Container Market Assessment, Container Cargo Projections and Benefits-Cost Analysis for the Deepening and Widening of the Mobile Shipping Channel

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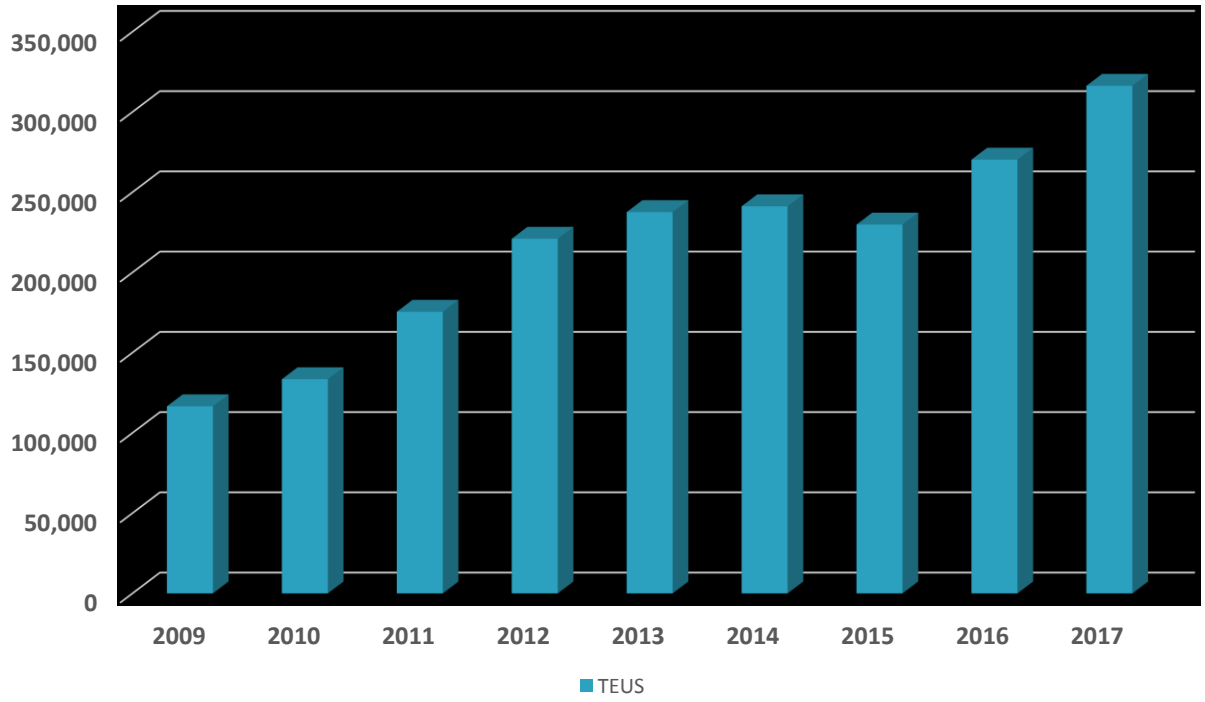
This report consists of a review of the current container market handled at the Port of Mobile, identification of the factors that will drive the future base level of container throughput, the identification of the potential market for containerized cargo, and the development of a benefit cost analysis of the deepening of the Mobile Ship Channel from 45 ft. to 50 ft. on the national and state economies.

1. HISTORICAL AND EXISTING CONTAINERIZED CARGO

The Port of Mobile's container throughput has been increasing steadily since the opening of the APM Terminal Mobile in September 2008. Container throughput has grown from 116,581 TEUs in the first full year of operation of the container terminal in 2009 to 316,340 TEUs in 2017.

Exhibit 1 - Composition of Historical TEUs Handled at the Port of Mobile



Source: Port of Mobile

The Port of Mobile competes with the South Atlantic ports of Savannah, Charleston, Norfolk, and Wilmington (NC); the Gulf Coast ports of New Orleans and Houston; and the Southern California ports of Los Angeles and Long Beach for containerized cargo destined and originating in Alabama, Mississippi, Arkansas and Tennessee.

Overall historical growth of international containerized cargo in the U.S. has averaged a 3.9% compound annual growth rate since 2003 (see Exhibit 2). Export growth has averaged 5.4% compared to a 3.0% growth of imported containerized cargo over the 14 year period. However, since 2009 (the impact of the recession), overall containerized tonnage has grown at an annual rate of 4.7%, with imports growing at a rate of 5.3% annually and exports growing at a rate of 3.9% annually. In contrast, total TEUs at the Port of Mobile has averaged an annual growth rate of 13.3% since the recession.

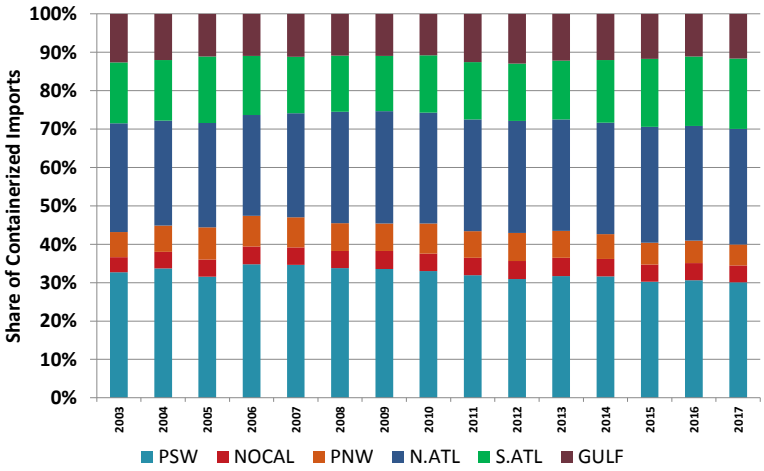
Exhibit 2 - Historical Growth in U.S. International Containerized Cargo

Source: USA Trade OnLine

1.1 Overview of Imported International Containerized Market

Exhibit 3 shows the historical share of international containerized cargo that is imported into the U.S. by port range.

Exhibit 3 - Historical Imported Containerized Cargo

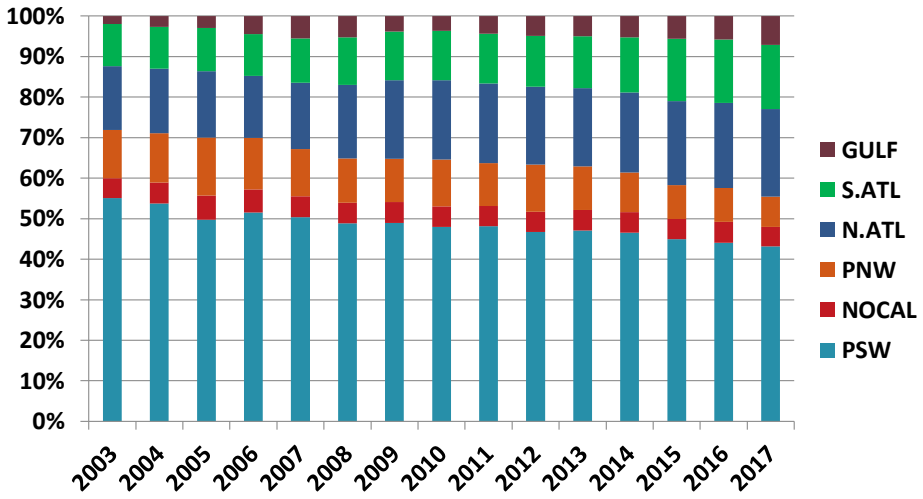


Source: USA Trade OnLine

The West Coast port range consists of the Pacific Southwest (PSW) ports of Los Angeles and Long Beach; the Pacific Northwest (PNW) ports consist of Seattle, Tacoma and Portland; and the Northern California (NOCAL) port range consists primarily of Oakland. The North Atlantic (N. ATL) ports consist of ports from Boston to Baltimore; the South Atlantic (S. ATL) ports consist of ports from Norfolk to Miami; and the Gulf (GULF) coasts ports include the ports from Port Manatee (FL) to Brownsville (TX). As shown in Exhibit 3, the West Coast port range has gradually lost market share to the other regions, as its share of imported containerized cargo has fallen from nearly 44% in 2003 to about 40% in 2017. This reflects the impact of the West Coast port shutdown that occurred in September, 2002 during the contract negotiations with the International Longshore and Warehouse Union (ILWU) and the Pacific Maritime Association (PMA), the management group representing the ocean carriers and terminal operators along the West Coast. In contrast, the imported containerized cargo market share of the Atlantic Coast ports has grown from about 40% in 2003 to nearly 49% in 2017.

The loss of containerized import market share on the West Coast since 2002 reflects the fact that beneficial cargo owners (BCOs) have increased the use of other port ranges to handle imported containers moving from the Pacific Rim into the U.S. This diversification strategy is evident when the share of imported cargo from Asia moving via the various port ranges is reviewed. As shown in Exhibit 4, the share of Asian imported containerized tonnage moving via the West Coast ports has fallen from about 72% in 2003 to about 55% in 2017, while the share of the South Atlantic and North Atlantic ports have increased from 26% in 2003 to 38% in 2017.

Exhibit 4 - Share of Asian Imported Containerized Cargo by Port Range



Source: USA Trade OnLine

Exhibit 5 - Imported Containerized Tonnage Handled by Port (Metric Tons)

	2003	2006	2009	2012	2015	2017	CAGR 03-17
LA/Long Beach	34,916,936	48,283,193	35,232,198	42,357,005	46,609,045	48,898,825	2.4%
New York/NJ	17,120,118	20,976,470	19,451,660	24,542,930	28,253,709	28,178,325	3.6%
Savannah, GA	4,864,068	6,515,686	6,007,022	8,052,694	11,364,206	12,803,124	7.2%
Houston, TX	6,299,348	7,792,393	5,419,957	8,790,889	9,499,687	10,865,401	4.0%
Norfolk/Newport News	6,438,530	7,341,425	5,171,847	6,596,781	8,300,014	9,541,278	2.8%
Charleston, SC	5,708,897	6,634,146	3,932,562	5,360,036	7,129,474	8,288,967	2.7%
Oakland, CA	3,778,956	5,854,515	4,606,610	5,626,495	6,260,787	6,598,488	4.1%
Baltimore, MD	2,627,924	3,468,951	2,614,751	3,843,282	4,536,160	5,131,414	4.9%
Tacoma, WA	3,308,250	4,405,514	2,667,008	3,811,861	5,347,007	4,653,063	2.5%
Seattle, WA	3,123,635	5,132,582	4,091,397	5,358,058	3,363,154	4,252,352	2.2%
Miami, FL	3,326,244	3,710,028	2,154,958	2,426,719	3,244,348	3,351,148	0.1%
Philadelphia, PA	1,845,681	2,542,251	1,477,171	2,031,144	2,998,419	3,259,928	4.1%
Port Everglades, FL	1,848,069	2,487,123	1,723,281	2,163,099	2,901,182	3,127,573	3.8%
New Orleans, LA	1,625,734	2,253,286	2,236,126	2,663,720	3,398,060	2,669,022	3.6%
Jacksonville, FL	694,294	1,120,964	647,168	1,339,945	1,604,390	1,772,201	6.9%
Mobile, AL	516,786	837,414	1,077,425	1,701,886	1,255,788	1,455,092	7.7%
Wilmington, DE	826,127	801,596	844,652	1,236,458	1,314,740	1,167,159	2.5%
Boston, MA	852,613	805,585	834,924	1,471,508	1,111,561	1,060,734	1.6%
Gulfport, MS	964,906	751,397	767,280	814,001	919,069	890,694	-0.6%
All Other	8,789,506	10,068,018	7,166,753	9,268,767	7,937,593	7,545,117	-1.1%
Grand Total	109,476,622	141,782,541	108,124,752	139,457,279	157,348,393	165,509,905	3.00%

Source: USA Trade OnLine

Exhibit 5 shows that the Port of Mobile has posted a 7.7% growth rate in imports compared to 3.0% overall, and has exhibited the strongest growth in containerized cargo of all U.S. container ports. However, this reflects the fact that the APM Terminal Mobile did not open until the fall of 2008. In the South Atlantic port range, Savannah has posted a 7.2% annual growth rate; containerized cargo at JAXPORT grew by 6.9%

over the past 14 years[1]; and imported containers grew by 2.7% at Charleston. However, looking at the growth rate of these ports after 2009, the lowest point after the recession, Savannah grew at an annual rate of 9.9% per year, Charleston at a rate of 9.7% per year, Houston at a rate of 9.1% per year, and New Orleans at a rate of 2.2% In comparison, imported containerized cargo grew by 3.8% at the Port of Mobile since 2009.

With respect to the growing trade lanes for imported international containerized cargo, the Asian trade lanes have demonstrated the strongest growth, and also represent the larger market sources for containerized imports into the U.S., as shown in Exhibit 6. Southwest Asia, which consists of countries from Vietnam to Pakistan, has shown the strongest growth in sources of import containers into the U.S. In addition, imported containers from the Middle East have also shown a significant growth over the period, although volumes remain small, relative to the trade with Asia.

Exhibit 6 - Imported Containerized Cargo by Trade Lane for the U.S.
(metric tons)

Country Areas	2003	2006	2009	2012	2015	2017	CAGR 03-17
China	33,860,810	56,557,694	43,263,014	52,525,484	61,444,236	65,339,903	4.8%
North Europe	15,430,894	17,544,696	13,659,326	19,174,137	19,187,200	20,936,405	2.2%
SE Asia	8,804,905	11,014,595	9,819,172	12,142,064	14,773,052	16,949,640	4.8%
Mediterranean	9,623,688	11,406,509	7,360,431	9,739,164	12,640,892	13,336,633	2.4%
Japan/Korea	7,945,623	9,906,486	6,517,658	10,667,608	9,837,975	10,127,962	1.7%
South America EC	9,035,601	11,329,607	6,823,880	6,989,297	8,328,190	8,602,472	-0.4%
SW Asia	3,440,553	4,973,582	4,030,501	5,796,797	7,223,368	8,461,313	6.6%
Central America	7,493,652	6,664,426	5,515,141	6,757,754	8,495,987	7,607,378	0.1%
South America WC	3,493,496	4,370,673	4,234,635	4,526,170	5,717,599	5,028,694	2.6%
Australia/NZ	2,429,756	2,772,853	2,135,003	2,438,933	2,968,525	2,327,991	-0.3%
Africa	2,253,236	1,590,960	1,482,756	2,606,860	1,759,178	2,113,045	-0.5%
Middle East	671,194	645,052	376,772	1,247,417	2,277,082	1,880,271	7.6%
Canada	3,336,699	1,397,856	1,112,930	1,691,397	886,104	1,359,352	-6.2%
Caribbean	1,558,073	1,443,802	1,654,877	2,947,545	1,527,575	1,065,241	-2.7%
All Other	98,441	163,751	138,656	206,654	281,430	373,604	10.0%
Grand Total	109,476,622	141,782,541	108,124,752	139,457,279	157,348,393	165,509,905	3.0%

Source: USA Trade OnLine

These trade lanes are well served by the Port of Mobile. The China, Japan/Korea, Southeast Asia and Southwest Asia trade lanes all represent strong growth market for the Port.

[1] It is to be noted that the MOL/TraPac Container Terminal at JAXPORT (Port of Jacksonville) opened in 2009.

