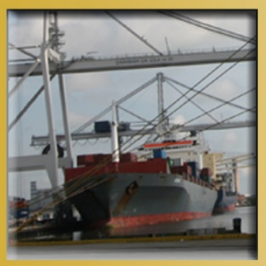
Georgia Department of Transportation
Office of Planning

Georgia Statewide Freight & Logistics Plan

Marine
Modal Profile





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1. Introduction

This report summarizes the characteristics of Georgia's ports and waterways as well as current volumes and estimated projections of freight to be moved through Georgia's ports by 2050. This report also describes current and anticipated future needs to accommodate the projected freight volumes. **Figure 1.1** identifies Georgia's Waterways.

Information provided in this report was assembled based on various readily available public information sources and interviews with stakeholders related to Georgia's marine industry.

Figure 1.1 Georgia's Waterways

1.2. Stakeholder Outreach

During the preparation of the report, meetings and interviews were conducted with various stakeholders in order to obtain their input and comments. Where appropriate, the information obtained during these discussions, has been incorporated into this report. **Table 1.1** identifies these stakeholders and the contact representatives with each agency.

Table 1.1 Stakeholder Outreach Summary

Waterway	Entity	Contact	Title
Savannah River			
1	The Georgia Ports Authority	Wilson Tillotson	Sr. Director of Engineering
		Randy Weitman	Engineering Manager
		Cliff Pyron	Chief Commerical Officer
2	Savannah Pilots Association	Thomas Browne, Jr.	Master Pilot
Brunswick River			
3	The Georgia Ports Authority	Wilson Tillotson	Sr. Director of Engineering
4	Logistec USA Inc. (East River & Lanier Docks)	David Proctor	Manager
5	Brunswick Bar Pilots Association	Bruce Fendig	Pilot
6	GPA's Colonel's Island Terminal	Ronald Abner	Terminal Manager
7	GPA's Mayor's Point	William Dawson	Terminal Manager
8	USACE Savannah District	Allen Garrett	Supervisory Program Manager
Tri-River System (Flint-Apalachicola-Chattahoochee Rivers)			
9	Tri River Waterway Development Association (TRWDA)	Rebecca Martin	Former Executive Director
10	GPA's Bainbridge Terminal	Kenneth Slater	Terminal Manager
11	Tri River Waterway Development Association (TRWDA)	Billy Houston	Executive Director

2. Institutional Freight Framework

2.1. Georgia Ports Authority

According to its enabling legislation (OCGA 52-2-9), the Georgia Ports Authority (GPA) is empowered to operate state-owned facilities and "to do any other things necessary or proper to foster or encourage the commerce, domestic or foreign, of the State, the United States of America, or the several sister states."

The GPA operates eight terminals within Georgia which support the state's growing presence as a transportation and distribution hub.
GPA's port facilities include:

- **Port of Savannah** complex**.** The terminals at this port specialize in the handling of container, reefer, breakbulk and "RoRo" (roll on-roll off) cargoes. The Garden City Terminal, located on the Savannah River about seven miles west of downtown Savannah, is the site of the GPA's corporate headquarters. Within Garden City

Terminal, the largest and most versatile of all GPA facilities is the GPA's high-speed container terminal. The Ocean Terminal, which is GPA's break-bulk activity center in downtown Savannah, has 96 acres of outside storage and 1.4 million feet^2 of warehousing and transit shed space back up 10 berths for cargoes like linerboard, lumber and steel.

- **Port of Brunswick** complex**.** The terminals at this port complex specialize in the handling of breakbulk, agri-bulk and RoRo cargoes and provide efficient service for importers and exporters of forest products, paper products, bulk commodities and automobiles. The terminals include Colonel's Island Terminal RoRo Facility and Agri-bulk Facility, Mayor's Point Terminal and Marine Port Terminal.

- **River Ports.** GPA's inland river Ports include Port Bainbridge and Port Columbus.

