

THE ECONOMIC IMPACTS OF THE TEXAS PORTS ON THE STATE OF TEXAS, 2018



Prepared for:
TEXAS PORTS ASSOCIATION
111 East Loop N
Houston, TX 77029
www.texasports.org



Prepared by:
MARTIN ASSOCIATES
941 Wheatland Ave., Suite 203
Lancaster, PA 17603
www.johncmartinassociates.com

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EXECUTIVE SUMMARY

Martin Associates was retained by the Texas Ports Association to estimate the economic impacts generated by marine cargo at the State's marine terminals, including marine terminals owned by the 13 public port authorities within the state; the private terminals owned by petroleum and petrochemical companies; the privately owned barge facilities; and the privately owned break bulk and dry bulk facilities located within the defined port districts. It is to be emphasized that the scope of the study is to quantify the economic benefits of the maritime cargo terminals located within the State and does not include the measurement of the net impacts of the Texas port system.

The methodology used in this analysis has been developed by Martin Associates and has been used to estimate the economic impacts of seaport activity at public and private marine terminals of more than 600 United States and Canadian ports. Since 1986, Martin Associates has been providing economic impact studies to the majority of the public ports located within the state of Texas, including the Ports of Houston, Brownsville, Corpus Christi, Calhoun Port Authority, Victoria, Beaumont, Port Arthur, Port Orange, Harlingen, Galveston, Texas City, and Freeport. This state-wide study follows the same methodology that Martin Associates has used on all of our port impact studies for the ports in Texas as well as throughout the United States and Canada. The methodology has been used in studies that have been presented before the International Trade Commission, the Council of Economic Advisors, the Federal Reserve Board, the Canadian Justice Department and several U.S. Presidents. We have used this same methodology to estimate the system-wide (United States and Canada) impacts of cargo activity on the Great Lakes-St. Lawrence Seaway Transportation System, as well as for the state of Florida and for the West Coast port region as part of the impact analysis of the West Coast Port Shutdown in 2002, and as part of the 2014-2015 contract negotiations between the Pacific Maritime Association and the International Longshore and Warehouse Union.

The state-wide impacts are measured for the year 2018. The analysis is developed based on port-specific impact analysis and models developed for 13 port districts within the state. These are:

- Port of Beaumont
- Port of Brownsville
- Port of Corpus Christi
- Port Freeport
- Port of Galveston
- Port of Harlingen
- Port of Houston
- Calhoun Port Authority
- Port Mansfield
- Port of Port Arthur
- Port of Orange
- Port of Texas City
- Port of Victoria

Detailed interviews were conducted with the marine terminal operators, service providers, railroads, port tenants, etc. at each of these ports. The firms were contacted by telephone and interviewed to develop the direct impacts and data required to develop the individual port models.

Four types of impacts are measured:

- Jobs;
- Employee earnings;
- Business revenue;
- State and local taxes.

With respect to jobs, four types of job impacts are measured. These are direct, induced, indirect and related jobs. The job impacts are defined as follows:

- Direct jobs are those jobs with local firms providing support services to the seaport. These jobs are dependent upon this activity and would suffer immediate dislocation if the seaport activity were to cease. Seaport direct jobs include jobs with railroads and trucking companies moving cargo to and from public and private marine terminals, members of the International Longshoremen's Association (ILA) and non-ILA dockworkers, steamship agents, freight forwarders, ship chandlers, warehouse operators, bankers, lawyers, terminal operators, stevedores, etc.
- Induced jobs are jobs created locally and throughout the regional economy due to purchases of goods and services by those directly employed. These jobs are with grocery stores, the local construction industry, retail stores, health care providers, local transportation services, etc., and would also be discontinued if seaport activity were to cease.
- Indirect jobs are those jobs generated in the local economy as the result of local purchases by the firms directly dependent upon seaport activity. These jobs include jobs in local office supply firms, equipment and parts suppliers, maintenance and repair services, etc.
- Related user employment impact jobs are jobs with firms using the seaport to ship and receive cargo. While the facilities and services provided at the ports and marine terminals are a crucial part of the infrastructure allowing these jobs to exist, they would not necessarily be immediately displaced if marine activity were to cease. The related users include the shippers/consignees who do not have operations on Port property, and therefore could and do use other modes to ship and receive cargo and raw materials. Shippers/consignees that have on-dock facilities or marine terminals associated with the production site are counted as directly dependent.

The employee earnings consist of wages and salaries and include a re-spending effect (local purchases of goods and services by those directly employed), while business revenue consists of total business receipts by firms providing services in support of the marine activity. State and local taxes include taxes paid by individuals, as well as firms dependent upon the seaport activity.

In 2018, 616.2 million tons of cargo were handled by the ports and marine terminals located within the boundaries of the state of Texas. The impacts of this activity are summarized in Exhibit E-1.¹

Exhibit E-1
Economic Impacts of the State of Texas Port and Maritime Cargo Activity

IMPACTS	STATE OF TEXAS 2018
JOBS	
Direct	128,848
Induced	193,060
Indirect	112,112
Related Users	<u>1,355,392</u>
TOTAL JOBS	1,789,412
PERSONAL INCOME (\$ Millions)	
Direct	\$8,712
Re-Spending/Local Consumption	\$23,621
Indirect	\$5,117
Related User Income	<u>\$65,370</u>
TOTAL PERSONAL INCOME	\$102,821
ECONOMIC REVENUE/OUTPUT (\$ Millions)	
Direct Business Revenue	\$53,635
Related Users Output	<u>\$372,306</u>
TOTAL ECONOMIC REVENUE/OUTPUT	\$425,942
LOCAL PURCHASES (\$ Millions)	\$11,318
STATE AND LOCAL TAXES (\$ Millions)	
Direct	\$662
Re-Spending/Local Consumption	\$1,795
Indirect	\$389
Related User Taxes	<u>\$4,968</u>
TOTAL TAXES	\$7,814
TOTAL ECONOMIC VALUE (\$ MILLIONS)	
Direct Business Revenue	\$53,635
Re-Spending and Local Consumption	\$23,621
Related Users Output	<u>\$372,306</u>
TOTAL ECONOMIC VALUE	\$449,563

Note: Totals may not add due to rounding

¹ In addition to the marine cargo impacts generated at the 13 port authorities, nearly 1,000,000 cruise passengers boarded ships at Texas ports. The impacts generated by the cruise operations are not included in this study, nor are the economic impacts generated by commercial fishing activity or marina activity.

The 616.2 million tons of cargo moving via the Texas ports, at the 13 ports generated the following economic impacts in the state of Texas:

1,789,412 jobs in Texas are in some way related to the cargo moving via the marine terminals located in the state of Texas:

- Of the 1,789,412 jobs, **128,848 jobs** are directly generated by the marine cargo and vessel activity at the marine terminals in the state of Texas.
- As the result of the local and regional purchases by those 128,848 individuals holding the direct jobs, an additional **193,060 induced jobs** are supported in the state economy.
- **112,112 indirect jobs** were supported by \$11.3 billion of regional purchases by businesses supplying services at the marine terminals and ports.
- The balance, **1,355,392 jobs** are classified as related jobs and are with importers and exporters and supporting firms using the public and private marine terminals in 2018.

In 2018, marine cargo activity at the public marine terminals located in the state of Texas generated a total of \$449.6 billion of total economic value in the state of Texas, representing 25% of the \$1.8 trillion State-Wide State Gross Domestic Product.

- Of the \$449.6 billion total economic value, \$53.6 billion is the direct business revenue received by the firms directly dependent upon the marine terminals and providing maritime services and inland transportation services to the cargo handled at the marine terminals and the vessels calling the port, as well as ship and rig repair and maintenance services. An additional \$23.6 billion represents the re-spending of the direct income, which is used for in-state purchases of goods and services by those directly employed. The remaining \$372.3 billion represents the value of the output to the state of Texas that is created due to the cargo moving via the public and privately owned marine terminals. This includes the value added at each stage of producing an export cargo, as well as the value added at each stage of production for the firms using imported raw materials and intermediate products that flow via the marine terminals and are consumed within the State. It is important to emphasize that these three components of total economic value are additive, and do not represent any double counting of monetary impacts. In contrast, direct income, local purchases by firms and taxes generated are all paid from the direct and related user revenue.
- Marine activity at the terminals supported \$102.8 billion of total personal wage and salary income and local consumption expenditures for Texas residents. This includes \$37.5 billion of direct, indirect, induced and local consumption expenditures, while the remaining \$65.4 billion was received as income by the employees of the related port users.

