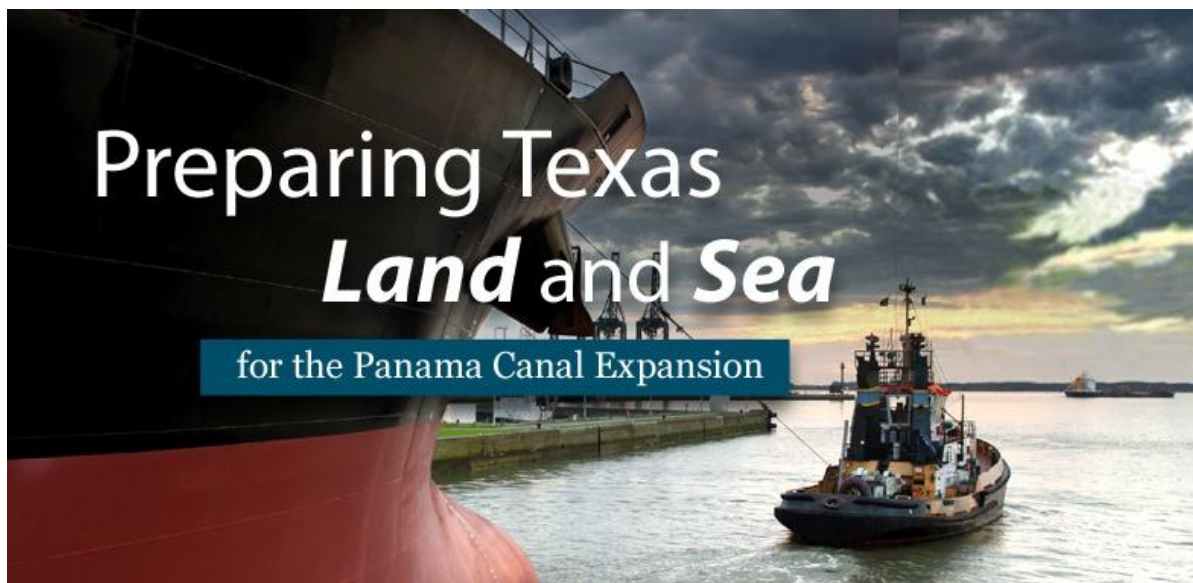


**REPORT FROM THE
PANAMA CANAL STAKEHOLDER WORKING GROUP**



FINAL REPORT

November 2012

REPORT FROM THE PANAMA CANAL STAKEHOLDER WORKING GROUP

Members

Harris County Judge Ed Emmett, Chair
Cameron County Judge Carlos H. Cascos, Vice Chair
Mr. Joseph Adams, Union Pacific
Mr. Steve Boecking, AllianceTexas
Mr. Aaron Demerson and Mr. Amir Mirabi,
Office of the Governor—Economic Development and Tourism
Mr. Kenneth Dierschke, Texas Farm Bureau
Mr. John Esparza, Texas Motor Transportation Association
Mr. Jim Greenwood, Texas Oil and Gas Association
Mr. James Griffin, East Harris County Manufacturers Association
Mr. John LaRue, Texas Ports Association
Mr. Fred Malesa, BNSF Railway
Mr. Carlton Schwab, Texas Economic Development Council
Mr. Jack Todd, Texas Association of Manufacturers
Mr. Rigoberto Villarreal, City of McAllen
Colonel Leonard Waterworth, Port of Houston Authority

Executive Sponsors

William Meadows, Texas Transportation Commission
Jeff Austin, III, Texas Transportation Commission

Prepared by

Katherine F. Turnbull
Executive Associate Director
Texas A&M Transportation Institute

Report 0-6800-R1
Project 0-6800
Project Title: Impacts on Texas Ports from the Panama Canal Expansion

Performed in cooperation with the
Texas Department of Transportation
and the
Federal Highway Administration

November 2012

TEXAS A&M TRANSPORTATION INSTITUTE
College Station, Texas 77843-3135

ACKNOWLEDGMENTS

This project was conducted in cooperation with TxDOT and FHWA. A number of TxDOT, Texas A&M Transportation Institute (TTI), and other personnel assisted with the project. Texas Transportation Commissioners Bill Meadows and Jeff Austin III were the executive sponsors for the Transportation Commission. Eduardo Hagert, who served as the TxDOT project director, Coby Chase, and Marc Williams provided assistance and guidance throughout the project. Duncan Stewart and Wade Odell served as the research engineers from TxDOT's Research and Technology Implementation Office. Roger Beall prepared the graphics on TxDOT projects for the meetings that are included in the report. Jay Bond assisted with meetings, and Dr. Gus Khankarli provided coordination to other TxDOT research projects. Dr. Martha Rozelle of the Rozelle Group, Ltd., acted as the meeting facilitator. Richard A. Zientek, transportation policy advisor in the Office of Harris County Judge Ed Emmett, also provided assistance throughout the project. Rob Harrison of the Center for Transportation Research at the University of Texas at Austin provided input from other research studies. TTI personnel Mary Cearly, Jim Kruse, Nick Norboge, Jordan Bertling, Bonnie Duke, Gary Lobaugh, and Joanna Dickens provided assistance with meetings, background research, word processing, and editing. The assistance, hard work, and contributions of all these individuals are both acknowledged and appreciated.

TABLE OF CONTENTS

	Page
List of Figures	vii
List of Tables	viii
Executive Summary	ix
Introduction.....	ix
Findings	ix
Chapter I—Introduction	1
Background.....	1
Working Group Members and Charge.....	2
Meetings, Process, and Schedule	3
Organization of Report	5
Chapter II—Expansion of the Panama Canal and Other Factors Influencing Freight Movements in Texas	7
Overview of the Panama Canal Expansion.....	7
Population Growth in Texas	9
Energy Exploration, Extraction, and Refining Activities	9
Emerging Global Trade Partners	10
Chapter III—Opportunities for Texas in Expanding Global Trade	11
Potential Growth in Exports	11
Dry Bulk.....	11
Liquid Bulk	12
General Cargo, Value Added Manufacturing, and Break Bulk Cargo	13
Containers	14
Potential Growth in Imports	14
Chapter IV—Summary of Previous Studies and Plans	17
Review of Previous Studies and Plans.....	17
Panama Canal.....	17
Waterborne Freight Studies	18
General Freight Studies.....	22
Rail Studies	22
Review of Other Related Studies.....	23
Chapter V—TxDOT Projects to Strengthen Texas’ Position in Global Trade	25
Major Interstate and State Highway Trade Corridors.....	25
Port Area TxDOT Landside Projects.....	27
Chapter VI—Ports, the GIWW, Railroads, Pipelines, and Other Programs and Policies to Enhance Texas’ Position in Global Trade	37
Ports	37
Gulf Intracoastal Waterway (GIWW).....	41
Railroads	43
Pipelines.....	45
Other Programs and Policies.....	47
Chapter VII—Findings, Recommendations, and Actions	49
TxDOT Highway Infrastructure Projects.....	49

Development of A Texas Freight Plan	52
GIWW	53
Ports	54
Rail.....	54
Information and Promotion.....	55
Appendix A—List of Speakers at Panama Canal Stakeholder Working Group	
Meetings	57
Austin—June 29, 2012	57
Corpus Christi—August 1, 2012	57
Houston—August 27, 2012	57
Beaumont—August 28, 2012	57
Fort Worth—September 7, 2012	58
Brownsville—September 14, 2012.....	58
Appendix B—References.....	59

LIST OF FIGURES

	Page
Figure 1. Location and Dates of PCSWG Meetings.	3
Figure 2. Panama Canal Expansion—Increase in the Size of Locks and Vessels.	8
Figure 3. Major Interstate and State Highway Corridors Serving Texas Ports.	26
Figure 4. Beaumont and Port Arthur Area TxDOT Projects.	28
Figure 5. Houston, Galveston, and Freeport Area Projects.	29
Figure 6. Victoria Area TxDOT Projects.	31
Figure 7. Corpus Christi Area TxDOT Projects.	32
Figure 8. Brownsville and Harlingen Area TxDOT Projects.	34
Figure 9. Texas Commercial Ports and the GIWW.	38
Figure 10. Gulf Intracoastal Waterway.	42
Figure 11. Pipeline Connections to Texas Ports.	46

LIST OF TABLES

	Page
Table 1. Panama Canal Stakeholder Working Group Members.....	2
Table 2. Speakers at Panama Canal Stakeholder Working Group Meetings.....	4
Table 3. Depths of Texas Ports Examined in This Project.	39
Table 4. Transportation Projects Included in the 2013-2014 Texas Ports Capital Program.....	41

EXECUTIVE SUMMARY

INTRODUCTION

Texas ports are an important economic engine for the state and the nation. Handling approximately 564 million tons of foreign and domestic cargo annually, Texas ports rank first nationally in goods exports and waterborne commerce. Texas ports account for 19 percent of U.S. port tonnage, and four ports—Houston, Corpus Christi, Beaumont, and Texas City—are in the top 10 ports in the country. Texas ports create nearly 1.4 million jobs and generate over \$82 billion in personal income annually. The maritime cargo activity at the public marine terminals in Texas generated \$277 billion in economic value to the state in 2011.

The Panama Canal is undergoing a \$5.25 billion expansion, which is expected to be completed in 2014 or early 2015. The new locks being added as part of the expansion will accommodate larger and wider vessels. In addition to serving these post-Panamax vessels, the expansion will reduce current congestion in the locks, providing more reliable and faster transit time for ships of all sizes. The wider locks will also accommodate liquefied natural gas (LNG) tankers, which cannot use the canal today.

The expansion of the Panama Canal will influence global trade, including potential impacts on Texas ports. The Texas Department of Transportation (TxDOT) formed a Panama Canal Stakeholder Working Group (PCSWG) in early 2012 and sponsored a research study conducted by the Texas A&M Transportation Institute (TTI) to assess the opportunities associated with the Panama Canal expansion and to examine the potential impacts on Texas ports and the landside infrastructure, including roadways, railroads, and intermodal facilities. The PCSWG was charged with examining short-, mid-, and long-range TxDOT transportation improvements that will better position the state of Texas to take advantage of the Panama Canal expansion and enhance Texas' role in global trade.

Led by Harris County Judge Ed Emmett as chair and Cameron County Judge Carlos Cascos as vice chair, the PCSWG held six information-gathering meetings. Representatives from shippers, carriers, ports, metropolitan planning organizations (MPOs), regional mobility authorities (RMAs), public agencies, industry groups, university research institutes, and consultants provided information on local conditions, current and future use of the Panama Canal, other opportunities, and infrastructure needs. TxDOT representatives summarized current roadway projects and future projects at the meetings. A review of previous studies and current plans was also conducted to identify roadway, rail, and port projects that may be impacted by the Panama Canal expansion or increases in global trade.

FINDINGS

Based on the information presented at the PCSWG meetings and the review of previous and current projects and studies, the PCSWG identified a number of findings, recommendations,

and actions to increase exports and imports through Texas ports and expand Texas' position as a global gateway for the nation.

The following major findings and recommendations are made by the PCSWG:

- **Overarching Finding**—One overarching finding from the study is that the Panama Canal expansion—coupled with continued population growth in Texas, energy sector developments, and the emergence of new trading partners throughout the world—represents opportunities to expand Texas' position as a global gateway for the nation. By providing a low-cost, reliable, safe, secure, multimodal, and environmentally sustainable supply chain, the state can increase its global trade, create new jobs, and expand the economy of the state and nation.
- **Overarching Finding**—As the leading goods export state in the country, Texas is well positioned to take advantage of the Panama Canal expansion and other opportunities to increase the export of dry bulk, liquid bulk, general and break bulk cargo, and containers to existing and new markets. Commodities in these general categories include agricultural produce, coal, value added manufacturing products, petrochemical and chemical products, military cargo, paper products, consumer goods, and other products. The emerging LNG export market resulting from energy developments in the state represents a major opportunity.
- **Overarching Finding**—To increase global trade and economic development, Texas must develop processes that provide a transportation system focused on commerce, including Texas ports, the Gulf Intracoastal Waterway (GIWW), the roadway system, the rail system, and the pipeline network. It is critical that Texas accelerate investments in freight transportation infrastructure to grow commerce and increase the tax base of the state.
 - Texas should invest in freight transportation infrastructure.
 - Freight transportation infrastructure investments grow commerce.
 - Commerce grows the tax base of the state.
- **Recommendation**—TxDOT should remain focused on trade-related improvements. TxDOT, working with its partners, has numerous projects in different stages of planning, design, and construction that address critical transportation needs in the state. Many of these projects focus on key trade corridors and connections to Texas ports. Working with available funding and recognizing that significant priorities exist throughout the state, TxDOT should continue to advance these projects in a timely fashion to address freight flow, safety, security, congestion, and environmental issues, and to strengthen Texas' position in global trade.

- Recommendation**—TxDOT should formalize the freight discussion in transportation planning. The Moving Ahead for Progress in the 21st Century Act (MAP-21) encourages state departments of transportation to develop a state freight plan and establish a freight advisory committee. Projects that are included in a state freight plan are eligible for a larger federal funding share. TxDOT should develop a Texas Freight Plan, using the information presented in this report, especially the summary of short-, mid-, and long-range projects identified in previous studies and plans, as a base for the development of the plan. Additionally, TxDOT should convene a State Freight Advisory Committee by transitioning the PCSWG into that role to help TxDOT develop a Texas Freight Plan. Additional members should be considered to ensure that freight stakeholders from all modes and various user groups are represented on the advisory committee.
- Recommendation**—Increase the use of the GIWW. The GIWW, which is maintained by the U.S. Army Corps of Engineers (USACE), is an important component of the Texas and U.S. maritime system. Ensuring that adequate funding is available to maintain the GIWW at a 12 ft depth and to make needed capital improvements is critical. As the local non-federal sponsor of the GIWW in Texas, TxDOT should continue to work in partnership with USACE, Texas ports, users of the GIWW, and other groups to establish a strategy for adequate funding of maintenance and operation of the GIWW, along with needed capital improvements. TxDOT should also continue to work with USACE, counties, cities, and developers to prevent real estate encroachment on the GIWW, as well as to identify strategies to increase the use of the GIWW.
- Recommendation**—Texas ports should continue with their port improvement plans. Maintaining and improving port infrastructure, including channels, harbors, turning basins, terminals, and landside access, are key to the economic competitiveness of Texas ports. Ensuring that Texas ports are deep and wide enough to meet current and future shipping demands is imperative. The ports, working with USACE, TxDOT, and other partners, should continue to pursue deepening projects.
- Recommendation**—TxDOT should serve as a resource for Texas ports. TxDOT should increase the visibility of port and maritime interests at the state level by establishing a Maritime Division within the department. Additionally, TxDOT and Texas’ ports should work together to strategically align their related activities, including the functions of the Port Authority Advisory Committee, and to seek funding for the Port Access Account Fund and the Port Capital Program.
- Recommendation**—TxDOT should work with the railroads, Texas ports, and other stakeholders to support needed rail capacity projects to accommodate

increases in imports and exports. The rail industry has made significant investments in capacity to handle freight growth in Texas. Additional rail improvements have been identified or are underway. Railroads that serve the ports, TxDOT, MPOs, and other groups should pursue needed rail improvement projects. The TxDOT Rail Division can play a role in facilitating this process as part of the anticipated detailed analysis of projects included in the Texas Rail Plan. The Texas Freight Plan should also address needed rail projects in the state. The current rail projects underway at the Port of Beaumont, the Port of Corpus Christi, the Port of Brownsville, the Port of Houston, Port Freeport, the Port of Galveston, and other ports should continue to be developed. These projects help to more efficiently move goods in and out of the ports on rail and relieve highways of freight congestion.

- **Recommendation**—Build on existing activities of the Texas Wide Open for BusinessTM initiative at the Office of the Governor—Economic Development and Tourism by developing and implementing a “Texas Global Gateway” marketing and information program. The Texas Global Gateway concept would provide a one-stop, unified, coordinated, and comprehensive source of information on all transportation modes in Texas for use in promoting the state with shippers, carriers, and other international clientele. The program would also be coordinated with the federal agencies and other groups responsible for promoting international trade. A coordinated strategy to promote Texas ports with international trading partners through contacts and trade missions could also be considered as part of the program.

CHAPTER I—INTRODUCTION

BACKGROUND

The Panama Canal is a critical link in the global maritime transportation system. Opened in 1914, the 51-mile canal connects the Atlantic Ocean to the Pacific Ocean across the Isthmus of Panama. The canal is currently undergoing a \$5.25 billion expansion, which is expected to be completed in late 2014 or early 2015. The Panama Canal expansion is anticipated to influence global shipping patterns. The canal expansion, along with population growth and energy development in Texas, provides opportunities to expand global trade through Texas ports.

Texas ports are an important economic engine for the state and the nation. Texas ports rank first nationally in goods exports and waterborne commerce, handling approximately 564 million tons of foreign and domestic cargo annually. Texas ports account for approximately 19 percent of U.S. port tonnage, and four ports—Houston, Corpus Christi, Beaumont, and Texas City—are in the top 10 ports in the country. Agricultural produce, petrochemical products, value added manufacturing, coal, and other commodities are exported through Texas ports, while all types of consumer goods and electronic products, automobiles, and other commodities are imported through the ports and distributed throughout the state and region. The Texas ports create nearly 1.4 million jobs and generate over \$82 billion in personal income annually. The maritime cargo activity at the public marine terminals in Texas generated \$277.6 billion in economic activity to the state in 2011. A total of \$2.4 billion of direct, induced, and indirect state and local taxes were generated by maritime activity at the public and private port terminals in Texas.

