of other modes. Airfreight combined with rail freight is highlighted by two locations. Frankfurt Airport in Germany and Lyon-Satolas Airport in France are described. In the US an FAA study was cited that predicts that inland airports could best meet future needs because they have available land. The downside is poor landside connections. This is where rail will play a key role. Brief mention is made of Global TransPark, Alliance and Rickenbacker. Sea-air shipping is also included to illustrate the benefits this intermodal relationship provides. The major concern with intermodal air transportation is the hand off of goods between modes. Timing must be accurate to prevent missed connections.

Abstract: Trade Journal - None Provided.

Gooley, T.B. "How Freight Gateways Put It All Together." *Logistics Management* October 1997, 45-49.

Gooley's article provides a potential definition of an inland port although he uses freight gateway or freight hub. A regional freight hub "bring(s) together in one location all the modes of transportation, along with warehousing, freight forwarding and customs brokerage, and logistics-management services." The author emphasizes that connection to rail, highways, and air cargo facilities are vital to a hub's success. A potential categorization is also provided in his description of the structure of multimodal freight centers. Some categories he presents are private enterprises, public-private partnerships, growth of existing facilities, or deliberate constructions. General descriptions of three existing facilities are provided including San Antonio, the Greater Columbus Inland Port and the Global TransPark.

Abstract: Trade Journal - None Provided.

Gooley, T.B. "One Location, Many Options." *Logistics Management and Distribution Report* November 1998, 81-89.

"Logistics-friendly industrial parks" and their ability to provide shippers one location where transportation, communication and building options are available are discussed. Air bases have been resurrected as multimodal distribution and manufacturing centers because they generally have runways, railway spurs and highway access. Kelly AFB in San Antonio is highlighted and its proximity to Mexico's industrial heartland is indicated as a selling point of the facility. Descriptions of the Greater Columbus Inland Port and Alliance Industrial Park in Fort Worth are given. For shippers that use multimodal transportation these sites can make for smoother, faster, more efficient and less costly operations.

Abstract: Trade Journal - None Provided.

Gooley, T.B. "The Midwest: America's Distribution Heartland." *Logistics Management and Distribution Report* September 1998, 77-83.

This article uses three main factors of site selection to illustrate why the Midwest is a favorite location for distribution centers. The three factors are proximity to markets, physical infrastructure, and economic and tax considerations. The Midwest has cities that are among the countries largest consumer markets. It is also close in proximity to Canadian markets and major routes running to Mexico. Highway, rail, waterway and air movement are possible within the Midwest. Land availability is an advantage in the Midwest considering its low cost. Other cost factors are decline in transportation cost and low utility cost. Tax incentives include job creation incentives and financial and managerial assistance with recruitment. Rickenbacker and the Greater Columbus Inland Port are briefly described.

Abstract: Trade Journal - None Provided.

Gooley, T.B. "The Southwest: America's NAFTA Crossroads." *Logistics Management and Distribution Report* October 1998, 69-75.

Three main factors of site selection are used to illustrate why the Southwest is a favorite location for distribution centers. The three factors are proximity to markets, physical infrastructure, and economic and tax considerations. As North American trade continues to grow under NAFTA, the Southwest will continue to increase in importance as a distribution location. The Southwest is known for its wide open spaces but it also has some of the country's fastest growing cities providing close proximity to markets. For companies that want proximity to Mexico's markets the Southwest is the logical choice. Texas is heavily promoting itself as a prime location for companies doing business with Mexico. Kelly Air Force Base, in San Antonio, will start its new life as a private-sector multimodal distribution and logistics center. Highways are the Southwest regions lifelines; they are well maintained and designed for truck traffic. Class 1, short line and regional rail service is offered. Shippers using air service benefit from good weather, frequent service and reliable schedules. Alliance Airport in Fort Worth offers dedicated freight service.

Abstract: Trade Journal - None Provided.

Harrington, L. "Landlocked Shippers Use Inland Port." *Transportation & Distribution* October 1991, 82-86.

Harrington uses the Virginia Inland Port (VIP) as an example of an emerging way to reduce shipping costs and delays at overcrowded coastal ports. VIP is connected by rail and truck to the Hampton Roads seaport and attracts business from steamship lines for the inland portion of the movement of goods. This article concludes by stating that the physical map may not be changing but that the concept of an international port is changing.

Abstract: The Virginia Port Authority (VPA) has used an innovative strategy to compete as an inland port. Virginia Inland Port (VIP), a $10-million facility, boasts good highway access, 3 container cranes, and 3-times-a-week rail service to Hampton Roads on Norfolk Southern. Today, some 22 steamship lines use the inland port for intermodal moves and through-bill-of-lading movements by independent carriers. For shippers and carriers, one of the big benefits of the port is no congestion. VIP shipper Elkern Metals Co. uses the facility as a consolidation point for exports moving from multiple plants to Hampton Roads.

HDR Engineering, Inc. "State of Washington/Port of Benton Hanford Investment Study Phase II: Detailed Feasibility." Washington State Department of Transportation, November 1999. http://www.wsdot.wa.gov/TEPD/Freight/HISPhase2Summary.PDF. INTERNET.

The state of Washington and the Port of Benton sponsored this study to evaluate opportunities for the development of land transferred from the Hanford Reservation. Eight "industrial development" and nine "business of transportation" options were identified and studied. A specific interest was found in "inland ports" or "intermodal centers." This study researched this topic and produced criteria for screening these potential centers. Three categories were developed to further define inland ports or intermodal centers. The categories are: Freight Transportation Services Center, Freight Intermodal Services Center and Freight Intermodal Services and Commercial Center. This report provides an excellent analysis of inland ports and intermodal centers.

Abstract: Professional Report - None Provided.

"Huntsville's Different Approach." *Traffic Management* November 1998, 48-49.

The International Intermodal Center in Huntsville, Alabama is described. This inland port was established as a terminal operation for intermodal cargo going to and from any point in the world. It is pointed out that this port is designed to attract cargo but the cargo is not necessarily destined for deep-water ports. Highway, railroad, and air connections are provided at this inland port.

Abstract: Trade Journal - None Provided.

LaLonde, B. J. "Intermodal Freight Requirements." *TR News* 192 (September-October 1997): 13-17.

In this article, LaLonde emphasizes the need for public-private partnerships in transportation planning. Partnerships are important so that funding is allocated where it is needed, therefore shippers will not divert to other modes or be forced to change the architecture of their logistics systems. A case study of the Columbus Inland Port supports these emphases. The most important element presented is the emphasis on the definition of an inland port. LaLonde suggests that the definition of a port be expanded to include "a site that facilitates and engenders international

trade and transportation by virtue of its location, business climate, and facilitating services and infrastructure, as well as its attitude toward development."

Abstract: This article explores the institutional implications of recent developments in logistics and the intermodal movement of freight. It begins with a look at shipper expectations for the 21st century, followed by a case study of the inland port, Columbus, Ohio. This case study illustrates the possibility of building a coalition of shippers, carriers, the metropolitan planning organization, and public-sector representatives. The conclusions drawn are that (1) new public-private coalitions will be required to address the challenges of the 21st century, (2) continuous and creative (nonpartisan) shipper input will be required to drive process change effectively, and (3) the bottom line is community, regional, and national economic vitality and global competitiveness.

MacDonald, M. E. "Ports Look Inland for New Business." *Traffic Management* November 1989, 47-50.

MacDonald's article discusses the establishment of inland ports connected to specific deep-water ports. For deep-water ports to survive they must become "load centers." The specific case of the Virginia Inland Port (VIP) is investigated. This inland port is designed to draw into the state, deep-water port container traffic traditionally delivered to Baltimore or New York or New Jersey. Establishing an inland port is a step that port authorities are taking to remain competitive. Two factors contributing to the shift to an inland center is the shifts in operations by steamship lines and the improvements in inland transportation. The success or failure of an inland port may depend on its proximity to the deep-water port it serves.

Abstract: Trade Journal - None Provided.

Marketing and Economic Development Subcommittee. "Marketing and Economic Development through Information Technology." San Antonio, Texas: Mayor's Task Force on Technology Implementation, September 4, 1999. http://www.salsa.net/metronet/market999.html. INTERNET.

This document represents a strategic response of the City of San Antonio to promote economic growth. The four target areas are: digital broadcasting and the use of media; marketing San Antonio as a destination through information technology; development of a technologically sophisticated workforce; and creation of an Inland Port to facilitate international commerce.

Abstract: Committee Report - None Provided.

"Metroport Offers Choice to Auckland Manufacturers." *New Zealand Manufacturer* April 1999, 17.