A total of \$2.8 billion of direct, induced and indirect state and local tax revenue was generated by maritime activity at the public and private terminals located in Texas. In addition, \$5.0 billion of state and local taxes were created due to the economic activity of the related users of the cargo moving via the public marine terminals.

Martin Associates conducted a similar study to measure the 2015 economic impacts of the Texas ports. Between 2015 and 2018, total tonnage handled at the public and private marine terminals grew by 53.4 million tons, primarily driven by the growth in petroleum and petroleum products. Dry bulk cargo grew by nearly 10 million tons over the period, and other liquid bulk cargo (mainly chemical products) grew by 5.1 million tons, while containerized cargo grew by 1.4 million tons. As a result of the growth in tonnage over the three year period, the total number of jobs supported by the marine cargo activity increased by 227,542 jobs since 2015. Total economic value of the Texas marine cargo activity grew from \$368.7 billion in 2015 to \$449.6 billion in 2018.

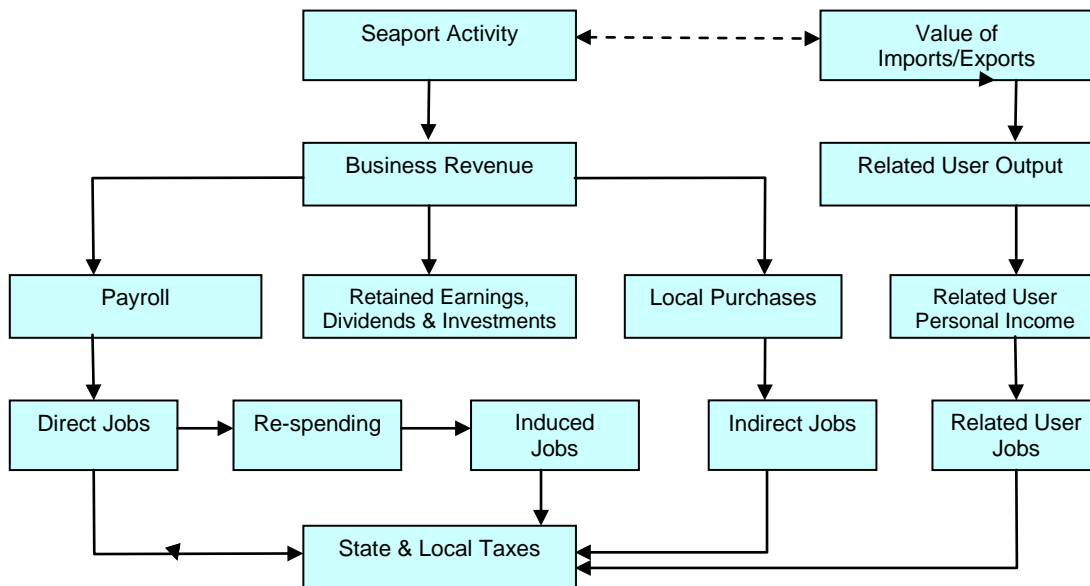
As demonstrated, the marine cargo and vessel activity at the public and privately owned marine terminals located in the state of Texas provide a major economic engine to the State's economy. In 2018, the 616.2 million tons of cargo moving via these terminals supported \$449.6 billion of economic activity in the state of Texas, or about 25% of the total State Gross Domestic Product.² In order to maintain and grow the economic contribution of the State's marine terminals, it is essential that the capital infrastructure supporting the terminals continues to be a key priority in State and National policy, and further that the shipping channels be maintained at the authorized water depths and capital projects that enhance the State's ports competitive position be given the highest priority. The demonstrated economic dividend that results from maritime trade underscores the overall importance of continued growth of the State's port and maritime transportation system.

² In 2018 the state GDP for Texas was \$1.8 trillion, as reported by the U.S. Bureau of Economic Analysis.

I. ECONOMIC IMPACTS OF MARINE CARGO ACTIVITY

Waterborne cargo activity at a marine terminal in the state of Texas contributes to the local, state, and national economies by generating business revenue to local and national firms providing vessel and cargo handling services at the marine terminals. These firms, in turn, provide employment and income to individuals, and pay taxes to federal, state and local governments. Exhibit I-1 shows how activity at marine terminals generates impacts throughout the local, state, and national economies. As this exhibit indicates, the impact of a port cannot be reduced to a single number, but instead, the port activity creates several impacts. These are the revenue impact, employment impact, personal income impact, and tax impact. These impacts are non-additive. For example, the income impact is a part of the revenue impact, and adding these impacts together would result in double counting. Exhibit I-1 shows graphically how marine cargo moving via the marine terminals within the State generates the four impacts.

Exhibit I-1
Flow of Economic Impacts Generated by Marine Activity



At the outset, activity at the port generates business revenue for firms which provide services. This business revenue impact is dispersed throughout the economy in several ways. It is used to hire people to provide the services, to purchase goods and services, and to make federal, state and local tax payments. The remainder is used to pay stockholders, retire debt, make investments, or is held as retained earnings. It is to be emphasized that the only portions of the

revenue impact that can be definitely identified as remaining in the local economy are those portions paid out in salaries to local employees, for local purchases by individuals and businesses directly dependent on the seaport, in contributions to federal, state and local taxes, in lease payments to the port authorities by tenants, wharfage charges, and dockage fees paid by the steamship lines to the individual port authorities.

The movement of marine cargo also supports regional exporters and importers using the public and privately owned marine terminals. These impacts are classified as *related user impacts* in that the exporters and importers using the marine terminals can and do use other ports for the shipment and receipt of cargo. The related user impacts are the jobs, income, revenue and state and local taxes related to the value and tonnage of the cargo exported and imported via the State's public and private marine terminals in 2018. It is to be emphasized that the related impacts do not include the total employment, revenue and taxes with the importers and exporters, but only that portion associated with the cargo moved via the State's marine terminals. The related impacts measure the impact, or influence, of the State's marine terminals at a given point in time, and if the terminals were no longer used by these importers and exporters, these influenced users would use ports in other states to export and import cargo. Unlike the direct, induced, and indirect impacts, the related impacts would not necessarily be dislocated from the economy – instead, the impacts would no longer be related to the specific port, but to another port through which this cargo would be routed.

The study is based on interviews with firms providing services to the cargo and vessels handled at the publicly and privately owned marine terminals in the state of Texas. Furthermore, the impacts can be traced back to the individual firm. The data collected from the interviews were then used to develop an operational model of the each of the 13 ports and the public and private marine terminals located in each of the port districts.

The employment impact of the State's port activity consists of four levels of job impacts:

- Direct employment impact -- jobs directly generated by seaport activity. Direct jobs generated by marine cargo include jobs with railroads and trucking companies moving cargo between inland origins and destinations and the marine terminals, longshoremen and dockworkers, steamship agents, freight forwarders, stevedores, etc. It is to be emphasized that these are classified as directly generated in the sense that these jobs would experience near term dislocation if the activity at the marine terminals were to be discontinued.
- Induced employment impact -- jobs created throughout the local, regional and national economies because individuals directly employed due to port activity spend their wages locally on goods and services such as food, housing and clothing. These jobs are held by residents located throughout the region, since they are estimated based on local and regional purchases.

- Indirect employment impact -- jobs created within the region due to purchases of goods and services by firms, not individuals. These jobs are estimated directly from local purchases data supplied to Martin Associates by the companies interviewed as part of this study, and include jobs with office supply firms, maintenance and repair firms, parts and equipment suppliers, etc. It is to be emphasized that special care was taken to avoid double counting, since the current study counts certain jobs as direct (i.e., trucking jobs, jobs with railroads, jobs with freight forwarders and steamship lines, etc.) which are often classified as indirect by other approaches, notably the input/output model approach.
- Related user employment impact -- jobs with firms using the seaport to ship and receive cargo. While the facilities and services provided at the ports and marine terminals are a crucial part of the infrastructure allowing these jobs to exist, these jobs would not necessarily be immediately displaced if marine activity were to cease. The related users include the shippers/consignees who do not have operations on Port property, and therefore could and do use other modes to ship and receive cargo and raw materials. Shippers/consignees that have on-dock facilities or marine terminals within the 13 port districts that are serving production facilities are counted as directly dependent.