Facilitating global trade through strategic U.S. East Coast gateways, GPA's operating framework is to act as a catalyst for international trade and investment. Through the combination of industry innovations and the flexibility to create new opportunities along the entire global logistics pipeline, the GPA continues to assist fueling Georgia's economic recovery on a wide-ranging basis, as the following examples highlight:

- The poultry and carpet industries of North Georgia,
- The interstate and intermodal hubs of Atlanta;
- The Kaolin clay, wood and paper companies in the central and south of the State;
- The just-in-time auto suppliers providing parts to the Kia plan in West Georgia; and
- The rapidly growing distribution centers to the transportation and logistics-based businesses throughout the State.

Created in 1945 under Governor Ellis G. Arnall, the GPA's mission is to develop, maintain and operate ocean and inland river ports within Georgia; foster international trade and new industry for state and local communities; promote Georgia's agricultural, industrial and natural resources, and maintain the natural quality of the environment.

GPA operates a very substantial and important business that has a major impact on the economy of the State of Georgia. Members of the Board are appointed by the Governor for terms not to exceed four years, but they may be reappointed As membership on the Board is the result of political appointment, the Board has some elements of an honorary or volunteer Board. At the same time, the Board has general oversight responsibilities that are characteristic of regular corporate boards. Board members serve out of a desire to provide a public service to the State. There is no financial incentive for anyone to serve on the Board. The Authority is simultaneously an arm of the State and a normal Board of Directors. It must remain cognizant of aspects of a unit of government, such as requirements for Open meetings.

But at the same time, it must oversee a very specialized and complex business. It must strike a balance between two potentially competing requirements.

The Economic & Industrial Development Department at GPA is tasked with building relationships with economic development professionals nationwide to assist in the State's efforts in attracting port dependent industry to Georgia. In particular, GPA works closely with the Georgia Department of Economic Development (GDEcD) with regard to specific project coordination, marketing, and incentive availability. GPA staff meets on a regular basis with GDEcD to discuss common interests and opportunities. GPA endeavors to build relationships with development authority officials within each of Georgia's 159 counties. Other targets for relationship building are:

- Retailers;
- Manufacturers;
- Real Estate Developers;
- Consulting Firms;
- 3rd Party Logistics operators ("3PLs"); and
- Public Utilities.

The GPA offers customized assistance in identifying property options along major highways and interstate highways using its on-line tool known as "Georgia's Commercial Corridors" www.gaports.com/siteselection/#/ This tool is used as an on-line brochure to market market buildings and properties along I-16, I-95, U.S. Hwy 341 and the Savannah River Parkway (parts of SR 121 and SR 21). GPA also promotes Georgia's statutory incentives package as well as serving as a resource for port-related information, services and logistical analysis for Georgia economic development stakeholders.

GPA has also recently introduced an initiative known as Rapid Routes which highlights the competitive advantages that rail shippers have when utilizing the intermodal facilities at the Port of Savannah. The initiative details to potential customers the benefits of the port in terms of the rail services, transfer facilities, and geographic location with regards to getting goods to market via train for various locations around the Southeast. [1]

2.2. Tax Incentives of Georgia

The GPA was also created, in part, to provide economic benefits to businesses statewide. Georgia's "Business Expansion Support" Act, or BEST, is a major force in expanding business in Georgia. BEST is designed to make all of Georgia's counties more attractive locations for new and existing businesses via state-supported incentives to create jobs and help businesses realize high returns on investment. Georgia can leverage all of its distinct advantages as a port-state to

[1] http://businessinsavannah.com/bis/2015-01-24/rail-still-rules-logistics-landscape

provide targeted, highly competitive tax incentives, all designed to bring significant incentives and jobs while expanding port traffic.

Below are some of the benefits of BEST:

- Encourages existing port-users to expand jobs and investment in Georgia and heighten the volume of traffic and trade through Georgia's ports;
- Promotes increased use of GPA, as well as private terminal facilities, which makes Georgia's ports become more attractive to shippers and handlers, thus creating more alternatives for Georgia's businesses; and
- Enables smaller counties to compete aggressively for business by offering higher job tax credits while maintaining the various threshold levels of jobs and investments required for different tiers.

Through BEST, the "Port Authority Tax Bonus" is available for industries that locate, or expand, in Georgia and utilize Georgia's ports. This incentive offers additional job tax credits to businesses, for each of 4 tiers of counties that add the required threshold of jobs, and increase their port traffic through Georgia's port facilities by 10 percent in one year from the base level. **Table 2.1** provides an overview summary.