Exhibit 7 - Imported International Containerized Cargo by Trade Lane for Mobile (metric tons)

Trade Lanes	2003	2006	2009	2012	2015	2016	2017	CAGR '03-
China	294	13,338	69,837	105,647	172,463	268,023	334,715	65.30%
Central America	213,891	66,316	300,843	257,667	245,092	227,228	310,588	2.70%
Japan/Korea	1,160	88,409	101,750	257,062	258,338	293,397	270,283	47.60%
South America EC	184,611	478,260	341,543	119,814	98,724	122,874	221,062	1.30%
North Europe	69,084	86,174	62,967	99,147	109,802	97,289	143,536	5.36%
SE Asia	19	22,796	15,197	31,187	69,784	40,150	76,482	80.60%
Mediterranean	3,872	53,157	4,547	37,168	95,226	163,438	34,686	16.96%
Africa		176		836	1,339	2,972	24,487	NA
SW Asia	0	213	59	3,471	4,789	1,591	10,323	108.37%
Caribbean	22,088	7,663	179,868	376,598	1,362	1,275	7,381	-7.53%
South America WC	1,882	12,822	785	755	1,338	1,624	6,696	9.49%
All Other		1		22			6,494	NA
Canada		8,013	6	142,711	76	911	4,380	NA
Middle East				269,784	196,750	64,502	3,000	NA
Australia/NZ	19,884	76	23	17	704	255	980	-19.34%
Grand Total	516,786	837,414	1,077,425	1,701,886	1,255,788	1,285,529	1,455,092	7.67%

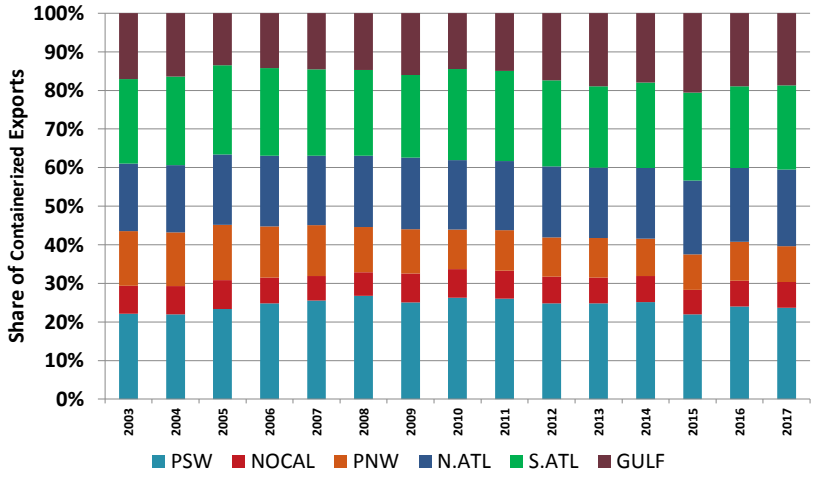
Source: USA Trade OnLine

Key from this macro overview of the containerized imports, the Port of Mobile has shown strong growth overall, and in particular in the Asian trade lanes. However, the Port of Mobile's import container growth has not been at the same pace as Savannah, Charleston, and Houston since 2009. Furthermore, in order to continue to grow the Asian market, which is served through the Panama Canal and the Suez Canal, the trade lanes on which the larger ocean carriers are being deployed, it is critical that the Port of Mobile's ship channel be deepened to a 50 ft. channel depth in order to compete with the key ports of Savannah and Charleston.

1.2 Overview of Export Containerized Cargo Market

Since 2003, international containerized export tonnage has grown by 5.4% annually throughout all U.S. ports, with the Gulf Coast ports showing the strongest growth, at 6.1% annually, followed by a 5.9% annual growth of exported containerized tonnage from the Atlantic Coast ports, and 4.7% from the West Coast ports. The strong growth in international containerized exports via the Gulf Coast ports resulted in an increase in market share of total U.S. international containerized exports, as the export share of total U.S. containerized cargo from the Gulf Coast port range grew from 17% in 2003 to 19% in 2017. The West Coast ports export share fell from 44% in 2003 to 40% in 2017, while Atlantic Coast ports' share of international containerized exports grew from 40% in 2013 to 42% in 2017.

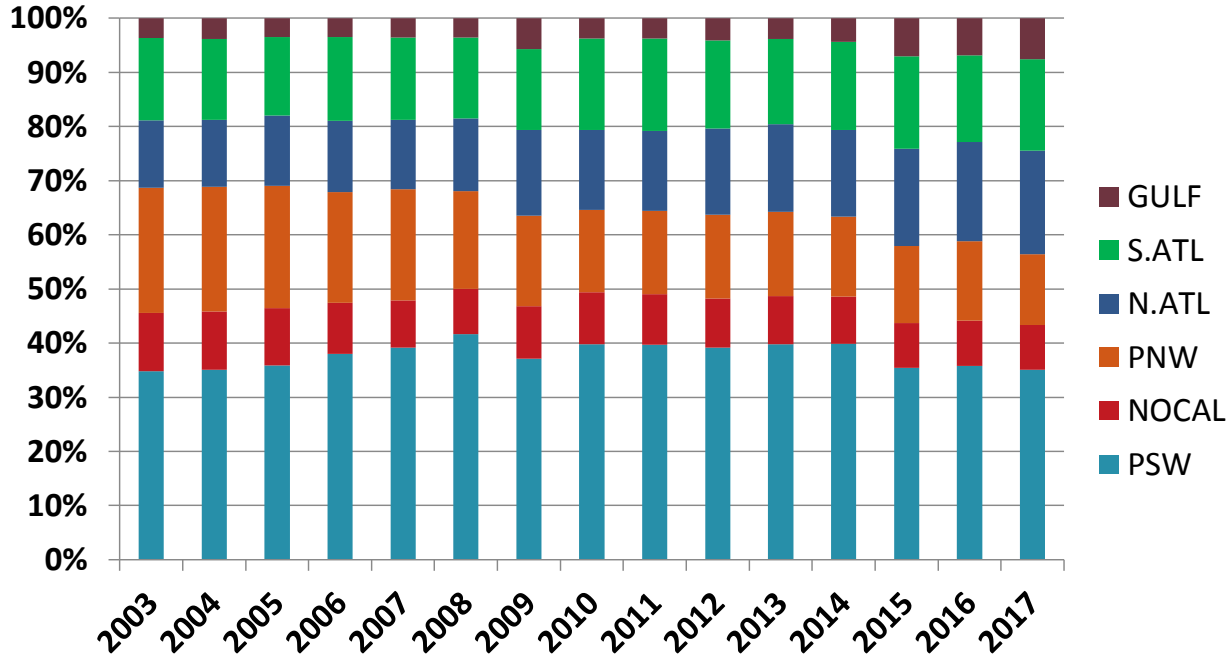
Exhibit 8 - Share of Historical Exported International Containerized Cargo by Port Range



Source: USA Trade OnLine

The loss of market share for the West Coast ports in terms of total international containerized exports from the U.S. ports reflects the growing all-water services between Asia and the U.S. East and Gulf Coast ports that have been put in place since the West Coast port shut down in 2002, and the expansion of the Panama Canal in 2016 to handle the growing size of container ships now being deployed on this all-water Asian routing. Exhibit 9 presents the market share changes by port range with respect to U.S. exports to Asian destinations. As this exhibit points out, the share of West Coast port exports to Asia declined from nearly 70% in 2003 to about 57% in 2017.

Exhibit 9 - Port Range Share of Exported International Containerized Cargo to Asia



Source: USA Trade OnLine

The Port of Mobile recorded a 9.5% annual growth rate in exports of international containerized cargo between 2003 and 2017, compared to an overall growth rate of U.S. exports at 5.4% annually over the same period. With respect to other South Atlantic ports, Wilmington, NC recorded the largest international containerized cargo export growth rate, 13.6% over the period, driven by exports to China and Northern Europe, while exports via the Port of Savannah grew by 6.1%; exports via Norfolk grew by 6.9%; and exports via Charleston grew by 3.7%. On the Gulf Coast, the Port of Houston exports grew by 5.8% and exports via the Port of New Orleans grew by 5.9% over the period.

Exhibit 10 - International Containerized Exports by U.S. Port
(metric tons)

	2003	2006	2009	2012	2015	2017	CAGR 03-17
LA/Long Beach	12,459,590	17,874,384	21,730,803	24,547,817	21,476,083	28,110,718	6.0%
Houston, TX	5,695,197	6,886,223	9,579,654	10,929,537	11,248,212	12,460,448	5.8%
Savannah, GA	5,403,611	7,772,245	9,636,729	11,357,003	10,678,479	12,346,012	6.1%
New York/NJ	4,880,339	6,808,648	8,366,934	9,352,846	8,563,103	10,598,902	5.7%
Norfolk/Newport News	3,338,059	4,249,885	5,222,405	6,099,149	7,213,266	8,545,432	6.9%
Oakland, CA	4,031,751	4,665,149	6,223,051	6,603,202	5,933,709	7,421,290	4.5%
Charleston, SC	3,973,948	4,550,658	3,729,841	4,672,121	5,455,849	6,597,729	3.7%
Tacoma, WA	2,886,032	3,965,825	4,063,893	4,308,368	4,957,845	5,995,024	5.4%
Seattle, WA	3,178,839	3,977,606	4,454,521	4,886,521	3,645,178	4,599,858	2.7%
New Orleans, LA	1,671,626	1,539,425	1,903,297	2,583,827	3,284,215	3,742,802	5.9%
Baltimore, MD	860,543	1,056,461	1,390,976	1,437,824	1,439,326	2,278,793	7.2%
Miami, FL	1,379,671	1,436,373	1,869,302	2,071,192	1,791,576	2,248,838	3.6%
Port Everglades, FL	680,870	1,081,996	1,318,556	1,609,321	2,048,046	1,943,539	7.8%
Mobile, AL	446,712	367,488	655,880	1,061,300	1,271,124	1,593,271	9.5%
Freeport, TX	334,088	218,122	181,622	234,631	1,026,486	1,277,604	10.1%
Wilmington, NC	185,676	363,908	839,769	793,066	887,983	1,112,741	13.6%
Jacksonville, FL	422,213	583,979	746,062	1,126,619	875,610	1,082,477	7.0%
Boston, MA	218,026	316,635	414,688	422,188	488,089	840,711	10.1%
Gulfport, MS	439,018	395,448	340,846	423,603	348,909	678,581	3.2%
All Other Ports	4,254,347	3,945,468	4,219,748	4,703,502	5,646,742	5,591,187	2.0%
Grand Total	56,740,156	72,055,925	86,888,576	99,223,634	98,279,831	119,065,955	5.4%

Source: USA Trade OnLine

As with the international containerized import market, the major and growing trade lanes for U.S. containerized exports are the Asian trade lanes. (Exhibit 11).

Exhibit 11 - International Containerized Export Tonnage by Trade Lane
(metric tons)

	2003	2006	2009	2012	2015	2017	CAGR 03-17
China	14,175,870	22,050,462	27,796,380	30,049,694	28,183,816	36,828,999	7.1%
SE Asia	4,706,958	5,634,904	9,150,003	9,478,419	10,326,127	14,568,444	8.4%
Japan/Korea	11,876,319	13,698,909	12,747,303	13,721,974	12,620,728	14,211,184	1.3%
North Europe	8,178,397	9,341,361	8,494,258	10,626,707	11,072,921	12,364,742	3.0%
SW Asia	1,342,350	1,705,969	4,012,493	4,441,803	4,480,432	7,330,961	12.9%
Mediterranean	4,622,126	4,982,324	5,714,615	6,172,406	5,643,926	6,613,062	2.6%
South America EC	2,941,021	4,063,199	4,554,670	6,740,226	7,166,569	5,876,829	5.1%
Central America	2,925,668	3,160,286	3,132,483	4,799,871	5,021,123	5,445,115	4.5%
Middle East	1,083,213	1,334,568	2,631,189	2,984,968	3,334,735	4,086,283	9.9%
South America WC	1,044,362	1,344,486	2,140,947	3,219,082	3,261,984	3,404,967	8.8%
Caribbean	1,748,808	2,160,501	2,370,187	2,482,595	2,696,476	3,035,929	4.0%
Africa	793,618	1,048,166	2,462,257	2,179,881	2,317,716	2,847,765	9.6%
Australia/NZ	1,204,173	1,432,516	1,574,631	2,207,544	2,044,618	2,332,387	4.8%
All Other	97,206	98,048	106,999	118,373	108,467	119,159	1.5%
Canada	66	226	160	94	193	131	5.0%
Grand Total	56,740,156	72,055,925	86,888,576	99,223,634	98,279,831	119,065,955	5.4%

Source: USA Trade OnLine

Exhibit 12 – Port of Mobile International Containerized Export Tonnage by Trade Lane
(metric tons)

Trade Lane	2003	2006	2009	2012	2015	2016	2017	CAGR '03-17)
China	1,072	25,108	167,571	172,411	313,106	513,750	536,908	55.89%
North Europe	46,320	67,980	84,443	315,088	460,351	291,236	280,088	13.72%
Japan/Korea	319	2,554	122,259	54,126	91,662	104,115	223,522	59.69%
Mediterranean	361,252	244,586	99,153	181,772	84,632	103,787	156,192	-5.81%
SE Asia	1,879	4,486	19,633	38,242	45,846	123,579	155,724	37.10%
Central America	27,922	1,961	83,446	116,586	94,664	102,479	76,381	7.45%
South America EC	5,189	3,350	20,546	54,562	58,144	45,756	56,016	18.52%
Caribbean	1,099	15,332	18,460	22,177	28,061	35,582	25,062	NA
SW Asia	103	2,021	2,595	11,232	44,462	17,229	23,650	47.46%
Middle East	1,358	23	17,465	35,990	16,181	24,090	21,240	21.70%
Africa	21	5	7,819	35,900	8,042	14,784	19,003	62.52%
South America WC	178		12,182	22,207	22,028	17,807	11,810	NA
Australia/NZ	1	84	19	1,008	3,944	4,703	7,675	NA
All Other			289					NA
Grand Total	446,712	367,488	655,880	1,061,300	1,271,124	1,398,897	1,593,271	9.51%

Source: USA Trade OnLine

The international export containerized growth at the Port of Mobile has also been driven by the growth in exports to Asia. The fact that Asia trade has been the growing export trade lane via the Port of Mobile, again underscores the importance of increasing the channel depth at the Port from 45 ft. to 50 ft., as the ability to fully load a vessel on the outbound Asian trade lane will increase the ability of the Port to serve as the last outbound port call on an Asian service rotation. This ability to attract a last outbound port call designation is an important ingredient to attract additional manufacturing activity into Mobile. By locating close to an export port, particularly a last port of call on an Asian service rotation before returning to Asia, a manufacturer can actually gain additional days of production throughout the year. This results from the fact that truck drayage time to a local export port is minimized, so the manufacturer can produce an additional number of days that

would otherwise be dedicated to drayage time to a more distant export port, such as Savannah or Charleston. However, with the growing size of the container ships that are deployed on the Asian trade lane, it is critical that the Port of Mobile have a 50 ft. shipping channel to attract the last outbound port of call to enable the vessel operators to fully utilize the capacity of the vessel.

2. CONTAINER MARKET POTENTIAL

In order to compete for additional international containerized cargo, particularly containerized cargo moving on the large growing Asian trade lanes to and from other South Atlantic ports, it is critical to identify the competitive logistics cost hinterland for the Port of Mobile container operations. This includes vessel access and the ability to handle the growing size of container ships. The second step involves the assessment of the hinterland that can be served more cost effectively using the Port of Mobile compared to competing ports such as Savannah, Charleston, Houston and New Orleans, as well as the West Coast ports. The third step in the analysis of the potential container market involves the identification of cargo moving to and from the Port of Mobile's identified cost effective hinterland but using other ports such as Savannah, Charleston, Norfolk, Houston, New Orleans and the West Coast ports of Los Angeles and Long Beach.