The personal earnings impact is the measure of employee wages and salaries (excluding benefits) received by individuals directly employed due to port activity. Re-spending of these earnings throughout the state economy for purchases of goods and services is also estimated. This, in turn, generates additional jobs -- the induced employment impact. This re-spending throughout the state is estimated using a state personal earnings multiplier, which reflects the percentage of purchases by individuals that are made within the state in which the Port is located. The re-spending effect varies by state -- a larger re-spending effect occurs in states that produce a relatively large proportion of the goods and services consumed by residents, while lower re-spending effects are associated with states that import a relatively large share of consumer goods and services (since personal earnings "leak out" of the state for these out-of-state purchases).

Tax impacts are tax payments to the state and local governments by firms and by individuals whose jobs are directly dependent upon and supported (induced and indirect jobs) by activity at the marine terminals.

1. IMPACT STRUCTURE

The four types of economic impacts are created throughout various business sectors of the local, state/province, national and regional economies. Specifically, four distinct economic sectors are impacted as a result of activity at the marine terminals. These are the:

- Surface transportation sector;
- Maritime services sector;

- Shippers/consignees using the port; and
- Port authorities.

Within each sector, various participants are involved. Separate impacts are estimated for each of the participants. A discussion of each of the economic impact sectors is provided below, including a description of the major participants in each sector.

1.1 The Surface Transportation Sector

The surface transportation sector consists of both the railroad and trucking industries, as well as pipelines. The trucking firms and railroads are responsible for moving the various cargoes between the marine terminals and the inland origins and destinations, while the liquid bulk products often use pipeline to distribute the liquid bulk cargo dependent upon the use of the marine cargo facilities.

1.2 The Maritime Services Sector

Waterborne cargoes handled by each marine terminal generate economic activity in various business sectors of the local economy. Specifically, these impacts occur in the following categories:

- Cargo Handling - This category involves the physical handling of the cargo at the port, from land-to-vessel or vice-versa. Included in this category are:
 - Terminal operators who operate the marine terminal and typically lease the terminal from port authorities. In some cases, the terminal operator owns the marine facility and is often part of a larger corporation or manufacturing facility with operations at the Port or near-by.
 - Stevedoring firms hire the labor to load and off-load the ships and are often terminal operators as well, handling the cargo after it is off-loaded from the ship or prior to vessel loading.
 - Warehouse operators operate the warehouses usually on-dock or near dock where cargo is stored prior to loading the vessel and after discharge. Warehouse operations can also be conducted by terminal operators, and are sometimes classified as terminal operators.
- Vessel Operations - This category consists of numerous participants. Pilots provide navigational assistance for vessels entering and leaving port facilities. Tug assist firms supply tugs for docking and undocking. Steamship agents provide vessel- and crew-related services, including documentation required to enter and clear the ship, arrange for crew pay, arranging for services provided by maritime service firms that

provide food and supplies to the vessel while in port, and provide maintenance and repair of equipment to the vessel while in port. Within the maritime service sector, the firms include chandlers that supply ships with food, supplies, and equipment; marine surveyors provide valuations of cargo and vessels for insurance purposes in case of cargo or vessel damage; fuel oil suppliers bunker the ships; and launch operators provide ferry services for the crew to move from the ships at anchor to the docks. Marine surveyors inspect the vessel and the cargo. Within the marine equipment and ship repair category, shipyards and machine shops provide scheduled and emergency repair service, as well as off-shore oil-rig support.

- Arranging Marine Transportation - Firms in this category are primarily involved with making arrangements for inland and water transportation of export or import freight. Freight forwarders are the major participants in this category.
- Government Agencies - This sector includes those federal and local government agencies that perform services related to cargo handling and vessel operations, as well as border patrol, the U.S. Army Corps of Engineers, Department of Homeland Security, U.S. Customs and Border Protection, the U.S. Coast Guard, and Department of Agriculture.

1.3 The Shippers/Consignees Sector

This sector includes those firms that ship or receive cargo via the specific port. For the purpose of the analysis, shippers/consignees will be divided into two categories. The first category will consist of those users dependent upon the Port and usually located within the Port's immediate hinterland, and most often associated with a privately owned marine facility. These direct impacts are included in the terminal operators and dependent shippers/consignees category.

The second category of shippers/consignees consists of those users that could easily use competing ports. For example, if the Port were not available, members of the first category would likely be driven out of business in the near term, while members of the second category will shift to another port. These impacts are classified as *related user impacts* in that the exporters and importers using the marine terminals can and do use other ports for the shipment and receipt of cargo. The related impacts measure the impact, or influence, of the Port's marine terminals at a given point in time, and if the Port's terminals were no longer used, these influenced users would use other ports to export and import cargo. Unlike the direct, induced, and indirect impacts, the related impacts would not necessarily be dislocated from the economy – instead, the impacts would no longer be influenced by the State's ports, but by another out-of-state port. It is emphasized that only the portion of jobs, income taxes and revenue related to the actual cargo moving via the public and private marine terminals within the State are counted in the related user impacts.

Finally, the direct, induced, and indirect port sector job, income, revenue and tax impacts associated with each of the cargoes for which related shipper/consignee impacts were estimated were subtracted from the total related impacts (by commodity and cargo type). This was done to avoid double counting, as the related shipper/consignee impacts include impacts at each logistical stage of handling the imported and exported cargo, such as the port activity and the trucking and rail activity to move the cargo to and from each port and the induced and indirect jobs associated with the direct port activity.

1.4 Port Authorities

This sector includes the employees of the 13 public port authorities, the income received by these employees and the revenue received by the port authorities from leases and terminal and cargo charges.

2. SUMMARY OF METHODOLOGY

The cornerstone of the Martin Associates' approach is the collection of detailed baseline impact data from firms providing services at the ports and terminals. To ensure accuracy and defensibility, the baseline impact data were collected from interviews with firms providing services to the vessel and cargo activity moving via the State's marine terminals. These firms represent the universe of companies in the State's maritime industry, as identified from the previously noted sources. For the most part, multiple interviews were conducted with several persons in each firm. In cases in which one firm provides services at multiple ports, care was taken to allocate the level of activity to each specific Texas port. Detailed interviews were conducted with the marine terminal operators, service providers, railroads, port tenants, etc. at each of these ports. The firms included in the interview process were identified from:

- Port directories
- Proprietary data bases developed and maintained by Martin Associates based on our on-going economic impact consulting services that we provide for the majority of the Texas ports
- Interviews with the 13 port authorities' managers.

All firms were contacted by telephone and interviewed to develop the direct impacts and data required to develop the individual port models. These firms provided data regarding:

- Jobs
- Income
- Revenue
- Local purchases
- Terminal operational specifics:
 - Modal splits
 - Hinterland distribution patterns
 - Rail and truck rates
 - Rail yard specifics

Individual port sensitivity models were developed for each of the 13 ports. These port specific models allow for the testing of the sensitivity of the impacts due to changes in such port activity as tonnage levels by commodity, labor productivity and work rules, vessel call levels, vessel size and mix of vessel types, inland modal distribution patterns by commodity, towing requirements, pilotage assignments by vessel type, changes in inland transportation technologies and changes in channel depth due to limited funding for maintenance dredging. The port sensitivity models can also be used in assessing alternative terminal development scenarios (i.e. bulk terminal versus container terminal development and high intermodal versus low intermodal container facility development), as well as for annual updates. Finally, a key use of the model system will be to show the economic impact of potential state and national policies that could impact port activity within the state. Such policies include the impacts of trade restrictions and free trade agreements, infrastructure investment programs, channel maintenance and dredging, surface transportation infrastructure, private sector development, and the development of a state and/or national port plan.

2.1 Direct Impacts

The results of these interviews were then used to develop the baseline direct job, revenue and income impacts for the economic sectors and job categories associated with the cargo activity at the marine terminals located within the 13 individual port districts for which specific impact models were developed.

The direct tax impacts are estimated at a state and local level based on actual per capita income levels as published by the Tax Foundation, as well as data from the U.S. Bureau of the Census, State and Local Government Finances.