The base level of Port traffic is set at 75 tons, 10 TEUs (20-foot equivalent units) or five containers. The total tax credit amount cannot exceed 50 percent of the taxpayer's state income liability for a single year. These credits can be carried forward 10 years if jobs and port traffic remain in service and above the base-level increases.

Table 2.1 Example of Four-Tier Tax Credits

County Designation	TIER 1	TIER 2	TIER 3	TIER 4
Mandatory Job Creation	5	10	15	25
Tax Credits Per New Full-Time Job	$3,500	$2,500	$1,250	$750
Joint Development Authority Bonus	$500	$500	$500	$500
Port Authority Bonus	$1,250	$1,250	$1,250	$1,250
Total Potential Incentives	$5,250	$4,250	$3,000	$2,500

Source: Georgia Ports Authority.

Eligible industries include manufacturing, warehouse/distribution, processing, telecommunications, tourism and research and development. Additional incentives are available for less-developed Tier 1 counties.

2.3. Tax Incentives of Other States

South Carolina provides a possible income tax credit to entities that use state port facilities and increase base port cargo volume by 5 percent over base year totals. To qualify, a company must have 75 net tons of noncontainerized cargo or 10 loaded TEUs transported through a South

Carolina port for their base year. The Coordinating Council has the sole discretion in determining eligibility for the credit and the amount of credit that a company may receive. The total amount of tax credits allowed to all qualifying companies is limited to $8 million per calendar year. A company must submit an application to the Coordinating Council to determine its qualification for, and the amount of, any income tax credit it will receive.

Businesses and individuals who pay North Carolina state income tax and use North Carolina State Ports can qualify for tax credits on inbound and outbound cargo. The credit is earned on cargo wharfage and handling fees paid to the North Carolina State Ports Authority which exceed the average for those fees over three tax years. The credit applies to taxes due the State – up to 50 percent of the total tax liability for each tax year. Any unused credit may be carried forward for as long as five years for a total credit of up to $2 million.

Legislation passed in 2009 gives Louisiana importers and exporters a $5 per-ton tax credit on break-bulk or containerized cargo on oceangoing vessels through a Louisiana public port authority. The bill also encourages public-private partnerships to build port infrastructure projects, by providing a 5 percent annual tax credit for 20 years. Companies must invest at least $5 million in order to qualify for the tax credit program.

2.4. Logistics Support

"Big box" importers such as Wal-Mart have underpinned the strong container volume growth at U.S. ports. As the volumes grew, these importers built large import warehouses or international distribution centers near ports in order to improve inventory management and logistics costs. Imports demanded by regional distribution centers are often transloaded from standardized containers (typically containers 20- or 40-foot in length) into 53-foot trailers and sent immediately, with the balance of the goods held at the international distribution centers. Importers have increasingly diversified their international distribution centers geographically to reduce logistics risks and allow more efficient shipment of inventory anywhere in the U.S.

Identified Savannah area industrial developments within Chatham County, Georgia are shown on **Exhibit 2.4** at the end of this report. In addition, the GPA owns several industrial tracts adjacent to the Garden City Terminal, including The Savannah River International Trade Park, The Megasite and the Georgia Steamship property.

The GPA also provides inland shipping/trucking rates to prospects in an effort to identify cost benefits of moving cargo through Georgia's ports and maintains a comprehensive list of warehouse and distribution center facilities which it makes available to businesses relocating to the area or seeking to expand in the State of Georgia. In addition, GPA assists prospective and existing industries with identification of international and domestic customers for ocean-going freight. Some of the other major container ports in the United States, such as the port authorities in Los Angeles and Long Beach in California, the Port of Seattle in Washington and Virginia Port Authority in Norfolk provide similar additional support for shippers.

2.5. International Connectivity Support

In recent years, the GPA has entered into partnerships with select ports around the world. Established GPA partnerships include the ports of:

- Shanghai, China;
- Shimizu, Japan;
- Sydney, Australia;
- The Suez Canal Authority; and
- The Panama Canal Authority.