2.1 Vessel Access

The expansion of the Panama Canal, which was completed in June, 2016, provides the capacity of the Canal's lock chambers to handle container ships up to about 14,000 TEUs. Prior to the expansion, the maximum size vessels that could transit the locks was about 5,000 TEUs. The impact of the larger Panama Canal is already impacting the size of the vessels moving through the Canal. Exhibit 13 shows the average size of the container ships moving to and from Asia through the Panama Canal to the ports of Jacksonville, Charleston, Miami and Savannah, which are the ports on the South Atlantic that have experienced strong growth in Asian cargo over the past several years.

Exhibit 13 - Average Size (in TEUs) of Vessels Deployed Through the Panama Canal on the Asian Trade for Selected Ports

PORT	AVERAGE SIZE OF CONTAINER SHIP (TEUs)2012	AVERAGE SIZE OF CONTAINER SHIP (TEUs)2017
MOBILE	**4500**	6,333
CHARLESTON	4,885	8,401
JACKSONVILLE	5,002	6,566
MIAMI	4,650	6,974
SAVANNAH	5,106	8,366

Source: PIERS

As this exhibit shows, the average size of the container vessels serving the Asian trade via all-water services through the Panama Canal in 2012, prior to the expansion of the Canal, were between 4,500 and 5,100 TEUs. After the opening of the enlarged Canal in 2016, the average container vessel size at Charleston and Savannah was about 8,400 TEUs and between 6,500 and 7,000 TEUs at the Port of Mobile, Port*Miami* and JAXPORT. As the vessel size increases, deeper channels, super-post Panamax cranes, and efficient terminal operations will become a necessity at those ports participating in the Asian all-water services. In addition, as the ship of larger sizes cascade from one trade lane to another, there will be constant growth in the size of vessels deployed on all trade routes. For example, the largest container vessels, those in the 18,000 TEU and

above category are deployed on the Asia-Europe trade, as the economies of the largest container vessels are realized on the longest trade routes with minimal port calls. As these larger ships, the 18,000 TEU vessels and greater, are deployed on the Asia-Europe routings, the current vessels on that route are moved to the Transpacific routing, which is the routing offering the next level of distance and minimal port calls. These newly deployed vessels on the Transpacific trade (from the Asia-Europe trade) displace the current sized fleet on the Transpacific trade, and these displaced vessels then cascade to the all-water Asia-U.S. East Coast/Gulf Coast trade via the Panama Canal.

A review of the current order book of container vessels, shown in Exhibit 14, underscores the growing average vessel size of the world container fleet. Of the 455 vessels on order as of January 1, 2016, 31% are 12,000 TEUs or greater, while another 25% are in excess of 8,000 TEUs. The balance of the vessels, primarily handymax vessels in 1,000-2,999 TEUs on order are for feeder services throughout Asia and Europe, as well as in the Caribbean trades. As further noted in Exhibit 14, is the fact that the draft of the vessels in excess of 8,000 TEUs range from a low 45 ft. to 50.5 ft. Typically, channel depths to handle such vessels require at least 2 feet in addition to the sailing draft of the vessel for a safe transit to the terminal. This suggests that a channel depth of 47 ft. and greater will be needed to handle fully laden vessels that will dominate the future container fleet.[2] Furthermore, the width of the post-Panamax vessels is between 150 and 170 ft. wide (breadth measurement), which is a major consideration at the Port of Mobile, along with channel depth and berth length (1,200 ft.).

[2] To emphasize the continually growing size of containerships, Hyundai Merchant Marine (HMM), has just announced plans to build twelve 23,000 TEU vessels, and another eight 14,000 TEU vessels. The 23,000 TEU ships will be delivered in the second quarter of 2020, while the 14,000 TEU ships will be delivered beginning in 2021. "Hyundai Merchant Marine's Building Spree Adds to Global Orderbook", Freightwaves, June 5, 2018.

Exhibit 14 - World Order Book for Container Vessels

WORLD CELLULAR CONTAINERSHIP FLEET IN PROFILE As of January 1, 2016												
CLASS (TEU Range)	AVERAGE SIZE/DIMENSIONS/AGE/SPEED						IN SERVICE			ON ORDER		
	LENGTH (Feet)	BEAM (Feet)	DRAFT (Feet)	DWT (Metric)	Age (Years)	SPEED (Knots)	SHIPS	TEUs	Avg. TEUs	SHIPS	TEUs (000s)	Avg. TEUs
Feeder (100-999)	400.9	64.3	23.0	8,196	16.2	16.1	1,070	648,809	606	1	590	590
Handy +(1,000-2,999)	545.3	84.0	30.5	19,102	12.1	19.2	1,883	3,374,966	1,792	192	382,564	1,993
Sub-Panamax(2,000-2,999)	682.1	100.1	37.4	34,769	12.1	21.7						
Panamax (3,000 & Over)	871.8	105.6	41.0	53,524	10.5	23.8	844	3,549,442	4,206	3	9,910	3,303
Post-Panamax (>8,000)	919.0	130.3	44.9	71,915	9.2	24.1	680	3,916,853	5,760	33	134,440	4,074
Post-Panamax (8,000 - 11,999)	1,080.1	148.3	47.6	108,198	5.8	23.0	533	4,788,135	8,983	83	835,838	10,070
Post-Panamax (12,000 & over)	1,228.1	169.0	50.5	157,978	3.2	23.9	239	3,456,960	14,464	143	2,410,324	16,855
TOTALS	721.5	102.0	36.1	46,954	11.3	21.0	5,249	19,735,165	3,760	455	3,773,666	8,294
Source: Clarkson Research												

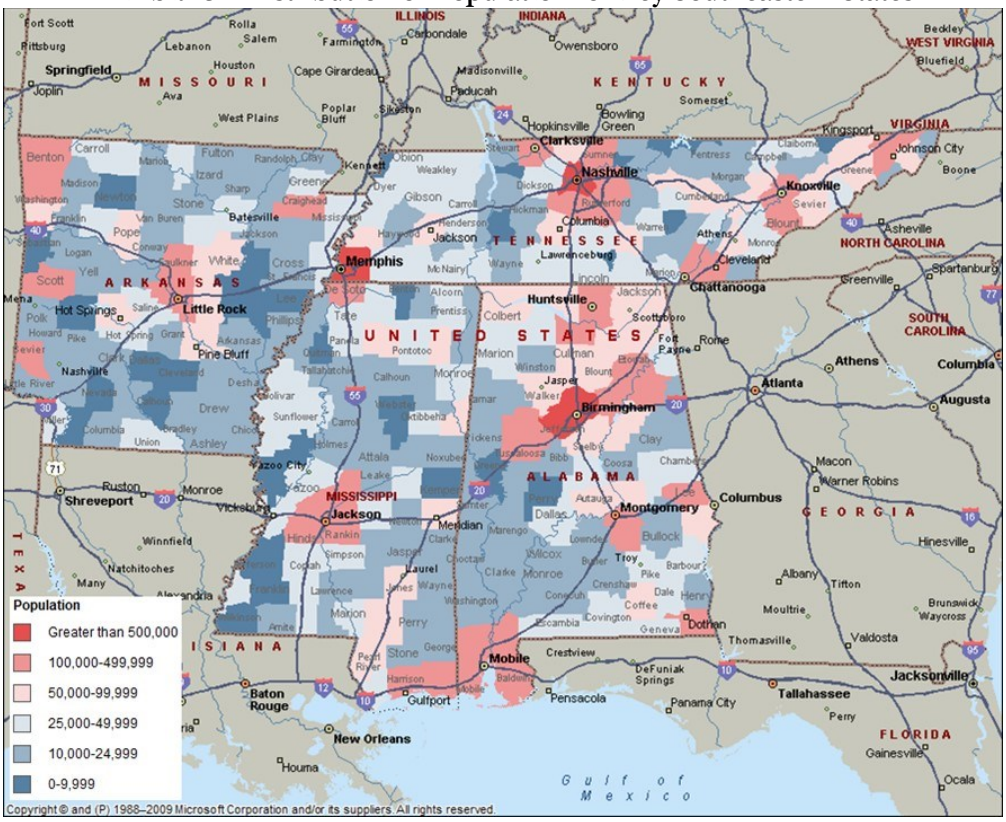
To date, Port*Miami* has successfully been deepened to 50 ft. The Port of Charleston has begun (February, 2018) deepening the channel to a depth of 52 ft.; the Port of Savannah is planning that the deepening of the 18.5 mile outer harbor to 49 ft. and the Savannah River to 47 ft. will be completed as early as 2019; the deepening of the St. Johns River to 47 ft. that serves JAXPORT's container terminals is now underway and plans are in place for a 2021 completion.

In addition to channel depth, state of the art container cranes and terminals are required. Cranes with outreach capacity of 22 containers are required, and efficient terminal operations and highway and rail access are essential to handle the growing size of the container vessels. The Intermodal Container Transfer Freight Station (ICTF), which opened in 2016 at the Port of Mobile will provide near dock double stack rail access to 5 Class I railroads. A rail bridge will connect the ICTF with the APM Container Terminal. Furthermore, the port has invested in post-Panamax container cranes and the development of the ICTF to serve the APM Container Terminal Mobile. Despite these investments, the current channel depth of 45 ft. will limit the Port from handling the growing size of the container ships and in particular those vessels serving as a last outbound port of call on the Asian trade lanes.

2.2 Identification of Local and Regional Container Hinterland

The geographic distribution of population density and the location of distribution centers within the states of Alabama, Mississippi, Arkansas and Tennessee are key in establishing the cost-effective hinterland that can be served by the Port of Mobile. Exhibit 15 shows the concentration of population, by county, in the states of Alabama, Tennessee, Arkansas, and Mississippi. As shown in this chart, population density is concentrated in the Birmingham, Mobile, Huntsville, and Montgomery areas in Alabama; Memphis and Nashville in Tennessee. In Mississippi the population is concentrated in Gulfport and Jackson, while in Arkansas, the greatest population concentration is in Little Rock, Scott County, Benton County, Sevier County, and Craighead County.

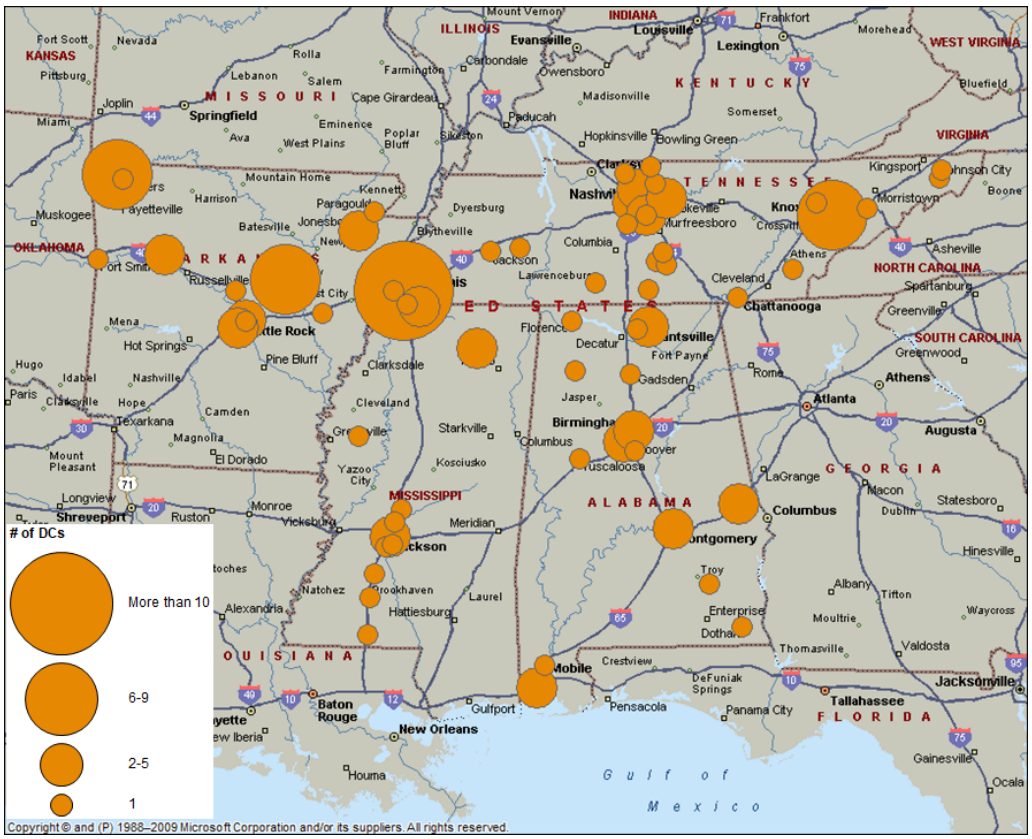
Exhibit 15 - Distribution of Population for Key Southeastern States



Source: U.S. Bureau of the Census

The location of distribution centers is critical in attracting cargo, particularly consumer goods such as furniture, apparel, electronics, toys, and perishables. Exhibit 16 shows the location of distribution centers throughout Alabama, Tennessee, Mississippi and Arkansas. As this exhibit indicates, the distribution centers are clustered in the population centers, namely Memphis, Nashville and Knoxville in Tennessee; Montgomery, Huntsville, Birmingham and Mobile in Alabama; Jackson in Mississippi; and Benton County and the Little Rock area in Arkansas.

Exhibit 16 - Location of Distribution Centers in Tennessee, Alabama, Mississippi and Arkansas



Source: Retail Chain Store Guide

Port-centric locations are becoming more critical in attracting ocean carrier service to the nearby port in that a key cost component to an ocean carrier is the ability to control empty containers, and minimize the cost of repositioning the empty containers from the consumption points back to the seaport, with no revenue bearing cargo. The opening of the WalMart import distribution center in Mobile, and a similar distribution center in Houston are examples of this trend in port-centric distribution centers. In addition, carriers are continuing to price "port-to-port" moves more frequently than "point-to-point" moves. Under the port-to-port moves, the ocean carrier is responsible for the cost of moving the cargo from the foreign port to the U.S. port, including the terminal and stevedoring charges. The beneficial cargo owner (BCO) is responsible for the inland transportation part of the move. Under the point-to-point move, the ocean carrier is responsible for the inland cost portion as well as the cost of the ocean transportation as well as the terminal and stevedoring operations. With the greater emphasis on port-to-port pricing, BCO's are incentivized to develop distribution centers closer to the port as well as to population centers, thereby minimizing the inland cost from the port to the consumption point, and further from the import distribution center to a regional distribution center or directly to the consumer from the distribution center. This later method of serving the consumers directly from the distribution center/fulfillment center is very advantageous to the growth in e-commerce, as the distribution center serves not only as an import distribution center, but also as a fulfillment center. At the distribution center, the marine containers are stripped, and cargo is warehoused, orders filled, and transloaded into domestic trailers (often 53 ft. trailers) for delivery to a regional distribution center. In cases where the distribution center also serves as a fulfillment center supporting e-commerce and last mile delivery (often within 24 hours), the imported containers are stripped, and often the cargo is reloaded into less than truckload lots for direct delivery to consumers.