2.2 Induced Impacts

Induced impacts are those generated by the purchases of the individuals directly employed as a result of seaport activity. For example, a portion of the personal earnings received by those directly employed due to activity at the marine terminals is used for purchases of goods and services, both regionally, as well as out-of-the region. These purchases, in turn, create additional jobs in the region which are classified as induced. To estimate these induced jobs, a state personal earnings multiplier was developed from data provided by the Bureau of Economic Analysis, Regional Income Division, for the state of Texas. This personal earnings multiplier is used to estimate the total personal earnings generated in the state as a result of the maritime activity. A portion of this total personal earnings impact is next allocated to specific local purchases (as determined from consumption data for the relevant state residents), as developed from the U.S. Bureau of Labor Statistics, Consumer Expenditure Survey. These purchases are next converted into retail and wholesale induced jobs in the state economy by combining the purchases with the jobs to sales ratios in the supplying industries. A portion of the retail purchases were allocated to wholesale

purchases, based on industry specific data developed from the U.S. Bureau of Census, Economic Census. These wholesale purchases were again combined with the relevant jobs to sales ratios for the wholesale industries associated with the local purchases. These ratios were again developed at the state level.

To estimate the non-consumption induced impacts with such sectors as state and local governments, education, and other social services, and finance and real estate, a ratio of state employment in these key service industries to total state employment was developed. This ratio is then used with the direct and induced consumption jobs to estimate induced jobs with business/financial services, legal, educational and other social services, not directly estimated from the consumption effect.

The re-spending impact includes not only the wage and salary income received by those employed to provide the goods and services to the direct job holders, but also the value of the purchases. Therefore, the re-spending/local consumption impact cannot be divided by the induced jobs to estimate the induced income, as this would overestimate the induced personal wage/salary impact per induced job.

A separate induced model was developed for each of the 13 ports. Induced jobs, the re-spending and consumption impact and the induced state and tax impacts were also estimated.

2.3 Indirect Impacts

Indirect impacts are generated in the local economy as the result of purchases by firms that are directly dependent upon cargo and vessel activity at the marine terminals, including the shippers/consignees located at each of the 13 ports. These purchases are for goods and services such as office supplies and equipment, maintenance and repair services, communications and utilities, transportation services and other professional services. To estimate the indirect economic impact, local purchases, by type of purchase, were collected from each of the firms interviewed. These local purchases were then combined with employment to sales ratios in local supplying industries, developed from the U.S. Bureau of Economic Analysis Regional Input-Output Modeling System. The indirect job ratios also account for the in-state spin-off effects from multiple rounds of supply chains that are required to provide the purchased goods and services. Indirect income, local purchases and taxes are also estimated.

A separate indirect model was developed for each of the 13 ports for which individual impact models were developed.

2.4 Related Impacts

Related impacts measure the jobs, income, revenue and state and local taxes with shippers and consignees moving cargo through the public and private terminals. These jobs are classified as related jobs, since the firms using the marine terminals for the movement of cargo can and do use other seaports and marine terminals. For example, firms importing or exporting containerized cargo typically select a steamship line rather than the seaport through which the cargo will move, and the port through which the containerized cargo moves is ultimately determined by the steamship line's port call rotation. Similarly, exporters of break bulk cargo often use freight forwarders, who in turn choose the port of export. Importers of break bulk cargo often use several ports for the import of cargo, based on market locations. Because of the proximity of other ports and the associated steamship service at these ports, such as New Orleans, as well as West Coast Ports (competing for the Far East land bridge cargo), importers and exporters of containers, break bulk and bulk cargo have some flexibility in port choice. As a result, jobs with these exporters and importers cannot be counted as dependent upon the public and private marine terminals.

These jobs are estimated based on the value per ton of the commodities exported and imported at each specific port and the associated jobs to value of output ratios for the respective producing and consuming industries located in the state. The value per ton of each of the key commodities moving via the marine terminals at the 13 individual ports was developed from the U.S. Census Bureau, USA Trade On-Line. The average value per ton for each commodity moving over the public and private marine terminals was then multiplied by the respective tonnage moved in 2018. Ratios of jobs to value of output for the corresponding consuming and producing industries were developed by Martin Associates from the U.S. Bureau of Economic Analysis, Regional Input-Output Modeling System for the state of Texas. These jobs to value coefficients include the in-state, spin-off impacts that would occur in order to produce the export commodity or use the import commodity in production. The percent of each commodity that is produced or consumed in the state of Texas was next developed from the interviews, and the value of each commodity remaining in the state of Texas was calculated. The ratios of jobs to value of export or import cargo were then combined with the in-state value of the respective commodities moving via the public and private terminals to estimate related jobs and the spin-off jobs in-state to support the export and import industries. Similarly, using the respective income and output multipliers were used to estimate the related personal income impact as well as the total value of economic output and taxes generated by the State's publicly and privately owned marine terminals. It is to be emphasized that care was taken to control for double counting of the direct, induced and indirect impacts.

3. COMMODITIES INCLUDED IN THE ANALYSIS

A major use of an economic impact analysis is to provide a tool for port development planning. As a port grows, available land and other resources for port facilities become scarce, and decisions must be made as how to develop the land and utilize the resources in the most efficient

manner. Various types of facility configurations are associated with different commodities. For example, containers require a large amount of paved, open storage space, while certain types of dry bulk cargo require covered storage and special dust removing equipment.

An understanding of the commodity's relative economic value in terms of employment and income to the local community, the cost of providing the facilities, and the relative demand for the different commodities is essential in making future port development plans. Because of this need for understanding relative commodity impacts, economic impacts are estimated for the following commodities handled at the public and private marine terminals.

- Containerized Cargo
- Autos
- RoRo
- Steel Products
- Bagged Cargoes
- Chilled Break Bulk
- Forest Products
- Miscellaneous Break Bulk
- Project Cargo
- Fertilizer
- Dry Bulk
- Grain
- Liquid Bulk
- Petroleum

It should be emphasized that commodity-specific impacts are not estimated for each of the economic sectors described in the last section. Specific impacts by commodity could not be allocated to individual commodities with any degree of accuracy for the banking/insurance/law sector and marine construction sector. In addition, taxes have not been displayed by specific commodity since these tax impacts will reflect the same distribution over commodities as the employment impact.

4. ESTIMATE OF TONNAGE AND THE COVERAGE OF THE STATE-WIDE PORT IMPACT

There does not exist a published measure of total waterborne trade at all Texas seaports. International waterborne tonnage for 2018 is provided by USA Trade On-Line, published by the U.S. Bureau of the Census. In 2018, a total of 418.1 million short tons of international cargo was handled at all Texas ports. Domestic waterborne tonnage handled at all Texas ports is reported by the U.S. Army Corps of Engineers. However, the most recent data for the domestic tonnage is for the year 2017. In addition, terminals also provided Martin Associates with domestic tonnage. Combining the 2018 international waterborne data with the 2017 domestic waterborne data and modified with the domestic tonnage data provided by several terminal operators for 2018, it is estimated that about 616.2 million tons were handled at the 13 Texas ports.

II. STATE-WIDE IMPACTS

This chapter presents the results of the economic impact analysis of the marine cargo and vessel activity at Texas state ports on the local and state economies. The impacts are presented in terms of total economic impacts at the regional level, the country level and the state level. The results of the 13 individual port impacts are not presented due to confidentiality issues.³

1. TOTAL ECONOMIC IMPACTS

In 2018, 616.2 million tons of cargo were handled by the public and private marine terminals located within the 13 public port districts in the state of Texas. The impacts of this cargo and vessel activity is summarized in Exhibit II-1. The impacts of the cruise activity at the Texas ports is not included in this study, nor are the impacts of commercial fishing activity nor marina activity.

³ Separate reports have been prepared for the individual ports and are the property of those ports.