Port partnerships are one tool that GPA's Trade Development team uses to reach out to its customers. Such partnerships also offer access to that port's hinterland, such as Shanghai's rapidly growing Yangtze River region. Among the factors that are important for GPA in considering such partnerships are the likelihood that the foreign port may grow rapidly, a similar structure to GPA, and a similar business mix (containers, break-bulk and RoRo).

2.6. Port Environmental Programs

Marine port operations have come under increasing environmental scrutiny due to the operations being a large source of mobile emissions. Nationally, port-related emissions are becoming a larger fraction of the total freight-related emissions in the country.

This section provides information on environmentally friendly activities undertaken by GPA based on information provided in their Annual Report. GPA has a history of identifying ways to improve efficiencies and operate in a more environmentally friendly manner. These methods currently include:

- Crane electrification;
- Use of refrigerated container racks; and
- Rubber-tire gantry (RTG) repower project and use of fuel additives.

Through the GPA's crane electrification, use of refrigerated container racks, as well as RTG repower project and use of fuel additives, the Port of Savannah will avoid use of more than 4.5 million gallons of fuel annually. Georgia Ports Auth added 10 new electrified refrigerated container racks and now has a total of 44 racks online, powering 1,056 containers. Previously, diesel generators were used to power refrigerated containers. For every 10 racks placed into service, the GPA saves about 540,000 gallons of diesel fuel annually.

GPA was also awarded a United States Environmental Protection Agency (EPA) Diesel Emissions Reduction Act grant in conjunction with the National Clean Diesel Funding Assistance Program. The $2.72-million grant to repower 17 older GPA-owned rubber-tired gantry cranes with higher tier engines will reduce air emissions and will make the cranes more fuel efficient.

GPA also commissioned a study to determine whether a fuel additive could reduce pollutant emissions and increase engine fuel efficiency for its diesel equipment fleet. This large-scale test studied two of the most widely used pieces of container-handling equipment at the Port of Savannah. The study indicated a decrease of approximately five percent in fuel consumption and more significant reductions in EPA criteria pollutants. Particulate matter reductions averaged as high as 71 percent, while nitrogen dioxide decreased as much as 20 percent and carbon monoxide decreased an average of 19 percent. The GPA had already converted to ultralow-sulfur diesel in 2008, reducing the total sulfur content by 99 percent.

2.7. Economic Impact of Georgia Ports

GPA commissioned a study to estimate the economic impacts of its activities. Completed by the Univeristy of Georgia and entitled "The Economic Impact of Georgia's Deepwater Ports On Georgia's Economy in FY 2014", the study found the following economic benefits from the port operations:

- 369,193 full- and part-time jobs (8.4 percent of Georgia's total employment);
- $84.1 billion in sales (9.6 percent of Georgia's total sales);
- $33.2 billion in state GDP (7.2 percent of Georgia's total GDP);
- $20.4 billion in income (5.3 percent of Georgia's total personal income); and
    - $1.3 billion in state taxes and $1.0 billion in local taxes

3. Supply of Freight Transportation (Deep Water and Inland Ports)

3.1. PORT OF SAVANNAH

3.1.1. Overview of the Port of Savannah

The Savannah River, the boundary between the states of South Carolina and Georgia, is navigable for deep-draft vessels to the upper end of the Savannah Harbor, 21 miles from the sea buoy, and for barges to the City of Augusta, approximately 172 miles from the sea buoy. The Federal Navigation Channel is the major conduit for Georgia's containerized cargo as well as other industries and extends from the sea buoy to the Houlihan Bridge. The portion used for access from this point upstream to Augusta has been de-authorized for maintenance and is not effectively navigable. Currently, the Navigation Channel has a predominant width of 500 feet and a Federal authorized depth of 44 feet, forming a prism through the bar along the Tybee Roads to the jetties, then 42 feet for about 16 miles in the main channel to the Kings Island turning basin, as shown on **Exhibit 3.1.1A** in the back of this document.

Table 3.1 indicates comparative authorized water depths of other Atlantic Coast ports that handle containers on the eastern seaboard. It is important to note that the restricting factor may be berths or access channels that reach the terminals or in some instances a combination of both.