Whether serving as an import center located in proximity to the port or as a fulfillment center, the near port location of distribution centers reduces the drayage cost between the port of discharge and the distribution center, as well as provides the ocean carrier with near port control of its marine container. In addition, with the escalation in trucking costs due to rising fuel prices, strictly enforced driving hours due to the mandatory electronic logging devices (ELD) installed on all trucks, and truck driver shortages, the minimization of trucking costs is critical to beneficial cargo owners. Thus, near port and near consumer market locations to the distribution center is a key factor driving ocean carrier port selection. In addition, the location of fulfillment centers in densely populated regions is further critical not only from the ability to meet 24 hour order fulfillments, but the fact that 30% of all e-commerce products are returned, compared to 8.9% for purchases from brick and mortar stores.[3]

In summary, the Port of Mobile is well positioned to capitalize on the development of additional distribution center square footage within the Mobile area, such as the new 2.6 million sf WalMart distribution center that opened in August, 2018, focusing on minimization of total logistics costs to the beneficial cargo owners. In addition, these total logistics costs include ocean carrier charges, drayage costs from port to distribution center, rental cost for distribution center development and operation, and drayage costs from the distribution center to population centers, particularly in Alabama, Mississippi, Arkansas and Tennessee.

2.3 Identification of Port of Mobile's Cost Effective Hinterland

As described in the previous sections of this report, the Port of Mobile competes with the ports of Savannah, Charleston, New Orleans, Houston, and to a lesser extent Wilmington, NC and Norfolk, particularly on the Asian market[4]. If the channel depth at Mobile were not deepened to 50 ft., the ocean shipping costs from Asia to this port would be about 25-35% per container greater[5] compared to Charleston and Savannah. Based on the Shanghai Shipping Freight Index, which reports average container shipping rates from Shanghai to the East Coast/Gulf Coast of the U.S., the most recent ocean freight rate for a voyage from Shanghai to the East Coast/Gulf Coast was $3,304 per forty foot container[6] compared to $2,587 per forty foot container to the West Coast. It is further assumed that terminal charges (including stevedoring) at Savannah and Charleston are about the same as at Mobile, ranging from $235 per box to about $270 per box. Therefore, the competitive hinterland of the Port of Mobile is dependent on the trucking cost to serve the population concentrations and distribution center locations, as the ocean freight rates are assumed to be very similar at the three ports.

To determine the truck cost effective hinterland of the Port of Mobile compared to the Ports of Savannah, Charleston, New Orleans, Houston, Wilmington, NC and Norfolk, the distance between each of the ports and the Alabama, Mississippi, Tennessee, and Arkansas counties was computed. Next, Martin Associates' truck cost model was calibrated with 2018 daily and hourly operating cost data developed from interviews with major trucking companies serving the South Atlantic port markets, as well as the most recent truck operating cost data presented in the American Transportation Research Institute (ATRI), An Analysis of the Operational

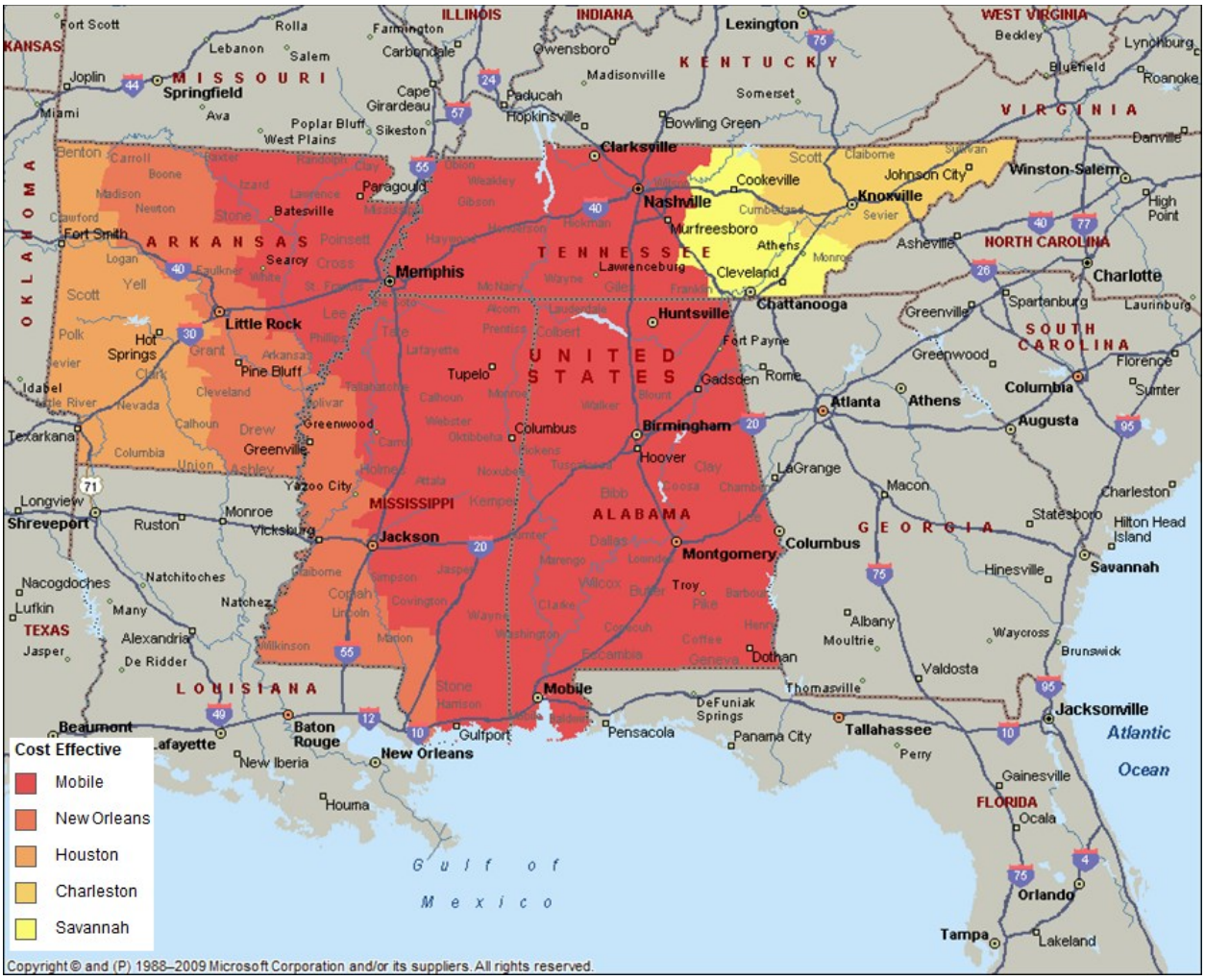
[3] https://www.abivin.com/single-post/2018/04/12/5-fundamental-ways-to-reduce-Last-mile-Delivery-Costs

[5] Martin Associates' Voyage Costing model estimates that the ocean carrier cost for an 8,500 TEU vessel deployed between Shanghai and the South Atlantic and Gulf Coast ports provides a 28% per TEU slot cost savings over the use of a 4,800 TEU vessel on the same routing (from $575 per slot to $417 slot for an 8,500 TEU vessel). A recent white paper from the U.S. Merchant Marine Academy, "Economies of Scale in Container Ship Costs", Midshipmen William Murray provides a detailed analysis of the cost savings container shipping costs due to the use of larger vessels. The report findings indicate that the use of a 10,000 TEU vessel vs. a 5,000 TEU vessel results in a reduction of daily operating costs from about $2.10 per TEU (for a 5,000 TEU ship), to about $1.40 per TEU for the use of a 10,000 TEU vessel. This represents a 33% cost savings.

[6] Shanghai Shipping Index, October 18, 2018, for U.S. East Coast routing, based on weighted rates for all water services to New York, Savannah, Norfolk and Charleston. Ocean carriers pay the terminal charges from the shipping rate. Source: Journal of Commerce

Costs of Trucking, 2017. Finally, for the purposes of the inland trucking cost analysis, it is assumed that there is one hour queuing, drop and retrieval time at each of the container terminals and a 1 hour drop and reload time at the point of delivery. It is assumed that the average operating speed of the truck is 40 miles per hour for long haul deliveries.[7] Using these assumptions, the cost effective hinterland of the Port of Mobile was developed and presented in Exhibit 17.

Exhibit 17 – Truck Cost Effective Hinterland For the Port of Mobile



As this exhibit demonstrates, the Port of Mobile enjoys a truck cost advantage over the competing ports to serve the state of Alabama, a western portion of the state of Tennessee including Memphis (and nearly equal reach to Nashville with Savannah and Charleston), and the eastern portion of Arkansas.

2.4 Quantification of Container Market Hinterland

This section addresses how the Port of Mobile truck cost effective market is currently served, including ports now serving the market. The results of this analysis provides detailed information as to containerized cargo destined and originating in Alabama, Tennessee, Arkansas, and Mississippi that now uses ports other than Mobile to serve the port's cost effective hinterland.

[7] ATRI, An Analysis of the Operational Costs of Trucking, 2017.

Imported Containerized Cargo Market Potential

The Journal of Commerce PIERS data base provides a starting point to identify the current importers and exporters located in the state of Alabama, current ports used and ocean carriers used. While this data base has limitations in terms of identifying the ultimate origin/destination of the exporter or importer by city and state, it provides a guide as to competitive position of the Port of Mobile to serve the importers and exporters located in the states of Alabama, Arkansas, Tennessee, and Mississippi. The key ports competing for this market in addition to Mobile are Savannah, Charleston, Houston and New Orleans, and Los Angeles and Long Beach by rail.

Exhibit 18 presents the volume of imports destined for the states of Alabama, Mississippi, and Tennessee, by trade lane from the key competing ports.[8] Based on the PIERS data for imports destined for the states of Alabama, Tennessee, and Mississippi, 576,617 loaded TEUs move into this market, of which the ports other than Mobile handled 522,784 loaded TEUs. This does not include associated exports or empty containers that would accompany the imported containers. Overall, the Port of Mobile handled about 9% of the imports consumed in the three state area based on the PIERS data, and 91% of these containers were destined for Alabama BCOs. The Southern California ports handled 47% of the imported containers into this market, followed by Savannah, which handled 26.5% of this market.

Nearly 80% of these 576,617 imports originate in China, Japan/Korea, and Southeast and Southwest Asia, and China alone accounts for 45% of the total imports into these states. Furthermore, 48% of the total imports from all sources are destined for Tennessee, reflecting the location of distribution centers in Memphis and Nashville.

[8] It is important to emphasize that the locations provided for the shippers/consignees may represent a headquarters location, and not an actual origin or destination of the freight. Due to the location of the WalMart headquarters in Bentonville AR, imports into Arkansas have not been included in this quantification of imports into the Mobile hinterland, as it has the potential to misrepresent the volume destined to Arkansas. Therefore, the estimate of TEUs by trade lane imported into the Mobile hinterland is conservative by design. The Port of loading or unloading and the steamship line included in the PIERS data base have a much higher degree of accuracy than the origin and destination of the cargo.

Exhibit 18 - Imports into Alabama, Mississippi, and Tennessee by Trade Lane and Port, 2017 (Loaded TEUs)

Trade Lanes	Charleston	Houston	Long Beach	Los Angeles	Mobile	New Orleans	Savannah	Grand Total
China	12,016	6,913	82,943	88,502	13,351	683	53,210	257,617
Japan/Korea	1,009	754	36,970	20,917	27,213	9	40,640	127,512
North Europe	48,898	4,765	944	823	3,632	2,706	16,292	78,058
SE Asia	973	550	6,792	26,601	4,092	96	14,152	53,255
Mediterranean	1,646	1,218	316	214	901	1,181	12,927	18,403
SW Asia	3,247	587	393	859	198	392	10,756	16,433
South America EC	2,448	2,034	41	38	1,633	2,351	828	9,374
Africa	2,302	71	2	11	1,390	106	93	3,974
South America WC	360	423	121	277	31	243	2,183	3,638
Central America	505	217	127	191	810	495	170	2,514
Middle East	241	167	197	50	11	894	932	2,493
Australia/NZ	521	145	782	12	173	6	492	2,130
Caribbean	64	128	0		373	406	34	1,004
All Other			105	9			1	115
Canada	2	0		2	26		66	96
Grand Total	74,229	17,973	129,733	138,505	53,833	9,567	152,776	576,617

Source: PIERS

In refining the cost effective hinterland for the Port of Mobile, it is to be emphasized that about 60% of the imported TEUs via Los Angles and Long Beach are destined for Tennessee, and most likely Memphis and Nashville. Evaluating the competitive costs of serving the Memphis market by rail via Los Angles and Long Beach, vs. using the Port of Mobile for Asian cargo, it appears that the use of Mobile is at a cost disadvantage to the intermodal routing when the inventory cost of goods is included to reflect the longer transit time via Mobile. A competitive cost analysis was conducted to serve Memphis via an intermodal routing from Los Angeles versus serving Memphis by truck via Mobile for Asian cargo. The analysis is based on the use of the Shanghai Freight Index as a proxy for ocean rates to Los Angeles and Mobile, combined with intermodal rates between Los Angeles and Memphis. The intermodal rates are based on Martin Associates' internal data base of intermodal rail rates that have been developed over a period, 2014-2018, from sources including actual contract rates as well rates published by Intek Freight Logistics. The inland truck rate to Memphis is based on the average hourly trucking cost and the mileage between Mobile and Memphis, while the inventory carrying cost is based on an average container value of goods of $80,000 and a transit time to Memphis via Mobile and via intermodally from Los Angeles. The transit time from Shanghai to Memphis via Los Angeles consists of 20 days sailing, plus 2 days in port, plus 7days rail transit. The transit time from Shanghai to Memphis via Mobile consists of 33 days sailing, plus 2 days in port, plus 1 day truck haul to Memphis. Exhibit 19 summarizes these costs and further indicates that it will be difficult for Mobile to compete with a West Coast intermodal routing for higher value cargo originating in Asia and destined for the Memphis area. However, Mobile can cost effectively compete with the cargo moving from Savannah, Charleston, Houston and New Orleans into the Memphis area, as Mobile provides the cost effective truck routing.

Exhibit 19 – Total Logistics Costs

Logistics Costs from Hong Kong	Voyage Cost	Terminal Charges	Inventory Carrying Costs	Inland Cost	Total Cost/FEU
Los Angeles/Long Beach	$2,587	$450	$1,589	$1,100	$5,726
Mobile	$3,304	$270	$1,973	$1,000	$6,547

Note: Los Angeles intermodal rate is an average contract rate for a laden container and includes ramp fees

Therefore, in defining the realistic potential market for the Port of Mobile, the cargo now moving via Los Angeles and Long Beach into the Tennessee, Alabama and Mississippi markets is not included. As such the total potential market for which Mobile can compete effectively is defined as 254,545 TEUs of which 60% are now moving via Savannah and 30% via Charleston. As Exhibit 20 shows Savannah is the competition for the imported cargo moving into the three state area on the Asian trade lanes, while Charleston is the key port serving the European trade lane.[9]

Exhibit 20 - TEUs Moving Into Alabama, Tennessee, and Mississippi from Competing Ports

Trade Lanes	Charleston	Houston	New Orleans	Savannah	Grand Total
China	12,016	6,913	683	53,210	72,822
Japan/Korea	1,009	754	9	40,640	42,412
North Europe	48,898	4,765	2,706	16,292	72,660
SE Asia	973	550	96	14,152	15,769
Mediterranean	1,646	1,218	1,181	12,927	16,973
SW Asia	3,247	587	392	10,756	14,983
South America EC	2,448	2,034	2,351	828	7,662
Africa	2,302	71	106	93	2,571
South America WC	360	423	243	2,183	3,209
Central America	505	217	495	170	1,387
Middle East	241	167	894	932	2,234
Australia/NZ	521	145	6	492	1,163
Caribbean	64	128	406	34	631
All Other				1	1
Canada	2	0		66	68
Grand Total	74,229	17,973	9,567	152,776	254,545

Source: PIERS

A total of 254,545 loaded TEUs represents the potential market in which the Port of Mobile can compete for cargo moving directly from other port ranges into the three state area.