The Texas Department of Transportation (TxDOT) initiated a research project in early 2012 to assess the opportunities associated with the Panama Canal expansion and to examine the potential impacts on Texas ports and landside infrastructure, including roadways, railroads, and intermodal facilities. The department retained the Texas A&M Transportation Institute (TTI) to assist with this project and formed a Panama Canal Stakeholder Working Group (PCSWG).

As documented in this report, a series of meetings were held to obtain information from shippers, carriers, ports, industry groups, and other organizations on their current operation and use of the Panama Canal, their perspectives on the future use of the expanded canal, planned improvements and infrastructure projects, and related activities. Information from other research projects, including a recent review of previous studies assessing the potential impact of the Panama Canal expansion and freight issues, was also used to identify future infrastructure needs.

This report documents the results of these activities. It summarizes the major findings from speakers at the PCSWG meetings and the review of previous studies. It highlights landside transportation projects identified in previous studies and plans to facilitate and expedite exports and imports through Texas ports. It presents a comprehensive multimodal strategy for increasing the benefits from the Panama Canal expansion and other opportunities facing the state. It also

identifies programs, projects, and policies to promote Texas as a global gateway, further supporting the state’s economy. The recommendations further enhance the competitive position of Texas’ ports compared to other ports in the country, allowing the state to respond to numerous opportunities to expand global trade.

WORKING GROUP MEMBERS AND CHARGE

The PCSWG was formed by TxDOT in early 2012 to provide the department with a better understanding of the potential opportunities associated with the Panama Canal expansion and the transportation infrastructure needed to best take advantage of these opportunities. Led by Harris County Judge Ed Emmett as chair and Cameron County Judge Carlos Cascos as vice chair, members of the PCSWG reflected the variety of stakeholders influenced by the Panama Canal expansion. Table 1 presents the members of the PCSWG and their affiliations.

Table 1. Panama Canal Stakeholder Working Group Members.

Name	Organization Represented
Judge Ed Emmett, Chair	Harris County
Judge Carlos H. Cascos, Vice Chair	Cameron County
Mr. Joseph Adams	Union Pacific (UP)
Mr. Steve Boecking	AllianceTexas
Mr. Aaron Demerson/ Mr. Amir Mirabi	Office of the Governor—Economic Development and Tourism
Mr. Kenneth Dierschke	Texas Farm Bureau
Mr. John Esparza	Texas Motor Transportation Association
Mr. Jim Greenwood	Texas Oil and Gas Association
Mr. James Griffin	East Harris County Manufacturers Association
Mr. John LaRue	Texas Ports Association
Mr. Fred Malesa	BNSF Railway
Mr. Carlton Schwab	Texas Economic Development Council
Mr. Jack Todd	Texas Association of Manufacturers
Mr. Rigoberto Villarreal	City of McAllen
Colonel Leonard Waterworth	Port of Houston Authority

The charge to the PCSWG was to “identify short-, mid-, and long-term TxDOT transportation improvements that will better position the state of Texas to take advantage of the Panama Canal expansion and enhance Texas’ role in global trade.” In addition to the Panama Canal expansion, the PCSWG considered other factors influencing the state’s position in global trade, including population

Charge to the Working Group

Identify short-, mid-, and long-term TxDOT transportation improvements that will better position the state of Texas to take advantage of the Panama Canal expansion and enhance Texas’ role in global trade.

growth and new and expanding natural gas and oil exploration, production, and refining in the state. Growing international export markets and new trading partners were also discussed.

MEETINGS, PROCESS, AND SCHEDULE

The PCSWG held six information-gathering meetings. The PCSWG reviewed and finalized the project report at a seventh meeting. Figure 1 shows the locations and dates of these meetings. At the first meeting in Austin, Texas, Transportation Commissioners Bill Meadows and Jeff Austin discussed the charge to the PCSWG, and Chair Judge Ed Emmett outlined the roles, responsibilities, and expectations of PCSWG members. A set of operating principles were also discussed and agreed upon. Rob Harrison from the Center for Transportation Research at the University of Texas at Austin provided an overview of freight logistics and the Panama Canal expansion.



Figure 1. Location and Dates of PCSWG Meetings.

Five subsequent meetings followed a common format. The meetings opened with an opportunity for public comments, including welcomes from local officials. Invited speakers covered a wide range of topics associated with the Panama Canal expansion, local activities, and future plans. A TxDOT representative highlighted current and planned projects in the area.

Table 2 summarizes the organizations of speakers at each meeting. As highlighted, representatives from shippers and carriers, ports, metropolitan planning organizations (MPOs), regional mobility authorities (RMAs), public agencies, university-affiliated research institutes, industry groups, and consultants provided information on local conditions, future opportunities, and infrastructure needs. Time for discussion of issues, opportunities, needs, and the final report was also provided at most meetings. Appendix A presents a complete list of speakers. Appendix B presents the references used in the report.

Table 2. Speakers at Panama Canal Stakeholder Working Group Meetings.

Organizations and Groups	Meetings							
	Austin	Corpus Christi	Houston	Beaumont	Fort Worth	Brownsville	Additional Input ⁵	Total
Shipper/Carriers		3	5	1	1	1	1	12
Ports ¹		2	3	3		1		9
Elected Officials		2	1	2	1	1		7
Public Agencies ²	2	2	1	2	1	3		11
University Transportation Institutes	1				1	1		3
Industry Groups ³			2	1	2	1		6
Consultants					2			2
Others ⁴			2					2

¹ Includes ports and navigation districts.

² Includes TxDOT, MPOs, RMAs, the U.S. Army Corps of Engineers (USACE), the U.S. Army, and local governments.

³ Includes national and regional associations, and local bureaus and forums.

⁴ Includes special interest groups and citizens.

⁵ Includes additional input from telephone calls and emails.

ORGANIZATION OF REPORT

The remainder of this report is organized into six chapters. Chapter II presents an overview of the Panama Canal expansion, projected population growth in the state, and energy exploration, extraction, and refining activities. It also highlights the emergence of new trading partners for Texas and growing international export markets. Chapter III highlights the opportunities for expanded global trade through Texas ports as identified by speakers at PCSWG meetings and available reports. Chapter IV summarizes previous studies and plans identifying freight-related infrastructure needs in the state. Chapter V presents the TxDOT projects discussed by department representatives and other speakers at PCSWG meetings. Chapter VI describes the GIWW, ports, and rail projects identified in previous studies, as well as the pipeline network in Texas, and other projects, programs, and policies to support expanding global trade. Chapter VII presents the overall findings, recommendations, and actions for consideration by TxDOT and other agencies and groups to expand Texas' position in global trade. Appendix A lists the speakers at the PCSWG meetings. Appendix B lists the references used in the report. The PCSWG meeting summaries and the PowerPoint slides used by some speakers are available at the TxDOT PCSWG website http://www.dot.state.tx.us/panama_texas/.

CHAPTER II—EXPANSION OF THE PANAMA CANAL AND OTHER FACTORS INFLUENCING FREIGHT MOVEMENTS IN TEXAS

The PCSWG was formed to examine the potential impacts of the Panama Canal expansion on Texas ports and the landside transportation system. In discussing the potential impacts of the expanded canal, the working group also noted the importance of the projected population growth in the state and the recent energy exploration, extraction, and refining on global trade. The emergence of new global trading partners, including Brazil and other South and Central American countries, Asia, India, Africa, Russia, and other areas, was also noted. This section summarizes the Panama Canal expansion, projected population growth, energy developments, and emerging trading partners to set the stage for the discussion of opportunities for expanding global trade in Chapter III.

OVERVIEW OF THE PANAMA CANAL EXPANSION

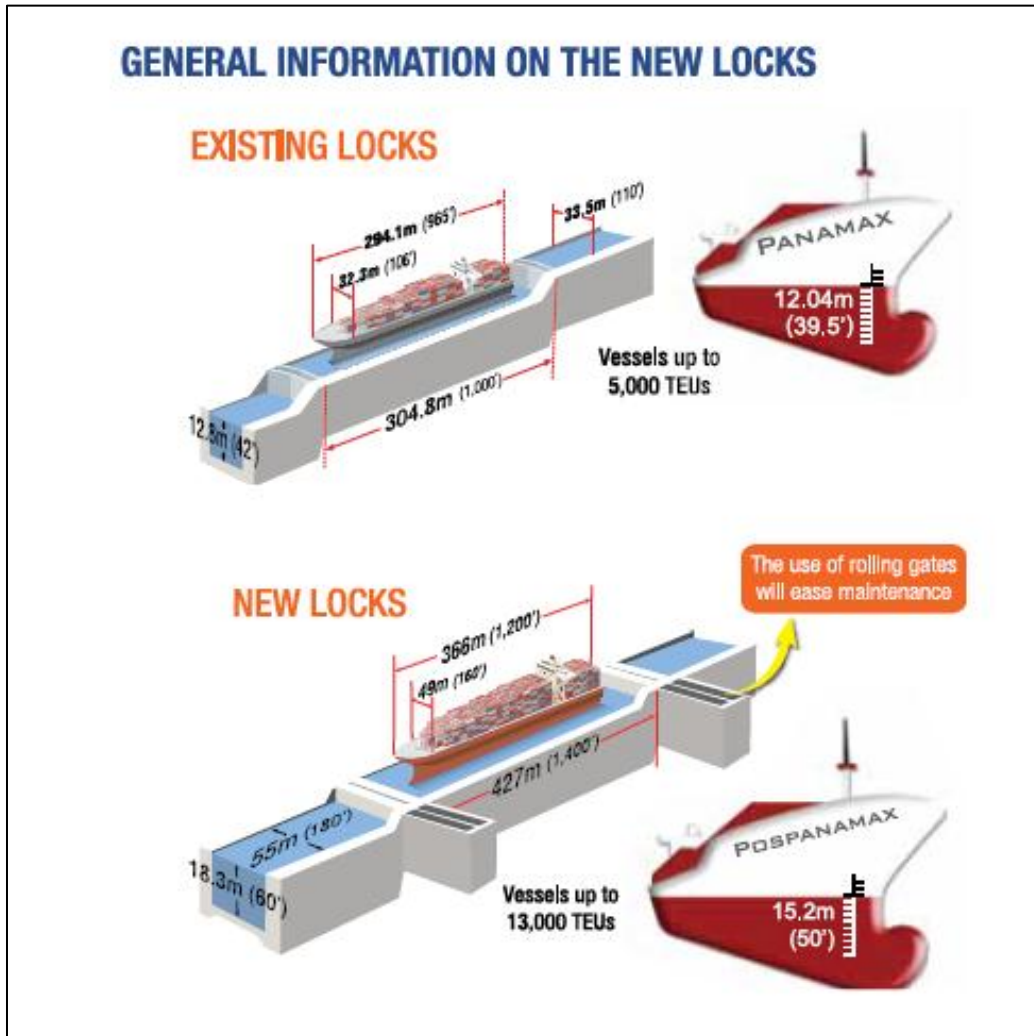
The Panama Canal opened in 1914, providing a connection between the Atlantic Ocean and Pacific Ocean across the Isthmus of Panama. The 51-mile canal greatly improved the global maritime system, with vessels no longer having to travel around the tip of South America to reach Asia. Ownership of the canal was transferred from the United States to Panama in 1999, resulting in a change in the business operating model from a public utility to a business enterprise.

The Panama Canal Authority (PCA), which operates the canal, has undertaken an extensive modernization and investment program. The passage of a 2006 referendum provided needed financing for a major expansion of the canal. The objectives of the expansion program include maintaining the competitiveness of the canal and the value of the route, increasing capacity and allowing larger vessels, and reducing water consumption. Other objectives are improving safety and efficiency, and sustaining tonnage and profitability growth.

The new locks being added as part of the expansion will accommodate larger and wider vessels. As Figure 2 illustrates, the maximum vessel size increases from 5,000 20 ft equivalent units (TEUs) to 13,000 TEUs with the expansion. In addition to accommodating these larger post-Panamax vessels, ships of all sizes should experience faster and more reliable transit times due to the decrease in congestion in the locks. Further, the wider locks will be able to accommodate liquefied natural gas (LNG) tankers, which currently cannot use the canal.

The impact of the Panama Canal expansion on global trade and on U.S. ports continues to be widely discussed and analyzed. Numerous proprietary and non-proprietary models are being used in this process. There are different schools of thought on the impacts. Some argue that there will be little change in global logistic patterns. Others argue there will be a shift of larger vessels servicing East Coast and Gulf Coast ports. Still others have suggested that new transshipment centers will be developed in Jamaica or other Caribbean locations. East Coast ports, including New York, Savannah, and Miami, are making significant investments in

deepening harbors and landside infrastructure improvements to accommodate larger vessels in the future.



Source: Panama Canal Authority.

Figure 2. Panama Canal Expansion—Increase in the Size of Locks and Vessels.

A number of factors will influence the ultimate impact of the Panama Canal on global logistics. These factors include the tolls charged by the PCA, which have not yet been set, the international location of production facilities for different goods, and the status of the global economy. As discussed in this report, the Panama Canal expansion, coupled with the increase in Texas' population and energy development in the state, provides opportunities for Texas to expand its role as the major export state in the nation. These opportunities are discussed more extensively in Chapter IV.

POPULATION GROWTH IN TEXAS

In addition to the Panama Canal expansion, the continued growth in Texas' population will influence global trade. More people mean more demand for the production of goods, which in turn means more demand for imports, which means more container shipments coming into Texas ports. The Texas State Data Center forecasts the population of the state to increase from approximately 25 million in 2010 to 37 million in 2030 and almost 45 million in 2040. These increases mean an additional 20 million people will be living in the state in 2040. Most of this growth will occur in the urban areas encompassed in the triangle of Houston, San Antonio, Austin, and the Dallas-Fort Worth Metroplex. Population growth is also forecasted for communities along the Gulf Coast.

ENERGY EXPLORATION, EXTRACTION, AND REFINING ACTIVITIES

Texas is the top petrochemical-producing state in the country. Numerous petroleum and petrochemical industries are located at and around Texas' ports. These industries generate large volumes of imports and exports at Texas' ports.

Texas is experiencing a dramatic increase in oil and gas exploration, extraction, and refining. Much of this increase is the result of advancements in drilling technology, primarily horizontal drilling and hydraulic fracturing (called fracking). These technologies have made it possible to develop tight shale fields in significant quantities to be profitable. Fracking is being used extensively in the Barnett Shale gas play in north Texas and the Eagle Ford Shale gas play in south Texas.

Much of the sand and other additions used in fracking are imported through Texas ports. The development of these gas plays is also resulting in the construction of new LNG production facilities focused on exporting LNG. For example, Cheniere has an LNG facility under development in Sabine Pass and a proposed facility in Corpus Christi. Other companies are also moving forward or considering new LNG plants focusing on the export market at the Port of Corpus Christi, the Port of Brownsville, and other areas.

Texas is also the largest producer of wind power in the country, and wind power generation continues to expand in the state. Many of the turbine components, including the large blades and center poles, are imported and exported through Texas ports.

All of these energy developments have impacts on Texas ports from both an import and export standpoint, as well as on the landside transportation system. The truck traffic generated from the development of shale gas plays is straining local, country, and state roadways. TxDOT has established a Task Force on Texas' Energy Sector Roadway Needs to explore these concerns. The movement of wind turbine sections requires overweight and oversized permits and other special considerations.

EMERGING GLOBAL TRADE PARTNERS

Texas and Texas ports are well positioned to serve existing, emerging, and growing international markets. Examples of these markets include South and Central American countries, India, Russia, China, Japan, and countries in Asia and Africa. The Panama Canal expansion does not impact all of these markets, but growth in trade to these countries will influence Texas ports and the landside transportation system.

As an example, Brazil represents one of these emerging trade markets. Brazil is the fifth largest country in the world—both by geographic area and by population. It represents an emerging international economy. Brazil was the U.S.'s eighth largest goods export market in 2011. Texas leads all states in the country with exports to Brazil. In 2010, Texas exported approximately \$4.7 billion worth of goods to Brazil. Texas exports a wide range of commodities to Brazil, including chemical and petrochemical products, petroleum and coal, machinery and transportation equipment, and agricultural produce.

In addition to Brazil, Texas exports goods to numerous other South and Central American countries including Venezuela, Columbia, Chile, Peru, and Argentina. These countries, as well as India, Russia, Japan, and countries in Africa and Asia, represent ongoing growing trading partners for Texas, regardless of the Panama Canal expansion.

CHAPTER III—OPPORTUNITIES FOR TEXAS IN EXPANDING GLOBAL TRADE

The Panama Canal expansion, along with continued population growth and energy development in the state, represents opportunities to expand Texas' role as a global gateway for the nation. In addition, existing and emerging global markets are well served by Texas ports. By providing a low-cost, reliable, safe, secure, multimodal, and environmentally sustainable supply chain based on sound logistics, Texas can increase exports and imports to create new jobs, further contributing to the state and national economy.

Speakers at the PCSWG meetings provided numerous examples of opportunities for increasing exports and imports through Texas ports from the Panama Canal expansion, population growth, energy development, and new international markets. Additional opportunities have been discussed in recent reports and studies. This chapter highlights the potential growth in exports and imports through Texas ports identified by speakers at the PCSWG meetings and in recent reports and studies.