This article provides a general overview of Metroport. This is an inland port linked by rail to the Port of Tauranga in Auckland, New Zealand. Information technology developments link Metroport to the Port of Tauranga and any movement to and from Metroport is considered movement with in the Port of Tauranga.

Abstract: The port of Tauranga's new inland port in Auckland's industrial heartland will ease a "bottleneck" for manufacturers in the area. The $2 Million Metroport in Otahuhu is New Zealand's first dry port and aims to offer customers a seamless rail link to the Tauranga port facilities.

Mogelluzzo, B. "Ports Look Inland for Success." *Journal of Commerce* March 17, 1998.

Waterside customer needs have been successfully met but now landside needs are of concern at many ports. Bottlenecks are found in intermodal transportation in the transfer of containers to truck and rail. To alleviate these bottlenecks ports are looking to more innovative solutions like intermodal corridors and inland sorting facilities. This article highlights the Ports of Los Angeles and Long Beach and briefly describes their venture into inland facilities.

Abstract: Trade Journal - None Provided.

"Multimodal Center Takes Shape in Europe." *Logistics Management and Distribution Report* November 1998, 82.

A brief review of France's Europort Vatry is provided. This inland port is located 90 miles east of Paris and will have a 24-hour airport, road and rail connections and light manufacturing facilities.

Abstract: Trade Journal - None provided.

Ness, R. "Inland Ports Come of Age." *Transportation & Distribution* 34, no. 10 (October 1993): 47-53.

Ness introduces reasons why inland ports are becoming attractive to shippers including growth of highway system and expense, overcrowding, and delays at coastal ports. Inland port growth is best sustained when location offers potential and demand is not created but exists initially. In addition growth is sustained in locations where public-private partnerships are fostered to develop and enhance a strong transportation system.

Abstract: In the 1960s and 1970s, the growth of the US highway systems, inflation, energy concerns, the emergence of electronic data interchange, the rapid globalization of the world economy that began in the 1980s, and other factors made the inland port an increasingly attractive alternative to the expense, crowding, and attendant delays of the big coastal ports. As of 1991, while about 1.2 billion tons of freight moved outbound from coastal port areas, nearly

3.2 billion tons originated from inland ports. Like coastal ports, inland ports grow best when they grow naturally. When a particular location offers both market proximity and access to major land, rail, air, and water lanes, it begins to attract big activity that spurs growth. This in turn attracts more carriers and other services. Advanced, effective intermodal transfer facilities and information services also develop. The port at Columbus, Ohio is profiled.

"New Rail Port slated for Uganda." *Ceramic Industry* 149, no.3 (March 1999): 21.

A brief description of a plan to build a "dry port" in Uganda to boost trade between Uganda and other South African countries is provided.

Abstract: Trans-Africa Railway Corp., a South African company, announced plans in December to build Uganda's first inland port in Namanve, a swampy area five miles east of the capital. The aim is to boost trade between Ugandan and South African companies.

Palmer, E. "Doubts Follow Dream of KC as Inland Port; City's Central Location on I-35 Can Be Blessing or Handicap, Backers Say." *The Kansas City Star* January 17, 2000, A1.

This article relays the concerns of transportation and trade experts about the potential success of Kansas City as an inland international port. However the view that Kansas City needs to grab this opportunity before it moves elsewhere is also presented.

Abstract: Newspaper Article - None provided.

Palmer, E. "Texas Border Tie-Ups a KC Opportunity? High Tech Port Envisioned, Paperless Processing Giant 'Scanners' Would Expedite Trade." *The Kansas City Star* June 8, 1999, A1.

This article highlights Kansas City's desire to become an inland port that focuses on 'paperless technology-based clearance' of international borders. A strong focus is put on the rail connections already in existence in Kansas City.

Abstract: Newspaper Article - None provided.

Robinson, A.E. "Inland Ports and Supply Chain Management." Paper presented at the International Business Association's Eight Annual Conference: On Global Perspectives, Cancun, Quitana Roo, Mexico May 1999.

Inland ports provide the physical and commercial infrastructure to allow efficient and effective

production and distribution. A concept of an inland port, assets necessary for the development of

an inland port and agile manufacturing are discussed. Expected results from integrating supply chain management with inland ports are cost reductions, risk reductions and committed relationships. Robinson concludes by stating that inland ports provide supply chain members a shared location for information sharing and activity coordination.

Abstract: Inland Ports are a further integrating mechanism within the supply chain management approaches to value creation. By enhancing multiple alliances, both vertically and horizontally, inland ports become economic growth nodes. Inland ports facilitate the shortening of the supply chain, thereby reducing costs. Costs are further reduced by making information transparent and avoiding such effects as the "bullwhip effect" (pricing). They also reduce the risk of uncertainty in approaching one's channel. The emergence of inland ports is evident in the operational inland port in Columbus, Ohio, and those in the process of development in San Antonio, Texas, (initial phase) and in Kinston, North Carolina (development phase).

Taylor, G. "An Idea That Won't Always Fly." *Journal of Commerce* August 28, 1995, 3.

This article indicates that despite increases in the shipment of air cargo, dedicated industrial airports will be few and far between. The concept of an industrial airport is very ill defined because it does not exist as an FAA airport category. An aviation consultant believes that two classes of industrial airports exist; greenfields and evolutionary. The greenfield sites are built-from-scratch and the evolutionary sites come out of closed air bases or passenger facilities. The article concludes that for an industrial airport to be successful it must focus on specialized applications for aircraft, perishables and electronics.

Abstract: Industrial airports may be the way to go for some communities, but experts see few successes. The Wurtsmith general-aviation airport in Oscada, MI, is a former military base that was reopened as a commercial airport. Oscoda Plastics Inc decided to open a manufacturing plant nearby. Such industrial airports appeal to a very specialized type of user, according to John Boyd, President of Boyd Co Inc (Princeton, NJ) a corporate site-selection consultant. Alliance Airport (Fort Worth, TX) is an example of a greenfield, or built-from-scratch, industrial airport. Chennault Industrial Airpark in Lake Charles, LA, used to be an airbase, but has been used for civilian purposes since World War II. Its authority recently spent $3.1 million to refurbish an old hangar to lure other aviation-related industries to the site. Gene Faulkner, a transportation consultant, feels now is the time for companies to negotiate with industrial airports for low rates on space, to help them get off the ground.

"The Rhine-Ruhr Port of Duisburg." *Logistics Management & Distribution Report* 38, no. 7 (July 1999): 11.

An in depth discussion of all the amenities at Port of Duisburg is provided in this article.

Abstract: Port of Duisburg, the world's largest inland port, handled waterborne transshipment cargo of 48.2 million metric tons in 1998, up 1.4% vs 1997. The port's traffic from Rotterdam, Antwerp and Amsterdam was 11.5 million metric tons in 1998. The port purchased a 663-acre site that previously was occupied by Krupp Iron & Steel Works. Logport, a development operation, is setting up a logistics center at that site. The first of 3 phases is a 150-acre tract slated to open in 2000. Duisburg is situated in Germany's industrial heartland that has a population of almost 30 million people and 312,000 firms. Detail is given to other activity involving the Port of Duisburg.

Thomas, J. "A Winning Distribution Tradition." *Logistics Management and Distribution Report* June 1998, 59-66.

The amount of trade that flows through various southeastern states highlighted. Thomas provides reasons why manufacturers and distributors want to locate in these states – tax breaks, weather and transportation infrastructure. Global TransPark and the Virginia Inland Port are mentioned briefly.

Abstract: Trade Journal - None Provided.

Thuermer, K.E. "A Network of Global Transportation Parks could Transform International Shipping." *Traffic World* 246, no. 6 (May 6, 1996): 22.

The Global TransPark concept and the efforts to spread this concept to a worldwide network are explained in this article. The Global TransPark goal is to link manufacturing and distribution with electronic telecommunications and air infrastructure capabilities. This combination will have comparative advantages because costs will be coordinated. A Global TransPark site has been established in North Carolina and efforts are being made in Thailand, Germany and the Philippines to start sites in those locations.

Abstract: The Kenan Institute Asia (Bangkok, Thailand) is setting up a Global TransPark (GTP) at U-Taphao, an existing Thai Navy airbase, that a feasibility study detemined would handle an estimated 62,500 tpy of air cargo within 10 years of start up. The GTP would also employ 20,000+ workers at that time, according to Paul Wedel of the Kenan Institute Southeast Asia office. The US Trade Development Agency in 9/95 made a $495,000 grant to the Thai government to start master planning for the GTP. The Thai government also has budgeted $1 million for its planning and the Royal Thai Navy has agreed to offer around 1,200 acres next to the runway. Meanwhile, Richard Gordon, the Subic Bay Metropolitan Authority's chairman, has signed a Mutual Agreement of Understanding in which North Carolina and the Philippines would work together to set up a GTP at the Subic Bay free trade zone outside of Manila. Subic Bay has thus far got pledges totaling some $1 billion from 182 local and foreign companies. Since beginning the Subic Bay project in 1992, some 40,000 jobs have come about, nearly substituting for the 42,000 jobs eliminated when the US government shut down the navy base there. Detail is given to various firms that are locating at Subic Bay.