It is to be emphasized that the growing trend in import activity is to transload ocean containers at the Port where they are unloaded into larger 53 ft. domestic truck containers. This practice of transloading or cross-docking is driven by the fact that imports, particularly electronics, apparel, toys, etc. from Asia typically "cube out" the container before "weighing out" the container. This results from the fact that imports are lighter weight and require a container with more volume for inland transportation. Using a 53 ft. container rather than a standard 40 ft. marine container for inland transportation provides a lower cost per ton than using a smaller 40 ft. container. In addition to providing the lower transportation cost to move more cargo in a truckload, the practice of transloading provides better control of the empty container for the steamship line, as the container remains in the port of discharge geographical area, minimizing the repositioning charges and improving equipment inventory control.

[9] TEUs imported via JAXPORT into Alabama, Tennessee, and Mississippi have not been included in the potential market analysis as the Piers data indicates that 2,069 TEUs were imported into this region via Mobile, of which 1,006 TEUs were from the Caribbean, namely Puerto Rico. This represents cargo that is not likely to move via ports not specializing in the Puerto Rican trade. Therefore the TEUs imported into this region via JAPXORT are not included in the potential market for Mobile.

As the result of the increasing use of transloading, the cargo that is removed from a marine container and then reloaded into a 53 ft. domestic container is no longer considered international cargo from a U.S. Customs perspective since the cargo is cleared for entry prior to the transload operation. As a result, the PIERS data base does not include this domestic move. Therefore, with a greater degree of transloading, the PIERS data will have a tendency to understate the amount of imported containerized cargo moving into a region or state, since it is arriving at its final destination via a domestic move. A similar situation occurs for cargo that moves from the port of discharge directly into an import distribution center, where it is repackaged and then moved on to the regional distribution center or a retail outlet.

In order to control for this potential under estimation of international containerized cargo imported into Florida via non-Florida ports, two additional data bases were used. The IHS Transearch data base provides truck moves of warehoused cargo from distribution center/warehouse locations serving the Port of Mobile cost effective markets (counites within the states of Alabama, Mississippi, and Arkansas). Truck cargo moving from distribution centers in Savannah and Atlanta were identified, as this cargo most likely represented cargo that moves through the Port of Savannah into distribution centers, and then is transloaded into 53 ft. containers for distribution into the Alabama, Mississippi and Arkansas markets.

The truckload data shown in Exhibit 21 identifies the volume of warehouse cargo moved by truck into Alabama, Arkansas, and Mississippi from distribution centers in Georgia (most likely supplied to the distribution centers via the Port of Savannah). Assuming 8 tons per TEU, which is the industry standard metric for TEUs and tonnage conversion, this warehouse cargo represents 89,029 TEUs that move into these states from distribution centers in Savannah and Atlanta, and therefore represents a strong potential market for the Port of Mobile to capture this cargo from the Port of Savannah (which is likely the port that has supplied the distribution centers in Georgia). This distribution center truck data was developed at the county level for the three states. The cargo was then identified for which the Port of Mobile would provide the most cost-effective routing over Port of Savannah.

Exhibit 21 - Truck Deliveries from Warehouse and Distribution Centers in the Port of Mobile's Cost Effective Hinterland

Destination State	Tons
ALABAMA	483,366
ARKANSAS	129,992
MISSISSIPPI	98,872
TOTAL	712,230

Source: IHS Transearch, 2017.

Based on the IHS Transearch truck flow data for distribution and warehouse cargo, it is estimated that cargo moving from distribution centers in Georgia into the Port of Mobile's cost effective hinterland represents an 89,029 TEU potential for Mobile.

In addition to warehoused cargo that represents cargo movements from distribution centers, the majority of which is imported cargo via Savannah that moved into the distribution centers in Georgia for delivery into the cost effective hinterland by truck, rail is also used to move imported containerized cargo that has been "devanned" and loaded into domestic intermodal containers for intermodal rail transport from distribution centers in key port regions such as Savannah and Atlanta area, as well as Los Angeles, Houston, and New Orleans. Exhibit 22 presents the volume of domestic intermodal rail cargo that moves from the key distribution center regions that are served by the Port of Savannah to the Port of Mobile's cost effective hinterland, as well as intermodal cargo that moves from other key locations of distribution centers to economic

regions in Alabama, Tennessee, Arkansas and Mississippi. It is to be noted that the most likely potential market is represented by intermodal rail cargo moving via the distribution centers in Atlanta and Savannah. As noted previously, it is likely to be more difficult for the Port of Mobile to capture intermodal cargo moving into Memphis, as the previous logistics analysis indicated that when inventory carrying costs are included, the West Coast intermodal routing via Los Angeles to serve the Memphis market is more cost effective than an all-water routing to the Port of Mobile and then trucked to Memphis. Therefore, a realistic potential market is that represented by the intermodal containers moving into the Mobile cost effective hinterland by rail from Savannah and Atlanta.

This internodal rail tonnage represents potential cargo that could also move through the Port of Mobile to key destinations in Alabama, Mississippi and Tennessee. Eliminating the Los Angeles intermodal rail tonnage, the potential market for the Port of Mobile represented by intermodal rail tonnage from locations of key international distribution centers, namely Savannah and Atlanta that are likely served presently via the Port of Savannah is 812,972 tons. Assuming 8 tons per TEU, this represents an additional 101,622 TEUs of market potential for the Port of Mobile in addition to the market potential represented by the distribution center cargo moving from the distribution centers to Mobile's cost effective hinterland.

Exhibit 22 - Intermodal Domestic Rail Cargo Destined for Port of Mobile's Cost Effective Regions from Key Locations of International Import Distribution Centers

Destination Regions	Origins of Intermodal Rail Tonnage			
	Atlanta	Los Angeles	Savannah	Total
Birmingham, AL	739,368	68,950	21,855	**830,173**
Huntsville, AL	39,890	37,909	3,296	**81,095**
Jackson, MS		3,492		**3,492**
Memphis, TN		1,265,129		**1,265,129**
Mobile, AL			8,564	**8,564**
Grand Total	**779,258**	**1,375,481**	**33,715**	**2,188,453**

Source: IHS Transearch

In summary, using a combination of PIERS data and warehouse truck data and intermodal domestic rail data, the following potential import container market for the Port of Mobile is estimated at 445,196 loaded TEUs:

- 254,545 loaded international TEUs that move into the Port of Mobile's cost effective hinterland via the other ports, particularly Savannah
- 89,029 loaded TEUs moving into the Port of Mobile's cost effective hinterland by truck from import distribution centers located in Atlanta and Savannah
- 101,622 TEUs of domestic intermodal rail cargo moving from key international import centers in Atlanta and Savannah

Exported Containerized Cargo Market Potential

Not only can the Port of Mobile increase its participation in the containerized cargo import market by identifying imports into the cost effective hinterland from other ports, most notably Savannah, it is equally important to identify the containers originating in the cost effective hinterland that are exported via other ports. Exhibit 23 shows the exports originating in Mobile's cost effective hinterland by trade lane and port. As this exhibit shows, overall, only 4% of the export containers originating in the Port of Mobile's cost effective hinterland use the Port of Mobile. More than 30% use the Port of Savannah, while nearly 28% use the Port of Charleston. Savannah is used for exports to Asia, while Charleston is used to serve the exports moving on the

Northern European trade and the Mediterranean. The Ports of Los Angeles and Long Beach are used to handle exports (from the Port of Mobile's cost effective hinterland) moving on the Asian trade.

It is to be emphasized that in developing a realistic estimate of the potential export market for the Port of Mobile, containers moving via the ports of Los Angeles and Long Beach are not included due to logistics costs differentials described previously. However, as the value of the export container is typically lower than an import container, the impact of transit time via Mobile may be less than is the case for import cargo using a west coast intermodal routing.

Exhibit 23 - Containerized Exports from Alabama by Trade Lane and Port (TEUs)

Trade Lane	Charleston	Houston	Long Beach	Los Angeles	Mobile	New Orleans	Savannah	Total
China	12,699	1,117	15,595	25,894	9,207	737	24,164	89,414
SE Asia	9,776	1,518	7,948	24,847	1,149	140	21,586	66,963
North Europe	45,526	3,431	150	220	1,371	1,758	11,041	63,498
Mediterranean	10,659	6,128	32	172	1,168	3,631	27,829	49,619
Japan/Korea	11,971	393	9,030	14,036	499	26	4,874	40,829
SW Asia	5,464	1,545	308	2,797	608	97	15,033	25,851
South America EC	5,621	6,071	76	164	1,700	1,324	2,454	17,411
Central America	439	5,199	35	683	57	3,322	1,846	11,581
South America WC	2,449	3,075	70	106	104	2,941	3,214	11,958
Africa	2,078	603	17	9	312	156	5,338	8,512
Middle East	1,852	1,445	10	142	16	90	4,210	7,764
Australia/NZ	1,800	316	1,404	109	19	3	737	4,387
Caribbean	154	572	9	56	143	98	631	1,661
All Other	30	7	358	310			69	774
Canada	54	3	4			1	55	116
Total	**110,571**	**31,421**	**35,046**	**69,542**	**16,352**	**14,325**	**123,081**	**400,338**
Share by Port	27.62%	7.85%	8.75%	17.37%	4.08%	3.58%	30.74%	100.00%

Source: PIERS

In summary, the most realistic potential export market for the Port of Mobile to penetrate is the 279,398 TEUs originating in the cost effective hinterland and exported through the ports of Savannah and Charleston, and to a lesser extent Houston and New Orleans.

Summary of Potential Container Market for the Port of Mobile

Based on the analysis of the PIERS data, and the warehouse truck and rail data, the potential market (outside the organic growth of the current container market served by the Port of Mobile) consists of:

- ***445,196 loaded TEUs:***
  - 254,545 loaded international TEUs that move into the Port of Mobile's cost effective hinterland via the other ports, particularly Savannah
  - 89,029 loaded TEUs moving into the Port of Mobile's cost effective hinterland by truck from import distribution centers located in Atlanta and Savannah
  - 101,622 TEUs of domestic intermodal rail cargo moving from key international import centers in Savannah and Atlanta
- ***279,398 loaded export TEUs***

In addition to this potential in loaded import and export moves, the import moves will also generate empty containers that will need to be returned by ocean carrier. Furthermore, the additional ocean carrier services that would result from the penetration of the potential import market by the Port of Mobile would also provide the opportunity for more export cargo capacity, which could be diverted from Savannah, as well

as Charleston, and to a lesser extent Houston and New Orleans. It is to be emphasized that for each new import TEU captured by the Port of Mobile, this generates an outbound TEU as well, loaded or empty. Therefore the 445,196 loaded TEUs actually represent about 890,392 TEUs of potential market to the Port of Mobile. The 279,398 loaded TEU potential export market, are in addition to the TEUs generated by the imports, but are in fact incorporated in those 445,196 TEUs supported by the import market.

Therefore, from a conservative standpoint, the current cost effective potential market identified for the Port of Mobile is about 890,392 TEUs. This potential market will be used in the following section to develop the range of container projections for the Port of Mobile.

3. CONTAINER MARKET PROJECTIONS

The future market potential for containerized cargo will be driven by several key factors. Export trade, will depend upon the projected growth in the trading countries' economies. The growth in imported containerized cargo will be driven by two key factors. The organic growth in the local consumption market driven by population and secondly the ability of the Port of Mobile to compete with other South Atlantic ports and Houston and New Orleans to capture imported containerized cargo that currently moves into the Port's cost effective hinterland, and thereby increasing container service capacity to handle exports now moving from the Port of Mobile's cost effective hinterland via Savannah, Charleston, Houston, and New Orleans for export.

Therefore, the cargo projection methodology for containerized cargo consists of a two-step process. First, projections are developed for the current container market served by the Port of Mobile. For the projections of the baseline imported container market, no new market penetration is assumed, and the imported container market will grow based on the organic growth of the regional consumption market, as represented by population growth in the state of Alabama. For the baseline export container projections, the GDP of the current trading partners are used to project export containerized cargo.

Next, a set of container projections are developed based on the two scenarios for the Port of Mobile to penetrate the current identified potential import market.

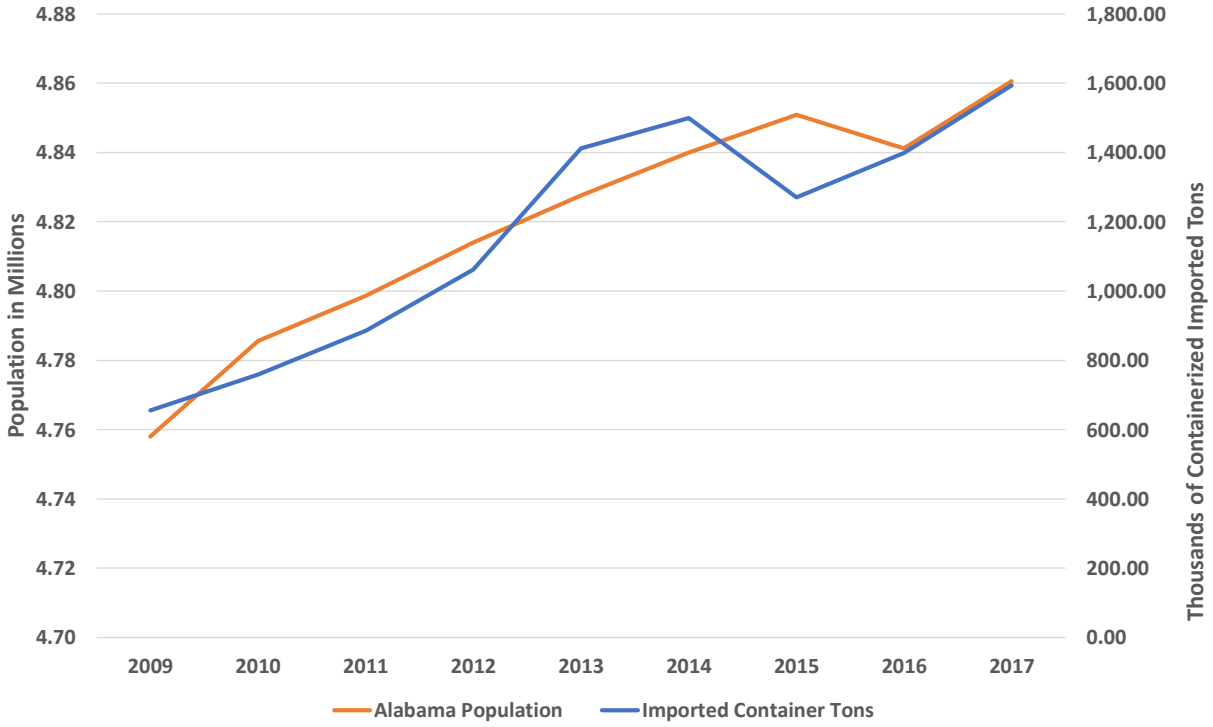
3.1 Development of Baseline Containerized Cargo Projections

The focus of this section is the development of containerized cargo projections for the current markets served by the Port of Mobile. Essentially these projections represent the organic growth of the Port's import and export levels of containerized cargo.

3.2 Projected Level of Baseline (Organic Growth) Imported Containerized Cargo Market

To develop the baseline or organic projection of containerized imported tonnage, Martin Associates developed a regression model between imported containerized tonnage at Port of Mobile and Alabama population. Exhibit 24 shows imported containerized tonnage and population levels in Alabama between 2009 and 2017.