Representatives from shippers and carriers stressed the importance of flexibility and options in the supply chain. Having options to use multiple supply chains and ports, including those in Texas, was viewed as important. Speakers also noted the importance of reliability, cost, and transit time in supply chain decisions. Reliability was stressed as being as important as, if not more important than, transit times. A longer all-water route serving Texas ports may be viable, as long as reliable and cost-effective service is provided.

POTENTIAL GROWTH IN EXPORTS

As the leading goods export state in the country, Texas is well positioned to take advantage of the Panama Canal expansion and other opportunities to increase the export of dry bulk, liquid bulk, value added manufacturing and break bulk cargo, and containers to existing and new markets. As highlighted in this section, commodities in these general categories include agricultural products, coal, natural gas, petrochemical and chemical products, military cargo, paper products, consumer goods, and other products.

Dry Bulk

The expansion of the Panama Canal provides opportunities to increase the export of dry bulk commodities, including grains, coal, and other commodities to existing and emerging global markets. A few examples of opportunities relating to some of these commodities are highlighted below:

- **Bulk Grains.** Expanding exports of corn, wheat, rice, soybeans, and other bulk grains was noted as an opportunity by speakers at some of the PCSWG meetings. A representative from Archer Daniels Midland (ADM) noted that the Panama

Canal expansion should help keep U.S. grain exports competitive. The GIWW may also play an expanded role in future grain exports.

- **Coal.** The potential for increasing shipments of coal through Texas ports and the Panama Canal expansion was discussed at a number of meetings. Speakers noted that opportunities appear to exist to build on current coal exports to China and other Asian destinations. Houston currently has several major dry bulk maritime terminals handling pet coke and coal. It is predicted that these facilities have significant expansion capacity, with room to more than triple their combined facility footprints. Coal exported out of the Port of Corpus Christi is also expected to increase.

Liquid Bulk

The Texas Gulf Coast is home to major oil- and gas-refining facilities. Petrochemical and petroleum products represent the largest export commodities for Texas ports. The Panama Canal expansion and other factors appear to provide opportunities for expanding liquid bulk exports, especially LNG and petrochemical products:

- **LNG.** Currently LNG vessels are not able to use the Panama Canal due to the width limitations in the locks. The new locks will accommodate LNG vessels, thus opening the Asian market to LNG from Texas. Cheniere, Golden Pass Products LLC, and other companies are making major investments in LNG plants along the Texas and Louisiana coast, focusing on exporting LNG. Current projects are located at Sabine Pass along the Sabine-Neches Waterway, the Port of Corpus Christi, and the Port of Brownsville. The LNG facilities represent billion dollar investments to construct and will provide ongoing jobs and income. Golden Pass Products LLC recently received authorization from the U.S. Department of Energy to export domestically produced natural gas as LNG from the Golden Pass LNG terminal in Sabine Pass to nations that have existing Free Trade Agreements (FTAs) with the United States. The \$10 billion project is a partnership of affiliates of Qatar Petroleum International and ExxonMobil.
- **Petroleum and Petrochemical Products.** The Port of Houston Authority in cooperation with the Greater Houston Port Bureau has been conducting a survey of current and planned investments being made along the Houston Ship Channel and surrounding areas. Preliminary results indicate that well over \$30 billion has been committed or planned to be invested in the Houston port region between 2012 and 2015. These investments are predominantly linked to the refining and petrochemical industry, which has seen a resurgence due to the rapid expansion of the Texas energy sector. These investments tie directly to increased maritime trade. For example, in the first 10 months of 2012, chemical tanker and LPG ships calling at the Port of Houston have increased approximately 60 percent

(1058 vessel calls in the first 10 months of 2011 compared to 1695 vessel calls in the first 10 months of 2012). In another example, Dow Chemical Texas Operations has a number of new facilities under construction at Port Freeport. A new chlor-alkali plant valued at \$1.4 billion will begin production in mid-2013 as part of a joint venture with Mitsui. A new propylene production facility is under construction, with a 2015 start-up date. A new ethylene production plant is also being planned, with a 2017 operating date. Approximately 48 percent of the products produced by Dow are exported in deep draft vessels. Phillips 66, in a joint venture with Chevron, is currently constructing two new polyethylene units valued at \$1 billion with production targeted for 2016.

General Cargo, Value Added Manufacturing, and Break Bulk Cargo

The Panama Canal expansion may provide opportunities for expanding exports of general cargo, value added manufacturing, and break bulk cargo. Military cargo, excavators, and offshore drilling rigs represent examples provided by speakers at PCSWG meetings:

- **Military Cargo.** The expansion of the Panama Canal provides opportunities to increase the shipment of military cargo through the ports of Beaumont, Port Arthur, and Corpus Christi. The 842nd Transportation Battalion of the U.S. Army's Military Surface Deployment and Distribution Command is located at the Port of Beaumont, which is the number one port in the country for the shipment of military cargo. The Panama Canal expansion will provide the Army with strategic flexibility in the deployment of cargo from the Port of Beaumont. Cargo can be shipped through the canal to destinations in the Pacific, as well as to Europe, South America, Africa, and other destinations.
- **Caterpillar Hydraulic Excavators.** In 2010, Caterpillar began construction of a \$130 million state-of-the-art hydraulic excavator plant at the Port of Victoria. In 2011, Caterpillar added a \$70 million investment to increase the size and the capability of the facility. When fully operational, the facility will produce a total of seven excavator models for markets in the United States and South America.
- **Offshore Drilling Rigs.** A major tenant at the Port of Brownsville, Keppel AmFELS LLC, recently was selected for a \$195 million contract to construct an offshore drilling rig for the Mexican drilling company Perforadora Central. The port is also a major location for ship recycling, with five of the eight ship recyclers in the country, including four U.S. Maritime Administration (MARAD) certified recyclers and the only two U.S. Navy certified ship recyclers in the United States.

Containers

Numerous commodities are exported in containers from Houston, Freeport, and other Texas ports. Products such as petrochemical products, value added manufacturing products, packaged food products, cotton, pecans, consumer goods, and other commodities may all be exported in containers. The Panama Canal expansion offers opportunities to expand the export of these commodities to existing and new international markets.

- **Cotton.** The Panama Canal expansion is projected to improve the efficiency, distribution, and competitiveness of U.S. cotton exports to China from Gulf and East Coast ports. Faculty at the Texas A&M University Department of Agricultural Economics used a spatial, intertemporal equilibrium model to examine scenarios using different reductions in ocean freight rates due to the Panama Canal expansion. Cotton exports from Texas ports, primarily Houston, and cotton warehouse revenues in the state increased under these scenarios. Depending on the estimated reductions in freight rates, the increase in Texas cotton warehousing revenues could range from \$22 million to \$84 million annually. A representative from Gulf Compress spoke at the PCSWG meeting in Corpus Christi, noting the importance of the export market to Texas cotton growers and the potential increase in exports to China with the Panama Canal expansion. Gulf Compress operates cotton and warehouse distribution facilities in Texas, including a new facility at the entrance to the Port of Corpus Christi's La Quinta Trade Gateway.
- **Resins.** Facilities at the Port of Houston manufacture approximately 20 percent of the world's supply of plastic resin, including polyethylene (PE) and polyvinyl chloride (PVC), which are used in packaging (bags, bins, jugs, and films) and numerous industrial applications (pipes, moldings, gutters, and other products). Resin is the largest container export commodity from the port, representing 38 percent of the port's total container exports in 2011. Due to the ready supply of low-cost feed stock resulting from shale fracturing, major investments are being made to expand and develop additional resin manufacturing capacity. It is expected that as these facilities come online, resin container exports will increase by as much as 30 to 40 percent over the next few years.

POTENTIAL GROWTH IN IMPORTS

Most of the attention on the Panama Canal expansion has focused on potential changes in the shipment of containers from Asia. Currently, container ships call primarily on West Coast ports. The Panama Canal expansion will allow the larger post-Panamax vessels to call on Gulf Coast ports. A number of factors will influence the potential shift in trade routes, including the

tolls for using of the Panama Canal, the global economy, Asian manufacturing locations, and shipper preferences.

The Port of Houston is the largest Texas port, with approximately 96 percent market share in containers by total TEUs in 2011. Further, the Port of Houston, with approximately 1.9 million containers, accounted for approximately 67 percent of all Gulf Coast container traffic in 2011. These imports include a variety of consumer products, food and drink commodities, automobiles and machinery, and raw materials for manufacturing. Speakers at the PCSWG meetings noted that Texas ports, especially Houston, should anticipate increases in container traffic with the Panama Canal expansion and other factors. Speakers stated that as long as Houston and other Texas ports provide reliable and competitive service, container shipments through the Panama Canal and other parts of the world should increase, especially to serve the growing population base of the state and region.

CHAPTER IV—SUMMARY OF PREVIOUS STUDIES AND PLANS

Studies and plans over the past 10 years have examined different aspects of the freight system in Texas, including ports, railroads, highways, and intermodal facilities. TxDOT sponsored Research Project 0-6801, Synthesis of Port Related Freight Improvement Studies, to summarize the key elements addressed in these studies, especially those related to landside access to ports. The results of this review were summarized in a research report, and a searchable Excel spreadsheet was developed containing information on the identified landside access projects. The spreadsheet includes information on the project type, the issues addressed, estimated cost, funding sources, and other related characteristics. The major studies examined in that project are highlighted in this chapter.

REVIEW OF PREVIOUS STUDIES AND PLANS

Approximately 50 previous studies and plans were reviewed in the synthesis. These included studies sponsored by TxDOT, as well as those completed by ports, MPOs, cities and counties, federal agencies, and other groups. A total of 27 of these studies and plans specifically focused on Texas and included the identification of needed waterborne freight, rail, roadway, and intermodal projects. The key elements addressed in these reports are summarized in this section. The reports are presented by the topic areas of the Panama Canal, waterborne freight, general freight, and rail.

Panama Canal

- Cambridge Systematics, Inc. Potential Effects of the Panama Canal Expansion on the Texas Transportation System. October 2011.

The purpose of this report was to help TxDOT summarize and envision the possible impacts and issues of the Panama Canal expansion on Texas transportation. It notes that the Panama Canal expansion will likely have significant impacts on many Texas ports. The report also discusses infrastructure needs and possible methods to address the infrastructure, along with operational and policy issues associated with the expansion.

- Texas Transportation Institute. Panama Canal Dry-Bulk Market Segment Peer Review. July 2003.

This report presents a peer review of a project examining the Panama Canal's potential market, vessel transit and fleet size, economic value, marketing strategy, and forecasts canal transits, cargo, and toll revenue.

- Center for Transportation Research and Texas Transportation Institute. Selected 2012-2014 Trade Flows and Texas Gulf Ports: Panama Canal and South American Markets. TxDOT Project 0-6690. In progress.

This project is examining trade between the United States, South America, and Asia as a growing opportunity for Texas ports, which may be in a position to capture a larger share of Asian and South American imports, expanding Texas export markets, and Texas ports serving as global hubs. The first year of this study examined a range of trade and marine transportation factors. U.S. trade with South American and Asian markets is being researched in a Policy Research Project (PRP) project and documented in a first-year report. Concurrently, two specific technical areas—port channels and vessel operating costs—are being examined. The PRP and technical work integrates to form the basis for a second-year work plan addressing strategic issues related to future South American and Asian trade volumes handled at Texas deep water ports, the role played by the expansion of the Panama Canal, and the impact of increased trade on the Texas transportation system.

Waterborne Freight Studies

- Cambridge Systematics, Inc. TxDOT Waterborne Freight Corridor Study. July 2010.

This study identified possible deficiencies in the landside and waterside portions of the Texas freight system. It was undertaken to help provide a base for TxDOT to develop system-level solutions for the freight needs and issues around Texas ports. Issues and chokepoints were identified and discussed.

- Cambridge Systematics, Inc. TxDOT Waterborne Freight Corridor Study, Task 1: Evaluation Criteria and Solution Packages. November 2011.

The goal of this report is to provide TxDOT and the public with a vision of changes to improve the waterborne freight system in Texas. It includes a possible implementation plan for TxDOT and its partners. The document lists the infrastructure, operational, and policy solutions developed to alleviate critical bottlenecks and other problem areas throughout Texas' freight system. These include the state's marine terminals, navigable waterways, inland highways, and rail systems. The document presents a "solution package," and describes the five-step process to examine potential projects and solutions.

- Cambridge Systematics, Inc. TxDOT Waterborne Freight Corridor Study, Task 3: Waterborne Freight Performance Measures. November 2011.

This report seeks to guide TxDOT's planning, investments, and decision making through 2017. This portion of the study provides background on the various types of waterborne performance metrics that were suggested in other reports and used by federal and state agencies. A recommendations and next steps section offers preliminary measures for the Texas waterborne

freight system. The report also identifies additional analysis needed to incorporate other items into the TxDOT planning process.

- Cambridge Systematics, Inc. TxDOT Waterborne Freight Corridor Study, Task 5: Port and Waterway Funding and Financing Options. November 2011.

This document identifies possible funding and financing options for projects and strategies listed throughout the other portions of the study. It includes potential options for funding the previously listed projects. It also includes a discussion of current port and waterway funding and describes federal- and state-level programs to fund and finance various projects.

- Cambridge Systematics, Inc. TxDOT Waterborne Freight Corridor Study, Phase II. November 2011.

This report presents possible infrastructure and operational approaches to address bottlenecks and other needs at or near Texas' ports. It also discusses the estimated costs and benefits of various approaches. It presents a potential phased implementation strategy for consideration by TxDOT and various stakeholders. Information on the problem areas, issues, solutions, costs, and current status is presented.

- The Texas Department of Transportation. Texas Ports 2011-2012 Capital Program. 2011.

This report presents the various funding requests for port transportation and economic development projects submitted by each of the eligible ports. The report was provided to the governor, lieutenant governor, speaker of the House of Representatives, and Texas Transportation Commission. The identified projects, which do not represent a comprehensive listing of all capital needs at Texas ports, account for approximately \$672 million in funding.

- Texas Transportation Institute. Analysis and Recommendations on Protecting Waterways from Encroachment. August 2010.

This project investigated hazards to navigation encroachments in the Texas portion of the GIWW originating from shore. It includes recommendations for mitigating these hazards in the future. The study included the development of a guidebook for permittees and a guidebook for developers on the types and quantity of structures that should be permitted along the GIWW. The guidebooks should help guide "smart" development with regard to navigation through better cooperation between governmental agencies on permitting development and a focus on the agglomeration, clustering, and density of development on the waterway. The guidebooks should also help increase cooperation between developers, governmental agencies, and the barge industry in maintaining the GIWW for its primary use of moving goods effectively and efficiently to promote and support Texas and U.S. commerce.

- Texas Transportation Institute. Short Sea Shipping Initiatives and the Impacts on the Texas Transportation System: Technical Report. December 2007.

This report examines the potential effects of short sea shipping development on the Texas transportation system. The report identifies several triggers, which, if they were to occur, could abruptly change the level of short sea shipping activities in the region. The report indicates that even with a doubling of current short sea shipping volumes, the effects on the Texas highway and rail systems would most likely be insignificant, with the possible exceptions of the ports of Freeport and Brownsville.

- Texas Transportation Institute. Analysis of Start-Up Cross-Gulf Short Sea Shipping Activities with Mexico since 1990: Problems and Opportunities. August 2004.

This report examines activities since 1990 in one subset of short sea shipping, the U.S.-Mexico cross-Gulf services. The report summarizes the services that have been attempted, the obstacles encountered, and possible policies to encourage the success of future ventures.

- Texas Transportation Institute. Development and Application of a Methodology to Identify Mexico-U.S. Cross Border Trade with Potential for Diversion to Short Sea Shipping Operations. November 2006.

This project examined the potential for short sea shipping to divert a portion of the trade that is currently being moved by land between Mexico and the United States. The report notes the need for further research to identify specific supply chains that have characteristics and volumes that make them candidates to divert from land cross border to short sea shipping between Mexico and the United States.

- Kruse and Texas Transportation Institute. America's Locks and Dams: A Ticking Time Bomb for Agriculture? December 2011.

This report discusses the surface transportation system in the United States and its effect on agriculture's ability to compete in domestic and world markets. It examines the rapidly deteriorating condition of the nation's lock and dam infrastructure and how that affects the waterborne transportation system that enables U.S. agricultural producers to continue to compete. It explores the effects of a catastrophic failure of lock and dam infrastructure and the economic effect it would have. The research examined six locks (in Ohio, Illinois, and the Upper Mississippi River) in more detail, based on economic importance and physical condition.

- Kruse and Bierling. The Effect of the New Security Paradigm on Port Infrastructure Development and Finances. October 2005.

This report provides an overview of the financial aspects of port infrastructure development, the implementation of new security measures, and the relationship between them at nine Texas ports. The history of the Port Security Grant Program through August 2005 is summarized, and the financial performance of the ports during the study period (FY 1994-

FY 2004) is presented. It examines the funding approaches used to finance asset acquisition and construction, and analyzes both the profitability of Texas ports in general terms and the potential effect of new security-related expenses on port finances. The use of security fees to recoup some of the security costs is explored, as are other potential “financing” mechanisms.

- Kruse and Harrison. NCFRP Report 5: North American Marine Highways. July 2010.