TranSystems Corporation. "Kansas City Mid-Continent Tradeway Study: Kansas City International Trade Processing Center Study." Kansas City, Missouri, February 1999. http://www.transystems.com/Projects/KCITS/KCITSDESC.HTM. INTERNET.

This is a comprehensive report prepared for the Mid-America Regional Council, the Greater Kansas City Chamber of Commerce and the U.S. Department of the Treasury to investigate if an international trade processing center (ITPC) would benefit Greater Kansas City and if the area has the resources to support such a facility.
In the first chapter freight flows are investigated. It was concluded that Kansas City already has a substantial amount of trade due to its strategic location and superior transportation infrastructure. The second chapter is a Technology Study that assessed technologies and automated services to support a "virtual inland port". An investigation of Institutional and Organizational Strategies is in the third chapter. To build a successful ITPC local public and private support must be present and this is investigated. Chapter four provides a Policy and Feasibility Assessment. An ITPC scenario is presented where the virtual concept will be carried out at a physical center. Chapter five presents an Implementation Plan with seven main actions. These actions are: formation of the ITPC systems sponsor, outreach, ITPC facility plan and framework, planning, design, construction of the ITPC physical facilities, funding sources/long term financial strategies, and marketing/business plan.

Abstract: Professional Report - Executive Summary Available.

"What VIP means to NS." *Railway Age* September 1988, 51-52.

An overview of the VIP concept and facilities is given in this article. The VIP aims to move the Port of Virginia 200 miles closer to markets and reduce shipper costs. The inland port will intercept containers destined for rival east coast ports and deliver them by a direct rail link to Hampton Roads. The potential success of the VIP is related to is favored geography and cost savings capabilities in dollars and transport time.

Abstract: Trade Journal - None Provided.

TRADE FLOWS AND CORRIDORS

Armstrong, R. "Mexico: Beware of the Bottlenecks." *Transportation & Distribution* 34, no. 9 (September 1993): 62.

Armstrong provides an excellent description of problems that exporters in the US and Canada have when shipping to Mexico. These problems highlight the need for reform in Mexican customs and brokerage. These reforms could take shape as inland ports, especially considering the efficiency noted in the article at inland sites like the airport in Guadalajara.

Abstract: Many changes have taken place recently that appear to have taken much of the mystery out of shipping into Mexico. There are constant changes in Mexican customs laws and procedures. They are designed to facilitate trade through the use of simpler, faster methods similar to US customs changes. Graft has disappeared, goods are moving, and drug seizures are on the rise. Uniformed officers are moved to a different port every 15 days so they do not form personal relationships with drug smugglers. Most senior customs administrators were formerly importers and understand the need for improvement, change, and modernization. Customs clearance at the border can take up to 32 hours while inland ports are processing clearances in less than 20 minutes. Recommendations are made for the exporter wishing to expedite entry into Mexico.

Barta, P. "Eagle Pass Makes a Grab for a Share of NAFTA Traffic." *The Wall Street Journal* September 15, 1999, T1.

Eagle Pass hopes that the new bridge will attract shippers that are currently experiencing long delays at other border crossings. One major component of Barta's article focused on the distribution of transportation funding in the state of Texas. Eagle Pass feels the current methods used to distribute funds unfairly reduces the monies given to their small community. This may be a valid argument if the focus is changed to improving corridor efficiency. By funding more projects in Eagle Pass congestion and inefficiencies could be reduced at other crossings.

Abstract: In fact, the $30 million, six-lane bridge is only the first in a number of highway and other improvements area leaders are planning in a bid to transform the crossing into an important inland port for trade with Mexico. The county is making plans to expand its industrial park, and the city is courting national trucking companies to make Eagle Pass the site of new terminal expansions. Most important, local leaders are pressuring state officials to divert more than $95 million in state highway funds for area projects to speed trade-related traffic.
But Eagle Pass faces a lot of challenges along the way. It isn't the only border town seeking to capitalize on trade riches, and the competition is especially fierce for state highway dollars, which already are inadequate for meeting all the border's transportation needs. And the city isn't as well-positioned as many of its competitors. About 100 miles from Interstate 35, Eagle Pass is far from the state's key trade routes. It has little political clout, and it faces competition for highway spending from larger, better-organized border cities that arguably have more pressing needs of their own.
City officials point to several factors to justify their plans. Truck traffic is already swelling, even without the bridge: Some 6,500 trucks a month crossed in Eagle Pass last year, according to the most recent data, 58% more than in 1993. Mexican officials are expanding the highway between Eagle Pass and Saltillo, Mexico, near Monterrey. Eagle Pass is also a good jumping-off point for Torreon, another large manufacturing center. And Piedras Negras, Eagle Pass's sister city across the Rio Grande, is also seeing its manufacturing sector thrive.

Cambridge Systematics, Inc. "Multimodal Corridor and Capacity Analysis Manual." *National Cooperative Highway Research Program Report 399* (1998).

One potential advantage of inland ports is their ability to improve corridor capacity issues because of their multimodal focus. This manual provides procedures that could be used to determine capacity along corridors with multimodal components like inland ports.

Abstract: Traffic volumes in many corridors throughout the United States are predicted to grow at substantial rates in the near future. Passenger and freight movements are expected to continue to increase in proportion to the demands for goods, services and mobility in both rural and urban areas. Transportation agencies, planners and analysts are concerned about providing sufficient capacity in many corridors to handle the projected future traffic. There is an urgent need to address capacity problems not only on highways but in other modes such as rail, waterway, and air. This first edition of the "Multimodal Corridor and Capacity Analysis Manual" provides a rather comprehensive framework and set of procedures for analyzing and characterizing the nature, extent, and severity of capacity problems in many transportation corridors. The manual first identifies and explains the key terminologies associated with unimodal and multimodal corridor capacity. A typology of corridors was developed to help characterize the various conditions, problems, options, and the constraints found in many corridors. Four corridors were selected to illustrate the procedures involved in scoping a corridor analysis and problem identification. The manual also contains a lengthy review and analysis of capacity determination procedures for various modes, as well as level of service and performance measures. Options to increase or enhance the capacity and level of service of different types of corridors and their components are discussed in detail. Procedures for evaluating supply-side and demand management options are identified and illustrated with examples. This manual should prove beneficial to researchers and practitioners who are dealing with multimodal corridor capacity analysis.

Casavant, K. L., J Lenzi, and K Eriksen. "Corridor Shifts and New Investment Requirements: Yes, NAFTA Is Having Impacts." Paper presented at the Forty-Second Annual Meeting of the Transportation Research Forum, Annapolis, Maryland 2000.

Three highways in Washington State were used to analyze NAFTA trade and to determine a highway damage coefficient. This coefficient quantifies the investment needed to sustain the infrastructure for trade.

Abstract: The overall purpose of this paper is to analyze the impacts of the North American Free Trade Agreement (NAFTA) on Washington's transportation infrastructure by specifically evaluating highway infrastructure investment requirements via damage coefficients. NAFTA truck ton-miles on Washington highways were approximately 10.4 billion in 1994. Nearly 69 percent of those ton-miles were transit movements and 18 and 13 percent were Washington origin and destination movements to and from Canada, respectively. Ton-miles by corridor vary significantly and will increase differently in different corridors in the future. In 1994, additional highway maintenance requirements for the Interstate 5, U.S. 97, and U.S. 395 highway specifically, to sustain highway usage associated with increased NAFTA trade, totaled $9.1 million annually. Ton-miles and associated road damage, especially on transit movements, in the three corridors are expected to nearly triple by 2005 to 27 million annually. Washington's

infrastructure supports NAFTA trade, yet the associated benefits received for that trade may not necessarily be in proportion to the costs associated with transportation.

Cottrill, K. "Widening Horizons: Freight Corridors Need Greater Priority on the Transportation Planning Map." *Traffic World* 260, no. 11 (December 13, 1999): 27-29.

Cotrill's article provides an overview of the recently completed Western Transportation Trade Network study. This study provides a multi-state approach to freight transportation corridors. It is acknowledged that the identification of key regional corridors, traffic levels and recommended methods for corridor analysis are important so emphasis is placed on corridors with existing intermodal facilities and investment potential.