Exhibit II-1
Economic Impacts of the State of Texas Cargo and Vessel Activity

IMPACTS	STATE OF TEXAS 2018
JOBS	
Direct	128,848
Induced	193,060
Indirect	112,112
Related Users	<u>1,355,392</u>
TOTAL JOBS	1,789,412
PERSONAL INCOME (\$ Millions)	
Direct	\$8,712
Re-Spending/Local Consumption	\$23,621
Indirect	\$5,117
Related User Income	<u>\$65,370</u>
TOTAL PERSONAL INCOME	\$102,821
ECONOMIC REVENUE/OUTPUT (\$ Millions)	
Direct Business Revenue	\$53,635
Related Users Output	<u>\$372,306</u>
TOTAL ECONOMIC REVENUE/OUTPUT	\$425,942
LOCAL PURCHASES (\$ Millions)	\$11,318
STATE AND LOCAL TAXES (\$ Millions)	
Direct	\$662
Re-Spending/Local Consumption	\$1,795
Indirect	\$389
Related User Taxes	<u>\$4,968</u>
TOTAL TAXES	\$7,814
TOTAL ECONOMIC VALUE (\$ MILLIONS)	
Direct Business Revenue	\$53,635
Re-Spending and Local Consumption	\$23,621
Related Users Output	<u>\$372,306</u>
TOTAL ECONOMIC VALUE	\$449,563

Note: Totals may not add due to rounding

The 616.2 million tons of cargo moving via the 13 Texas ports generated the following economic impacts in the state of Texas:

1,789,412 jobs in Texas are in some way related to the cargo moving via the marine terminals located in the state of Texas:

- Of the 1,789,412 jobs, **128,848 jobs** are directly generated by the marine cargo and vessel activity at the marine terminals in the state of Texas.
- As the result of the local and regional purchases by those 128,848 individuals holding the direct jobs, an additional **193,060 induced jobs** are supported in the State economy.
- **112,112 indirect jobs** were supported by \$11.3 billion of regional purchases by businesses supplying services at the marine terminals and ports.
- The balance, **1,355,392 jobs** are classified as related jobs and are with importers and exporters and supporting firms using the public and private marine terminals in 2018.

In 2018, marine cargo activity at the public marine terminals located in the state of Texas generated a total of \$449.6 billion of total economic value in the state of Texas, representing 25% of the State-Wide State Gross Domestic Product.

- Of the \$449.6 billion total economic value, \$53.6 billion is the direct business revenue received by the firms directly dependent upon the marine terminals and providing maritime services and inland transportation services to the cargo handled at the marine terminals and the vessels calling the port, as well as ship and rig repair and maintenance services. An additional \$23.6 billion represents the re-spending of the direct income, which is used for in-state purchases of goods and services by those directly employed. The remaining \$372.3 billion represents the value of the output to the state of Texas that is created due to the cargo moving via the public and privately owned marine terminals. This includes the value added at each stage of producing an export cargo, as well as the value added at each stage of production for the firms using imported raw materials and intermediate products that flow via the marine terminals and are consumed within the State. It is important to emphasize that these three components of total economic value are additive, and do not represent any double counting of monetary impacts. In contrast, direct income, local purchases by firms and taxes generated are all paid from the direct and related user revenue.
- Marine activity at the terminals supported \$102.8 billion of total personal wage and salary income and local consumption expenditures for Texas residents. This includes \$37.5 billion of direct, indirect, induced and local consumption expenditures, while the

remaining \$65.4 billion was received as income by the employees of the related port users.

A total of \$2.8 billion of direct, induced and indirect state and local tax revenue was generated by maritime activity at the public and private terminals located in Texas. In addition, nearly \$5.0 billion of state and local taxes were created due to the economic activity of the related users of the cargo moving via the public marine terminals, for a total state and local tax impact of \$7.8 billion in 2018.

2. JOB IMPACTS

In this section, the employment generated by maritime activity at the public and private marine terminals in Texas is discussed. The section is organized as follows:

- First, the total employment that is in some way related to the activities at the public and private marine terminals is estimated.
- Second, the subset of total employment that is judged to be totally dependent (i.e., direct jobs) on port activity is analyzed as follows:
 - The direct job impact is estimated in terms of key economic sectors, i.e., surface transportation sector, maritime services sector, and Port Authority sector.
 - The direct job impact is estimated by detailed job category, i.e., trucking, ILA/dockworkers, freight forwarders/customhouse brokers, steamship agents, warehousemen, stevedores and terminal operators/dependent shipper/consignees, maritime services, bunkering, pilotage and tug and barge operations, etc.
 - The direct job impact is estimated for each of the key commodities/commodity groups.
 - Induced and indirect jobs are estimated.
- Finally, jobs in Texas that are related to the marine activity at the public and private marine terminals are described.

2.1. Total Employment Impact

It is estimated that 1,789,412 Texas jobs are in some way related to port activities at the public and private marine terminals in Texas. Of the 1,789,412 jobs held by Texas residents:

- 128,848 jobs are directly generated by activities at the public and private marine terminals and if such activities should cease, these jobs would be discontinued over the short term.
- 193,060 jobs (induced jobs) are supported by the local purchases of the 128,848 individuals directly generated by port activity at the marine terminals. An additional 112,112 indirect jobs were generated due to \$11.3 billion of purchases in the State economy by firms providing direct cargo handling and vessel services and by the directly dependent shippers/consignees located within the 13 port districts.
- An additional 1,355,392 Texas jobs are with exporters and importers located in Texas that ship cargo via the public and private marine terminals. These jobs are estimated based on the actual volume and value of the containerized cargo, break bulk cargo and dry and liquid bulk cargo moving via the individual marine terminals. These jobs are considered to be related to activities at the public and private marine terminals, but the degree of dependence on these terminals is difficult to estimate. It is to be emphasized that the level of employment with these exporters and importers is based on the demand for the final product, i.e., imported retail commodities such as electronics and computer equipment, not by the actual use of the marine terminals located in Texas. However, if other ports were used, it is likely that the costs of importing and exporting would increase, which could have long run implications on the level of employment with the related shippers/consignees. Finally, it is to be emphasized that there is no double counting of the directly dependent shippers/consignees in this related job estimate.

2.2 Direct Job Impacts

In 2018, 616.2 million tons of domestic and foreign waterborne cargo moved via the public and private marine terminals.⁴ As a result of this activity, 128,848 full-time jobs were directly created.⁵ In this section the jobs are analyzed in terms of:

⁴ Total tonnage is estimated based on actual 2018 tonnage at the publicly owned terminals, as provided by the 13 port districts. For the domestic and international cargo handled at the terminals, a combination of sources was used to estimate the 2018 tonnage, including interviews with the private terminals, and a review of the U.S. Army Corps of Engineers, Waterborne Commerce Statistics (2017 data for domestic and international trade), and 2018 USA Trade On-Line data.

⁵ Jobs are measured in terms of full-time worker equivalents. If a worker is employed only 50 percent of the time by

- Distribution by economic sector
- Distribution by job category
- Distribution by commodity group

2.2.1 Job Impacts by Sector and Job Category

Exhibit II-2 presents the distribution of the 128,848 direct jobs by sector and job category. As this exhibit shows, the largest job impacts are with terminal operators (including employees of the petroleum and chemical facilities dependent on the ability to receive and ship product by vessel or barge), followed by tenants of the public port that are dependent upon the cargo moving via the marine terminals. Jobs generated with the trucking industry serving the ports is the third largest employment impact category, followed by jobs with maritime services, marine construction and ship repair.

Exhibit II-2
Direct Employment Impacts by Job Category

IMPACT CATEGORIES	DIRECT JOBS
SURFACE TRANSPORTATION	
Rail	2,148
Truck	17,862
MARITIME SERVICES	
Terminal	40,931
ILA/Dock Workers	5,106
Tug Assist	657
Pilots	257
Agents	1,705
Maritime Services/Construction	14,725
Freight Forwarders	2,021
Warehouse	2,260
Container Repair/Storage	551
Government	4,505
Barge/Bunkers	2,699
Chandler/Surveyors	2,295
TENANTS	29,921
PORT AUTHORITY	1,206
TOTAL	128,848

Notes: 1. Totals may not add due to rounding.

2. There are currently 6,846 registered members of the International Longshoreman’s Association in the state of Texas. However, ILA hours are converted to full time equivalent jobs based on hours worked. Also included are non-ILA and non-unionized dockworkers.

activity at the State’s public and private marine terminals, then this worker is counted as .5 jobs. For members of the International Longshore Union, the differences between full time workers and workers “on the register” is significant, due to the limited hours worked per registered ILA member on an average annual basis.