This report discusses the North American Marine Highways (NAMH) Initiative. It examines several aspects of this initiative, including activities since 1990, shipper requirements and vessel considerations, legislation to encourage NAMH, future development obstacles, financing, and other considerations.

- Siegesmund et al. An Analysis of the Value of Texas Seaports in an Environment of Increasing Global Trade. February 2008.

This report discusses an economic impact exercise for all Texas ports, updating a similar study conducted a decade earlier. It also provides TxDOT with information for incorporating the most recent marine port impacts into the state transportation planning process. Most of the larger Texas ports had undertaken economic impact studies. The project provided both a forecast of container growth at Texas terminals and an estimate of the economic impact of Texas ports on the U.S. economy.

- Kruse et al. A Modal Comparison of Domestic Freight Transportation Effects on the Public. December 2007.

This report discusses several aspects of the Inland Waterway System (IWWS). It discusses several emissions, congestion, and safety issues, as well as other concerns. Additionally, it examines the significance of the IWWS and the impact it has on rail and highway transportation.

- Kruse et al. Potential Policies and Incentives to Encourage Movement of Containerized Freight on Texas Inland Waterways. October 2008.

This report examines the need for increased utilization of marine freight options and the challenges involved in accomplishing this goal. It also describes the potential benefits from increasing the utilization of marine freight options. It includes a summary of relevant programs in Europe and in other states. The capacity and efficiency of the GIWW and examples of activities taken by Texas ports to encourage more domestic waterborne freight shipments are presented. The report recommends several steps TxDOT could pursue in the short term to encourage increased waterborne shipments along the coast.

General Freight Studies

- Amadeo Saenz, Jr. Trade Transportation Activities Report. January 2009.

This report summarizes freight activities in various regions in Texas. It includes the Pharr District Regional Freight Study, which discusses possible or planned changes to the rail system in the area.

- Cambridge Systematics, Inc. H-GAC Regional Goods Movement Study. December 2011.

This study identified improvements and strategies for increasing person and freight mobility, while mitigating the negative impacts on the community (e.g., congestion and safety). Overall, the objectives of the study were to document existing and emerging freight, industry, and logistics movements that impact the demand, locate problem areas and bottlenecks, and create strategies to improve mobility, reliability, and safety for the region's freight transportation.

- Harrison et al. Emerging Trade Corridors and Texas Transportation Planning. September 2009.

This report describes the major trends in intermodal shipping influencing Texas intermodal trade corridors. Key supply and demand forces that underpin intermodal service and routing options are provided. Intermodal development from a technological and shipping industry perspective is described, including the impacts of the global economic recession beginning in late 2007. An overview of Texas trade patterns is also presented. A review of current and future corridors used for handling international intermodal trade illustrates the comparative strengths and weaknesses of different routing options for intermodal cargo shipping. Finally, suggested infrastructure and economic milestones driving changes in trading patterns are presented as they relate to the Texas economy and its transportation system.

- Texas Transportation Institute. The Future of Texas Freight: Roles, Forces, and Policies. TxDOT Strategic Research Program Research Brief. June 2011.

This white paper examines the roles, forces, and policies affecting transportation in Texas. It identifies potential strategic issues for consideration by TxDOT in formulating goals related to goods movement.

Rail Studies

- The Texas Department of Transportation. Houston Region Freight Rail Study. June 2007.

This report examines deficiencies in the Houston freight rail network. It discusses the issues with the current system and presents methods to accommodate and capitalize on future freight movements in the region. It identifies improvements that may provide relief to residents

and the traveling public affected by delays, interruptions, and noise attributed to the movement of freight in the region. It also identifies alternatives that may improve regional freight rail capacity by enhancing efficiency and railroad operations. The report identifies \$3.4 billion in transportation improvements throughout the region.

- The Texas Department of Transportation. Texas Rail Plan. November 2010.

This report presents policies, directions, and a vision for rail for the state. It is intended to assist in meeting federal and state regulations. The plan is coordinated with other statewide planning documents. The development of the rail plan was guided by TxDOT's strategic plan and coordinated with the Statewide Long-Range Transportation Plan. Key components include an inventory of the freight and passenger rail infrastructure and an examination of state rail system needs. The final component prioritizes the various programs and financing strategies to achieve the goals of Texas' rail system.

- Jacobs and the Texas Department of Transportation. A Regional Freight Study of the Corpus Christi and Yoakum Districts, Phase I Report. May 2010.

This is the first of two documents prepared for the Corpus Christi and Yoakum Districts. It presents the findings from studies completed by TxDOT examining freight movement into, out of, or through the two districts. The overall purpose of this Phase I document is to help inventory the existing rail network, model the freight movements, and identify various bottleneck and safety issues within the two districts.

- Jacobs and the Texas Department of Transportation. A Regional Freight Study of the Corpus Christi and Yoakum Districts, Phase II Report. May 2010.

This is the second of two documents prepared for the Corpus Christi and Yoakum Districts. The Phase II report identifies potential rail and roadway projects for the districts. The projects focus on improving freight movement in the regions and improving the efficiency of the regions.

Other Related Studies

- Frawley et al. Landside Freight Access to Airports: Findings and Case Studies. May 2011 and Guidebook on Landside Freight Access to Airports. February 2011.

These two reports examined landside freight access to airports in Texas. Many of the findings related to design elements, pavements, signings, and operations are relevant for landside freight access to ports. These documents should be considered in designing and operating roadways accessing ports in the state.

CHAPTER V—TXDOT PROJECTS TO STRENGTHEN TEXAS’ POSITION IN GLOBAL TRADE

A number of sources were used to identify TxDOT projects to further strengthen Texas’ position in global trade. The projects identified in the review of previous studies and current plans discussed in Chapter IV provided a starting point. The presentations by Marc Williams of TxDOT at the PCSWG meetings highlighted current information on TxDOT projects and plans. Comments from speakers at the meetings highlighted additional project needs. Follow-up communication with TxDOT district and division personnel, as well as staff from other agencies, provided additional information on current and planned projects. While not exclusively linked to the Panama Canal expansion, these projects would enhance freight movement in major trade corridors, into and out of Texas ports, and to distribution centers and intermodal facilities. The projects will be of benefit in positioning the state to expand its global trade profile.

The TxDOT projects identified through these sources are presented in this chapter. The roadway corridors connecting Texas ports with the state, region, and country are summarized first. Projects connecting ports to these main trade corridors are discussed next by the general port geographic areas of Beaumont and Port Arthur; Houston, Galveston, and Freeport; Victoria; Corpus Christi; and Brownsville and Harlingen.

MAJOR INTERSTATE AND STATE HIGHWAY TRADE CORRIDORS

Figure 3 illustrates the major interstate and state highway corridors serving Texas ports. These trade corridors provide connections from the ports to the major urban areas in the state, the region, and the country. The major existing and planned interstate and state highway corridors supporting Texas ports are highlighted:

- I-35 extends from Laredo to the Oklahoma state line. It connects the ports of Brownsville, Harlingen, Port Isabel, and Port Mansfield via I-69 and I-37, and the Port of Corpus Christi, via I-37 to San Antonio, Austin, the Dallas-Fort Worth Metroplex, and the central United States. I-35 is heavily traveled, with many segments on the TxDOT 100 most congested roadway list. I-35 carries high volumes of trucks. The section of I-35 from the Williamson County line to Hillsboro is undergoing a \$2.1 billion reconstruction. When completed, this section will include three lanes in each direction, improved geometrics, and state-of-the-art traveler and traffic information systems.



Source: TxDOT.

Figure 3. Major Interstate and State Highway Corridors Serving Texas Ports.

- I-45 connects the ports of Galveston, Houston, and Texas City to the Dallas-Fort Worth Metroplex. I-45 is also a well-utilized facility, by both passenger vehicles and trucks. It is also a major hurricane evacuation route from Houston and southeast Texas. TxDOT plans to undertake a corridor planning study to examine options to enhance freight movements between Houston and the Dallas-Fort Worth Metroplex. For example, Dallas County Judge Clay Jenkins discussed the potential of a pilot project allowing heavier trucks on I-45 between Houston and UP’s Dallas Intermodal Terminal in south Dallas at one of the PCSWG meetings. The railroads are also looking at options to improve freight movements between Houston and the Dallas-Fort Worth area.
- I-10 extends the length of Texas from the Louisiana state line east of Beaumont to the New Mexico state line west of El Paso. It provides east-west connections for the ports of Beaumont, Port Arthur, Orange, Sabine Pass, Houston, Galveston, and Texas City. The Houston to San Antonio and the Houston, Beaumont, and

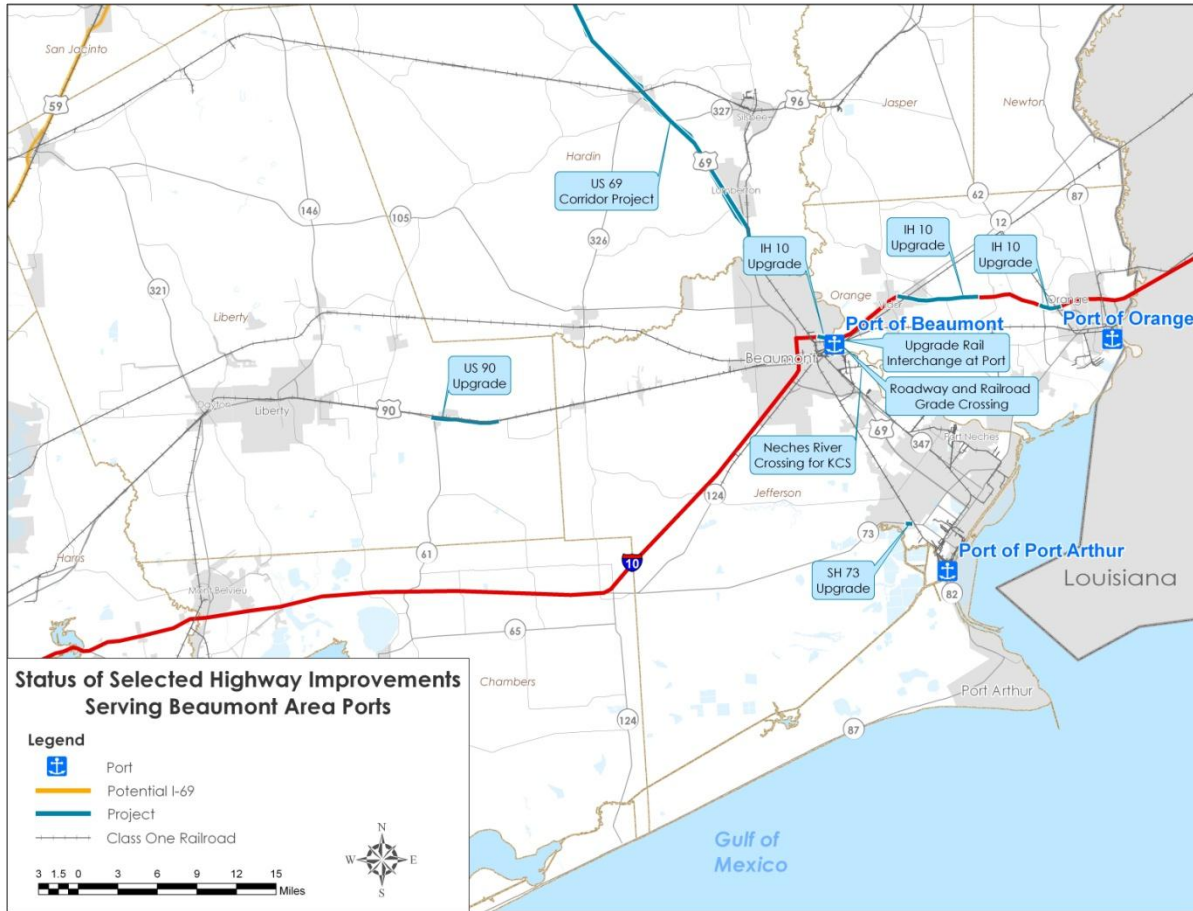
Louisiana sections are important links for port-related truck traffic. I-10 is heavily traveled and is especially congested in the Houston area during the peak periods. Major improvements were recently made on I-10 West in the Houston area.

- I-69 is a proposed national interstate extending from Texas to Michigan. The proposed route of I-69 in Texas will include existing highways as much as possible. These highways include US 59, US 77, US 84, US 281, and SH 44. TxDOT is using five segment committees to gain input from the public and groups in the areas. Following the recommendations of these committees, current sections of existing freeways are being designated as I-69 to help establish the interstate in Texas. In addition the existing right of way is being utilized to the greatest extent possible. Serving as a connection between international border crossings and most of the Gulf Coast ports along the Texas Gulf Coast, the development of I-69 will be of benefit to freight movement in the state, Texas ports, and the state's role as a leader in global trade. The Houston-Galveston Area Council (H-GAC) and Houston-area stakeholders noted the need to examine a southern reliever route for I-69 that would provide improved connectivity to ports and help reduce urban congestion.

PORT AREA TXDOT LANDSIDE PROJECTS

Figures 4 through 8 present the maps highlighting the projects in the different port areas used at the PCSWG meetings. Figure 4 presents the projects in the Beaumont and Port Arthur area. Figure 5 illustrates the projects in the Houston, Galveston, and Freeport area. Figure 6 presents the projects in the Victoria area. Figure 7 shows the projects in the Corpus Christi area, and Figure 8 highlights the projects in the Brownsville and Harlingen area. General information on the projects in each area is also provided. The need for these projects was identified prior to discussions concerning possible impacts of the Panama Canal expansion. The projects would benefit the movement of freight, including increasing exports and imports through Texas ports, as well as accommodating growth in trade resulting from the Panama Canal expansion.

As illustrated in Figure 4, TxDOT projects in the Beaumont and Port Arthur area focus on upgrades to I-10, US 90, and SH 73. Other projects include upgrading the Port of Beaumont rail interchange, the US 69 project, a new roadway/railroad upgrade crossing, and the Neches River Crossing Feasibility Study. These projects are highlighted below.



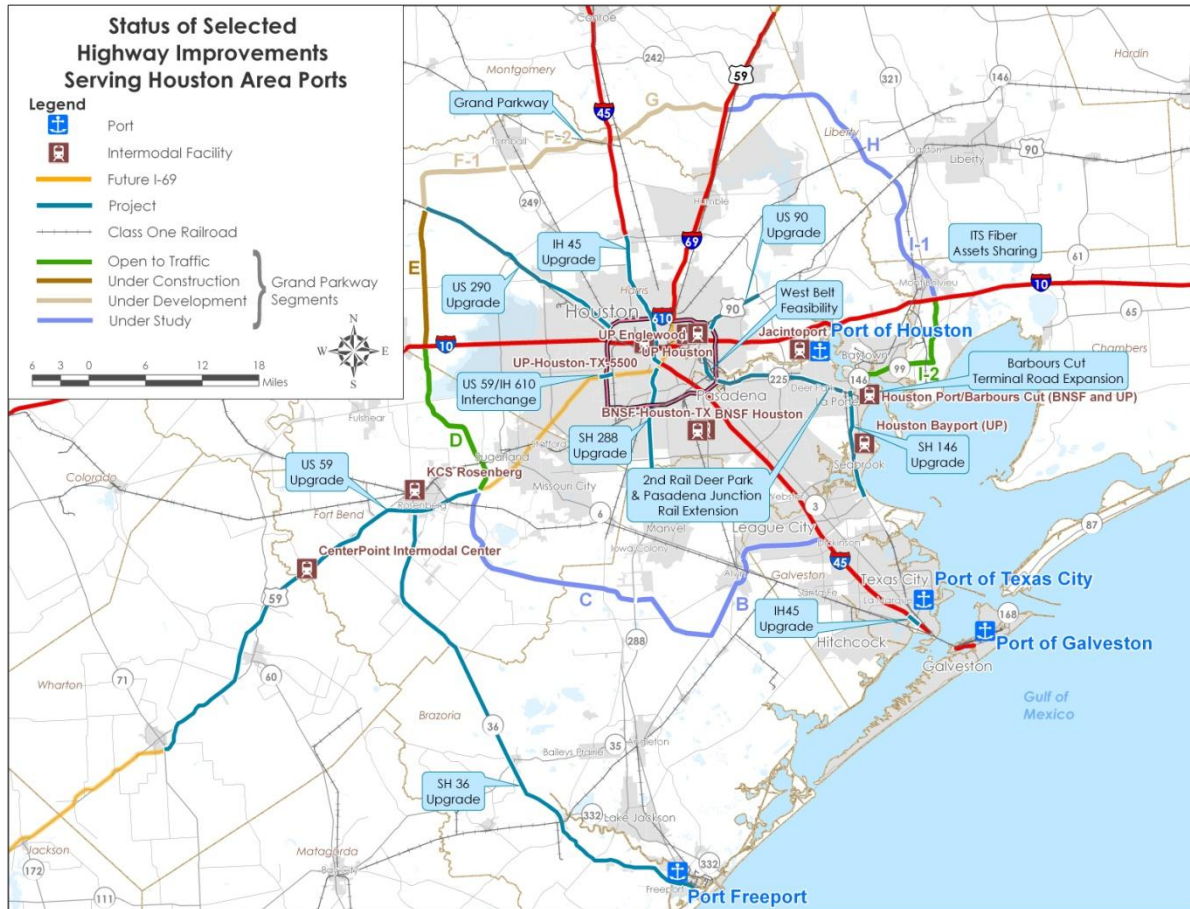
Source: TxDOT.