Abstract: Intermodal configurations may vary from state to state but a shift to more collaborative planning is needed to make way for growing traffic volumes. Central to the new thinking is the concept of trade corridors that run like major rivers across states and are fed by networks of trade tributaries. There were applications to the Department of Transportation totaling some $2 billion for the $123.6 million allocated for trade corridor and border-crossing programs under the first year of the Transportation Efficiency Act for the 21st Century, President Bob Zuelsdorf of Wilbur Smith Associates noted. This is an indication of the growing interest in corridor schemes.

"How NAFTA Has Changed Site Selection in North America." *Logistics Management and Distribution Report* December 1998.

Since the NAFTA agreement took effect five years ago, trade patterns have shifted manufacturing and distribution facilities in North America. Trade patterns have shifted from a traditional east-west orientation to north-south orientation. US and Canada duty structures have allowed companies to serve both markets from a single location. The US and Mexico situation is changing more slowly due to different regulations. Some goods shipped across the US and Mexico border are not being directly distributed for US consumption. They are now being shipped to regional Distribution Center's in the southwest for distribution. The concept of a regional distribution center can be a model for an inland port.

Abstract: Trade Journal - None Provided.

McCray, J. "North American Free Trade Agreement Truck Highway Corridors; U.S.-Mexican Truck Rivers of Trade." *Transportation Research Record* 1613 (1998): 71-78.

In this article, McCray takes trade data and converts it into truck trips, which are then assigned on to principal U.S. national trade routes. The location and density of U.S./Mexican trade is determined by identifying the established trade corridors identified when trips are assigned. This system or network approach emphasizes the benefits to transportation planners that are gained when primary trade corridors are identified. The identification of primary trade corridors will be important in the successful siting of inland ports.

Abstract: The dramatic growth in trade between the United States and Mexico from $12.39 billion to $56.8 billion of U.S. exports and $17.56 billion to $73 billion of U.S. imports between 1977 and 1996 and the implementation of the North American Free Trade Agreement (NAFTA) have focused attention on the impact that the truck-transported portion of this trade has on U.S. highways. State and federal highway administrators are concerned with the planning implications this additional unexpected traffic may have on the transportation infrastructure. Public advocacy groups want additional highway funds to promote one NAFTA highway corridor over others in an effort to stimulate additional economic development. Most of these groups advocate a north-south route through the United States between Canada and Mexico that follows the alignment of an existing federal highway number. Research conducted by the U.S. government under the 1991 Intermodal Surface Transportation Efficiency Act has failed to define NAFTA highway corridors adequately, leaving policy makers with little concrete information with which to combat the rhetoric of the trade highway corridor advocacy groups. A report is provided on research critical to the needs of both highway administrators and corridor advocacy groups, namely, the location of U.S.-Mexican trade highway corridors and the trade truck density along these corridors.

McCray, J., and R. Harrison. "North American Free Trade Agreement Trucks on U.S. Highway Corridors." *Transportation Research Record* 1653 (1999): 79-85.

This article extends and updates the earlier work published by McCray under the "Rivers of Trade" heading. It again takes trade data and converts it into truck trips; these trips are then assigned to trade routes linking both Canada and Mexico. The inclusion of trade with Canada allows a complete network analysis and identification of dominant border crossings related to centers of population and production. It is indicated that the identification of NAFTA corridors is critical to infrastructure investment decisions. Inland ports may be an important component of corridor efficiencies and infrastructure investment will be directly connected to inland port investment.

Abstract: The increasing number of trucks that transport U.S.-Mexico and U.S.-Canada trade on U.S. highways has stimulated a strong interest among state departments of transportation and federal highway officials in the location and truck densities along these highway corridors. In many cases, public advocacy groups seeking corridor-related economic development have been formed to promote one of more highway trade corridors. Most of these groups advocate a north-south route through the United States between Canada and Mexico that flows the alignment of an existing federal highway number. Because of the interest in and promotion of highway trade corridors in the United States, the Transportation Equity Act for the 21st century includes authorizations for a discretionary program for the development, study, and construction of highway trade corridors. This places a serious burden on state and federal highway administrators to define, plan, and upgrade these corridors adequately. Earlier work that defined U.S. highway trade corridors for U.S.-Mexico trade is extended by including U.S.-Canada trade and total North American Free Trade Agreement (NAFTA) trade. Results indicate that U.S.-Mexico trade transported by truck primarily affects the highway corridors in southern border states such as Texas, California, and Arizona. U.S.-Canada trade primarily affects highway trade corridors in the northern border states of Michigan, New York, Ohio, Illinois, and the states

along I-80 from Salt Lake City to Chicago. Interestingly, there are no significant north-south NAFTA highway corridors with a single Interstate of U.S. Highway number.

Nozick, L.K., M. A. Turnquist, and G.F. List. "Trade Pattern Estimation between the United States and Mexico." *Transportation Research Circular* 459 (July 1996): 74-86.

This paper provides an overall process for generation of origin-destination trade matrices by region between the United States and Mexico. It does not evaluate specific routes or modes. Routes between regions can be inferred by further study into the connections between origin-destination paired regions but this is not done within this study. Mode is not designated because of insufficient data provided by United States and Mexican customs agencies and unavailable statistics from the Bureau of Transportation Statistics.

Abstract: The North American Free Trade Agreement (NAFTA) established the largest free trade zone in the world, with a population of more than 360 million people. To evaluate potential investments in intermodal terminals near the U.S.-Mexican border--terminals that will handle the escalation in trade that is likely to result from NAFTA--transportation planners must understand current trade patterns. Unfortunately, most data required to achieve this understanding are considered confidential between the shipper and the government customs agency. However, both the governments of Mexico and the United States do release summaries of these shipment data. This paper presents a method for estimating commodity-based origin-destination matrices based on these summaries.

Pendleton, S. "Laredo Thrives on Mexico Trade." *Christian Science Monitor* May 20, 1993, 2.

This article provides an overview of the increase in trade in Laredo. Not only the trade passing over the border in trucks is discussed but the retail goods purchased in Laredo by Mexicans is described. This article is informative but may not provide a valid view of trade today; it may be outdated.

Abstract: Here in the nation's largest inland port, citizens predictably favor ratification of the North American Free Trade Agreement (NAFTA, even though some will admit that they are unsure how it will affect their already-thriving businesses). The "sucking sound" of American jobs going to Mexico? asks Mayor Saul Ramirez, scoffing at Ross Perot's prediction of the consequence of ratification. "That's not what we hear in Laredo. We hear the tractor trailers that come from Idaho, Ohio, and Tennessee" carrying United States exports to Mexico even before NAFTA, and "making the cash registers ring up north," Mr. Ramirez says.

Rico, A., A. Mendoza, and E. Mayoral. "Main Freight Land Transport Corridors in Mexico." *Transportation Research Record* 1613 (1998): 79-87.

This paper presents a methodology for assigning trips based on User Equilibrium. This trip assignment is used to determine the primary corridors for international trade in Mexico. The importance of connecting these corridors to U.S. roads and railroads is indicated. The connection of Mexican trade routes will be important for inland ports receiving trade from Mexico. The theoretical models used for trip assignment may also be valuable for corridor analysis.

Abstract: The current modal share between highway and railroad in freight land transportation in Mexico is presented. Based on available origin and destination (O-D) data, the most important origin and destination points of freight transportation by both modes are identified. Information is also provided on the multicommodity flows taking place in Mexico. The O-D information and network assignment analyses are used to establish the major Mexican land transport corridors and their characteristics. The possible extension of these corridors to the U.S. road and railroad corridors that are more important for the binational trade is indicated. Data about the recent evolution of this trade are presented. Only freight transportation is discussed.

Smith, S. "Guidebook for Transportation Corridor Studies: A Process for Effective Decision-Making." *National Cooperative Highway Research Program Report 435* (1999).

The emphasis in this guidebook is on "how to employ systematic, effective study procedures in bringing stakeholders together to make transportation decisions." It details the corridor study process as a catalyst to the ultimate decision-making stage. Although this guidebook focuses on metropolitan areas and mostly passenger travel it can provide guidance related to inland ports. It can assist in determining how to turn the impact an inland port potentially has on a corridor into the decision-making stage of choosing a potential inland port site.