2.2.2 Direct Job Impacts by Commodity

Most of the 128,848 jobs considered to be generated by port activity can be related to the handling of specific commodities or commodity groups. Certain employment categories such as government employees, employees with marine construction and ship repair, and the miscellaneous maritime services firms cannot be identified with a specific commodity. As a result, employment in these groups (which totaled 21,196) was not allocated to commodity groups.

Exhibit II-3 presents the direct employment impacts in terms of commodity groups. This exhibit indicates that in 2018, other liquid bulk cargoes handled at the private terminals generated the largest number of direct jobs, 39,010 jobs, followed by 35,093 jobs generated by the receipt of crude and shipment and receipt of petroleum products. The majority of these jobs are with petrochemical firms and refineries. The jobs are directly dependent upon the shipment and receipt of chemicals, petroleum and petroleum products via these ports. Containerized cargo created the third largest direct job impact, accounting for 14,468 direct jobs. The majority of these jobs are with trucking; warehouse/container repair; members of the International Longshoremen Association; and dependent shippers/consignees and associated distribution centers.

Exhibit II-3
Distribution of Direct Job Impact by Commodity

COMMODITY TYPE	DIRECT JOBS
Containers	14,468
Autos/RoRo	1,696
Steel Products	4,440
Bagged Cargoes	541
Forest Products	265
Miscellaneous Break Bulk	4,367
Bulk Grain	779
Other Dry Bulk	6,994
Petroleum	35,093
Other Liquid Bulk	39,010
Not Allocated	<u>21,196</u>
TOTAL	128,848

Totals may not add due to rounding

2.2.3 Job Impacts per Ton

The assessment of the job impacts on a per 1,000-ton basis provides a tool for port planners to use in evaluating the relative importance of different commodities as economic generators. Exhibit II-4 presents the job impacts per 1,000 tons for each commodity moving via the public and private marine terminals.

Exhibit II-4
Job Impacts per 1,000 Tons

COMMODITY TYPE	JOBS/1,000 TONS
Containers	0.47
Autos/RoRo	3.18
Steel Products	0.37
Bagged Cargoes	2.08
Forest Products	0.34
Miscellaneous Break Bulk	1.36
Bulk Grain	0.09
Other Dry Bulk	0.16
Petroleum	0.08
Other Liquid Bulk	0.46

The movement of autos and RoRo cargo such as agricultural equipment and road working equipment generates the greatest number of direct jobs per 1,000 tons. Bagged cargo creates the second largest direct jobs per 1,000 tons, followed by break bulk cargo. On a per container basis, 7.6 direct jobs are generated per 1,000 container moves.

Despite the fact that petroleum and petroleum products generated the largest direct job impact, on a per 1,000-ton basis, crude petroleum and products generated 0.08 jobs per 1,000 tons, while liquid bulk cargoes support 0.46 jobs per 1,000 tons. The finding that the crude petroleum and petroleum products and dry bulk cargoes, including bulk grains, generate relatively small direct jobs per 1,000 tons of throughput reflects the fact that the handling of these cargoes is much less labor intensive than handling RoRo and automobiles, bagged cargo, palletized and containerized cargo. Also, the supporting infrastructure of freight forwarders and customhouse brokers, warehousing and terminal operators is much greater for general cargo than for the dry and liquid bulk cargoes. The relatively high impacts per ton of liquid bulk cargo reflects the larger number of dependent terminal operators and shippers/consignees associated with the petrochemical business.

It is important to emphasize that these jobs per 1,000 tons ratios are static ratios and should not be used to extrapolate increases in tonnage into increases in direct jobs. The relationship between tonnage increase and jobs is not linear, since certain jobs are fixed with respect to waterborne tonnage. To estimate changes in direct jobs due to tonnage changes, the Martin Associates' Texas Maritime Economic Impact Model should be used, as this is the designed purpose of the model.

2.3. Induced Jobs

The 128,848 directly employed individuals due to activity at the public and private marine terminals received wages and salaries, a part of which was used to purchase local goods and services such as food, housing, clothing, transportation services, etc. As a result of these local purchases, 193,060 jobs in the regional economy were supported. The majority of the induced jobs are with state and local government agencies providing school, health care, police and fire protection, other community and social services, as well as firms providing business and personal services. The next largest induced job impact occurs in the local food (restaurant and groceries) industry sector.

2.4. Indirect Jobs

In addition to the induced jobs generated by the purchases of the directly employed individuals, the firms providing the direct services and employing the 128,848 direct jobs make local purchases for goods and services. These local purchases by the firms dependent upon the public and private marine facilities generate additional local jobs – indirect jobs. Based on interviews with the port service providers and terminal operators, these firms made more than \$11.3 billion of local purchases in 2018. These direct local purchases created an additional 112,112 indirect jobs in the local economy. These purchases include expenditures for equipment and parts, maintenance and repair services, office supplies, raw materials, fuel, utilities and insurance. Care is taken to avoid any double counting of jobs already included in direct jobs.

2.5. Related Jobs

It is estimated that about 1,355,392 jobs with Texas companies using the ports to ship and receive waterborne cargo are classified as related to the public and private marine terminals. These jobs are with importers of steel, producers and consumers of containerized cargo and break bulk cargo, producers and consumers of the liquid and dry bulk cargoes moving through the public and private marine terminals and farmers producing grain and rice for export.

To estimate the related user jobs with importers/exporters and those industries supporting the production of the container exports and the consumers of the containerized imports moving via ports, the following methodology was used. First, the key cargoes within the containers moving via each Texas port were identified from USA Trade On-Line. The majority of imported containerized

cargo consists of electronics, beverages, iron and steel products and chemicals. For export containers, key commodities include plastics, chemicals, and machinery and equipment. The average value per ton of each commodity was also developed from USA Trade On-Line. An average value per ton of containerized cargo imports and exports handled at the Port was then estimated.

Export producing industries were similarly identified for the key commodities moving in the export containers via the Port's container terminals. Similarly, the cargo moving in the imported containers were also associated with the producing industries. Using the Bureau of Economic Analysis, RIMS II model for the state of Texas, jobs to value of output ratios were developed for the relevant export producing and import consuming sectors. For imported goods associated with wholesale operations, the average wholesale margins were applied to the value of the imported containerized cargo associated with wholesale operations.

The values of import and export containers moving via each port were next estimated by multiplying the value per container (export and import separately) by the number of full containers moved via the container terminals. The total values of each type of container moved via the port were then adjusted to reflect the percentage of containers originating or destined for Texas, as determined from the terminal operators and steamship lines.

About 80 percent of the containerized cargo imported and exported via the Texas ports is estimated to originate or be consumed in Texas. Combining this share with the value of export and import containers, and the relevant jobs to value of shipment ratios, it is estimated that about 500,000 jobs are with in-state users for the shipment and receipt of containerized cargo. Included in this related job estimate are not only the jobs with the importers and exporters and the induced and indirect jobs created by these jobs, but the jobs required to support the production of the exports as well as the distribution and use of the imports are also included in the related user job impacts.

A similar method was used to estimate jobs related to forest products, grain, and liquid and dry bulk cargoes. The impact of imported steel in the local construction industry was estimated in a similar method, combining the value of the imported steel via the Texas ports that is estimated to remain in Texas (determined through terminal interviews) with the construction employment to output coefficient developed from the U.S. Bureau of Economic Analysis. It is estimated that about 415,000 jobs in the Texas economy are related to crude petroleum, petroleum products, chemicals and liquid bulk products moving via the 13 ports. At the national level, the movement of crude, petroleum products, chemicals and liquid bulk products have a much greater impact on users, as the majority of these products are consumed outside the state of Texas. Steel products moving via the public and private marine terminals in the 13 port districts supported about 350,000 jobs state-wide.

It is to be emphasized that these are related jobs, and would not likely disappear if the terminals were to close to marine cargo activity. Given a level of demand for the steel, containerized cargo, export grain and break bulk commodities (mostly manufactured cargo), the cargo would be

shipped through another port such as New Orleans or Los Angeles/Long Beach. The directly dependent shipper/consignee impacts, as well as direct, induced and indirect jobs are not included in these related job estimates.