Figure 4. Beaumont and Port Arthur Area TxDOT Projects.

- I-10 is being upgraded. A project to replace the Neches River Bridge was let in February 2012. A widening project starting east of Vidor is slated to be let in the fall of 2013. Reconstruction of I-10 west of Orange is nearing completion.
- Upgrading a section of US 90 from a two-lane roadway to a four-lane roadway to the west of Beaumont is scheduled to be let in the summer of 2013.
- A railroad grade separation on SH 73 near the Port of Port Arthur is proposed but does not have funding yet.
- Projects in the Port of Beaumont include the Port of Beaumont rail interchange upgrade and a new roadway and railroad grade crossing.
- Environmental studies are being conducted on the US 69 corridor project in Hardin, Tyler, and Jasper Counties. This 54-mile four-lane highway would be on a new alignment, possibly an abandoned railroad corridor. It represents an estimated \$464 million project that would serve as a major trade corridor.

Speakers at the PCSWG meeting in Beaumont also noted the need for improvements to SH 87 from Port Arthur to Sabine Pass, SH 73 from Winnie to Port Arthur, and SH 78 from Sabine Pass to High Island.

As presented in Figure 5, there are numerous TxDOT projects in the Houston area. These projects will provide improved access to and from the Port of Houston, the Port of Texas City, the Port of Galveston, and Port Freeport. The major TxDOT projects in this area are highlighted below.

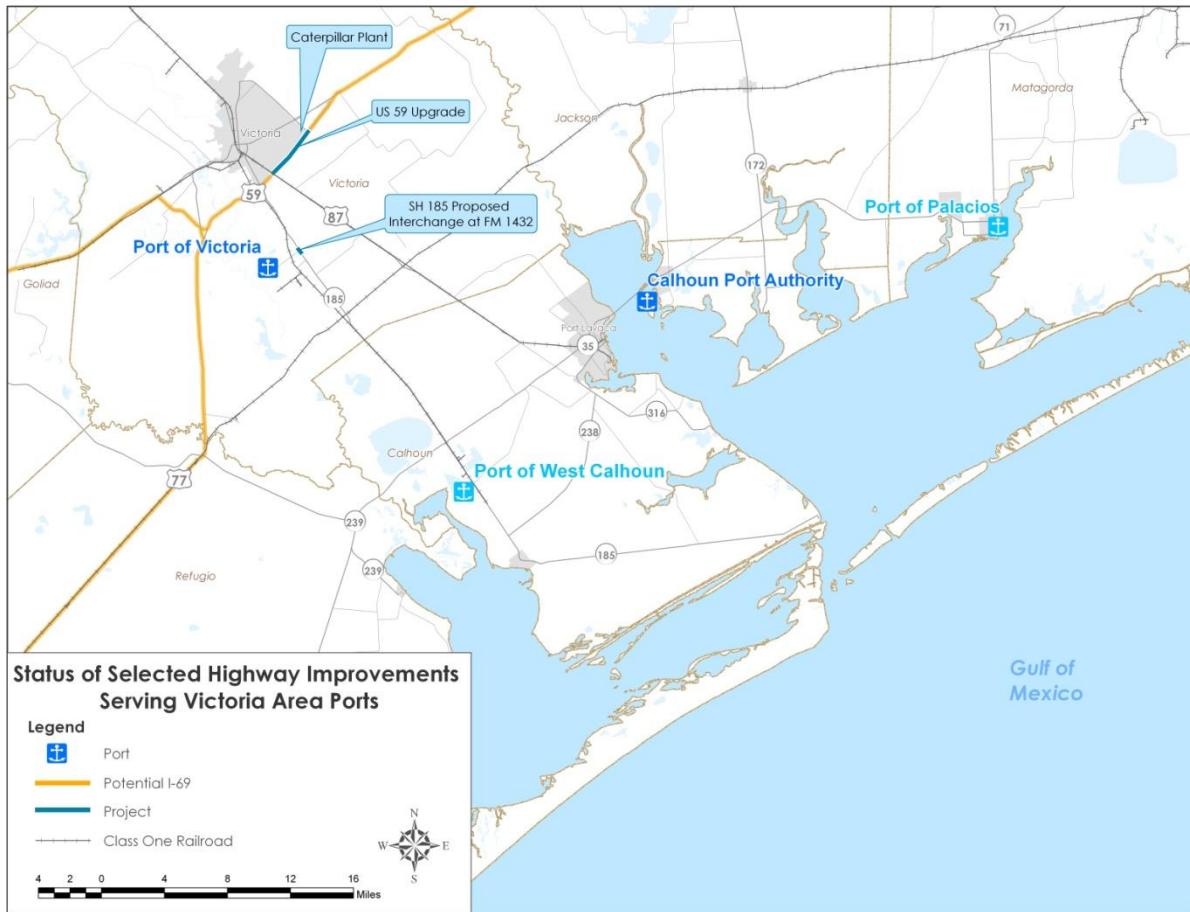


Source: TxDOT.

Figure 5. Houston, Galveston, and Freeport Area Projects.

- The American Association of State Highway and Transportation Officials (AASHTO), Federal Highway Administration (FHWA), and the Transportation Commission approved the I-69 designation on a 35-mile section from I-69/US 59 North I-610 to the Liberty County line.
- Completed projects in the Houston area include the Deer Park and Pasadena Junction rail extension, the Barbour's Cut Terminal road expansion, and the US 90 upgrade from I-610 to Beltway 8.
- Environmental studies are underway on widening and upgrading US 59 from SH 99 to the Fort Bend/Wharton County line, and environmental work is beginning through Wharton County.
- The estimated letting of the direct connector reconstruction of the US 59/I-610 interchange is the fall of 2018.
- Multiple grade separations on SH 146 are underway, as are upgrades on sections of I-45 (SH 146/SH 6 downtown to Beltway 8) and SH 36 (widening to four lanes).
- Segment D and Phase I of Segment I-2 of the Grand Parkway are open to traffic. Segment E is under construction. Phase 2 of Segment I-2 is currently under design. A developer was recently selected for Segments F-1, F-2, and G. Other segments are at various stages of development.
- US 288 is in the beginning stages of a public/private partnership procurement, and additional funding has recently been allocated to the US 290 project.
- A \$45 million project on SH 36 (Brazoria County) is part of the TxDOT Houston District's ongoing efforts to widen SH 36 from two to four lanes from Port Freeport north toward Fort Bend County. In the coming years, the district plans to widen SH 36 to four lanes all the way to US 59.

Figure 6 presents TxDOT projects in the Victoria area. These projects will benefit the Port of Victoria and the Calhoun Port Authority, as well as the Port of Palacios and the Port of West Calhoun. The following TxDOT projects are underway in the area.

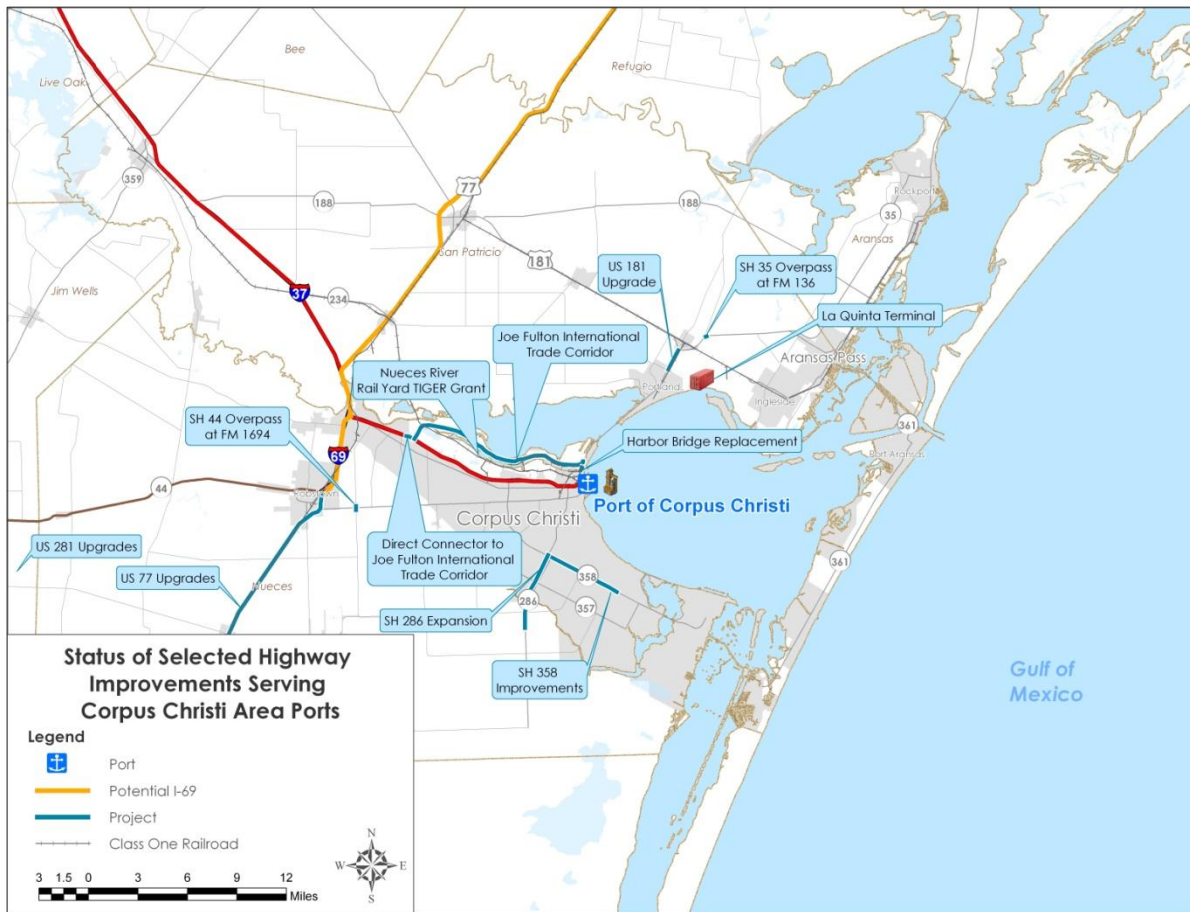


Source: TxDOT.

Figure 6. Victoria Area TxDOT Projects.

- US 59 is being upgraded to interstate standards from Loop 463 to US 87. This improvement will facilitate access to the new Caterpillar plant. It also makes progress in meeting interstate standards for I-69 designation. Also underway on US 59 are project development services related to the development of I-69 in Wharton County.
- The SH 185/FM 1432 interchange is being studied by the MPO for possible improvements.
- Approximately \$4 million has been allocated to the TxDOT district for safety and maintenance work for roadways impacted by energy developments.

Figure 7 illustrates the major TxDOT projects in the Corpus Christi area. As described below, a number of major projects are underway on US 77, US 281, and state highways. The Joe Fulton International Trade Corridor and the Nueces River Railyard were also noted by John LaRue of the Port of Corpus Christi in his presentation. The rail projects are described in Chapter VI. The US 181 Harbor Bridge replacement was also noted as an important project for accommodating post-Panamax vessels in the future.

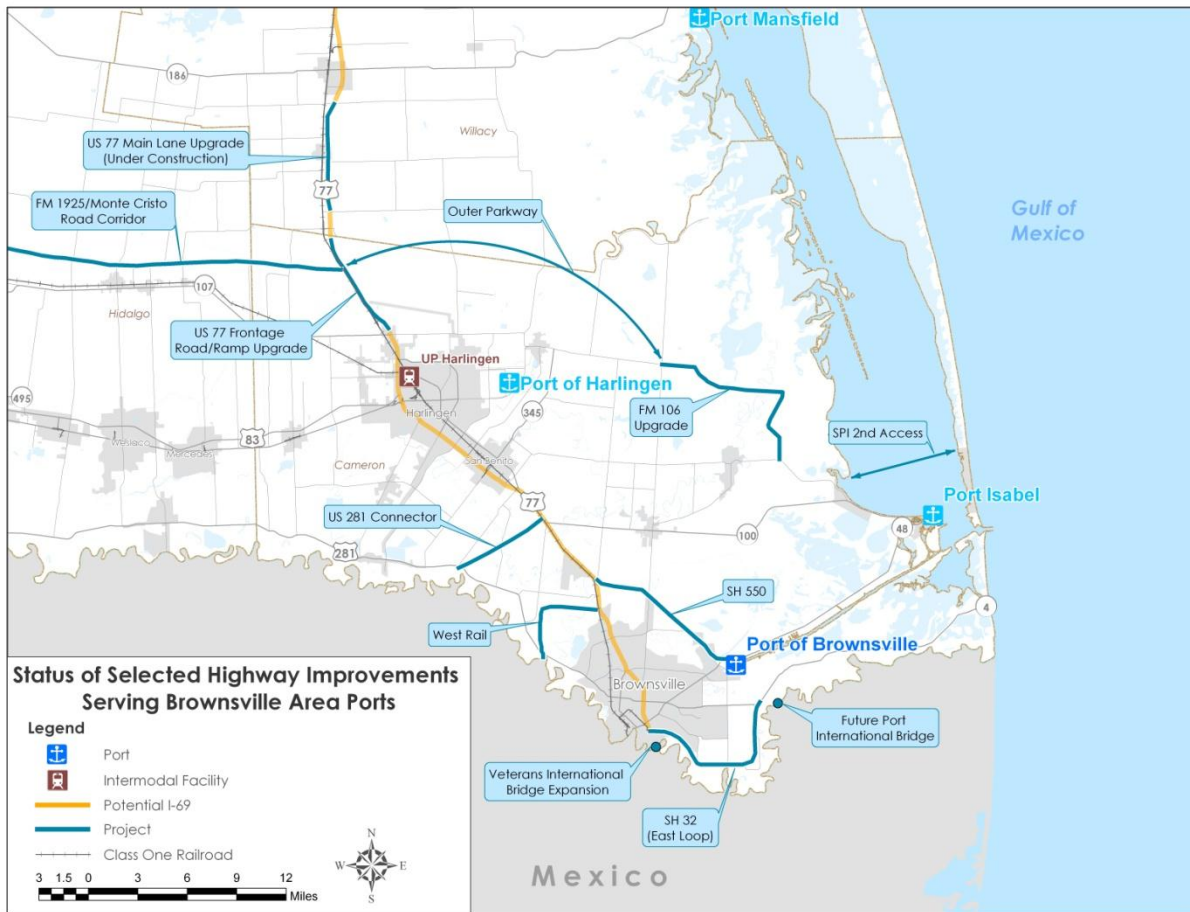


Source: TxDOT.

Figure 7. Corpus Christi Area TxDOT Projects.

- A number of improvements are being made to US 77 as part of the designation to I-69. A 122-mile Environmental Assessment and Development Plan was approved in July 2012. A project to construct the main lanes from SH 44 to FM 892 was let in July 2012. A project to construct the main lanes and overpasses from FM 892 to CR 28 is scheduled to be let in July 2013. A design/build project approach is being used from Kingsville to Driscoll.
- A number of projects are underway on US 281. The overpass at FM 1554 in Alice was let in July 2012. The Premont Relief Route Environmental Assessment is underway, as is a planning and feasibility study/interstate evaluation.
- Other projects underway include the SH 44 overpass at FM 1694 and the SH 286 expansion, which involves constructing new freeway lanes. Improvements to SH 358, including Phase IIA ramp and operational work, are scheduled for 2017. The SH 35 overpass at FM 136 is under construction. Another project, which is not funded yet, is the US 181 overpass between Portland and Gregory.
- The US 181 Harbor Bridge replacement represents a major project in the area. Environmental documents and schematics are currently being prepared. The Joe Fulton International Trade Corridor includes a number of projects. The Joe Fulton Direct Connector to I-37 is complete.
- Approximately \$10 million has been allocated to the TxDOT district for safety and maintenance work for roadways impacted by energy developments.

As illustrated in Figure 8, a number of projects are underway in the Brownsville and Harlingen areas. These projects serve the Port of Brownsville, the Port of Harlingen, Port Isabel, and the international bridge crossings into Mexico. Many of these projects represent the coordinated efforts of TxDOT, the Cameron County Regional Mobility Authority (CCRMA), the Hidalgo County Regional Mobility Authority (Hidalgo RMA), the ports, and other agencies and groups.



Source: TxDOT.

Figure 8. Brownsville and Harlingen Area TxDOT Projects.

- A number of projects are underway on US 77. The main lanes and overpass from FM 1018 to FM 3168 are under construction. The 122-mile Environmental Assessment and Development Plan was approved in July 2012. The SH 107/FM 508 interchange ramp upgrades and frontage road conversions represent other projects. As a result of MAP-21, I-69 designation efforts are underway.

- The SH 550 toll road from US 77/83 to the new Port of Brownsville entrance represents a CCRMA and TxDOT project, as does the SH 32 (East Loop) new roadway from US 77/83 to the Port of Brownsville.
- The extension to FM 106 to General Brandt Road is scheduled for letting in July 2013.
- Longer-term projects include a second access to South Padre Island and on Outer Parkway, the FM 1925/Monte Cristo Road Corridor, the West Rail UP railway relocation project, the Veterans International Bridge Expansion, and the US 281 Connector.