Abstract: This report contains the results of research into the design and management of corridor and subarea transportation planning studies. It is intended to provide transportation organizations, planning practitioners, and transportation decision-makers with practical tools and guidance for designing, organizing, and managing these studies to effectively support transportation investment decisions tailored to the specific conditions and performance needs for major transportation improvements. Presented as a guidebook, it brings together lessons learned from different regions of the country on corridor and subarea studies with different scopes and levels of complexity. It provides a structured approach to the process of conducting corridor studies, with an emphasis on designing each study to address the conditions unique to the particular physical, social, and institutional environment. The guidebook should be especially valuable to state departments of transportation, metropolitan planning organizations, and local transportation planners, as well as other practitioners concerned with planning, programming, and implementing multimodal transportation projects. The report will also be useful as an educational resource into the concepts, tools, and procedures currently employed for establishing and carrying out corridor and subarea studies that sustain effective transportation planning consensus and timely project development. The report is organized in the following chapters: (1) Orientation to the Guidebook and Key Issues; (2) The Transportation Planning Process and Corridor Decision-Making; (3) Identifying the Problem and the Corridor Study Strategy; (4) Study Organization and Initiation; (5) Community Involvement and Outreach; (6) Confirming the Problem and Developing Evaluation Criteria; (7) Developing and Evaluating Alternatives;

(8) Financial Analysis and Selection of the Preferred Investment Strategy; (9) Corridor Study Documentation; (10) Dealing with Technical and Institutional Issues that Arise During a Corridor Study; and (11) Actions Agencies Can Take to Facilitate the Conduct of Corridor Planning Studies.

PLANNING

Bomba, M. and R. Harrison. "A Selection Process and Evaluation Framework for Texas Gulf Containerports." Austin, Texas: Center for Transportation Research at the University of Texas at Austin Project No. 1833-2, November 1999.

A containerport evaluation process is presented. This process involves six steps to be followed by an evaluation team. This process could be modified for the potential evaluation of inland port sites.

Abstract: This is the third in a series of four reports prepared by the Center for Transportation Research at The University of Texas at Austin for the Texas Department of Transportation to explore containership activity in the Gulf of Mexico. The original scope of work for this report was to produce a process for selecting a candidate port to become a containership load center among Texas Gulf ports. As the project progressed, however, the scope was expanded to also provide a port evaluation process that would be useful to all Texas ports that might provide containership service. The study begins by identifying and discussing relevant topics of port development and operations in four general areas: infrastructure demands; environmental constraints; locational attraction and land-side access; and port finance. After introducing the issues surrounding these topics, the report proposes a load center selection process and a containerport evaluation process. The procedure for constructing a load center selection process concentrates on the following: heuristic methods; selecting matrix parameters; parameter criteria; and the scoring and weighting of these parameters and criteria. The port evaluation process focuses on identifying baseline characteristics, determining objectives and alternatives, assessing these objectives and alternatives, and the identification of a preferred alternative and its constraints. In its conclusion, the report recommends that these techniques be reviewed and tested on selected Texas ports, and that the data collected for the study's decision tools be stored and updated in a database for TxDOT's future use.

Eatough, C.J., S.C. Birch, and M.J. Demetsky. "A Statewide Intermodal Freight Transportation Planning Methodology." Paper presented at the Fortieth Annual Meeting of the Transportation Research Forum, Philadelphia, Pennsylvania 1998.

This paper presents a six-step framework for the Virginia Department of Transportation (VDOT) to follow when implementing statewide freight transportation planning. The authors indicate that the knowledge of a Freight Advisory Committee will validate the inventory. The benefits of using a freight-planning framework are public and private communication on freight issues, consistency, and increased interest and attention to freight issues. This process, with modifications, may be valuable for inland port planning.

Abstract: The Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) emphasized the responsibility of states to provide for the efficient movement of people and goods. As a result of Section 1025 of this legislation, states must now include a freight component in their transportation plans. This paper describes a methodology for statewide freight transportation planning that provides the framework to support comprehensive statewide freight transportation planning. The methodology consists of six steps: (1) inventory the system, (2) identify problems, (3) establish performance measures, (4) collect data and define conditions for specific problems, (5) develop and evaluate improvement alternatives, and (6) select and implement improvements. The methodology is flexible so that it can adapt to changing planning concerns and resources and can be applied to a broad range of issues. Throughout the process, a Freight Advisory Council is used to maintain the input and perspective of the private sector. The methodology is shown to be usable even under the limitations on freight flow data and freight planning experience in the public sector and will lead to standard practices in statewide freight transportation planning.

Harder, F.R. "MPOs and Railroad Intermodal Terminals: Successful Development Strategies." *Transportation Quarterly* 53, no. 2 (Spring 1999): 31-44.

Harder's article provides an overview of the factors that private sectors use to select locations for new railroad intermodal terminals and the specifics of site selection. A brief history of intermodalism is presented along with historical reasons for intermodal terminal sitings. Factors important in selecting a location for a new terminal are sufficient demand, competitive motor carrier service, successful commercial relationships and public and private sector capital funding. These factors could be applied to inland port planning.

Abstract: Trade Journal - None Provided.

Heanue, K. E. "Improving Metropolitan Planning to Integrate Freight Transportation Policy Forum." Washington, D.C.: Eno Transportation Foundation and US Environmental Protection Agency, 1998.

This document provides a summary of a policy forum meeting concerning issues of freight

movement.

Abstract: Metropolitan transportation planning has focused primarily on passenger needs, while improvements to facilitate freight transport services often have been viewed as benefiting private transportation providers. More communities now recognize that a robust freight transportation infrastructure will improve environmental quality, boost trade, and help bring in new private capital. Several regions have successfully bridged the gap between private freight carriers and metropolitan planning organizations (MPOs) through joint efforts to collect and analyze freight related traffic flow data. These regions involved freight related interests more directly in the planning process and integrated innovative carrier-owned technologies into regional traffic management processes. This forum was structured to focus on these successful experiences as

models and to extrapolate how they might be applied in other regions of the country. Participants were encouraged to explore issues common among MPOs working more closely with the freight sector, including identifying how disconnects can be addressed. One element of the freight business received particular attention. The intermodal niche was identified as providing a unique opportunity for benefiting transportation and the environment. Several different models of approaches to regional planning were discussed. The sense of the forum was that there is a win/win/win opportunity for communities, transportation, and the environment. A strong belief was expressed by many conferees that short-term wins are important for building understanding and a mutual trust between the stakeholders. This report should benefit those working in transportation planning who want to understand the practices, concerns, and outlooks of those in the freight community. Similarly, those in the freight community who are considering becoming involved in transportation planning will find the planning material useful. All stakeholders in freight transportation should find the presentation overviews of interest. The summary and conclusions should help jumpstart further partnership efforts to improve freight flow, the environment, and transportation systems.

Lipinski, M.E., and D.B. Clarke. "Resolution of Land Use and Port Access Conflicts at Inland Waterway Ports." *Transportation Research Record* 1522 (1996): 102-07.

The majority of this article provides a discussion of case studies done on inland waterways in communities where urban waterfront redevelopment is conflicting with industrial port operations. Although this article does not lend much insight into inland (non-waterway) ports it does provide "guidelines related to resolving port and terminal access issues." These guidelines emphasize the need for communication between port agencies and MPOs to establish priorities concerning the access needs of the port. This will also be valuable and necessary for inland port development.

Abstract: During the last two decades urban redevelopment of waterfronts has accelerated. The historical significance of these areas coupled with their unique visual amenities has resulted in major renewal efforts in many cities. The competition between the waterway navigation industry and redevelopment interests for scarce waterfront land has resulted in conflicts. Congestion along the access routes to existing ports and terminals has affected the efficient movement of goods to and from the waterfront. The results of an investigation into waterfront redevelopment issues and port and terminal landside-access conflicts are presented. There are many complex forces at work that affect the use of and access to waterfront land. Some of these forces are economic and involve uses of the waterfront that are the "best and highest", one example of which is riverboat gaming. The surveys and case studies conducted identified many conflicts that have occurred. Guidelines have been developed that address some of the problems that arise during the development of waterfront development projects and planning of adequate transportation access. Application of these guidelines by waterway transportation interests, urban planners, transportation engineers, and community officials may alleviate some of the conflict and enhance the planning process.

Morlok, E.K., and S.P. Riddle. "Estimating the Capacity of Freight Transportation Systems: A Model and Its Applications in Transport Planning and Logistics." *Transportation Research Record* 1653 (1999): 1-8.

This paper presents the results of research to develop a quantitative, operational way to measure the capacity of a freight transportation system. The concept of system capacity versus link or facility capacity is used to develop a mathematical model.