Table 3.1 Summary of Atlantic Channel and Berth Depths for Major Container Ports

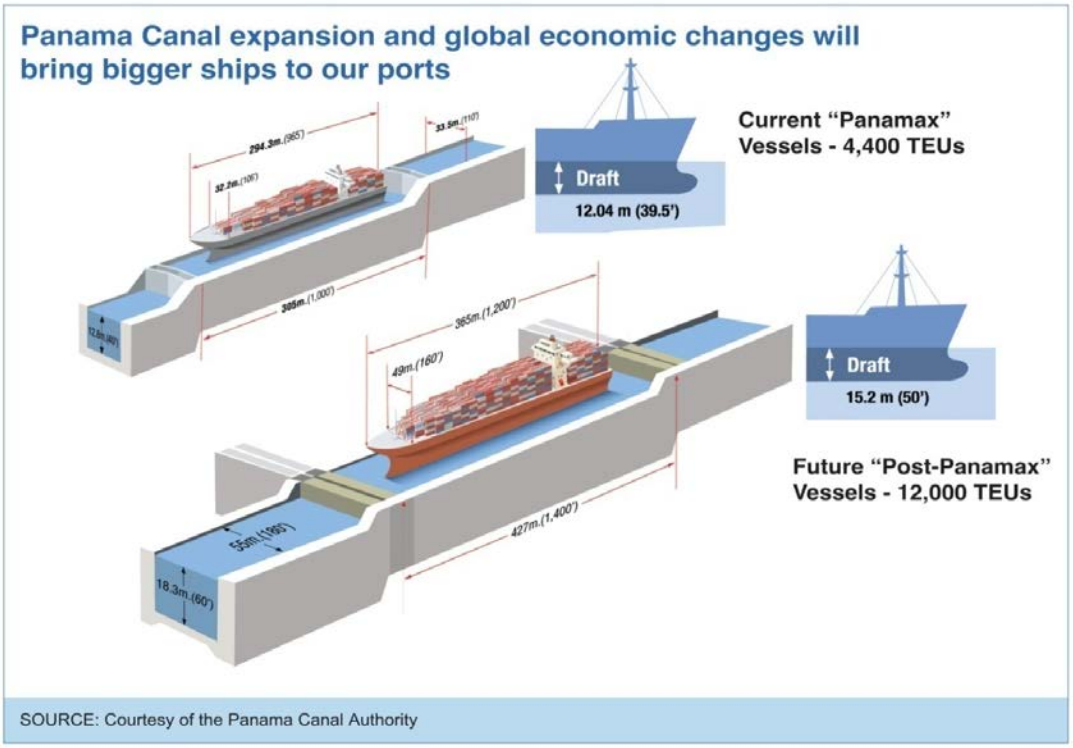
Port	Terminal	Channel Depth Range – Feet	Berth Depth Range – Feet
Savannah	Garden City	42	42-48
Baltimore	Seagirt	36-50	45
	Dundalk	36-50	34-46
	North Locust Point	36-50	34
	South Locust Point	36-50	30-36
Boston	Conley Container Terminal	35-40	35-45
Charleston	Columbus Street	47	40
	North Charleston	47	40
	Wando Welch	47	45
Jacksonville	Blount Island	38	38
	Talleyrand	38	38
Miami	Lummus Island	36-44	42
	Seaboard Marine Terminal	36-44	50
NY/NJ	Maher Terminals	40	45
	APMT	40	45
	Port Newark	40	40-50
	Red Hook Marine	45	42
	Global Terminal	45	42
	NY Container Terminal	45	35-42
Philadelphia	Packer Avenue	40	40
	Tioga Marine Terminal	40	36
	Tioga Cont. (ro-ro berth)	40	36
Port Everglades	Midport/Northport	45	38
	Southport Container Terminal	45	44
Virginia	APM Terminals (Portsmouth)	50	49-56
	Newport News	40	36-40
	Norfolk International Terminal	50	50-55
	Portsmouth	43	40
Wilmington DE	Port of Wilmington	38-40	38
Wilmington NC	Wilmington, NC	42	38

Source: Project team analysis

3.1.2. Panama Canal Expansion

The GPA and the GDOT Office of Intermodal have been working with Federal and state stakeholders on the ongoing Savannah Harbor Expansion Project (SHEP) to deepen the harbor and allow the harbor to accommodate deeper draft vessels without tidal restrictions. With the Panama Canal Expansion completed in mid- 2016 deeper draft vessels now use the waterway, as shown in **Figure 3.1**.