It is to be further emphasized that when the impact models are used for planning purposes, related jobs should not be used to judge the economic benefits of a particular project. Related jobs are not estimated with the same degree of defensibility as are the direct, induced and indirect jobs. Therefore, these three types of job impacts should be used in evaluating port investments. The purpose of the related jobs estimates is to provide a proxy for the magnitude of the more general economic development impact of the private and public port facilities at a given point in time.

The 616.2 million tons of cargo at the public and privately owned marine terminals generated revenue for firms in each of the economic sectors. For example, revenue is received by the railroads and the trucking companies within the surface transportation sector as a result of moving export cargo to the marine terminals and distributing the imported commodities inland after receipt at the marine terminals. The firms in the maritime services sector receive revenue from arranging for transportation services, cargo handling, providing services to vessels in port and repairs to vessels calling the port facilities. The banking/insurance sector receives revenue from financial services provided to users of the marine terminals. The 13 individual port authorities receive revenue from terminal leases and port charges such as wharfage and dockage assessed on cargo and vessels calling on the public terminals. In addition, revenue is received by shippers/consignees from the sales of cargo shipped or received via the marine cargo terminals and from the sales of products made with raw materials received through the terminals. Since this chapter is concerned with the revenue generated from providing maritime services, the shipper/consignee revenue (i.e., the value of the cargo shipped or received through the marine terminals) will be excluded from the remaining discussion.

3. REVENUE IMPACT—TOTAL ECONOMIC ACTIVITY

The revenue impact is a measure of the total economic activity in the State that is generated by the cargo and vessel activity at the public and private marine terminals within the state of Texas. In 2018, it is estimated that the total economic value of the Texas ports is \$449.6 billion. Of this total economic value, \$53.6 billion is the direct business revenue received by the firms directly dependent upon the marine terminals and providing maritime services and inland transportation services to the cargo handled at the marine terminals and the vessels calling the port, as well as ship and rig repair and maintenance services. An additional \$23.6 billion represents the re-spending of the direct income, which is used for in-state purchases of goods and services by those directly employed. The remaining \$372.3 billion represents the value of the output to the state of Texas that is created due to the cargo moving via the public and privately owned marine terminals. This includes the value added at each stage of producing an export cargo, as well as the value added at each stage of production for the firms using imported raw materials and intermediate products that flow via the

marine terminals and are consumed within the State. It is important to emphasize that these three components of total economic value are additive, and do not represent any double counting of monetary impacts. In contrast, direct income, local purchases by firms and taxes generated are all paid from the direct and related user revenue.

The remainder of this section focuses only on the \$53.6 billion revenue impact generated from the provision of transportation services in support of the cargo and vessel activity at the State’s public and private marine terminals. It is important to emphasize that the direct business revenue does not include the value of the cargo moving via the marine facilities.

3.1 Direct Revenue Impacts by Economic Sector

In 2018, the cargo and vessel activity at the state of Texas’ public and private marine terminals generated \$53.6 billion of business revenue to the firms providing cargo handling and vessel services and supporting the firms directly dependent upon the marine terminals.

3.2 Direct Revenue Impacts by Economic Sector and Job Category

Exhibit II-5 presents the distribution of the \$53.6 billion of directly generated revenue across the various port sectors and job categories. This revenue includes the revenue received by firms providing services to the cargo and vessel activity at the publicly and privately owned terminals, and includes revenue received by trucking firms, stevedores, the port authorities, chandlers, vessel agents, pilots, towing companies, etc.

Exhibit II-5
Revenue by Sector and Category

IMPACT CATEGORY	REVENUE (\$1,000)
SURFACE TRANSPORTATION	
Rail	\$4,203,990
Truck	\$2,667,305
Pipeline	\$3,715,856
MARITIME SERVICES	
Terminal	\$20,877,858
Tug Assist	\$219,738
Pilots	\$259,465
Agents	\$66,976
Maritime Services/Construction	\$2,961,905
Freight Forwarders	\$410,089
Warehouse	\$596,625
Container Repair/Storage	\$189,290
Barge/Bunkers	\$1,275,450
Chandler/Surveyors	\$487,628
TENANTS	\$15,302,292
PORT AUTHORITY	\$400,833
TOTAL	\$53,635,301

Totals may not add due to rounding

The majority of the direct revenue is received by the terminal operators, followed by tenants/dependent shippers/consignees, followed by the miscellaneous maritime services/marine construction category. Within the surface transportation sector, rail transportation accounted for \$4.2 billion, followed by \$3.7 billion received by pipeline operations serving the public and private marine terminals.

3.3 Direct Revenue by Commodity

Exhibit II-6 shows the total revenue impact by commodity. The exhibit shows that in terms of total revenue, liquid bulk cargoes, followed by petroleum and petroleum products create the largest revenue impacts, followed by containers and other dry bulk.

Exhibit II-6
Revenue Impacts by Commodity

COMMODITY TYPE	REVENUE (1,000)
Containers	\$3,366,047
Autos/RoRo	\$304,780
Steel Products	\$837,207
Bagged Cargoes	\$24,806
Forest Products	\$59,270
Miscellaneous Break Bulk	\$939,164
Bulk Grain	\$225,290
Other Dry Bulk	\$3,145,689
Petroleum	\$20,120,922
Other Liquid Bulk	\$21,149,466
Not Allocated	\$3,462,659
TOTAL	\$53,635,301

Note: The revenue per commodity excludes the revenue estimated for miscellaneous maritime services marine and construction, ship repair and Port Authority, which has not been allocated to the commodity groups. This revenue is included in the not allocated category.

Exhibit II-7 shows total direct business revenue generated per ton of cargo. In terms of per ton revenue, autos and RoRo cargo generate the largest revenue per ton, as the result of the relatively high transportation cost per vehicle, and the labor intensive loading, discharge, processing and pre-staging required for export and import. Miscellaneous break bulk cargo also generates relatively high direct business revenue per ton, reflecting the labor intensity of handling and processing the break bulk cargo, and the handling and transport of project cargo. Liquid bulk cargo generates a relatively high revenue per ton impact, reflecting the value of the revenue from the

operations of the dependent shippers/consignees handling the liquid bulk cargo as well as the high cost of transporting liquid bulk cargo, and the value of bunkering activity.

Exhibit II-7
Direct Business Revenue per Ton

COMMODITY TYPE	REVENUE/TON
Containers	\$108.96
Autos/RoRo	\$572.12
Steel Products	\$69.73
Bagged Cargoes	\$95.42
Forest Products	\$76.35
Miscellaneous Break Bulk	\$292.43
Bulk Grain	\$25.47
Other Dry Bulk	\$70.70
Petroleum	\$46.83
Other Liquid Bulk	\$247.32

4. PERSONAL EARNINGS IMPACT

In the previous section of this chapter, the total revenue generated by port activity was identified. As described earlier, the personal income received by those directly dependent upon port activity is paid from the business revenue received by the firms supplying direct services at the marine terminals.

The income impact is estimated by multiplying the average annual earnings (excluding benefits) of each port participant, i.e., truckers, steamship agents, pilots, towing firm employees, longshoremen, warehousemen etc., by the corresponding number of direct jobs in each category. The individual annual earnings in each category multiplied by the corresponding job impact resulted in the \$8.7 billion direct personal income (wage and salary earnings) impact. This results in an average annual salary of \$67,611 per direct employee. In comparison, the mean annual salary in the state of Texas for all occupations in 2018, as reported by the U.S. Bureau of Labor Statistics, is \$49,720.

The impact of the re-spending of this direct income for local purchases is estimated using a personal earnings multiplier. The personal earnings multiplier is based on data supplied by the Bureau of Economic Analysis (BEA). The BEA estimates that for every one dollar earned by direct employees generated by activity at the marine terminals, an additional \$2.71 of personal income and consumption expenditures would be created as a result of re-spending the income for purchases of

goods and services produced in-state. Hence, a personal earnings multiplier of 3.71 was used to estimate the additional consumption and income impact due to re-spending – \$23.6 billion. This additional re-spending of the direct income generates the 193,060 induced jobs, described in the previous section.⁶

In addition to the direct and induced personal income and consumption impact, wages and salaries were received by the 112,112 indirect employees. Using wage and salary data for these indirect employees as reported by the U.S. Bureau of Economic Analysis, RIMS II, it is estimated that \$5.1 billion of indirect wages and salaries were created by port activity. Therefore, in 2018, the maritime activity at the public and private terminals located in the state of Texas created a total of \$37.5 billion of direct, induced and indirect wages and salaries.