Abstract: The issue of adequate capacity in the freight transportation system to accommodate growing cargo volumes is now becoming a major public policy concern. The problem of extraordinary rail line congestion and service failures in connection with the recent Union Pacific-Southern Pacific merger has galvanized attention to the problem, but the issue extends far beyond the rail system to other modes and contexts. The concept of *system capacity* (as opposed to link or facility capacity) is developed, and prior literature is reviewed for approaches to estimating it. A model that was developed from the most promising of these is presented. This model is multimodal in concept and is intended to be applicable to any vehicular freight mode. The model is tested through application to a portion of the rail network, and results are assessed for reasonableness and utility. Finally, the applicability of the model and approach to various capacity-related questions is described and discussed.

Peyrebrune, H. " Multimodal Aspects of Statewide Transportation Planning." *National Cooperative Highway Research Program Synreport of Highway Practice* 286 (2000).

This synreport provides information on the state of the practice in multimodal statewide transportation planning. Emphasis is placed on policies, programs and projects that have resulted from multimodal thinking in statewide transportation planning. A literature review, state DOT survey and case studies provide information on methods currently in use. State DOT survey results and the case studies list many intermodal/multimodal projects but none are related to terminals or inland ports. Freight is a component in many of these cases and corridor planning is emphasized. The methods used and the results derived from these plans may be useful in researching the impacts of inland ports on corridor efficiencies. This synreport illustrates the importance of including multimodal aspects, like inland ports, into state transportation planning.

Abstract: This synreport report will be of interest to departments of transportation (DOT) administrators, planning supervisors, managers, and staffs, as well as to planning consultants that work with them. It provides information for practitioners interested in the results of attempts to apply multimodal considerations at the statewide level and identifies key research findings. It covers post-ISTEA processes and projects and both passenger and freight activities. The report examines the application of three multimodal aspects: alternatives, modal mix, and integration into three statewide planning functions, which include state planning, corridor studies, and financing, budgeting, and programming. The emphasis is on implementation. This report of the Transportation Research Board documents processes and research currently under development, using three approaches: a literature review, results of a survey of state DOTs, and five case studies. It cites the following states with exemplary practices in multimodal/intermodal transportation based on a 1998 report by the policy research project at the University of Texas on

Multimodal/Intermodal Transportation: Florida, Minnesota, Oregon, Pennsylvania, Virginia, Washington, and Wisconsin.

Richardson, H.L. "Select the Best Port for Your Needs." *Transportation & Distribution* 32, no. 10 (October 1991): 79-81.

A checklist for shippers is provided to use when choosing which port best suits their needs. A similar checklist could be developed for evaluation of inland port sites.

Abstract: Many shippers leave the choice of port to the ocean carrier, freight forwarder, or broker. However, if all factors involved are understood, the shipper may want to take a greater role in the decision-making process. A shipper's checklist would include: 1. location, 2. cost, 3. service, 4. reliability, 5. infrastructure, 6. market, 7. customs, 8. equipment, and 9. environmental issues.

Smadi, A, and T.H. Maze. "Statewide Truck Transportation Planning: Methodology and Case Study." *Transportation Research Record* 1522 (1996): 55-63.

In recognition of the need for statewide truck transportation planning the authors have developed a case study in Iowa to estimate truck flows.

Abstract: An alternate approach for truck transportation planning at the state level is presented using a case study application in the State of Iowa. The method was based on some freight modeling concepts and available freight data sets. However, the model takes advantage of two concepts: unconstrained highway capacities and the decomposition of commodities, resulting in manageable data and modeling requirements. Identification of significant economic sectors, selection of appropriate productivity measures, estimation of truck freight volumes for each sector individually, and estimation of routing of truck traffic on major highway routes are major elements of the planning method. The case study used two industrial sectors-food and kindred products, and machinery products-which accounted for the largest portion of state employment in non-service sectors and the largest truck traffic generated in the state. A simplistic transportation network was used to demonstrate the modeling procedure. The analysis uses county-level employment and population to estimate zonal freight tonnage. The truck share of generated freight was estimated as the total freight generated less the freight tonnage among origin-destination pairs, using travel time as the impedance on highway links. Estimated truck flows were converted to vehicle trips on least time highway routes using typical vehicle equivalent weights.

Stumpp, R. "Developing a Framework for Airport Cargo Planning." In *Handbook of Airline Economics*, edited by Darryl Jenkins, 509-12, 1995.

This article illustrates that cargo planning is becoming increasingly important at US airports. Economic development and airport business perspectives are reasons for airports to support

cargo development. The article explores the roles that integrated carriers, passenger airlines and conventional all-cargo carriers play in airport operations. Important considerations in airport cargo planning indicated by the author are market conditions, onsite facilities, and predicted freight volume. Cargo plane parking positions are indicated as the most basic measure to begin with in airport cargo planning.

Abstract: Book Chapter - None Provided.

INTERMODALISM

Anderson, K. and C.M. Walton. "Evaluating Intermodal Freight Terminals." Austin, Texas: Southwest Region University Transportation Center No. 467505, August 1998.

Three strategies to rank intermodal facilities so that transportation funds are effectively spent are presented. These strategies focus on maximizing potential benefits related to funding high-ranking intermodal facilities. Since inland ports and intermodal facilities are interrelated, the ranking and prioritization strategies could be modified to assist in planning decisions for potential inland port sites.

Abstract: A method for rating the intermodal freight terminals as candidates for government funded access improvements is proposed in this report. This report presents an overview of the intermodal freight transportation industry. Then government intermodal freight planning and participation including examples of government sponsored intermodal projects are presented. An intermodal freight planning procedure is then proposed. A terminal capacity analysis is performed as required for a terminal prioritization process. Finally, three prioritization strategies are proposed and illustrated using data collected from Texas. The system is designed to rank priority by facility for a given network, utilizing facility operational and physical attributes.

Bartelme, T. "A Shift in Strategy: Charleston will seek investment for next phase of container expansion." *Journal of Commerce* February 19-25, 2001, 14-15.

In the face of expansion needs the South Carolina State Ports Authority has decided to open its plans for a new terminal to private sector bids. This shift in attitude toward private sector investment will help define what interest exists in a smaller terminal on the proposed Global Gateway Terminal site.

Abstract: Trade Journal - None Provided.

Barton, J.E., C.L. Selness, R.L. Anderson, D.L. Lindberg, and N.S.J. Foster. "Developing a Proposal for a Multi-User Intermodal Freight Terminal as a Public-Private Partnership: Lessons Learned About Public and Private Perspectives, Timing and Roles." *Transportation Research Record* 1659 (1999): 145-51.

This article is an overview of a study conducted in Minnesota to determine the overall position of intermodal traffic and terminal capacity and options for the future. The actual conclusions of the study are not relevant to inland port development but the lessons learned by the public agencies involved are valuable. With the recognition that shippers should be involved more directly in transportation planning, differing perspectives, timing, access, and competition will all become important issues to contend with in public-private partnerships. This article provides insight into the evolution of a public-private partnership focusing on the development of an intermodal terminal. A conclusion was made that proposals that follow the traditional model succeed more often. The traditional model starts with a developer taking an active role in defining the project and focusing on the benefits to the users, while the public agencies examine how the project will fit into the long-range and community goals. This process may work best because private

partners can focus on the payoffs and public agencies can define how the project will enhance the public good.

Abstract: Intermodal rail terminals are an important part of an integrated freight transportation system. The location of intermodal terminals often has depended on where railroads had spare land adjacent to freight-rail lines. But many of these locations are less than ideal in terms of surrounding land uses and offer little scope for expansion as intermodal traffic grows. A study undertaken in Minnesota to evaluate the need for new or expanded intermodal terminal facilities in the Twin Cities metropolitan area is described. The process was funded by the metropolitan planning organization for the Twin Cities region, the state department of transportation, and three private railroad carriers. It involved a series of studies to determine the market for an intermodal facility, to locate a site and develop a proposal for a multi-user terminal, and to assess the terminal's economic benefits for the region. Several lessons were learned during this public-private partnership process; these are useful for other metropolitan areas considering freight needs. The public and private sectors bring different perspectives to the development process, and coordinating their decision-making is a challenge. It is crucial to obtain and to maintain appropriate and timely access to decision makers. The competitive positions of carriers must be assessed and the project's impact on the relative market share among them will be critical. Given the lack of support by the railroads to develop a joint-use intermodal facility, as recommended in the study, neither the railroads nor the development community was willing to implement the project.

Boske, L.B. "Case Studies of Multimodal/Intermodal Transportation Planning Methods, Funding Programs, and Projects." Austin, Texas: Lyndon B. Johnson School of Public Affairs Policy Research Project 132, 1999.

This report looks at 18 multimodal/intermodal transportation-planning methods, funding programs, and projects. This report describes practices that Texas policy makers could select if deemed advantageous to the state. In the "Selected Multimodal/Intermodal Projects" section, the Fort Worth Alliance Intermodal Trade and Logistics Center is discussed.