CHAPTER VI—PORTS, THE GIWW, RAILROADS, PIPELINES, AND OTHER PROGRAMS AND POLICIES TO ENHANCE TEXAS’ POSITION IN GLOBAL TRADE

A multimodal transportation system—including ports, the GIWW, roads, railroads, and pipelines—is needed to further strengthen Texas’ position in global trade and potential benefits to Texas from the Panama Canal expansion. The state is well served by these transportation modes, but improvements in existing facilities and new capital investments have been identified in previous studies to address capacity concerns and bottlenecks. While not all projects are specifically linked to the Panama Canal expansion, all would help support potential opportunities from the Panama Canal expansion, as well as to meet the needs of the state’s growing population and energy sector. Additional programs and policies can support these modes and better position the state to expand its role as the nation’s export leader, as well as increasing imports. Ports, railroads, pipelines, and many programs and policies are beyond TxDOT’s jurisdiction. The department may play a facilitating and coordinating role in some of these activities, however.

The status of existing channel widening and deepening projects at Texas ports, the existing rail system, and possible rail improvement are summarized in this chapter. An overview of the pipeline system in the state is also represented. A more extensive assessment of possible pipeline needs was beyond the scope of this project. The chapter also includes a discussion of possible programs, policies, and strategies to enhance the benefits of the Panama Canal expansion and other opportunities facing the state.

PORTS

Texas ports play a critical role in the state’s transportation system and are key to the state’s economy. Figure 9 illustrates the major commercial ports in the state and the GIWW. Texas’ ports complement, rather than compete, with each other. Although the petroleum, petrochemical, and agricultural sectors form the base for many ports, the various ports tend to serve different functions, markets, and niches. For example, the Port of Houston handles approximately 65-75 percent of Gulf container traffic, the Port of Beaumont is the primary port in the country for the shipment of military cargo, the Port of Victoria serves primarily barge traffic, the Port of Texas City handles primarily liquid products, and tenants at the Port of Brownsville are leaders in constructing offshore oil rigs. The ports offer unique benefits, present different opportunities, and have different landside transportation needs.

Table 3 presents information from USACE on the depths of Texas commercial ports. The ports of Houston, Corpus Christi, Texas City, Freeport, and Galveston currently have 45 ft depths. Five ports have harbor and channel-deepening projects moving through the federal approval process. The ports of Beaumont and Port Arthur, which are served by the Sabine-Neches Waterway operated by the Sabine-Neches Navigation District (SNND), received a signed Chief's Report for improvements to 48 ft in July 2012. The SNND is currently awaiting funding through the congressional process. The Port of Corpus Christi submitted a draft Limited Reevaluation Report for a 52 ft port depth to the Southwest Division of USACE in July 2012. Port Freeport is anticipating a Chief's Report in December 2012 for an improved depth of 50-55 ft. The Port of Brownsville is in the process of developing the justification for a depth of 45-52 ft, with a Chief's Report anticipated in August 2014.



Figure 9. Texas Commercial Ports and the GIWW.

Table 3. Depths of Texas Ports Examined in This Project.

Texas Ports*	Authorized Depth (ft)	Under Study	
		Improved Depth (ft)	Status
Houston (2)	45	45	Construction Completed in June 2005
Beaumont (4)	40	48	Chief's Report Signed July 2011
Corpus Christi (6)	45	52	Draft LRR to SWD July 2012
Texas City (10)	45	45	Construction Completed in June 2011
Port Arthur (25)	40	48	Chief's Report Signed July 2011
Freeport (27)	45	50-55	Chief's Report December 2012
Galveston (41)	45	45	Construction Completed March 2011
Matagorda (54)	38	38	No improvements forecasted
Brownsville (78)	42	45-52	Chief's Report August 2014
Victoria (89)	12	12	No improvements forecasted

*National ranking of port is in parentheses.

Source: U.S. Army Corps of Engineers.

In addition to these projects, Texas ports fund ongoing dredging and maintenance, as well as improvement projects. For example, Port Freeport is pursuing a \$35 million project to widen the Freeport harbor entrance channel from 400 ft to 600 ft. A variety of local funding sources are being used on the project, which will allow two-way traffic for certain vessels and will accommodate wider vessels, including LNG tankers.

The Texas Legislature took initial steps in 2001 to address port capital needs. Legislation was passed creating Chapter 55—Funding of Port Security, Projects, and Studies within the Texas Transportation Code. The chapter established the Port Authority Advisory Committee, the Port Access Account Fund, and the Capital Program. The Texas Transportation Commission appoints the seven-member Port Advisory Committee, which is responsible for developing the annual Capital Program containing the projects and funding requests submitted by the state's public ports. The Port Access Account Fund provides the mechanism for cost sharing between the state and a port on a 50-50 basis for the projects included in the Capital Program.

The annual Capital Program prepared by the Port Authority Advisory Committee is submitted to the governor, lieutenant governor, speaker of the House of Representatives, and Texas Transportation Commission. The number of ports submitting projects, the number of

projects, and the requested funding has varied by year. There were 87 projects submitted by 15 ports in the 2010-2011 Capital Program. With the 50 percent local matching fund requirement, these projects accounted for approximately \$279 million in state funds. The 2011-2012 Capital Program included 81 projects submitted by 16 ports, totaling approximately \$336 million in state funding. The 2013-2014 Capital Program included 51 projects submitted by 10 ports, totaling approximately \$239.9 million in state funding. These projects represent only a small portion of the ports' capital programs.

The projects in the Capital Program include improvements to docks and warehouses, port security, rail, and off-system roads. New infrastructure and deepening and widening feasibility studies are also included in the Capital Program. No funding has ever been allocated by the legislature to the Port Access Account Fund, however. As a result, no projects have been funded through this mechanism. It appears that the lack of funding may result in some ports not submitting requests on a regular basis.

Table 4 presents the transportation projects included in the Texas Ports 2013-2014 Capital Program, which are limited to those that meet the legislative language. A total of 12 transportation projects, with a total estimated cost of \$131.7 million, were included in the 2013-2014 Capital Program. These projects represent only a small percentage of the capital investments being made by ports in transportation, docks, and other infrastructure improvements.

Table 4. Transportation Projects Included in the 2013-2014 Texas Ports Capital Program.

Area	Project	Project Description	Estimated Total Cost (Millions)
Beaumont	Orange County railroad overpass	Construct railroad overpass	\$9.0
Beaumont	Kansas City Southern Railway Company (KCS) railroad bridge improvement	Upgrade and double truck KCS railroad bridge across Port of Beaumont ship channel	\$16.0
Brownsville	Rail access at docks	Construct rail improvements at Cargo Docks 15 and 16	\$2.2
Corpus Christi	Nueces River railyard improvements, Phase II	Improvements to Nueces River railyard	\$28.8
Corpus Christi	Realignment of interchange yard	Realign existing interchange yard	\$11.2
Corpus Christi	Rail and road improvements at La Quinta Terminal	Rail and road improvements to multi-purpose dock and terminal	\$20.0
Galveston	41 st Street Harborside entrance	Secure easements and construct entrance from Harborside Drive/ SH 275 to Old Port Industrial at 41 st Street	\$1.5
Galveston	Internal traffic circulation	Construct roads and rehabilitate railroad crossings to ensure safety and to improve internal traffic circulation	\$5.0
Houston	Reconstruction of High Level Road	Reconstruction of High Level Road from I-610 feeder road to Gate 2 Road	\$20.0
Port Arthur	Rail extension and enlarge staging area	Extend rail and enlarge truck staging area	\$6.5
Port Arthur	Rail extension to Industrial Park South property	Extend rail line to Industrial Park South property	\$5.5
Port Arthur	Road improvements	Improve road surface between rail and roadways	\$6.0

Source: 2013-2014 Texas Ports Capital Program.

GULF INTRACOASTAL WATERWAY (GIWW)

The GIWW is part of the nation's Inland Maritime Transportation System. The GIWW is 107 years old and spans over 1000 miles from Brownsville, Texas, to St. Markso, Florida. As illustrated in Figure 10, the GIWW includes 423 miles in Texas. It connects Texas ports and links them with ports in Louisiana, Mississippi, Alabama, and Florida. It provides a key link for Texas waterborne freight. Texas accounts for approximately 63 percent of the traffic on the GIWW. In 2010, approximately 73 million tons of cargo, valued at \$28 billion, was transported on the GIWW in Texas. Approximately 87 percent of this cargo was petroleum or petrochemical

products. The GIWW is the nation's third busiest inland waterway, behind the Mississippi River and the Ohio River.

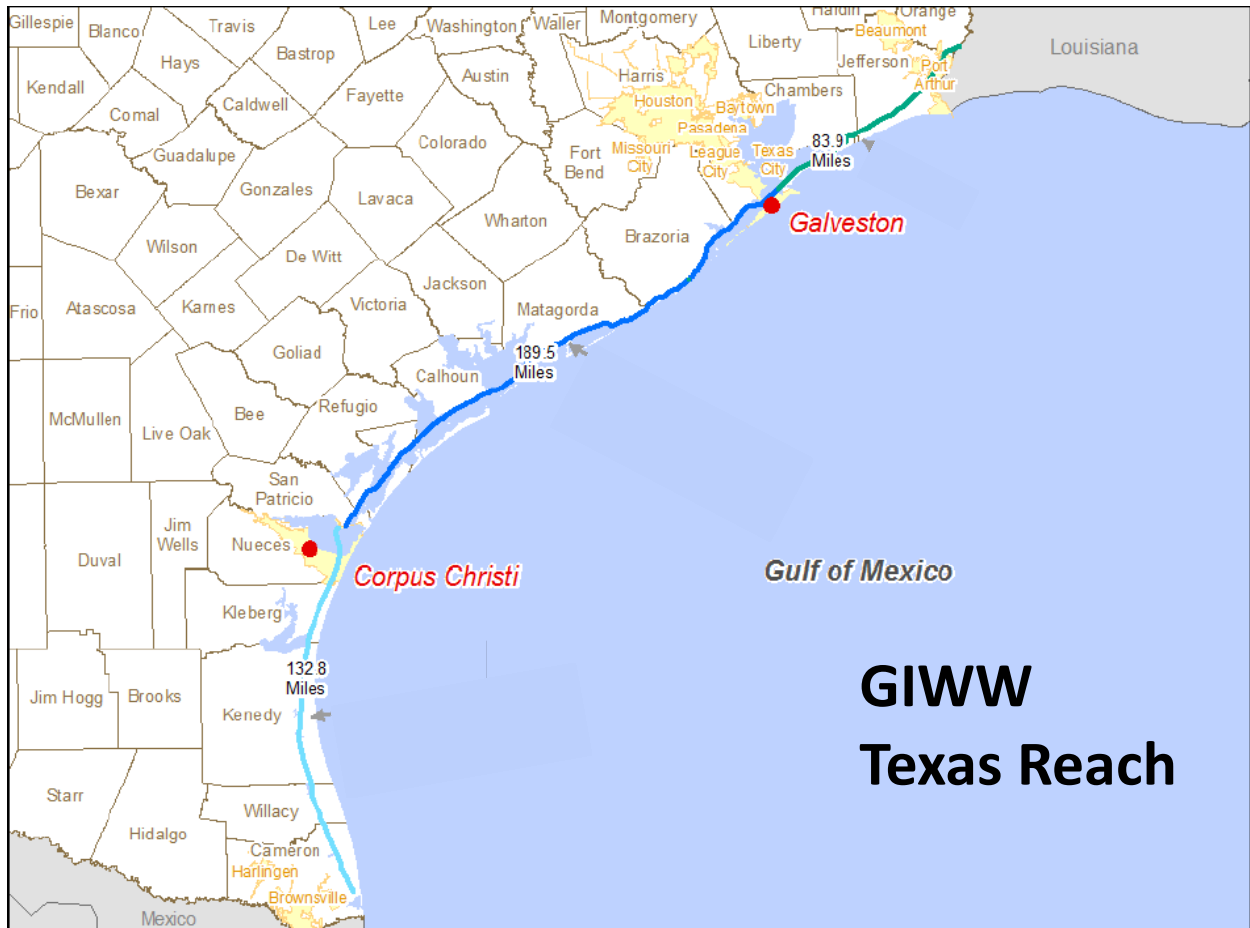


Figure 10. Gulf Intracoastal Waterway.

The navigable channel of the GIWW is generally 125 ft wide and 12 ft deep. Many sections are not being maintained to the 12 ft depth, however, due to funding limitations for needed dredging. Combinations of barges, called tows, are authorized to travel at a width of 108 ft. Because of narrow widths, tidal conditions, and weather, tows must often utilize waters outside the authorized channel to pass and navigate difficult bends.

The GIWW is maintained by USACE, providing federal funds to dredge, operate, and maintain the structures and navigability of the waterway. The 1975 Texas Coastal Waterway Act, codified as Texas Transportation Code, Chapter 51, established TxDOT as the local non-federal sponsor of the GIWW. The department's primary responsibility is to provide lands, easements, rights of way, relocations, and necessary disposal areas for maintenance and operation of the GIWW.

TxDOT has sponsored research projects on different aspects of the GIWW and waterborne freight. Topics addressed in these studies include containerized freight movement, short sea shipping, the value of Texas seaports, and protecting waterways from encroachment.

Other projects examined policies and incentives to encourage the movement of containerized freight on Texas inland waterways, as well as waterborne freight corridors.

These studies, other TxDOT projects, and speakers at the PCSWG meetings identified issues associated with the GIWW. One issue is inadequate funding for USACE to maintain the depth of the channel and to make other needed improvements. The Galveston District of USACE has been receiving approximately \$24 million to \$27 million in annual funding for dredging maintenance of the GIWW. The district has the need and the capacity for approximately \$60 million annually to support dredging to maintain the 12 ft depth of the GIWW. Addressing this need provides an important opportunity for USACE, Gulf Coast ports, users of the GIWW, and TxDOT to work in partnership to establish a strategy for funding and maintaining the GIWW.

Encroachment from housing and commercial development on the GIWW represents another issue. USACE is establishing revised, realistic setback policies to assist in preventing encroachment. Another issue is that the dimensions and structures of the GIWW do not adequately support the state of barge transportation today. There is also a need for additional mooring structures at numerous locations. Additionally, the Brazos River floodgates and the Colorado River locks are over 50 years old and are only 75 ft wide, which creates inefficiencies by requiring barge chains to be broken down and barges moved through individually. Cost estimates for these improvements have not been identified.

The GIWW enhances the competitiveness of Texas ports. It will continue to play an important role after the expansion of the Panama Canal. The recent Eagle Ford Shale development is resulting in increases in GIWW barge shipments. Additional use of the GIWW would also avoid overburdening the surface transportation system. As the non-federal sponsor of the GIWW in Texas, TxDOT's support is critical to providing maritime representation and focus.

PCSWG members discussed the importance of the GIWW to freight movement in Texas. It was suggested that the GIWW is the sleeping giant—it does not get much visibility but is a key element of the freight-waterway system. The need for adequate funding for dredging and critical improvements was discussed, along with the role TxDOT could play in addressing these needs.

RAILROADS

The rail network in Texas is critical to the port system. Railroads bring raw materials and products to ports for export and transport imports to inland markets. The three Class I railroads operating in Texas—the BNSF Railway, UP, and KCS—all serve some ports. BNSF and UP operate over 93 percent of the Class I track mileage in the state. In addition, some ports are served by a dedicated switching railroad or operate their own on-site railroads, linking to the Class I railroads.

The location of the major rail lines and intermodal facilities are illustrated in Figure 3 in Chapter V. The intermodal facilities and hubs in the Houston area and the Dallas-Fort Worth

Metroplex serve not only Houston ports, but ports in other parts of the country, and play important roles in the U.S. rail system.

A number of railroad improvements have been identified in previous studies and plans. The Texas Rail Plan, the TxDOT Waterborne Freight Corridor Study, the TxDOT Houston Region Freight Study, the Port Capital Plans, the H-GAC Regional Goods Movement Study, and other studies identified a number of rail improvement needs. As noted previously with the roadway projects, these rail projects were identified previously to address capacity needs, bottleneck issues, and other concerns. They are not linked to the Panama Canal expansion. Undertaking these projects will assist in meeting future opportunities associated with population increases and energy developments in the state and the Panama Canal expansion, however.

A number of these projects focus on railroad grade crossing improvements to address safety, capacity, and congestion. The majority of these projects are in the Houston area, where numerous automobile-train collision hot spots and safety and impedance situations exist. These projects were identified prior to extensive discussion of the Panama Canal expansion and potential impacts on Texas.