Figure 3.1 Panama Canal Expansion



Traditionally, the Panama Canal routing has competed with intermodal rail service from West Coast ports to East Coast destinations and, to a lesser degree, with the Suez Canal. Asian services calling Atlantic ports have, by and large, reached these ports via the Panama Canal.

The Canal's limitations with respect to the length and width of vessels that could transit the Canal (i.e., Panama class vessels – maximum TEU capacities of between 5,000 and 5,500 TEU) led the Panama Canal Authority to undertake the expansion of its facilities that allows ships up to 12,600 TEU in size to transit the w aterway. Expansion of the Canal also accommodates ships with larger beams up to 160 feet and drafts up to 50 feet.

However, it is important to note that there is unlikely to be a sudden change on size of ships transiting the Panama Canal. Over time, the trend for use of bigger ships will continue but it will remain driven by volume demand and capability of ports to handle larger tonnage. The expansion of the canal brings the ability to introduce larger ships and with it greater volumes of cargo. Research has indicated that for a 6,000 TEU size container vessel, the savings by being able to use a larger vessel with more containers (while taking into account ship operating costs, etc.) would be in the realm of 8 percent per service rotation. The figure rises to 16 percent if an 8,000 TEU size ship was employed, so the ability to see ships as large as 12,000 TEU transiting the Canal offers potential for better economies of scale to be obtained by the liner companies.

The shipping industry is extremely competitive and is characterized by very low margins. Therefore, 8 percent to 16 percent savings would be considered an extraordinarily high cost advantage for shipping companies that are able to switch to the larger fleets.

From a shipping line perspective, the ability to utilize larger ships offers better economies of scale. Although the operating costs for a larger ship are higher, the ability to carry greater box volumes generates revenues that off-set the higher operating costs, ultimately allowing better results for the ocean carrier.

Other significant changes that may occur in relationship to shipping industry dynamics include:

- The ability for Asia-U.S. container traffic to be served in Latin America by transshipping cargo at a Caribbean/Central America port.
- The importance of existing import-export cargo at some Caribbean/Central American ports because shipping lines are already interested in calling to service the local demand, plus the port has staple transshipment cargo already. This helps to boost cargo utilization factors on ships.
- The importance of an efficient terminal operation will increase for all shipping lines. Ports will need to ensure that schedule integrity is maintained, irrespective of slower transit speeds (also known as steaming times) currently employed by some ocean carriers. The number of ships in a string is immaterial to the need of port calls to be made as scheduled.

3.1.3. Additional Savannah River Characteristics

Tidal effects and cross currents in and out of the various sounds and inlets should be carefully considered by vessels approaching, and there are several unmarked obstructions in the approaches. The entrance channel to the Savannah River is protected by jetties on both sides to reduce shoaling effects and excess siltation. The north jetty is unmarked and covered with water at Mean High Water (MHW) and marked about 0.2 miles seaward of its east end by a light, while the south jetty is submerged at MHW and marked at the east end by a light. Anchorage in the Savannah River is prohibited except in an emergency.

There are vertical obstructions along the Navigation Channel that should be considered by all deep-draft vessels. An overhead high voltage power cable, owned by the Georgia Power Company, with 221 feet clearance crosses the main channel of the Savannah River at Fig Island about 10.3 miles upstream of the entrance of the River. The Eugene Talmadge Memorial Highway Bridge, 13 miles upstream of the entrance of the River, is a concrete cable-stayed bridge that spans from just west of the City of Savannah to Hutchinson Island and has a vertical clearance of 185 feet above mean low water (MLW) over the center span width of 500 feet. The Talmadge Bridge serves U.S. Route 17A between Georgia and South Carolina. Another high

voltage overhead power cable with a clearance of 208 feet crosses the main channel of the River at Port Wentworth about 4.3 miles upstream of the Talmadge Bridge.

The mean range of tide is 6.8 feet at Tybee Light and 7.9 feet at the City of Savannah. The velocity of the ebb and flood of the Savannah River is reported to be as high as 7 to 8 knots near Berths 1-2 of the Garden City Terminal and at Colonial Oil Berths 50-51 (2.5 miles upstream of the Talmadge Bridge).