Abstract: University Report - None Provided.

Gooley, T.B. "The Geography of Logistics." *Logistics Management and Distribution Report* January 1998, 63-65.

Gooley provides four main factors that must be considered when choosing locations for facilities that provide low cost and efficiency while meeting a company's operational and strategic needs. As manufacturing and sourcing have become more global it is clear that logistics plays a vital role. The four factors are physical infrastructure; proximity to suppliers and customers; political and tax considerations; and international trade conditions. These factors could be applied to the development stage of an inland port.

Abstract: Trade Journal - None Provided.

Kenneally, M. "The Process in Developing Intermodal Freight Strategies." Paper presented at the 1996 Semisesquicentennial Transportation Conference, Ames, Iowa November 1996.

This article provides a summary of the process Kansas City undertook in 1994 to study the area's intermodal resources.

Abstract: The economic well being of the Kansas City region depends in great part upon the reliable and efficient movement of freight and goods between producers and markets. To facilitate this movement and to ensure that Kansas City remains a vital transportation hub, local, regional, and state governments in 1994 launched a major study of the area's intermodal resources – "intermodal" meaning the shipment of freight by various methods of transport, including rail, air, water, and roadway. This study was sparked by the need for the Mid-America Regional Council (MARC) to fully integrate freight considerations into its overall metropolitan transportation planning process, as well as an outgrowth from the Chamber's July 1993 Inland Port/Intermodal Task Force Report, which recommended that industry-specific analysis, trends, and technologies be examined.

Management and Transportation Associates, Inc. "Economic Viability of a Waterborne Barge Service for Bridgeport Harbor." Bridgeport, Connecticut: Greater Bridgeport Regional Planning Agency, December 15, 2000.

This report investigates the potential of Bridgeport, Connecticut to become a transfer port for the region. Investigation is made into the possibility of Bridgeport being used as a reliever port to the Port of New York/New Jersey. Although this may not be considered an inland port, the issues concerning relief of congested port facilities are discussed.

Abstract: Professional Report - None Provided.

Minahan, T. "Intermodal Service Gains go Unnoticed." *Purchasing* 124, no. 7 (May 7, 1998): 77-79.

This article highlights improvements made to nationwide intermodal service by several rail lines. These improvements, however, have been overshadowed by delays and service disruptions by major intermodal carriers. The improvements have been related to infrastructure upgrades and information technology installations.

Abstract: Strong international traffic sparked a 7.3% uptick in intermodal loadings last year. However, well-publicized service problems at West Coast ports and along the Union Pacific Railroad disrupted intermodal service and are prompting shippers to view intermodal as a system that provides sub-par service. Ironically, the biggest challenge for the intermodal industry has always been the single thing shippers need most: the ability to provide consistent, reliable and on-time service. A key improvement to improved intermodal service lies in how well the railroads, intermodal marketing companies and drayage companies can manage shipment data.

Muller, G. *Intermodal Freight Transportation.* 4th ed: Eno Transportation Foundation and the Intermodal Association of North America, 1999.

This is a comprehensive book on intermodal freight transportation.

Abstract: Intermodal freight transportation is a flexible response to changing worldwide marketing and distribution requirements for moving all types of cargoes. This book, organized into 16 chapters, presents a comprehensive view of intermodal freight transportation. The chapter headings include the following: 1. What is Intermodal Freight Transportation? 2. How Intermodality Developed in the United States; 3. The Container Revolution; 4. Government Regulation and Deregulation; 5. Intermodal Movements by Rail and Motor Carrier; 6. Intermodal Movements by Air, Water, and Bridge Services and Doublestack Operations; 7. The Military and Intermodalism; 8. Intermodal Through Carriage Documents, Liability Rules, and Facilitation; 9. Intermodal Transportation Facilitators; 10. Terminals and Cargo-Handling Equipment; 11. Intermodal Containers; 12. Intermodal Information Technology; 13. Competition; 14. The "How to" of Intermodal Freight Transportation; 15. The Future of Intermodalism; and 16. The Business of Intermodal Freight Transportation - So What!.

Muller, G. "The Business of Intermodal Freight Transportation." *Transportation Quarterly* 52, no. 3 (Summer 1998): 7-11.

This article provides an overall summary of intermodal freight transportation. It begins by highlighting the history of intermodalism from its start in hardware innovations to today's focus on information technologies. Finally an overview of the state of the intermodal industry and its struggles and future necessary focuses is outlined. This article was adapted from the 4th edition of Muller's Intermodal Freight Transportation.

Abstract: Trade Journal - None Provided.

Reebie Associates. "Missouri Intermodal Freight Hub Opportunities." Greenwich, Connecticut: Missouri Department of Transportation, November 1993.

This is a comprehensive report to determine if Missouri can support an Intermodal Freight Hub. An inland port and intermodal freight hub in many cases serve the same functions therefore this report could be a model for inland port development.

Abstract: Missouri's position in the geographic center of the nation and its established role as a transportation gateway provide the state with unique opportunities in the area of intermodal terminal facilities and interline connections. This study examined the feasibility of establishing a new regional intermodal hub in Missouri. Results revealed that sufficient potential exists for the establishment of a new hub in the state of Missouri. This is in terms of the volume of relevant types of freight traffic moving in specific origin-destination corridors, currently and forecast to

the year 2000; and the inherent economics of moving via a Missouri hub terminal versus alternative scenarios and modal choices currently available. It is concluded that much more rail/highway intermodal freight activity could be diverted to a new facility in Missouri, with St. Louis as the best candidate site. This would be especially true if the interchange connections between eastern and western rail carriers at St. Louis were improved. Kansas City, too, has significant potential in terms of amounts of intermodal type traffic that could be handled. As for air cargo hub potential, St. Louis offers more promise than Kansas City, but neither represents a truly strong case for general airfreight.

Selness, C.L., and J.E. Barton. "Minnesota Intermodal Regional Terminal Project." *Transportation Research Circular* 459 (July 1996): 66-73.

This article provides an explanation of the development of a public-private partnership established to explore the feasibility of a regional solution to terminal capacity problems in the Twin Cities, Minnesota.

Abstract: A growing portion of the commodities produced and consumed in the Twin Cities region is transported via containers that are interchanged directly among railways, trucks, and steamship lines. This is known as intermodal freight transportation. Efficient freight transportation is a key element enabling businesses to maintain their competitiveness in a global economy.

Growth in the use of truck-rail intermodal freight services in the Twin Cities region is being threatened by capacity limits and locations of current facilities. The growing scale of intermodal freight handling requires a higher level of cooperation between the public and private sectors as these services work to combine both the efficiencies of public highways and private railway networks.

A public-private partnership was formed to ensure that decisions for future investments in intermodal facilities and services are timely and focused on serving the entire Twin Cities region. This partnership consists of the region's planning and transportation agencies, the Metropolitan Council and Minnesota Department of Transportation, as well as railroad intermodal freight service providers to the region, Burlington Northern and the CP Rail System. The partnership may expand as the process to identify regional intermodal terminal needs moves forward.

In 1994 the partnership studied future terminal capacity needs and identified the principal terminal alternatives to serve the intermodal industry. The results of this study will form the basis for further action to address identified terminal capacity needs.

Smallen, D. "Intermodal Connectors: NHS Catches up to the 1990s." *Public Roads* 6, no. 16 (May 1998): 13-17.

Discusses the neglect of intermodal connections to the National Highway System. Recently, through ISTEA and the FHWA, states have begun to identify and include intermodal connections in their state plans. Although this article may not directly provide input into inland port issues, it is important to recognize that intermodal connections will be important in successful inland port operations.

Abstract: Intermodal connectors were neglected for many years as construction of the Interstate Highway System was the focus of the transportation program. That focus resulted in numerous situations where traffic moves rapidly along interstate highways, but getting to and from nearby terminals can be slow going. In recent years, planners at all levels have begun to recognize the need to include intermodal connections in their planning programs. These connectors serve major ports, airports, public transit stations, Amtrak stations, intercity bus terminals, rail-highway terminals, ferry terminals, pipeline terminals, and multipurpose passenger terminals. After the Intermodal Surface Transportation Efficiency Act was signed into law on December 18, 1991, the Federal Highway Administration (FHWA) instructed the states to work with metropolitan planning organizations to identify intermodal terminals that warranted connection with the National Highway System. Through this process, the states identified intermodal connectors covering 3,250 km for inclusion, and FHWA is working to compile even more information on these connectors.

Spraggins, H.B. "The Potential for International Intermodal Movements of Goods from Alberta to the U.S. And Mexico." Paper presented at the Forty-Second Annual Meeting of the Transportation Research Forum, Montreal, Quebec 1997.