Exhibit 24 - Imported Containerized Tonnage at Port of Mobile vs. Alabama Population, 2009-2017



U.S. Bureau of Census and USA Trade OnLine

This data was used to develop a regression model between Alabama population and imported containerized cargo tonnage at the Port of Mobile, assuming no additional capture of imported containerized cargo now moving into Mobile's cost effective hinterland from other ports. Overall, the regression model explains 95.5% of the growth in containerized imported tonnage handled at the Port of Mobile historically. Projected population data for the state of Alabama was obtained from the U.S. Census Bureau and Center for Business and Economic Research, The University of Alabama, April 2018. The population projections were used to project import container throughput through 2045. Between 2045 and 2050, a 1.5% annual growth rate was applied; between 2050 and 2060 a 1.0% annual growth rate was applied; after 2060, tonnage was projected to remain constant throughout the period through 2068.

The projected baseline import TEUs are shown in five year increments in Exhibit 25. Projected containerized cargo tonnage was converted to TEUs based on the actual container tons at the Port of Mobile per total TEUs, to reflect loaded and empty TEUs.

Exhibit 25 - Baseline Import Total TEU Projections

Year	2017	2018	2019	2024	2029	2034	2039	2044	2049	2054
Baseline Import TEUs	153,898	176,592	199,409	284,495	364,299	446,412	530,786	581,499	626,440	661,654

3.3 Projected Level of Baseline (Organic Growth) Export Container Tonnage

To project the baseline export TEUs, Martin Associates first developed the distribution of exports by trade lane/country, and then applied projected growth rates of the receiving countries' GDP, as developed by Martin Associates from country specific GDP projections from the International Monetary Fund, World Economic Outlook, 2016, Revised May 24, 2018. The GDP projections by country (and associated trade lane) were used to project from 2017 to 2030. Due to uncertainty as to long term country specific performances,

from 2030 to 2045, exports across all countries were projected to grow at 2.5% annually, while exports were projected to grow at 1.5% between 2045 and 2050; 1.0% between 2050 and 2060; and to remain constant after 2060.

Exhibit 26 presents the projected baseline containerized export TEUs from the Port of Mobile.

Exhibit 26 - Baseline Export Total TEU Projections

Year	2017	2018	2019	2024	2029	2034	2039	2044	2049	2054
Baseline Export TEUs	155,584	163,520	171,899	221,429	286,809	340,171	394,352	448,349	487,758	515,177

3.4 Total Baseline Container Projections

Exhibit 27 presents the total baseline container projections for the Port of Mobile through 2052. Overall the baseline containerized cargo is projected to grow at 3.8% annually over the period. ***This container projection assumes that the Port of Mobile does not capture any additional market potential that has been identified. Furthermore, the baseline projections assume that the Port of Mobile will not lose any additional ocean carrier service due to the current conditions at the Port in terms of channel width and depth restrictions.***

Exhibit 27 - Total Baseline Container Market Projections

Year Total	2017	2018	2019	2024	2029	2034	2039	2044	2049	2054
Baseline TEUs	309,482	340,112	371,309	505,924	651,107	786,583	925,138	1,029,849	1,114,198	1,176,831

3.5 Development of Potential Container Market Projections

In this section, two scenarios are developed regarding the penetration share of the potential import and export market base for the Port of Mobile. The first scenario, the moderate scenario, assumes that Port of Mobile can penetrate 25% of the 890,392 TEU potential market identified, or 222,598 TEUs. It is further assumed that the Port of Mobile will gain the 25% market share over a five year period, adding about 44,520 TEUs per year until it reaches a 25% penetration rate of the potential market. It is additionally assumed that the potential market of 222,598 TEUs grows at the same annual rate to the baseline container TEU import throughput at the Port of Mobile. After the five year incremental addition of potential market, the total TEUs at the Port of Mobile will grow at the overall annual rate developed for the baseline import projections. This scenario reflects the scenario that the Port of Mobile will complete channel deepening, and channel widening.

Exhibit 28 shows the projected market potential for the Port of Mobile under the medium scenario, while Exhibit 29 shows the combined baseline and medium market penetration scenario for total TEUs.

Exhibit 28 - Medium Scenario Projected Potential TEUs

Year	2019	2024	2029	2034	2039	2044	2049	2054
Potential TEUs (Medium)	44,520	287,255	367,833	450,743	535,935	587,141	632,517	668,073

Exhibit 29 - Projected Total TEUs for the Port of Mobile (Medium Market Penetration)

Year Total	2019	2024	2029	2034	2039	2044	2049	2054
Medium Scenario TEUs	415,828	793,178	1,018,940	1,237,326	1,461,073	1,616,990	1,746,716	1,844,904

The same methodology was used to estimate the projected TEUs potential under the aggressive scenario, with the exception of an assumed 50% capture by rate by the Port of Mobile of the 890,392 TEU market potential over the next five years, beginning in 2019.

Exhibit 30 shows the projected potential TEUs and tonnage under the aggressive scenario, while Exhibit 31 shows the combined baseline and aggressive market scenario container TEU projections for the Port of Mobile.

Exhibit 30 - Aggressive Scenario Projected Potential TEUs

Year	2019	2024	2029	2034	2039	2044	2049	2054
Potential TEUs (Aggressive)								

Exhibit 31 - Projected TEUs for the Port of Mobile (Aggressive Market Penetration)

Year Total	2017	2018	2019	2024	2029	2034	2039	2044	2049	2054
Agressive Scenario TEUs	340,112	371,309	460,348	1,080,433	1,386,773	1,688,069	1,997,009	2,204,130	2,379,233	2,512,977

Under the medium market capture scenario, containers are projected to grow at an average annual compound growth rate of 4.9% between 2017 and 2054, while under the aggressive market capture scenario, container throughput is projected to grow at an annual rate of 5.5% between 2017 and 2054. For comparison, between 2009 and 2017, total U.S. container traffic grew at a rate of 4.7% annually.

4. BENEFITS OF THE CHANNEL DEEPENING AND WIDENING OF THE MOBILE HARBOR AND RIVER CHANNELS TO THE STATE OF ALABAMA

The purpose of this section is to provide an estimate of the benefits ***to the state of Alabama*** of deepening and widening of the Mobile Harbor and River Channels. Currently, the Harbor is maintained at a 45 ft. depth and a 400 ft. width. The U.S. Army Corps of Engineers has developed a tentatively selected plan for deepening and widening the Harbor. This plan includes:

- Deepen the existing bay and river channels by 5 ft. to project depths of 52 ft. at the bar, 50 ft. at the bay and 50 ft. in the river channels, plus an additional 2 ft. for advanced maintenance, plus 2 ft. of allowable over depth
- Incorporate easing of the bend in the Bar Channel
- Widen the bay from 400 to 500 ft. for 3 nautical miles to provide two way traffic for passing of vessels
- Expand the Choctaw Pass Turning Basing to the south to better accommodate safe turning of the design vessel

The economic benefits to the state of Alabama of the tentatively selected plan for the Port of Mobile Harbor and River Channel, consist of the following benefit criteria. These criteria have been developed by the U.S. Department of Transportation, as well as the U.S. Army Corps of Engineers, to evaluate economic benefits of transportation projects and to evaluate grant applications for Tiger Grants as well as Build Grants. These benefit criteria are:

- ***Safety benefits*** due to the reduction in the truck travel distance and resulting vehicle miles traveled to serve the State's beneficial cargo owners (BCO)'s and manufacturers with and without the deepening and widening project
- ***Environmental benefits*** resulting due the reduction of the truck distance and corresponding vehicle miles traveled to serve the state of Alabama's beneficial cargo owners and manufacturers with and without the deepening and widening project
- ***External trucking and road and highway infrastructure benefits*** due to reducing the truck distance and corresponding vehicle miles traveled to serve the State's beneficial cargo owners and manufacturers with and without the deepening and widening project
- ***Economic competitiveness benefits*** to container exporters and importers located in the state of Alabama by reducing the truck distance, and hence transportation costs to serve the State's beneficial

cargo owners and manufacturers with and without the deepening and widening project -- This is the transportation cost savings to the state of Alabama importers and exporters, which in turn increases the competitive position of the State to attract new manufacturing and distribution centers.

The key factor that drives these benefits in the four benefit categories noted above to the state of Alabama is the reduction in truck distance to serve the State's beneficial cargo owners (BCOs), i.e., those that import and export cargo through other ports than Mobile. As noted in the previous sections of this report, the Port of Savannah is the port typically used by these in-state importers and exporters, especially for cargo moving on the Asian trade lanes. Therefore, the focus of the analysis to evaluate the economic benefits (in the above four benefit categories) to the state of Alabama is to first identify that subset of cargo that moves to and from the state of Alabama from the Port of Savannah by truck. As noted previously, this includes cargo that moves by truck to and from in-state BCOs, as well as cargo that moves between the BCOs in Alabama and the distribution centers in Savannah and Atlanta that are most likely served by the Port of Savannah. The second step is to calculate the mileage savings and hence transportation cost savings to the Alabama BCOs should they use the Port of Mobile.

In addition to these environmental, safety and infrastructure benefits, as well as the transportation costs savings to the State, ***the economic impact to the state of Alabama*** that could be generated by the potential new containers moving through the Port of Mobile are also estimated. This impact includes direct business revenue to the Alabama companies providing the services to the additional containers that could be captured with a deeper and wider channel and harbor; additional tax revenues to the state and local governments within Alabama; and new job creation with port service providers in the State, as measured not only by jobs, but also in direct income and the state purchases generated by the additional income.

4.1 Potential Market for Alabama Beneficial Cargo Owners Due to Deepening and Widening of the Mobile Harbor and River Channels

The total market potential for cargo that moves directly from the Ports of Savannah, Charleston, Houston and New Orleans into the states of Alabama, Mississippi, and Tennessee was estimated at a total of 254,545 loaded TEUs. This potential market is adjusted to reflect only the cargo moving to and from the Port of Savannah and the BCOs in the state of Alabama only, and further on the Transpacific trade routings of China, Japan/Korea, Southeast Asia and Southwest Asia, since it is these routings that will most likely benefit from the actual deepening and widening project. It is to be emphasized that the focus on the Transpacific trade is conservative by design, but it is this trade lane that has seen the largest growth in vessel size that will require a deeper and wider harbor and river channel. Exhibit 32 shows the loaded TEUs destined for Alabama BCOs on the Asian trade lanes. A total of 50,471 loaded TEUs move directly from the Port of Savannah to BCOs in Alabama, while 4,211 loaded TEUs move from Charleston to Alabama BCOs, 3,457 loaded TEUs move directly from Houston to Alabama BCOs, and 373 loaded TEUs move from New Orleans to Alabama BCOs.

Exhibit 32 - Size of Market Now Moving on the Asian Trade Directly into Alabama from Ports Other than Mobile
(Loaded Inbound TEUs)

Trade Lane	Charleston	Houston	New Orleans	Savannah	Grand Total
China	2,775	2,380	261	16,601	22,016
Japan	238	531	1	28,261	29,030
SE Asia	282	177	20	3,515	3,994
SW Asia	916	369	91	2,095	3,472
Total	**4,211**	**3,457**	**373**	**50,471**	**58,512**

Source: PIERS

In addition to the TEUs moving directly from the Port of Savannah to Alabama BCOs on the Transpacific routing, cargo imported via the Port of Savannah is also transloaded at distribution centers and cross dock operations in Savannah and Atlanta, and not included in the PIERS data base as these are considered domestic moves (after the international containers are devanned) to the final consumption points. To capture this cargo, the IHS Transearch data base was used to estimate the cargo trucked from the Savannah and Atlanta distribution centers into the state of Alabama only. Using this data base, a total of 51,989 TEUs were trucked into Alabama via distribution centers in Savannah and Atlanta. It is assumed that this is also cargo moving on the Transpacific trade lanes since the majority of the imported cargo moving into Alabama from the Port of Savannah is also moving in the Transpacific trade, as noted previously in this report.

Therefore, a total of 110,501 loaded TEUs move into the state of Alabama from ports other than the Port of Mobile on the Transpacific trade, including the distribution center cargo from Savannah and Atlanta. Assuming that for each inbound move that would be captured by the Port of Mobile, an additional outbound empty or full export container would be generated at the Port to balance the ocean carrier equipment utilization. Therefore, the current potential market in Alabama that could be penetrated with a deeper and wider harbor and river channel is estimated at 221,002 total TEUs.

4.2 Truck Mileage Savings for Alabama Beneficial Cargo Owners if the Port of Mobile is Used Rather than Current Out-of-State Ports

The next step in determining the economic benefits to the state of Alabama resulting from the harbor and channel deepening and widening study is to estimate the truck savings for Alabama BCOs should the Port of Mobile be used instead of the current ports used. The current origins and destinations by Alabama county of the warehoused cargo moving from Savannah and Atlanta distribution centers were developed from the IHS Transearch data base. The mileage between Savannah and each county seat in Alabama was next calculated as was the distance from the Port of Mobile to each of the Alabama counties. The distribution of the inbound distribution center cargo was then used as a proxy to allocate the inbound containers moving directly into Alabama (on the Transpacific trade lanes) from the ports of Savannah, Charleston, Houston and New Orleans. The mileage differentials between using the Port of Mobile vs. Savannah, Charleston, New Orleans and Houston to each of the Alabama counties was next calculated. A weighted average mileage differential between Mobile and each of the other ports was estimated based on the volume of cargo that moved directly from each port into each Alabama county. These mileage differentials represent the mileage cost savings to Alabama BCOs of using the Port of Mobile rather than Savannah, Charleston, Houston and New Orleans. The mileage savings provided by the Port of Mobile to Alabama BCOs is shown in Exhibit 33, along with the total TEUs moving to and from Alabama BCOs on the Transpacific trade by port now used. Also included is the distribution center cargo that moves into Alabama from the DCs in Georgia.

Exhibit 33 - Mileage Savings and TEUs Moving to and from Alabama BCOs on the Transpacific Trade Lane

Port Used	Total TEUs	Mileage Savings
Charleston	8,421	186.2
Houston	6,915	433.2
Savannah	204,921	104.2
New Orleans	745	118.7
Total	221,002	

The mileage savings are then used to estimate the vehicle miles, converting the TEUs into actual containers and then truck trips (assuming a round trip load for each truck movement). The vehicle mile savings are estimated under a 25% and 50% capture rate by the Port of Mobile of the identified 221,002 TEUs potential market for the Alabama BCOs. The projected TEUs that can be captured by the Port of Mobile under the two market penetration rates are estimated over a 50 year time horizon. The future potential market volumes are projected to grow at the same annual rate as the ***baseline TEU projections*** for the Port of Mobile described previously, which assumes no new cargo market penetrations. The vehicle miles saved are then used to estimate the benefits to Alabama of the deepening and widening project in terms of safety benefits, environmental benefits, and highway degradation and congestion.

4.3 Economic Benefits to the State of Alabama

The benefits to the state of the harbor and channels deepening and widening project are estimated over a 50 year time horizon, which is consistent with the time period used by the U.S. Army Corps of Engineers in navigation studies. The present value of the benefits are then calculated under a 3% and 7% discount rate.