In addition, the related job holders received \$65.4 billion of personal wages and salaries.

5. LOCAL PURCHASES

Each of the firms surveyed were asked to provide a breakdown of local expenditures for equipment, parts, office supplies, business services, utilities, raw materials, maintenance and repair, new construction, etc. Based on the reported expenditures, it is estimated that \$11.3 billion of local purchases were made by the firms directly dependent upon maritime cargo activity at the public and private marine terminals. These firms also include the refineries and petrochemical firms that ship and receive cargo by barge or vessel. These \$11.3 billion of local purchases in turn supported the 112,112 indirect jobs in the state of Texas.

6. TAX IMPACTS

State and local tax impacts are based on state and local per capita income tax burdens developed by the Tax Foundation, as well as state and local taxes collected by type of tax, as reported by the U.S. Bureau of Census, State and Local Government Finances. The taxes include all state and local taxes collected divided by personal income in the state of Texas. Multiplying the tax/capita income burden to the total direct, induced and indirect personal income impact, it is estimated that activity at the public and privately owned marine terminals within the state generated \$2.8 billion of state, county and local taxes. Of the \$2.8 billion impact, the state of Texas received \$1.3 billion, while the local governments received \$1.5 billion.

⁶ It is to be emphasized that the re-spending impact of \$23.6 billion does not represent the earnings of the 193,060 induced jobs. The \$23.6 billion re-spending impact does include the direct earnings received by the employees holding the induced jobs, but the re-spending impact also includes the revenue received by the firms providing the goods and services to those directly employed.

In addition, \$5.0 billion of state and local taxes were generated by the users of the public and private marine terminals, of which the state of Texas received \$2.3 billion and local governments received \$2.7 billion.

As demonstrated, the marine cargo and vessel activity at the publicly and privately owned marine terminals located in the state of Texas provide a major economic engine to the State's economy. In 2018, the 616.2 million tons of cargo moving via these terminals supported \$449.6 billion of economic activity in the state of Texas, or about 25% of the total State Gross Domestic Product.⁷ In order to maintain and grow the economic contribution of the State's marine terminals, it is essential that the capital infrastructure supporting the terminals continues to be a key priority in state and national policy, and further that the shipping channels be maintained at the authorized water depths and capital projects that enhance the State's ports competitive position be given the highest priority. The demonstrated economic dividend that results from maritime trade underscores the overall importance of continued growth of the State's port and maritime transportation system.

⁷ In 2018, the U.S. Bureau of Economic Analysis reported a \$1.8 trillion GDP for Texas.

III. COMPARISON OF IMPACTS: 2018-2015

The last economic impact study conducted for the Texas Ports Association was conducted by Martin Associates in 2016, using 2015 cargo data. Since 2015, total tonnage handled by the public and private marine terminals at the 13 public ports increased by 53.4 million tons. This growth in tonnage was driven by the growth in the movement of petroleum and petroleum products, including the export of crude petroleum, as well as the growth of nearly 10 million tons of dry bulk cargo, and 5.1 million tons of other liquid bulk cargo. Containerized cargo also increased by nearly 1.4 million tons. The impact of the steel import tariffs imposed by the current Administration resulted in a loss of nearly 2.5 million tons of steel products to the Texas ports. Grain tonnage declined as the result of the temporary closing of several grain elevators for reconditioning, as well as a decline in grain export tonnage which is often a backhaul on vessels carrying imported iron and steel products. The change in tonnage handled at the public and private marine terminals at the 13 ports districts is shown in Exhibit III-1.

Exhibit III-1
Change in Tonnage by Commodity, 2015-2018

COMMODITIES	2018 TONS (1,000)	2015 TONS (1,000)	CHANGE (1,000)
Containers	30,893	29,533	1,359
Autos	533	586	-54
Steel Products	12,006	14,488	-2,482
Bagged Cargoes	260	217	43
Forest Products	776	772	4
Miscellaneous Break Bulk	3,212	2,972	239
Bulk Grain	8,844	15,289	-6,445
Other Dry Bulk	44,491	34,637	9,854
Petroleum	429,659	383,939	45,720
Other Liquid Bulk	85,514	80,380	5,135
TOTAL	616,188	562,814	53,374

As a result of this growth in tonnage, the total number of jobs supported by the marine cargo activity within the state of Texas increased by 227,542 jobs since 2015. Total economic value of the Texas marine cargo activity grew from \$368.7 billion in 2015 to \$449.6 billion in 2018, and the contribution of the Texas ports to the State's Gross Domestic Product grew from 23% in 2015 to 25% in 2018.

Exhibit III-2 shows the change in impacts between 2015 and 2018.

Exhibit III-2
Change in Economic Impacts, 2015-2018

IMPACTS	STATE OF TEXAS 2018	STATE OF TEXAS 2015	CHANGE
JOBS			
Direct	128,848	116,175	12,673
Induced	193,060	143,169	49,891
Indirect	112,112	94,807	17,306
Related Users	<u>1,355,392</u>	<u>1,207,720</u>	<u>147,672</u>
TOTAL JOBS	1,789,412	1,561,870	227,542
PERSONAL INCOME (\$ Millions)			
Direct	\$8,712	\$7,016	\$1,695
Re-Spending/Local Consumption	\$23,621	\$18,582	\$5,040
Indirect	\$5,117	\$4,329	\$788
Related User Income	<u>\$65,370</u>	<u>\$62,229</u>	<u>\$3,142</u>
TOTAL PERSONAL INCOME	\$102,821	\$92,156	\$10,665
ECONOMIC REVENUE/OUTPUT (\$ Millions)			
Direct Business Revenue	\$53,635	\$46,669	\$6,967
Related Users Output	<u>\$372,306</u>	<u>\$303,469</u>	<u>\$68,837</u>
TOTAL ECONOMIC REVENUE/OUTPUT	\$425,942	\$350,138	\$75,804
LOCAL PURCHASES (\$ Millions)	\$11,318	\$9,728	\$1,590
STATE AND LOCAL TAXES (\$ Millions)			
Direct	\$662	\$526	\$136
Re-Spending/Local Consumption	\$1,795	\$1,394	\$402
Indirect	\$389	\$325	\$64
Related User Taxes	<u>\$4,968</u>	<u>\$4,667</u>	<u>\$301</u>
TOTAL TAXES	\$7,814	\$6,912	\$903
TOTAL ECONOMIC VALUE (\$ MILLIONS)			
Direct Business Revenue	\$53,635	\$46,669	\$6,967
Re-Spending and Local Consumption	\$23,621	\$18,582	\$5,040
Related Users Output	<u>\$372,306</u>	<u>\$303,469</u>	<u>\$68,837</u>
TOTAL ECONOMIC VALUE	\$449,563	\$368,719	\$80,844

Totals may not add due to rounding

Direct jobs increased by 12,673 jobs since 2015, and induced jobs grew by 49,891 jobs reflecting the growth in the re-spending multiplier within the state of Texas, as well as the growth in average annual salary received by the directly employed workers from \$60,400 in 2015 to \$67,611 in 2018. Indirect jobs grew by 17,306 jobs, reflecting the increase of \$1.6 billion of in-state purchases by the directly dependent firms. Related user impacts grew significantly reflecting the growth in containerized cargo and petroleum and petrochemical products over the period.

Direct business revenue increased by \$7.0 billion, and total state and local taxes supported by the port activity grew by \$903 million since 2015.

As demonstrated, the marine cargo and vessel activity at the public and privately owned marine terminals located in the state of Texas provide a major economic engine to the State's Economy. In 2018, the 616.2 million tons of cargo moving via these terminals supported \$449.6 billion of economic activity in the state of Texas, or about 25% of the total State Gross Domestic Product. In order to maintain and grow the economic contribution of the State's marine terminals, it is essential that the capital infrastructure supporting the terminals continues to be a key priority in state and national policy, and further that the shipping channels be maintained at the authorized water depths and capital projects that enhance the State's ports competitive position be given the highest priority. The demonstrated economic dividend that results from maritime trade underscores the overall importance of continued growth of the State's port and maritime transportation system.