The following projects currently underway or planned were noted by TxDOT personnel and other speakers at the PCSWG meetings:

- **Double-Tracking the Single-Track Bridge near the Port of Beaumont.** TxDOT is currently conducting a freight movement feasibility study investigating the possibility to double-track the single-track bridge owned by KCS in the vicinity of the Port of Beaumont. The project would improve operations for UP and BNSF trains along the major west to east route.
- **Additional Rail Line at West Belt Junction.** This planned \$13.7 million project would construct a second 4000 ft rail line parallel to the existing UP rail line at West Belt Junction (along Hardy Road near Crosstimbers Road) in north Houston. The additional rail line would significantly improve existing rail operations.
- **The Nueces River Rail Yard at the Port of Corpus Christi.** This rail yard, which is one element of a larger rail modernization master plan, received a \$10 million TIGER grant in 2012 for siding and storage tracks. Other elements of the rail modernization plan are anticipated through cooperative arrangements among the ports, TxDOT, railroads, the Nueces County Rural Rail District, the San Patricio Rural Rail District, industries, and other groups.
- **West Rail.** This project will relocate the Union Pacific Railroad (UPRR) line from the Rio Grande River to US 77/83 north of Brownsville. It was developed through a partnership between TxDOT, Cameron County, CCRMA, and the City of Brownsville. The improvements, which include construction of a new international rail bridge and approximately 6 miles of new single rail track from the new bridge to US 77/83, will eliminate 11 at-grade crossings within

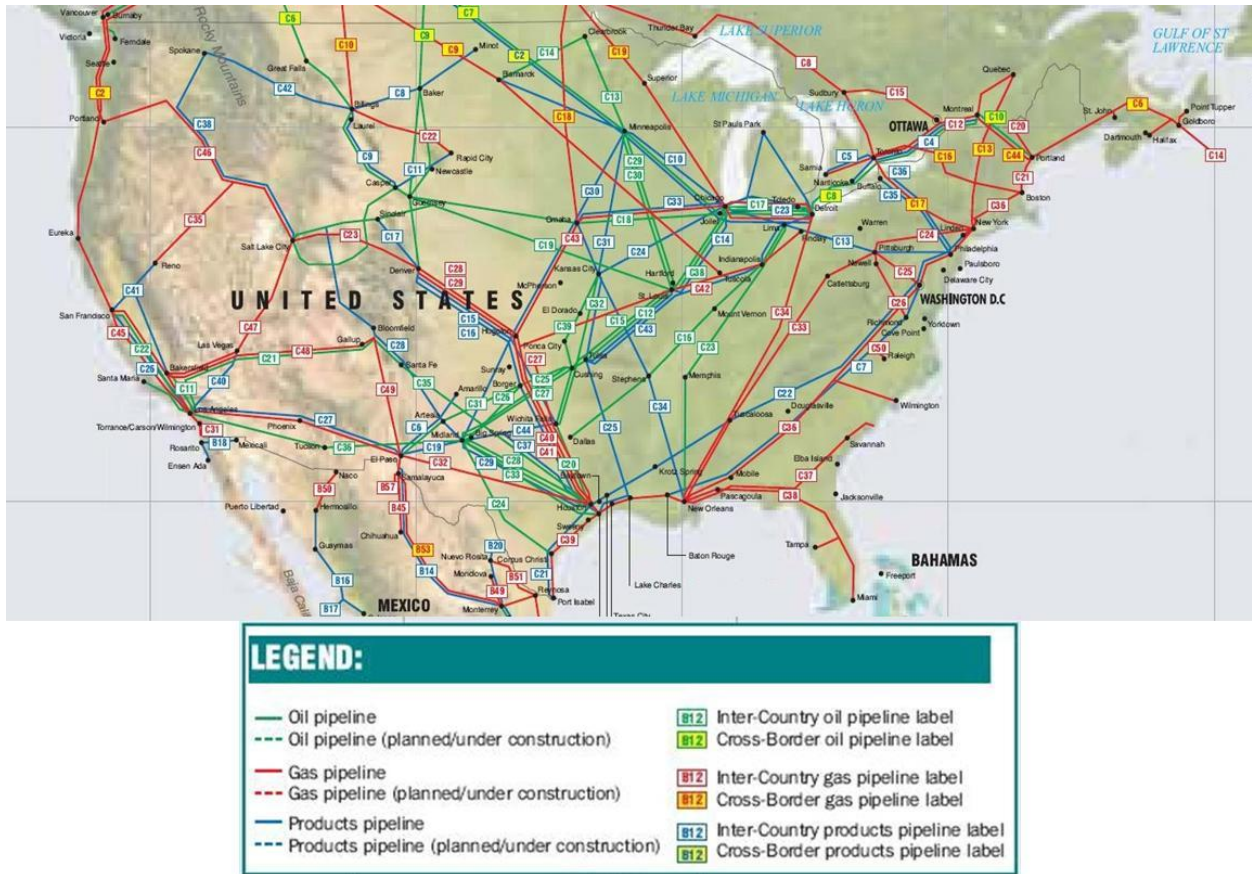
Brownsville. The project is currently under construction and approximately 71 percent complete with a construction cost of \$24.8 million. Once this new rail line is complete, it will provide a direct connection from Mexico to the Port of Brownsville.

- **Port of Houston Authority Barbours Cut Intermodal Facility.** The Port of Houston Authority's intermodal facility at Barbours Cut has been planned and developed to facilitate increasing container trade by rail. The intermodal terminal is available for customers using either the Bayport or Barbours Cut container terminals. The facility is currently operating at 40 percent capacity and is ready to accommodate growth. The Port of Houston Authority has also planned an intermodal facility at the Bayport container terminal, which stands ready for development as soon as there is market demand.
- **Gulf Coast Rail.** UP has noted that capacity needs to be added to its Houston-Brownsville route to accommodate traffic growth to and from the ports of Brownsville, Corpus Christi, Victoria, and Freeport. This includes structural improvements to the Algoa-Brownsville line and its bridges to provide weight-carrying capacity for 143-gross-ton rail cars (286,000 lb). BNSF has trackage rights authority over this entire route, and KCS uses a portion of it. In addition to upgrading the weight limitations for the entire line, initial needs also include a second track on the UP line between Angleton and Algoa and on the BNSF line shared with UP between the T&NO Junction in Houston and Alvin. Another pressing need is to add a siding on the UP line between Freeport and Angleton to handle increasing traffic to and from Port Freeport and the important chemical shippers in the Freeport area. Consideration should also be given as part of any line capacity project that there is sufficient rail staging capacity at or near the ports.

PIPELINES

Pipelines are the unseen freight transportation mode. The United States has the largest network of energy pipelines of any country in the world. Pipelines are used to transport oil, natural gas, and refined products from producing areas to refineries, processing plants, and ports, and on to marketplaces throughout the country.

Pipelines are a critical part of the multimodal transportation system in Texas. As Figure 11 illustrates, pipelines connect to most of the Texas ports, including to docks and storage facilities at some ports. An examination of the pipeline system was beyond the scope of this project, except as information was provided by speakers at PCSWG meetings. A brief summary of pipelines in the United States and Texas is provided in this section as background.



Source: U.S. Army Corps of Engineers.

Figure 11. Pipeline Connections to Texas Ports.

There are two general types of energy pipelines: oil pipelines and natural gas pipelines. The oil pipeline network includes both crude oil lines and refined products lines. Crude oil is collected by gathering lines in producing areas, including Texas, Wyoming, Louisiana, and Oklahoma. It is estimated that there are 30,000-40,000 miles of gathering lines in the United States, which are small pipelines of 2-8 inches in diameter that collect crude oil from onshore and offshore wells. These gathering lines connect to larger trunk lines, which are typically 8-24 inches in diameter. There are also larger trunk lines measuring 48 inches in diameter. As Figure 11 shows, many of these trunk lines are oriented to the Houston and Beaumont areas. There are approximately 55,000 miles of crude oil trunk lines in the United States.

The second group of oil pipelines carries refined petroleum products, including gasoline, jet fuel, home heating oil, and diesel fuel. Refined product pipelines range in size from 8 inches to 42 inches in diameter. There are approximately 95,000 miles of refined product pipelines. These pipelines deliver refined petroleum products to storage tanks at large fuel terminals. The Gulf Coast also has many refined product pipelines.

The natural gas pipeline system is organized slightly differently. Natural gas is collected by small gathering pipeline systems and moved to gas processing plants. There are

approximately 20,000 miles of natural gas gathering lines in the country. Impurities are removed at the processing plants, and large cross-country transmission pipelines—both onshore and offshore lines—carry the natural gas throughout the country. There are approximately 278,000 miles of natural gas transmission lines. Main lines are used to connect the transmission lines with cities, where smaller lines connect to homes and businesses.

Oil and gas pipelines are owned and operated by different companies and groups. Royal Dutch Shell, British Petroleum (BP), ExxonMobil, and other large oil companies operate pipeline systems serving large regions of the country. There are also companies specializing in operating pipelines that are not involved in other aspects of the oil business. Companies owning and operating power plants, chemical plants, or other related businesses often operate small pipeline systems to service their needs. Natural gas pipelines are owned and operated by a mix of large, regional, and small companies and municipal gas systems. The railroads also have taken on a major role in transporting crude oil. In particular, railroads are transporting crude oil from the Bakken Shale Oil Field in North Dakota to Houston and Galveston.

OTHER PROGRAMS AND POLICIES

A number of programs, projects, strategies, and policies that public and private sector groups could undertake to increase exports and imports through Texas ports were identified during discussions at the PCSWG meetings. Working together, state and federal agencies, ports, MPOs and RMAs, cities and counties, shippers and carriers, and other groups can support needed infrastructure improvements, increase the use of existing facilities, provide a coordinated promotion of the state's transportation system, and present a unified voice with federal funding sources and other groups. Examples of these programs, projects, strategies, and policies are highlighted in this section:

- As noted previously, the Texas Legislature established the Port Access Account Fund in 2001. It has never been funded, however. Examining potential revenue sources to fund the account and identifying those sources that appear most viable would be a beneficial step.
- Consideration could be given to providing incentives for use of the GIWW. These incentives could focus on shipments serving Texas and Gulf ports, as well as shipments between Texas ports destined for international markets. A study examining possible incentives, funding sources, and program elements would be a beneficial first step.
- Texas should build on existing programs at the Office of the Governor—Economic Development and Tourism promoting international trade by developing and implementing a “Texas Global Gateway” marketing and information program focusing on shippers and carriers. The Trade and Export component of the Texas Wide Open for Business™ initiative at the Office of the Governor—Economic

Development and Tourism provides resources for businesses in Texas interested in developing and expanding exports. Links are provided to other programs, including Export.gov, the International Trade Administration (ITA) and the National Export Initiative, the Export/Import Bank of the U.S. (EX-IM Bank), the U.S. Small Business Administration (US SBA) Office of International Trade, the U.S. Commercial Service's U.S. Export Assistance Center in Texas (USEAC), the U.S. Department of Agriculture Foreign Agent Service (USDA FAS), the Texas District Export Councils (DECs), the Office of the U.S. Trade Representative, the U.S. International Trade Commission, and other agencies and organizations. The "Texas Global Gateway" would expand on these efforts by providing a one-stop source for information on all transportation modes in Texas, as well as other programs of interest to international clientele. It would provide a unified and comprehensive approach for promoting Texas on a national and international scale with shippers and carriers and other groups responsible for exports and imports. A first step would be to develop the Texas Global Gateway concept in more detail and identify the funding levels needed to support such a program.

- TxDOT can serve a central coordinating role among Texas ports, counties, cities, and other groups to bring the importance of sufficient and reliable funding for ports, the GIWW, and landside transportation infrastructure to the attention of federal authorities. Key to this success is building a consensus approach in the Texas Congressional Delegation.
- Explore the potential use of public-private partnerships for financing, designing, constructing, and operating port and landside transportation improvements.

CHAPTER VII—FINDINGS, RECOMMENDATIONS, AND ACTIONS

This chapter presents the findings, recommendations, and actions from this research project and the work of the PCSWG. The overarching finding is discussed first, followed by findings, recommendations, and actions related to short-, mid-, and long-range TxDOT highway infrastructure projects. Findings, recommendations, and actions are also identified related to developing a Texas freight plan, the GIWW, ports, rail, and promoting the state with shippers and carriers through a Texas Global Gateway concept.

The overarching finding from the study is that the Panama Canal expansion—coupled with continued population growth in Texas, energy sector developments, and the emergence of new trading partners throughout the world—represents opportunities to expand Texas’ position as a global gateway for the nation. By providing a low-cost, reliable, multimodal, and environmentally sustainable supply chain, the state can increase global trade, create new jobs, and expand the economy of the state and nation.

- Texas should invest in freight transportation infrastructure.
- Freight transportation infrastructure investments grow commerce.
- Commerce grows the tax base of the state.

To increase global trade and economic development, Texas must develop processes that provide a transportation system focused on commerce, including Texas ports, the GIWW, the roadway system, the rail system, and the pipeline network. It is critical that Texas accelerate investments in freight transportation infrastructure to grow commerce and increase the tax base of the state.

TXDOT HIGHWAY INFRASTRUCTURE PROJECTS

Finding 1—TxDOT, working with its partners, has numerous projects in different stages of planning, design, and construction that address critical transportation needs in the state. As described in Chapter V, many of these projects focus on key trade corridors and connections to Texas ports. Working with available funding and recognizing that significant priorities exist throughout the state, TxDOT should strive to advance these projects in a timely fashion to address freight flow, safety, security, congestion, and environmental issues, and to strengthen Texas’ position in global trade.

Recommendation 1.1—All of the projects identified in Chapter V are important and should be pursued. The following short-, mid-, and long-term projects are highlighted by the PCSWG as specific opportunities that are especially important to expanding Texas’ position in global trade. Advancing these projects within the recommended time frames is presented as a goal for TxDOT and other agency partners.

Short-Range (1-3 Years)

- Complete the SH 550 toll road between US 77/83 to the new Port of Brownsville entrance, including interchange connections between SH 550 and US 77/83.
- Continue the I-69 route designation efforts and work to upgrade priority segments of designated highways to interstate standards to serve as I-69, consistent with the recommendation of the I-69 citizen advisory committees.
- Initiate development and construction of Segments H and II of the SH 99/Grand Parkway, providing a connection between I-69/US 59 and the Port of Houston.
- Initiate development and construction of mobility improvements along SH 288 south of downtown Houston, including segments in Harris and Brazoria Counties. The SH 288 corridor is an important connection between the Port of Freeport and the Houston metropolitan area.
- Improve pavement, drainage, and operational conditions along SH 73 between Winnie and Port Arthur and along SH 87 within the Port Arthur area.
- Conduct a planning study in coordination with H-GAC to assess opportunities to provide relief options for I-69 south of Houston to improve port access, reduce congestion, and facilitate hurricane evacuations. The study should consider improved connections to I-69 east and west of the Houston area, as well as to SH 146 along the Houston Ship Channel and Galveston Bay.
- Develop strategies to improve freight flow along the I-45 corridor between the Houston and Dallas-Fort Worth metropolitan regions. Consider options for improved rail service along with enhanced and more efficient truck freight mobility.
- Examine strategic opportunities to link the Ports-to-Plains Corridor, which is proposed to extend from Laredo through west Texas to Denver, Colorado, with Texas deep water ports to help improve transportation services between Texas ports and agricultural and energy-producing regions of Texas and North America.
- TxDOT districts should work closely with local port operators and other stakeholders to identify needs for safety and congestion improvements in response to growing and evolving truck traffic demand serving the ports. For example, increased truck traffic serving the Port of Victoria with energy sector shipments can cause lines of vehicles to extend onto adjacent state highways serving the port area.
- Develop funding and maintenance strategies to address energy sector impacts on state and county roads to ensure safe and efficient freight flows between energy-producing areas of the state and Gulf Coast ports.

Mid-range (4-8 Years)

- Complete priority segments to widen and upgrade SH 146 to an expressway between NASA Road 1 in Harris County and State Loop 197 in Texas City/Galveston County. This highway segment serves traffic operating between the ports of Houston, Texas City, and Galveston.
- Complete I-10 upgrades in the Beaumont area, including the Neches River Bridge and the widening project to six lanes east of the KCS Railroad at Vidor and reconstruction/future expansion efforts along I-10 west of Orange. Provide railroad grade separation on SH 73 near the Port of Port Arthur.
- Complete upgrading and widening priority segments of SH 36 in Brazoria and Fort Bend Counties to provide improved highway service between I-10, I-69/US 59, and Port Freeport.
- Initiate interchange improvements along SH 185 at FM 1432 to better serve truck traffic at the Port of Victoria as identified by the Victoria Metropolitan Planning Organization.
- Complete I-69 connection along US 77 from I-37 to the Port of Brownsville.
- Work to support the SH 32/East Loop under development by CCRMA to provide a new oversize/overweight freight route connecting the Port of Brownsville with the Veterans International Bridge and the I-69/US 77/US 83 corridor.

Long-Range

- Upgrade the US 69 corridor through Hardin, Tyler, and Jasper Counties to provide a four-lane roadway. These improvements will enhance safety and freight mobility along this route and provide a connection between I-69/US 59 and the ports at Beaumont, Port Arthur, and Orange.
- Completion of the full length of I-69 through the state is anticipated to be a long-range project; however, continued efforts should be made to address priority segments and enhance freight service to ports and international border crossings.
- Complete improvements to upgrade and widen the north end of SH 146 in Harris County, as well as the southern portion of Segment I-2 of SH 99/Grand Parkway in Baytown/Chambers County in order to provide for a continuous expressway facility through the Port of Houston area and extending to Texas City.
- Complete improvements to upgrade and widen SH 36 in Brazoria and Fort Bend Counties to provide a continuous four-lane highway between I-69/S 59 and Port Freeport.

- Replace the US 171 Harbor Bridge in Corpus Christi to potentially enhance both highway and maritime service to the port.
- Undertake possible improvements to I-45 based on the corridor planning study recommendations for enhanced freight mobility.
- Improve intermodal transfer freight mobility between the Port of Brownsville and the U.S./Mexico border, including the potential development of a new international bridge (currently permitted) south of the Port of Brownsville.

Action 1.1—TxDOT, working with partner agencies, should continue to actively pursue these projects, including examining the use of innovative financing methods.