4.3.1 Safety Benefits to the State

Safety benefits are defined in terms of reduced accidents and associated injuries as the result of the reduced vehicle truck miles traveled. Accidents per 100 million vehicle miles traveled (VMT) were developed from *Surface Transportation, A Comparison of the Costs of Road, Rail and Waterways Freight Shipments that are not Passed on to Consumers*, GAO, Report to the Subcommittee on Select Revenue Measures, Committee on Ways and Means House of Representatives, January 2011. The value of an accident, a fatality, injury, or property damage only (PDO) was collected from *BTS Motor Vehicle Safety* Data, 2015 National Transportation Statistics, 2015. The values were inflated from 2015 values to 2018 values based on the consumer price index published by the U.S. Bureau of Labor Statistics, May 2018.

Exhibit 34 - Accidents per 100 Million VMT

	Accident Probability/100 million VMT	Value per Accident, 2018$
Fatal Accident Cost (K)	1.13369	$10,011,917
Severe Injury Accident Cost (A)	78.92426	$214,318
PDO Accident Cost (no injury)	203.40039	$3,337

Sources: *Surface Transportation, A Comparison of the Costs of Road, Rail and Waterways Freight Shipments that are not Passed on to Consumers*, GAO, Report to the Subcommittee on Select Revenue Measures, Committee on Ways and Means House of Representatives, January 2011.
BTS Motor Vehicle Safety Data, 2015 National Transportation Statistics, 2015

The accident rates per 100 million VMT by type of accident were multiplied by the 100 million vehicle miles traveled savings to estimate the number of accidents by type (due to the reduced VMT). The estimated number of accidents by type were then multiplied by the value accidents (by type) to estimate the total annual value of accidents that would be avoided if the Port of Mobile was used rather than the other ports to serve the Transpacific trade as the result of the deepening and widening of the Mobile Harbor and River Channels. These safety savings were estimated through 2068, and then discounted under a 3% and 7% discount rate. The safety savings to the state were estimated under a 25% and 50% capture rate of the potential Transpacific market for Alabama BCOs that is now served via other ports. The present value of the savings benefits are shown in Exhibit 35 under the 25% capture and 50% capture rate.

Exhibit 35 - Safety Benefits due to Reduced Vehicle Miles For Alabama BCOs

Safety Benefits 25% Market Capture

NPV of Safety @3%	**$37,986,064.72**
NPV of Safety@7%	**$21,691,905.90**

Safety Benefits 50% Market Capture

NPV of Safety @3%	**$75,972,129.45**
NPV of Safety@7%	**$43,383,811.80**

4.3.2. Environmental Benefits

Environmental benefits are generated in the State due to the reduced vehicle miles traveled as the result of the deepening and widening project. Emissions of air pollutants are generated per VMT, and the metrics used to estimate the volume of emissions per truck VMT are shown in Exhibit 36. These emission rates are measured in terms of short tons emitted per million VMT.

Exhibit 36 - Short Tons of Emissions per Million VMT

Emissions	TONS EMITTED PER MILLION VMT
Nitrogen Oxides (Nox)	3.0193
Volatile Organic Compounds (VOC)	0.11
Fine Particule (PM)	0.1191
Sulfur Dioxide (SO2)	0.0055

Source: *Surface Transportation, A Comparison of the Costs of Road, Rail and Waterways Freight Shipments that are not Passed on to Consumers*, GAO, Report to the Subcommittee on Select Revenue Measures, Committee on Ways and Means House of Representatives, January 2011

The cost per short ton of the emissions by type of emission were developed from *NHTSA, Final Regulatory Impact Analysis, CAFE for MY 2012-MY 2016 Passenger Cars and Light Trucks*, March 2010. The cost of carbon dioxide has historically been based on the social costs of carbon and their costs per metric ton (converted to short ton) are prepared for future years by the *IWGSCC, Social Cost of Carbon for Regulatory Impact Analysis* Under Executive Order 12866, February 2011. As of June 2018, the cost of carbon dioxide emissions is no longer considered in the evaluation of emissions. These costs were updated using the May 2018 CPI and are shown in Exhibit 37.

Exhibit 37 - Value per Short Ton of Emissions

Cost Metrics	Cost/Short Ton Emitted Truck
Nitrogen Oxides (Nox)	$7,693.53
Volatile Organic Compounds (VOC)	$1,952.32
Fine Particule (PM)	$351,938.69
Sulfur Dioxide (SO2)	$45,470.79

Source: Final Regulatory Impact Analysis, CAFE for MY 2012-MY 2016 Passenger Cars and Light Trucks, March 2010. And *IWGSCC, Social Cost of Carbon for Regulatory Impact Analysis* Under Executive Order 12866, February 2011.

The net present value of the environmental cost savings due to the use of the Port of Mobile by Alabama beneficial cargo owners due to the widening and deepening project are summarized in Exhibit 38, under the 25% and 50% Transpacific market capture rate of the Alabama cargo now moving via ports other than Mobile.

Exhibit 38 - Emissions Savings due to Truck Mileage Savings for Alabama BCOs

Emission Savings Benefits 25% Capture

NPV of Emissions @3%	**$13,485,322.23**
NPV of Emissions @7%	**$6,211,003.58**

Emission Savings Benefits 50% Capture

NPV of Emissions @3%	**$26,970,644.45**
NPV of Emissions @7%	**$12,422,007.17**

4.3.3 External Truck Cost Savings Benefits

External truck cost savings consist of reduced costs of highway/pavement repair, highway congestion, and noise pollution, due to reduced truck vehicle miles traveled for Alabama beneficial cargo owners resulting from the use of the Port of Mobile due to the deepening and widening project. Metrics that measure highway/pavement degradation costs per truck mile, noise pollution costs per truck mile and highway congestion per ton mile are published by the *1997 Federal Highway Cost Allocation Study*, Final Report, USDOT, Federal Highway Administration, May 2000, Table 13. These cost metrics are shown in Exhibit 39 and updated to 2018 dollars using the CPI for May 2018. These metrics are applied to the vehicle miles travelled that are saved due to the deepening and widening of the Mobile Harbor and River Channels under a 25% capture rate and 50% capture rate of the Alabama cargo now using ports other than the Port of Mobile.

Exhibit 39 - External Truck Cost Savings

Combination Truck 4 Axel	Cost/VMT
Congestion	$0.4730
Noise	$0.0232
Pavement (Urban Interstate)	$0.2623

Source: *1997 Federal Highway Cost Allocation Study*, Final Report, USDOT, Federal Highway Administration, May 2000, Table 13

The present value of the external truck cost benefits due to the reduced truck miles for Alabama beneficial cargo owners is presented in Exhibit 40 under the 25% and 50% market capture rates

Exhibit 40 - External Truck Cost Benefits due to Reduced Miles for Alabama BCOs

Reduced Truck Cost Benefits 25% Market Capture	
NPV of External Truck Cost Savings @3%	$102,687,184.41
NPV of External Truck Cost Savings @7%	$59,810,168.46
Reduced Truck Cost Benefits 50% Market Capture	
NPV of External Truck Cost Savings @3%	$205,374,368.82
NPV of External Truck Cost Savings @7%	$119,620,336.92

4.3.4 Economic Competitiveness Benefits – Transportation Cost Savings for Alabama Beneficial Cargo Owners

The economic competitiveness benefits resulting from the deepening and widening of the Mobile Harbor and River Channels consists of the transportation cost savings to the State's beneficial cargo owners (importers and exporters) as the result of lower truck costs due to the savings in miles traveled to the key consumption destinations and export origins in the Port of Mobile's hinterland that are currently served via the ports of Savannah, Charleston, New Orleans, and Houston. After the deepening and widening project is completed, larger vessels will be deployed on the Transpacific trade lane at the Port of Mobile, and the container volumes now moving from and to other ports by the importers and exporters located in Alabama can competitively move through Mobile to the consumption and production points at lower transportation costs than currently faced by using other ports. To estimate the transportation cost savings, the hourly trucking cost was estimated from interviews with key trucking companies engaged in port drayage, as well as information provided by American Transportation Research Institute (ATRI), *An Analysis of the Operational Costs of Trucking, 2017*. Based on these sources, it is estimated that the daily trucking costs are $950. Using the 11 hours of daily service that are capped under the current hours of service regulation and enforced through the electronic logging devices (ELD), the current hourly operating cost per truck is estimated at $86.36. For highway transportation, an average speed of 40 miles per hour is assumed. Using these assumptions, the average truck

cost savings per container was estimated for 25% and 50% market penetration scenarios of the Alabama cargo now moving via other ports.

Exhibit 41 - Transportation Cost Savings Per Container for Alabama Beneficial Cargo Owners Due to Use of the Port of Mobile After Harbor and Channel Deepening and Widening Project

TRUCKING COST PENALTIES OVER THE USE OF MOBILE FOR ALABAMA BCOS TO:	HOURS SAVINGS USING MOBILE	COST SAVINGS/TRUCK TRIP
Charleston	4.65	$401.96
Houston	10.83	$935.40
Savannah	2.61	$225.05
New Orleans	3.0	$256.19

The cost savings per truck trip multiplied by the number of truck trips was used to estimate the transportation cost savings to beneficial cargo owners located in Alabama and importing and exporting on the Transpacific trade lanes that will be able to use the Port of Mobile after the deepening and widening of the Mobile Harbor and River Channels. The present value of the transportation cost savings benefits to Alabama importers and exporters, or the Economic Competitiveness Benefits, are shown in Exhibit 42 under the 25% and 50% market penetration scenarios.

Exhibit 42 - Cost Savings to Alabama Beneficial Cargo Owners as the Result of the Deepening and Widening of the Mobile Harbor and River Channels

Cost Savings 25% Capture Rate

NPV of Economic Competitiveness @3%	**$443,775,550.93**
NPV of Economic Competitiveness @7%	**$204,391,967.11**

Cost Savings 50% Capture Rate

NPV of Economic Competitiveness @3%	**$887,551,101.87**
NPV of Economic Competitiveness @7%	**$408,783,934.21**

4.3.5 Economic Impact to the State of Alabama from the Additional Cargo Generated at the Port of Mobile Resulting from the Deepening and Widening Project

Martin Associates developed an economic impact model for the Port of Mobile as part of the economic impact study developed for the Alabama State Port Authority in 2017.[10] Based on this study, the Port of Mobile supported 153,278 direct, induced, indirect, and related jobs in the state of Alabama in fiscal year 2017. Of these 153,278 jobs, **18,879 direct jobs** are generated by the marine cargo and vessel activity. As the result of local and regional purchases by those 18,879 individuals holding the direct jobs, an additional **18,163 induced jobs** were supported in the regional economy. An additional **10,341 indirect jobs** were supported by $809.1 million of local purchases made by businesses supplying services at the marine terminals and by businesses dependent upon the marine terminals, and by businesses dependent upon the marine terminals. **Jobs related to the marine cargo imported and exported via the public and private marine terminals accounted for 105,896 jobs.** These jobs with Alabama importers and exporters are considered

[10] **THE LOCAL AND REGIONAL ECONOMIC IMPACTS OF THE PORT OF MOBILE – 2017,** conducted by Martin Associates for the Alabama State Port Authority, December 18, 2017

to be related to activities at the public and private marine terminals, but the degree of dependence on these terminals is less direct than the direct, induced and indirect impacts. These jobs include the portion of jobs at importing and exporting firms that are directly associated with the cargo moved via the Port of Mobile marine terminals, but not generated by the actual port operations. Also included in the related jobs are the supporting jobs at the various levels of production throughout the State to deliver the export cargo to the marine terminals and to process the cargo imported by Alabama importers. It is the demand for the product that generates the employment and other impacts with the shippers/consignees. The **total economic value to the state of Alabama** supported by the marine cargo activity at the public and private marine terminals in 2017 is estimated at **$25.1 billion.** This consists of the direct business revenue of $3.2 billion, the re-spending and local consumption impact of $1.7 billion, and the related user output of $20.1 billion. This dollar value represents the sphere of influence of the public and private marine terminals in 2017. Direct wages and salaries of $976.3 million were received by those 18,879 directly employed, resulting in an average annual salary of $51,718. This salary compares to an average statewide salary of $42,510. As the result of re-spending this income, an additional $1.7 billion of income and consumption expenditures were created. The 10,341 indirect job holders received $460.3 million of indirect wages and salaries. An additional $3.7 billion was received by the related port users. In total, **about $6.8 billion of total personal wages and salaries** were supported by maritime activity at the public and private terminals located at the Port of Mobile. State and local taxes supported by activity at the marine terminals totaled **$568.0 million,** which includes $262.9 million of direct, induced, and indirect state and local tax revenue as well as nearly $305.1 million of state and local taxes that were supported by the economic activity of related users of the cargo moving through the Port.

Using the model that was developed as part of the economic impact study, Martin Associates evaluated the incremental direct, induced and indirect impacts that would be generated in Alabama under a 25% and 50% capture rate of the containerized cargo now moving to and from Alabama importers and exporters on the Transpacific trades via ports other than Mobile, most notably the Port of Savannah. Related impacts associated with the potential containerized cargo are not estimated since these impacts are with importers and exporters that are already located in the state of Alabama, and would not be new jobs to the State.

The potential annual container throughput under the 25% and 50% capture rate of cargo now moving to and from Alabama importers and exporters via other ports that could potentially move through the Port of Mobile with a deeper and wider harbor and river channels was used as inputs into the economic impact model. The annual economic impacts, at five year increments, that could be generated by the potential container volumes under each capture rate, are presented in Exhibit 43. It is to be emphasized that these are new annual impacts to the state of Alabama that could be potentially generated under the 25% and 50% market capture rates due to the deepening and widening project.