Spraggins' article explores intermodal movements primarily from Alberta, Canada to destinations in the U.S. and Canada. First an introduction to intermodalism and intermodal hubs is given. The author indicates that a strong intermodal transportation system will have the potential to provide a seamless system that is efficient, flexible, environmentally sound, and meets the needs of shippers. To facilitate an intermodal transportation system an intermodal hub should look at facilities, location, access, and infrastructure as primary concerns. Then the author investigates domestic and international intermodal rail-truck service as an alternative for Alberta exports.

Abstract: The impact of NAFTA on exports from Canada to the U.S. and Mexico has been significant. In turn, the need to transport these goods has created increased demands on the transportation system. Trucks have provided the major capacity to meet the requirements. Intensive lobbying efforts are being made for authority to utilize longer and heavier trucks along certain U.S. highway corridors for movement of the increasing volume of goods moving from Canada to the U.S. and Mexico. The prospect of such an implementation has serious economic, social, and infrastructure consequences. One possible alternative to this plan is intermodal transportation. This paper explores the prospects of intermodal transportation as a viable alternative to truck movement. The issues of intermodal service factors, intermodal hubs, and intermodal railroad-truck service are examined. Examples of emerging North American international intermodal movements are discussed. The focus then moves to transportation of Alberta exports to the U.S. and Mexico. The potential for trucking alternative movement by intermodal from various Alberta origins is detailed. Cost and service of trucking versus intermodal are the key ingredients to the conclusions.

Zimmer, R.N. "Designing Intermodal Terminals for Efficiency." *Transportation Research Circular* 459 (July 1996): 99-109.

This article describes the actual design and layout for two rail terminals located near marine ports.

Abstract: The introduction of the double-stack container train in the mid-1980s brought railroads back to the waterfront at a level of activity that had not been observed before. Since that time, the term "intermodal" has become synonymous with the ubiquitous "box". Much effort has gone into speeding the movement of these containers from point A to point B, whether by water, rail, highway, or air. Seaports, airports, and railroads have worked to make the interface among transportation modes an integral part of the shipping system. For some, the search was for the ideal terminal that could be built on any piece of land and that would solve all modal interface problems. Sadly, no such treasure was found. Instead we find that the ideal terminal is not a certain physical configuration of pavement and tracks, but an organization of services integrated with a physical plant that meets the business needs of a specific marketplace. These physical plants may take many forms, which are influenced by the characteristics of the landscape, their proximity to the marine terminal or major industrial complex, their location relative to the mainline railroads, and their distance from the country's highway network. This paper looks at the early development of the modern intermodal terminal and the improvements made during the periods of rapid growth. It evaluates some facilities that work well and some that do not and explores the reasons why. The paper addresses current developments in equipment and labor use, reviews marine intermodal terminals and inland terminals, looks at the requirements of both good rubber-tired and steel-wheeled access to the terminal, and sets forth some guidelines for future intermodal terminal development, including the development of an inland seaport.

INTERNET SITES

Battle Creek Unlimited. http://www.battlecreek.org/bcu/. Accessed 7 February 2001.

Battle Creek Unlimited is a private, non-profit organization that acts as the business development arm for the city of Battle Creek, Michigan. This site provides information on the Fort Custer Industrial Park and the U.S. Customs Port of Battle Creek, which is explained as an uncongested inland point of entry.

Duisport Duisburg Hafen AG. http://www.duisburg-ports.de. Accessed 7 February 2001.

Duisport is an inland waterway port in Duisburg, Germany. Located near Duisport is Logport, a comprehensive tri-modal logistics concept. This Web site provides information on the port, harbor specifications, history, Logport, port management and site availability. Information on goods shipments and volumes are also provided.

Europort Vatry. http://www.europort-vatry.fr/index.html. Accessed 7 February 2001.

Located approximately 90 miles from Paris is Europort Vatry, one of Europe's multimodal facilities. This facility has 24-hour air access, direct access to the French rail system and quick access to the European rail system and it is less than 7 hours by road to Europe's leading economic centers. This site provides information on the facilities located at Vatry and information regarding its services and potential.

Free Trade Alliance. http://www.inlandportsa.com/. Accessed 7 February 2001.

This site highlights Inland Port San Antonio. Inland Port San Antonio is consider a platform for exports and imports for North America. It provides an overview of the goal of Inland Port San Antonio as well as descriptions of the logistics infrastructure, the Kelly USA Multimodal Center, incentive packages, and an overview of airport and air cargo facilities.

Greater Columbus Chamber: The Inland Port. http://www.columbus-chamber.org/iport.html. Accessed 7 February 2001.

This site provides information on the Greater Columbus Inland Port (GCIP). The GCIP is a coalition that focuses on advancing the awareness of the logistical advantages of the Central Ohio region.

Greater Los Angeles March Global Port. http://www.marchglobalport.com/index2.html. Accessed 7 February 2001.

This is a marketing site for the development of the March Inland Port. Provided at this site are reasons for locating at the site, team member descriptions, timeline, facility maps, and press releases.

Hillwood Alliance. http://www.hillwood.com/prop/alliance.cfm. Accessed 14 February 2001.

This Web site is for Alliance, a 9,600 acre business center located near Fort Worth, Texas. Alliance is a private development that is served by an industrial airport, two rail lines and major roadways. Information provided at this Web site include current property availability, airport operations, a timeline and maps.

KCSmartPort/Richards-Gebaur: An Inland Port in the Heart of the Midwest. http://www.kctrade.com/body_3a5_rich_gebaur.htm. Accessed 14 February 2001.

This site is a brief introduction to the plans to create an international trade processing center at a former air base in Kansas City. Information, including a timeline, is given on the Richards-Gebaur airbase and the process undertaken to convert it from military use to its intended future as a distribution and transportation center. This Web site is maintained by the Greater Kansas City Chamber of Commerce.

Kelly USA. http://www.kellyusa.com. Accessed 7 February 2001.

Kelly USA is a master-planned aviation, logistics, business and industrial center according to this site. This site is hosted by the Greater Kelly Development Authority and provides information on space for lease, opportunities for development, and current tenants.

March Inland Port Airport. http://www.marchjpa.com/MIP.html. Accessed 7 February 2001.

Information on the formation, operations and facilities available at the March Inland Port in Southern California are provided at this Web site. This inland port is a joint use facility with the United States Air Force targeted for air cargo operations. Included at this site are descriptions of the joint use agreement, facilities and setting, usage fees, and potential demand in the region.

Metroport Auckland. http://www.metroport.co.nz/. Accessed 7 February 2001.

Metroport Auckland is located in New Zealand. This is New Zealand's first inland dry port. It links the Port of Tauranga to South Auckland by Tranz Rail. This link provides shipments destined for Auckland to be offloaded at the Port and directly transferred by rail to Metroport. The reverse process is also utilized.

North Carolina Global TransPark Partnership. http://www.gtp.net/. Accessed 14 February 2001.

The North Carolina Global TransPark Partnership is an economic development agency for eastern North Carolina. The Global TransPark is an intermodal and just-in-time manufacturing complex comprising of 15,000 acres at build-out. This site outlines the advantages of locating in Eastern North Carolina, while providing information on infrastructure, labor force and available sites.

Port of Huntsville. http://www.hsvairport.org. Accessed 12 July 2001.

This site highlights the Huntsville International Airport, the International Intermodal Center and Jetplex Industrial Park. These three elements combine to form an industrial and international oriented business focus at the Port of Huntsville.

Rickenbacker International Airport. http://www.rickenbacker.org/home.html. Accessed 7 February 2001.

Rickenbacker is a cargo airport located in Columbus, Ohio. This cargo port is one of the main economic drivers of the Greater Columbus Inland Port. This site provides overview information, airport operation specifications, description of Foreign Trade Zone #138 and the Rickenbacker Port Authority.

Venlo Location and Infrastructure. http://ez.venlo.nl/location/chapt5b.htm. Accessed 14 February 2001.

Venlo Trade Port is located in the southeast Netherlands and is considered a combined industrial/logistics center. This site provides general information on the Venlo site and specific facts about distance to nearby ports and population centers, as well as utilities on site and transportation components.

Virginia Inland Port. http://www.vaports.com/FAC-term-vip.htm. Accessed 7 February 2001.

The Virginia Inland Port operates as an intermodal container transfer facility in Front Royal, Virginia that connects to the deep-water ports at Hampton Roads by rail. This site provides information on the services available, site maps, aerial photographs and a link to the Virginia Port Authority and the Virginia International Terminals, Inc.