DEVELOPMENT OF A TEXAS FREIGHT PLAN

There is a need for a comprehensive and coordinated statewide freight planning program encompassing all modes within TxDOT. Freight activities are currently conducted by many divisions and districts within TxDOT. Recognizing the critical need to address freight within TxDOT in a multimodal and system-wide approach, TxDOT is expanding its freight planning capacity and capabilities with a newly created statewide freight coordinator position. A key purpose of this position is to elevate, integrate, and institutionalize freight into TxDOT’s transportation planning process, as well as to develop and administer a comprehensive and multimodal statewide freight planning program.

Recommendation 2.1—MAP-21 encourages state departments of transportation to develop a state freight plan and establish a freight advisory committee. Projects that are included in a state freight plan are eligible for a larger federal funding share. Rather than the normal 80 percent federal and 20 percent state/local funding split, projects included in a state freight plan are eligible for a 90 percent federal and 10 percent state/local funding split. TxDOT should develop a Texas Freight Plan, using the information presented in this report, especially the summary of short-, mid-, and long-range projects identified in previous studies and plans, as a base for the development of the plan. Additionally, TxDOT should convene a State Freight Advisory Committee, considering PCSWG members and other stakeholder interests for membership.

Action 2.1—TxDOT should convene a State Freight Advisory Committee by transitioning the PCSWG into that role to help TxDOT develop a Texas Freight Plan. Additional members should be considered to ensure that freight stakeholders from all modes and various user groups are represented on the advisory committee.

Action 2.2—TxDOT, with the assistance of the advisory committee, should develop a Texas Freight Plan using the information in this report as a starting

point for the plan. Additional information on air freight, pipelines, and other topics will be needed in the development of the plan.

Action 2.3—In developing the Texas Freight Plan process, TxDOT should examine the need for additional freight-related projects to expand Texas’ position in global trade.

Action 2.4—TxDOT should periodically report progress on implementing the PCSWG recommendations to the State Freight Advisory Committee.

GIWW

Finding 3—The GIWW represents an important component of the Texas and U.S. maritime system. The GIWW is maintained by USACE. Ensuring that adequate funding is available to dredge, operate, and maintain the GIWW, as well as make needed capital improvements in the Brazos River floodgates and the Colorado River locks, is important. Maintaining the GIWW from real estate encroachment and increasing the use of the GIWW are also important.

Recommendation 3.1—As the local non-federal sponsor of the GIWW in Texas, TxDOT should work in partnership with USACE, ports, users of the GIWW, and other groups to ensure the GIWW is maintained to a 12 ft depth and needed capital improvements are made. A strategy for adequately funding maintenance and operation of the GIWW should be developed.

Action 3.1—TxDOT should meet with USACE and other groups to develop and implement a funding strategy to adequately maintain and operate the GIWW.

Recommendation 3.2—TxDOT should continue to work with USACE, counties, cities, and developers to prevent real estate encroachment on the GIWW.

Action 3.2—TxDOT should continue to work with USACE on a comprehensive outreach program to educate communities, developers, and the public on USACE’s revised setback policies and the importance of preventing encroachment on the GIWW. Community meetings, workshops, brochures, and websites represent possible elements of a comprehensive outreach and education program.

Recommendation 3.3—TxDOT, USACE, ports, and other groups should identify and implement strategies, policies, and programs to increase the use of the GIWW.

Action 3.3—TxDOT, USACE, ports, and other groups should assess different methods to increase use of the GIWW, including promotions, incentives, demonstration projects, and other approaches.

Action 3.4—TxDOT, USACE, ports, and other groups should implement the most promising approaches and monitor and evaluate the results.

PORTS

Finding 4—Texas ports are a critical economic engine for the state and nation. Maintaining, improving, and developing new port infrastructure, including channels, harbors, turning basins, terminals, and landside access are key to the economic competitiveness of Texas ports. Ensuring that Texas ports are deep and wide enough to meet current and future shipping demands is imperative.

Recommendation 4.1—The ports, working with USACE, TxDOT, the Texas Port Association (TPA), and other partners, should continue to pursue deepening projects.

Action 4.1—TxDOT should increase the visibility of port and maritime interests at the state level by establishing a Maritime Division within the department. Additionally, considering the recommendations of the PCSWG, the TxDOT Maritime Division and the Texas ports should work together to strategically align their related activities, including enhancing the functions of the Port Authority Advisory Committee.

Action 4.2—Texas' ports should continue to pursue deepening projects.

Action 4.3—Ports, the TxDOT Maritime Division, and other partners should develop and present a coordinated and unified approach in seeking federal support and other funding.

Action 4.4—Ports and the TPA, working with TxDOT and the legislature, should seek funding for the Port Access Account Fund and the Port Capital Program.

RAIL

Finding 5—The rail network in Texas is a key element of the multimodal transportation system serving Texas ports. Rail improvement projects at specific ports and rail capacity and safety projects were identified in previous studies and plans, and by speakers at the PCSWG meetings. These projects are all important for enhancing Texas' position in global trade.

Recommendation 5.1—TxDOT should work with the railroads, Texas' ports, and other stakeholders to support needed rail capacity projects to accommodate increases in imports and exports. Railroads, working the ports, TxDOT, MPOs, and other groups should pursue needed rail improvement projects. The TxDOT Rail Division can play a role in facilitating this process as part of the anticipated detailed analysis of projects included in the Texas Rail Plan. The Texas Freight Plan should also address needed rail projects in the state.

Action 5.1—The TxDOT Rail Division should facilitate this process and provide assistance with the Texas Freight Plan.

Recommendation 5.2—The current rail projects underway at the Port of Beaumont, the Port of Corpus Christi, the Port of Brownsville, the Port of Houston, Port Freeport, the Port of Galveston, and other ports should continue to be developed. These projects help to more efficiently move goods in and out of the ports on rail and relieve highways of freight congestion.

Action 5.2—The TxDOT Rail Division should provide assistance as needed to facilitate the development of the port-related rail projects.

INFORMATION AND PROMOTION

Finding 6—The Office of the Governor-Economic Development and Tourism promotes trade and exports through the Texas Wide Open for Business™ initiative. The opportunity exists to build on these efforts with a “Texas Global Gateway” marketing and information program targeted at international shippers and carriers and other important stakeholders. Developing and maintaining an ongoing program that highlights all transportation modes and the competitive advantages of the state would be beneficial to all groups in expanding Texas’ position as a global gateway for the nation.

Recommendation 6.1—Build on existing activities of the Texas Wide Open for Business™ initiative at the Office of the Governor-Economic Development and Tourism by developing and implementing a “Texas Global Gateway” marketing and information program. The “Texas Global Gateway” concept would provide a one-stop, unified, coordinated, and comprehensive source of information on all transportation modes in Texas for use in promoting the state with shippers and carriers and other international clientele. The program would also be coordinated with the federal agencies noted in Chapter VI, including the ITA, EX-IM Bank, US SBA, USDA FAS, the Office of the U.S. Trade Representative, the U.S. International Trade Commission, and other agencies. A coordinated strategy to promote Texas ports with international trading partners through contacts and trade missions could also be considered as part of the program.

Action 6.1—A first step would be to develop the concept more fully by identifying the elements of the “Texas Global Gateway,” as well as funding levels and funding sources to implement and operate the program. TxDOT and the Office of the Governor-Economic Development and Tourism could take the lead with this activity.

Appendix A—List of Speakers at Panama Canal Stakeholder Working Group Meetings

Austin—June 29, 2012

Bill Meadows, Texas Transportation Commissioner
Jeff Austin, III, Texas Transportation Commissioner
Rob Harrison, Center for Transportation Research, University of Texas at Austin

Corpus Christi—August 1, 2012

Mayor Joe Adame, City of Corpus Christi
Judge Samuel “Lloyd” Neal, Jr., Nueces County
David Fields, Gulf Compress
Marc Williams, Texas Department of Transportation
Judge Terry Simpson, San Patricio County and Corpus Christi Metropolitan Planning Organization
John LaRue, Executive Director, Port of Corpus Christi
Jennifer Stastney, Executive Director, Port of Victoria
Pete Goetzman, Archer Daniels Midland
John Hallmark, Osprey Lines

Houston—August 27, 2012

Matt Tejata, Air Alliance Houston
Al Navarro, Citizen
Representative Armando Walle, 140th District in north Houston
Bruce Carlton, National Industrial Transportation League
Colonel Christopher W. Sallase, Commander, U.S. Army Corps of Engineers, Galveston District
Colonel Leonard Waterworth, Executive Director, Port of Houston Authority
Phyllis Saathoff, Interim Executive Director/CEO, Port Freeport
Captain John Peterlin, Senior Director of Marketing and Administration, Port of Galveston
Sue Collins, Liquid Logistics Director, Styrolution America, LLC
Ron Beeson, Global Logistics Manager, The Lubrizol Corporation
Tony Davis, Senior Vice President of Distribution and Logistics, Academy Sports
Ian Cairns, Vice President, Terminal Link Division, CMA CGM
Michael Casey, Global Logistics Senior Manager, Halliburton
Captain Bill Diehl, U. S. Coast Guard (Retired), President, Greater Houston Port Bureau

Beaumont—August 28, 2012

Judge Jeff Branick, Jefferson County
Mayor Becky Ames, City of Beaumont
John Durkey, Southeast Texas Plant Managers Forum
Chris Fisher, Executive Director, Port of Beaumont Navigation District
Larry Kelly, Deputy Port Director, Port of Port Arthur
Jason French, Cheniere Energy

Clayton Henderson, Sabine-Neches Navigation District (SNND)
Colonel Mike Arnold, U.S. Army Surface Development and Distribution Command
Marc Williams, Texas Department of Transportation

Fort Worth—September 7, 2012

Ted Prince, Ted Prince & Associates, LLC
Jake Bessembinders, Senior Business Director—Intermodal, Union Pacific
Steve Boecking, Alliance Texas
Kent Wilkinson, Vice President, Natural Gas Ventures for Chesapeake Energy Corporation
Brad Walker and Luis Crespo, E-ndeavor
Dallas County Judge Clay Jenkins
Marc Williams, Texas Department of Transportation
Steve Roop, Freight Shuttle International and Texas A&M Transportation Institute

Brownsville—September 14, 2012

State Senator Eddie Lucio, Jr.
Jim Stark, Executive Director, Gulf Intracoastal Canal Association
Jim Kruse, Texas A&M Transportation Institute
Eduardo Campirano, Port Director and Chief Executive Officer, Brownsville Navigation District
Jody Sumrall, Gulf Coast LNG, LLC
Pete Sepulveda, Cameron County Regional Mobility Authority
Mario Jorge, Texas Department of Transportation
Marc Williams, Texas Department of Transportation

Telephone Call with Steve Stewart, Gulf Winds, September 19, 2012

Appendix B—References

The following sources were used in the development of this report.

- Cambridge Systematics, Inc. *H-GAC Regional Goods Movement Study*. December 2011.
- Cambridge Systematics, Inc. *Potential Effects of the Panama Canal Expansion on the Texas Transportation System*. October 2011.
- Cambridge Systematics, Inc. *TxDOT Waterborne Freight Corridor Study*. July 2010.
- Cambridge Systematics, Inc. *TxDOT Waterborne Freight Corridor Study, Phase II*. November 2011.
- Cambridge Systematics, Inc. *TxDOT Waterborne Freight Corridor Study, Task 1: Evaluation Criteria and Solution Packages*. November 2011.
- Cambridge Systematics, Inc. *TxDOT Waterborne Freight Corridor Study, Task 3: Waterborne Freight Performance Measures*. November 2011.
- Cambridge Systematics, Inc. *TxDOT Waterborne Freight Corridor Study, Task 5: Port and Waterway Funding and Financing Options*. November 2011
Canal De Panamá. *Panama Canal Expansion Program*. April 2012
- Center for Transportation Research and Texas Transportation Institute. *Selected 2012-2014 Trade Flows and Texas Gulf Ports: Panama Canal and South American Markets*. TxDOT Project 0-6690. In progress.
- Frawley et al. *Guidebook on Landside Freight Access to Airports*. February 2011.
- Frawley et al. *Landside Freight Access to Airports: Findings and Case Studies*. May 2011.
- Harrison et al. *Emerging Trade Corridors and Texas Transportation Planning*. September 2009.
- Jacobs and the Texas Department of Transportation. *A Regional Freight Study of the Corpus Christi and Yoakum Districts, Phase I Report*. May 2010.
- Jacobs and the Texas Department of Transportation. *A Regional Freight Study of the Corpus Christi and Yoakum Districts, Phase II Report*. May 2010.
- Kruse and Bierling. *The Effect of the New Security Paradigm on Port Infrastructure Development and Finances*. October 2005.
- Kruse and Harrison. *NCFRP Report 5: North American Marine Highways*. July 2010.

Kruse and Texas Transportation Institute. *America's Locks and Dams: A Ticking Time Bomb for Agriculture?* December 2011.

Kruse et al. *A Modal Comparison of Domestic Freight Transportation Effects on the Public.* December 2007.

Kruse et al. *Potential Policies and Incentives to Encourage Movement of Containerized Freight on Texas Inland Waterways.* October 2008.

Martin Associates. *The Economic Impacts of the State of Texas Port and Maritime Industry, 2011.* November 2012

Metropolitan Policy Program at Brookings. *Export Nation 2012: How U.S. Metropolitan Areas Are Driving National Growth.* March 2012

Saenz. *Trade Transportation Activities Report.* January 2009.

Siegesmund et al. *An Analysis of the Value of Texas Seaports in an Environment of Increasing Global Trade.* February 2008.

Texas Department of Transportation. *Gulf Intercoastal Waterway Legislative Report—83rd Legislature.* 2012

Texas Department of Transportation. *Houston Region Freight Rail Study.* June 2007.

Texas Department of Transportation. *Texas Ports 2011-2012 Capital Program.* 2011.

Texas Department of Transportation. *Texas Ports 2013-2014 Capital Program.* 2012.

Texas Department of Transportation. *Texas Rail Plan.* November 2010.

Texas Transportation Institute. *Analysis and Recommendations on Protecting Waterways from Encroachment.* August 2010.

Texas Transportation Institute. *Analysis of Start-Up Cross-Gulf Short Sea Shipping Activities with Mexico since 1990: Problems and Opportunities.* August 2004.

Texas Transportation Institute. *Development and Application of a Methodology to Identify Mexico-U.S. Cross Border Trade with Potential for Diversion to Short Sea Shipping Operations.* November 2006.

Texas Transportation Institute. *The Future of Texas Freight: Roles, Forces, and Policies.* TxDOT Strategic Research Program Research Brief. June 2011.

Texas Transportation Institute. *Panama Canal Dry-Bulk Market Segment Peer Review.* July 2003.

Texas Transportation Institute. *Short Sea Shipping Initiatives and the Impacts on the Texas Transportation System: Technical Report.* December 2007.

1. Report No. FHWA/TX-12/0-6800-1D		2. Government Accession No.		3. Recipient's Catalog No.	
4. Title And Subtitle REPORT FROM THE PANAMA CANAL STAKEHOLDER WORKING GROUP				5. Report Date November 2012	
				6. Performing Organization Code	
7. Author(s) Katherine F. Turnbull				8. Performing Organization Report No. Report 0-6800-1D	
9. Performing Organization Name and Address Texas A&M Transportation Institute College Station, Texas 77843-3135				10. Work Unit No. (TRAIS)	
				11. Contract or Grant No. Project 0-6800	
12. Sponsoring Agency Name and Address Texas Department of Transportation Research and Technology Implementation Office P.O. Box 5080 Austin, Texas 78763-5080				13. Type of Report and Period Covered Technical Report: May 2012–December 2012	
				14. Sponsoring Agency Code	
15. Supplementary Notes Project performed in cooperation with the Texas Department of Transportation and the Federal Highway Administration. Project Title: Impacts on Texas Ports from the Panama Canal Expansion URL: http://tti.tamu.edu/documents/0-6800-1D.pdf					
16. Abstract <p>This project assists the Texas Department of Transportation (TxDOT) in assessing the potential impacts of the Panama Canal expansion on Texas ports and the landside transportation system. TxDOT formed a Panama Canal Stakeholder Working Group (PCSWG) to help examine these impacts and possible opportunities for expanding global trade. The PCSWG held a series of meetings to obtain input from shippers and carriers, ports, metropolitan planning organizations (MPOs), regional mobility authorities (RMAs), industry groups, and other organizations. In addition to the Panama Canal expansion, the PCSWG discussed opportunities to expand global trade related to the growth of the state's population and developments in the energy sector. This report summarizes the results of these meetings, along with an examination of current and planned roadway, port, and rail projects. Short-, mid-, and long-term TxDOT transportation improvements, other projects and policies that will better position the state of Texas to take advantage of the Panama Canal expansion, and other opportunities to enhance Texas' role in global trade are presented.</p>					
17. Key Words Port, Panama Canal, Freight, Intermodal, Trade, Shipping			18. Distribution Statement No restrictions. This document is available to the public through NTIS: National Technical Information Service Alexandria, Virginia http://www.ntis.gov		
19. Security Classif. (of this report) Unclassified		20. Security Classif. (of this page) Unclassified		21. No. of Pages 74	22. Price

DISCLAIMER

This research was performed in cooperation with the Texas Department of Transportation (TxDOT) and the Federal Highway Administration (FHWA). The contents of this report reflect the views of the author, who is responsible for the facts and the accuracy of the data presented herein. The contents do not necessarily reflect the official view or policies of FHWA or TxDOT. This report does not constitute a standard, specification, or regulation.