Exhibit 43 - Potential Annual Economic Impacts Generated by the Deepening and Widening of the Mobile Harbor and River Channels

Potential Economic Impacts Under a 25% Capture Rate

	2018	2023	2028	2033	2038	2043	2048	2053	2058	2063	2068
Jobs											
Direct	201	283	366	448	529	596	647	694	722	729	729
Induced	166	234	302	370	437	492	535	574	596	602	602
Indirect	110	155	200	246	290	326	355	380	396	400	400
Total	476	671	869	1,064	1,255	1,414	1,537	1,648	1,714	1,731	1,731
Personal Income ($1,000)											
Direct	$8,276	$11,660	$15,092	$18,488	$21,807	$24,570	$26,694	$28,632	$29,777	$30,075	$30,075
Induced	$14,665	$20,663	$26,745	$32,763	$38,644	$43,541	$47,305	$50,739	$52,768	$53,295	$53,295
Indirect	$4,893	$6,894	$8,924	$10,932	$12,895	$14,529	$15,785	$16,931	$17,608	$17,784	$17,784
Total	$27,833	$39,218	$50,761	$62,184	$73,346	$82,640	$89,784	$96,302	$100,153	$101,154	$101,154
Direct Business Revenue ($1,000)	$29,436	$41,481	$53,695	$65,785	$77,601	$87,442	$95,007	$101,910	$105,988	$107,048	$107,048
In-state Purchases ($1,000)	$8,602	$12,120	$15,688	$19,219	$22,669	$25,542	$27,751	$29,766	$30,956	$31,266	$31,266
State and Local Taxes ($1,000)	$2,310	$3,255	$4,213	$5,161	$6,088	$6,859	$7,452	$7,993	$8,313	$8,396	$8,396
State	$1,479	$2,083	$2,696	$3,303	$3,896	$4,390	$4,769	$5,116	$5,320	$5,373	$5,373
Local	$832	$1,172	$1,517	$1,858	$2,192	$2,469	$2,683	$2,878	$2,993	$3,022	$3,022

Potential Economic Impacts Under a 50% Capture Rate

	2018	2023	2028	2033	2038	2043	2048	2053	2058	2063	2068
Jobs											
Direct	401	566	732	896	1,057	1,191	1,294	1,374	1,444	1,458	1,458
Induced	331	467	604	740	873	984	1,069	1,134	1,192	1,204	1,204
Indirect	220	310	401	491	579	652	709	752	791	799	799
Total	953	1,342	1,737	2,128	2,509	2,827	3,072	3,260	3,426	3,461	3,461
Personal Income ($1,000)											
Direct	$16,547	$23,317	$30,170	$36,957	$43,586	$49,106	$53,348	$56,621	$59,505	$60,099	$60,099
Induced	$29,322	$41,321	$53,465	$65,491	$77,239	$87,020	$94,538	$100,338	$105,449	$106,502	$106,502
Indirect	$9,784	$13,788	$17,841	$21,855	$25,777	$29,042	$31,552	$33,489	$35,195	$35,547	$35,547
Total	$55,652	$78,426	$101,476	$124,303	$146,602	$165,168	$179,439	$190,448	$200,149	$202,147	$202,147
Direct Business Revenue ($1,000)	$58,872	$82,980	$107,390	$131,571	$155,202	$174,883	$190,014	$201,688	$211,977	$214,097	$214,097
In-state Purchases ($1,000)	$17,200	$24,240	$31,365	$38,422	$45,317	$51,058	$55,470	$58,875	$61,875	$62,493	$62,493
State and Local Taxes ($1,000)	$4,619	$6,509	$8,423	$10,317	$12,168	$13,709	$14,893	$15,807	$16,612	$16,778	$16,778
State	$2,956	$4,166	$5,390	$6,603	$7,788	$8,774	$9,532	$10,117	$10,632	$10,738	$10,738
Local	$1,663	$2,343	$3,032	$3,714	$4,380	$4,935	$5,362	$5,691	$5,980	$6,040	$6,040

Using the output of the economic impact model, the present value of the direct business revenue and the state and local taxes impact to the state of Alabama represent two measures of the economic benefit to the State of the port activity that could potentially be generated as the result of the deepening and widening of the Mobile Harbor and River Channels. Taxes represent a direct revenue earned by the State from the deepening and widening project, while port generated business revenue represents a new addition to the state domestic product due to the deepening and widening project. It is important to note that the taxes and business revenue cannot be added together, since a portion of the taxes are paid from business revenue as is the direct wage and salary income. To add the business revenue and taxes together that were generated by port activity would result in double counting. Therefore, benefits are estimated separately for port generated business revenue and port generated state and local tax impacts. These benefits are summarized in Exhibit 44, which shows the present value of the business revenue generated for Alabama firms providing the cargo and vessel handling services associated with the potential containerized cargo under the 25% and 50% capture rate. Similarly, the present value of the state and local taxes to the state of Alabama is a direct measure of the return to the State of the potential containerized cargo generated under the 25% and 50% capture rate of the container market associated with the deepening and widening of the Mobile Harbor and River Channels. The

present values of the potential business revenue impact and the state and local tax impacts under the 25% and 50% capture rate are shown in Exhibit 44.

Exhibit 44 - Present Value of the Potential Business Revenue and State and Local Tax Revenue Generated in the State of Alabama by Port Activity Due to the Deepening and Widening Project

	25% Capture	50% Capture
Present Value of the Business Revenue		
3% Discount Rate	$1,854,133,085	$3,704,699,878
7% Discount Rate	$852,216,147	$1,703,599,311
Present Value of the State and Local Tax Revenue		
3% Discount Rate	$145,456,074	$290,463,075
7% Discount Rate	$66,863,017	$133,594,484

This exhibit shows the Port generated economic impact in terms of the value of port generated business revenue added to the state of Alabama's state domestic product due to the deepening and widening of the Mobile Harbor. Using a 3% discount rate to develop the net present value of the annual stream of port generated business revenue that would be added to the State's gross domestic product could potentially range from $1.9 billion to $3.7 billion under a 25% and 50% market capture rate. Using a 7% discount rate, the present value of the business revenue that could potentially be generated in the State due to the handling of the additional cargo associated with the deepening and widening project could potentially range between $852.2 million to $1.7 billion, under the respective market penetration rates.

With respect to state and local taxes that are generated due to the potential 25% and 50% capture of cargo now moving between Alabama importers and exporters and ports other than Mobile, the present value of the state and local taxes associated with the deepening and widening project are estimated to range between $145.5 million and $290.5 million with a 3% discount rate and between $66.9 million and $133.6 million under a 7% discount rate.

4.4 Summary of Economic Benefits Generated for the State of Alabama Resulting from the Deepening and Widening of the Mobile Harbor and River Channels

The economic benefits calculated to be generated for the state of Alabama as the result of the deepening and widening project are summarized in this section. The benefits are estimated under a 25% and 50% market capture rate of the containers now moving between Alabama BCOs (importers and exporters) and ports other than Mobile. The benefits are further estimated over a 50 year period and the present value of the benefits is calculated under a 3% and 7% discount rate. Two sets of benefits are estimated; one which includes the present value of the business revenue generated in Alabama as the result of the additional volume of containers that would be handled at the Port of Mobile and excludes the port generated state and local taxes; the second set of benefits excludes the port generated business revenue, but includes the port generated state and local taxes.

Exhibit 45 summarizes the potential economic benefits to the state of Alabama as the result of the deepening and widening of the Mobile Harbor and River Channels. This exhibit presents the impacts by category under a 25% and 50% market capture rate, as well as the inclusion of the present value of the business revenue estimated to be generated by the additional containerized cargo moving via the Port of Mobile. State and local taxes are not included.

Exhibit 45 - Summary of Economic Benefits to Alabama Including Port Generated Business Revenue
25% Capture Rate

BENEFIT CATEGORIES	3% DISCOUNT	7% DISCOUNT
EMISSIONS	$13,485,322	$6,211,004
SAFETY	$37,986,065	$21,691,906
EXTERNAL TRUCK	$102,687,184	$59,810,168
ECONOMIC COMPETITIVENESS	$443,775,551	$204,391,967
PORT GENERATED BUSINESS REVENUE	$1,854,133,085	$852,216,147
TOTAL BENEFITS	**$2,452,067,207**	**$1,144,321,192**

Summary of Economic Benefits to Alabama Including Port Generated Business Revenue
50% Capture Rate

BENEFIT CATEGORIES	3% DISCOUNT	7% DISCOUNT

When port generated business revenue is included, the total economic benefits to the state of Alabama under the 25% capture rate range from $1.1 billion to $2.5 billion under a 7% and 3% discount rate. Under a 50% market capture rate of the cargo now moving between Alabama importers and exporters and ports other than Mobile, the benefits to the state of Alabama including the Port business revenue generated in the state by the additional containerized cargo range from $2.3 billion to $4.9 billion, under a 7% and 3% discount rate.

Exhibit 46 presents a summary of the economic benefits to the state of Alabama under a 25% and 50% market penetration rate when port generated state and local taxes are included rather than port generated business revenue. Under a 25% market penetration rate, including port generated state and local taxes rather than port generated revenue, the benefits to the state of Alabama are estimated to range between $359 million to $743.4 million under the 7% and 3% discount rates. Under a 50% market penetration rate with port generated state and local taxes included instead of port generated business revenue, the benefits to the state of Alabama of the deepening and widening project range from $717.8 million to $1.5 billion.

Exhibit 46 - Summary of Economic Benefits to Alabama Including Port Generated Business Revenue
25% Capture Rate

BENEFIT CATEGORIES	3% DISCOUNT	7% DISCOUNT
EMISSIONS	$13,485,322	$6,211,004
SAFETY	$37,986,065	$21,691,906
EXTERNAL TRUCK	$102,687,184	$59,810,168
ECONOMIC COMPETITIVENESS	$443,775,551	$204,391,967
PORT GENERATED STATE AND LOCAL TAX REVENUE	$145,456,074	$66,863,017
TOTAL BENEFITS	**$743,390,197**	**$358,968,062**

Summary of Economic Benefits to Alabama Including Port Generated Business Revenue
50% Capture Rate

BENEFIT CATEGORIES	3% DISCOUNT	7% DISCOUNT
EMISSIONS	$26,970,644	$12,422,007
SAFETY	$75,972,129	$43,383,812
EXTERNAL TRUCK	$205,374,369	$119,620,337
ECONOMIC COMPETITIVENESS	$887,551,102	$408,783,934
PORT GENERATED STATE AND LOCAL TAX IMPACT	$290,463,075	$133,594,484
TOTAL BENEFITS	**$1,486,331,319**	**$717,804,574**

5. COMPARISON OF ECONOMIC BENEFITS OF ALABAMA TO THE STATE OF ALABAMA'S SHARE OF COSTS OF THE DEEPENING AND WIDENING OF THE MOBILE HARBOR AND RIVER CHANNELS

Exhibit 47 presents the tentatively selected plan (TSP) project costs associated with the deepening and widening of the Mobile Harbor and River Channels. The project costs are identified for the federal share and the non-federal share. The non-federal share represents the cost that will be borne by the state of Alabama as well as other local sponsors. As this Exhibit shows, the non-federal cost share of the project is currently estimated at $145,957,000.

Based on the project benefits to the state of Alabama described in the previous section of this report, the minimum benefit cost ratio for the State is represented by the benefits to the state of Alabama under a 25% market capture rate, a 7% discount rate, and excluding port generated business revenue to the State -- $359 million of economic benefits. This compares to the $146 million project cost to the State, and represents a minimum 2.5 benefit cost ratio to the state of Alabama.

Exhibit 47 - Summary of Project Costs

Description	Total Costs (K)	Implementation of Costs (K)			
General Navigation Features (GNF)		Federal	%	Non-Federal	%
Dredging: Deepening including Bend Easing and Turning Basin	$350,372	$262,779	75	$87,593	25
Dredging: 100' Widening 3 Nautical Mile Lane	$12,773	$9,580	75	$3,193	25
Lands Easements Rights of Way and Relocation (LERR)	$40	$0	0	$40	100
Preconstruction, Engineering & Design	$8,542	$6,406	75	$2,136	25
Construction Management	$4,029	$3,022	75	$1,007	25
Subtotal of GNF	$375,756	$281,791	75	$93,969	25
10% of GNF		($37,576)	-	$37,576	-
GNF LERR credit		$40		($40)	
Associated Costs:					
Local Service Facilities: Berthing (ASPA)	$11,397	$0	0	$11,397	100
Aids to Navigations (U.S. Coast Guard)	$609	$609	100	$0	0
Total Estimated Costs:	$387,762	$244,860	63	$142,981	37
Incremental Annual Maintenance Cost (FY18 Price Level)					
Deepening, Bend Easing, Widening, Turning Basin	$2,358	$2,358	100	$0	0

Source: ASPA and US. Army Corps of Engineers

Exhibit 48 summarizes the benefit cost ratio to the state of Alabama under the two market capture rates, the 3% and 7% discount rates, and the two benefit scenarios including port generated business revenue versus (not state and local taxes). As shown in these tables, the benefit cost ratio to the state of Alabama ranges from a low benefit cost ratio of 2.5 (under a 7% discount rate, with a 25% market capture, and the inclusion of port generated state and local taxes rather than port generated business revenue) to a high benefit cost ratio of 33.6. The highest benefit cost ratio to the State is achieved under a 50% market capture rate, a 3% discount rate and the inclusion of port generated business revenue rather than state and local taxes.

Exhibit 48 - Economic Benefits to Cost Ratio for Alabama Including Port Generated Business Revenue
25% Capture Rate

BENEFIT CATEGORIES	3% DISCOUNT	7% DISCOUNT
EMISSIONS	$13,485,322	$6,211,004
SAFETY	$37,986,065	$21,691,906
EXTERNAL TRUCK	$102,687,184	$59,810,168
ECONOMIC COMPETITIVENESS	$443,775,551	$204,391,967
PORT GENERATED BUSINESS REVENUE	$1,854,133,085	$852,216,147
TOTAL BENEFITS	**$2,452,067,207**	**$1,144,321,192**
NON-FEDERAL COST	**$145,947,000**	**$145,957,000**
BENEFIT-COST RATIO FOR THE STATE	**16.80**	**7.84**

Economic Benefits to Cost Ratio for Alabama Including Port Generated Business Revenue
50% Capture Rate

BENEFIT CATEGORIES	3% DISCOUNT	7% DISCOUNT
EMISSIONS	$26,970,644	$12,422,007
SAFETY	$75,972,129	$43,383,812
EXTERNAL TRUCK	$205,374,369	$119,620,337
ECONOMIC COMPETITIVENESS	$887,551,102	$408,783,934
PORT GENERATED BUSINESS REVENUE	$3,704,699,878	$1,703,599,311
TOTAL BENEFITS	**$4,900,568,123**	**$2,287,809,401**
NON-FEDERAL COST	**$145,947,000**	**$145,947,000**
BENEFIT-COST RATIO FOR THE STATE	**33.58**	**15.68**

Exhibit 48 (Continued) - Economic Benefits to Cost Ratio for Alabama Including Port Generated State and Local Tax Revenue
25% Capture Rate

BENEFIT CATEGORIES	3% DISCOUNT	7% DISCOUNT
EMISSIONS	$13,485,322	$6,211,004
SAFETY	$37,986,065	$21,691,906
EXTERNAL TRUCK	$102,687,184	$59,810,168
ECONOMIC COMPETITIVENESS	$443,775,551	$204,391,967
PORT GENERATED STATE AND LOCAL TAX REVENUE	$145,456,074	$66,863,017
TOTAL BENEFITS	**$743,390,197**	**$358,968,062**
NON-FEDERAL COST	**$145,947,000**	**$145,947,000**
BENEFIT-COST RATIO FOR THE STATE	**5.09**	**2.46**

Economic Benefits to Cost Ratio for Alabama Including Port Generated State and Local Tax Revenue
50% Capture Rate

BENEFIT CATEGORIES	3% DISCOUNT	7% DISCOUNT
EMISSIONS	$26,970,644	$12,422,007
SAFETY	$75,972,129	$43,383,812
EXTERNAL TRUCK	$205,374,369	$119,620,337
ECONOMIC COMPETITIVENESS	$887,551,102	$408,783,934
PORT GENERATED STATE AND LOCAL TAX IMPACT	$290,463,075	$133,594,484
TOTAL BENEFITS	**$1,486,331,319**	**$717,804,574**
NON-FEDERAL COST	**$145,947,000**	**$145,947,000**
BENEFIT-COST RATIO FOR THE STATE	**10.18**	**4.92**

In summary, even under the most conservative scenario, the benefits estimated to be generated to the state of Alabama are more than double the non-federal share of the project cost. It is to be emphasized, that without the deepening and widening project, Alabama importers and exporters will continue to incur higher shipping costs associated with the use of ports other than Mobile. Furthermore, without the deepening and widening project, it will be difficult for the Port of Mobile to capture a portion of the total market potential identified in section 2 of this report. It is to be emphasized that with a 50 ft., channel and harbor, the Port of Mobile will be attractive to an ocean carrier as a last port of call on an Asian routing, as the carrier will be able to fully utilize the capacity of the vessel by loading to a maximum draft. The ability to serve as a last port of call outbound will provide significant benefits to current and potential manufacturers and producers of export cargo that are located in the state of Alabama. The ability to use a last port of call by an exporter saves significant drayage costs to a more distant port, and further provides a longer production period as the manufacturer has to dedicate fewer days of the year to dray its product to the port of export, in effect increasing production capacity on a weekly basis. This results from the fact that production cut-off time needed to transport the product to the port of export can be minimized with the ability to use the Port of Mobile as the last outbound port rather than dray the product to a more distant last port of call such as Savannah.