3.1.4. Savannah River Freight

Marine freight operations south of the Talmadge Bridge are generally bulk, dry-bulk, liquid-bulk, or break-bulk cargo that is served by various private industries located along the southwest bank of the Savannah River from Elba Island to Downtown Savannah. Information about the waterfront facilities for these industries can be found in the United States Coast Pilot 4, Chapter 7, beginning in Paragraph 170. The majority of the dry-bulk, break-bulk and liquid-bulk commodities are imported and distributed through the Savannah Area, with an increasing export market primarily due to the weakness of the dollar that accelerated since the economic downturn/recession that started in 2008.

Distribution is accomplished by use of the railroad infrastructure owned by CSX and the series of "last mile" roads leading to Interstates 516, 16 and 95. The road system can be seen in **Exhibit 3.1.4A**, and the interstate system can be seen in **Exhibit 3.1.4B**, both located in the back of this document. The trucks used for the various bulk commodities include flat bed trucks, dump and hopper trucks, and tanker trucks. Use of Bay Street and President Street is increasing, which concerns the residents and businesses of the surrounding area that have to share the narrow roadways with a larger volume of truck traffic (the Savannah MPO's current Long Range Transportation Plan includes roadway improvement projects for both these routes.) Meanwhile, the truck traffic is generated from a mix of local industrial activity and private ports in the region. The local collector roads converge into US Route 80 and State Route 21 before making their way to the Interstates. The completion of the "last-mile" port connector projects mentioned later in Section 6.2 may alleviate many of these concerns.

The deep water Navigation Channel extends north of the Talmadge Bridge and serves marine freight that consists of bulk, dry-bulk, liquid-bulk, break-bulk, and containerized cargo. Information about the water front facilities for the privately owned industries can be found in United States Coast Pilot 4, Chapter 7, beginning in Paragraph 170. The facilities have rail access from both Norfolk Southern and CSX railroads -- providing direct connections to major cities throughout the State and southeastern region, as shown on **Exhibit 3.1.4C in** the back of this document. **Exhibit 3.1.4D**, also located in the back of this document, identifies the types of rail crossings (at-grade or grade-separated) within the Savannah-Chatham County area.

The facilities along the Savannah River also share road infrastructure, which provides access to State Routes 21, 307, and 17; US Route 80; and Interstates 16, 516, and 95. Truck traffic is

consistent with that seen south of the Talmadge Bridge, with the addition of numerous container chassis. In addition to privately owned facilities, the Georgia Ports Authority owns and operates two large terminals, Ocean Terminal and Garden Terminal, previously mentioned and discussed in more detail below.

3.1.5. Ocean Terminal (General Cargo Facility)

The Ocean Terminal is a break-bulk; Roll-on Roll-off (RORO); container, heavy-lift and project cargo terminal located along the Savannah River just north of downtown Savannah approximately 16.5 miles from the Atlantic Ocean. The 200-acre facility is owned and operated by Georgia Ports Authority and is located just north of the Talmadge Bridge. Berths 1 and 2 combine for a 1,178-foot face, but has 1,250 feet of berthing space with a mooring dolphin. The depth alongside the wharf is 42 feet with a deck height of 15 feet. There are two transit sheds, with 171,950 square feet of storage, and surfaced open storage at the rear of the sheds. Berth 13 has a 975-foot face used for berthing. The depth alongside the wharf is 42 feet with a deck height of 15 feet. There are three transit sheds, with 350,460 square feet storage, and 2 acres of surfaced open storage. Berths 14-17 have a 1,128-foot face (Berths 14 and 15) and a 1,041-foot face (Berths 16 and 17). The depth alongside the wharf is 34 feet with a deck height of 15 feet. There are transit sheds which total 327,700 square feet of storage. Berths 18-20 have a 1,666-foot face used for berthing. The depth alongside the wharf is 38 to 42 feet with a deck height of 15 feet. There is a transit shed with 57,000 square feet storage, and surfaced open storage area. In summary the Ocean Terminal has 5,988 feet of berth along the Savannah River.

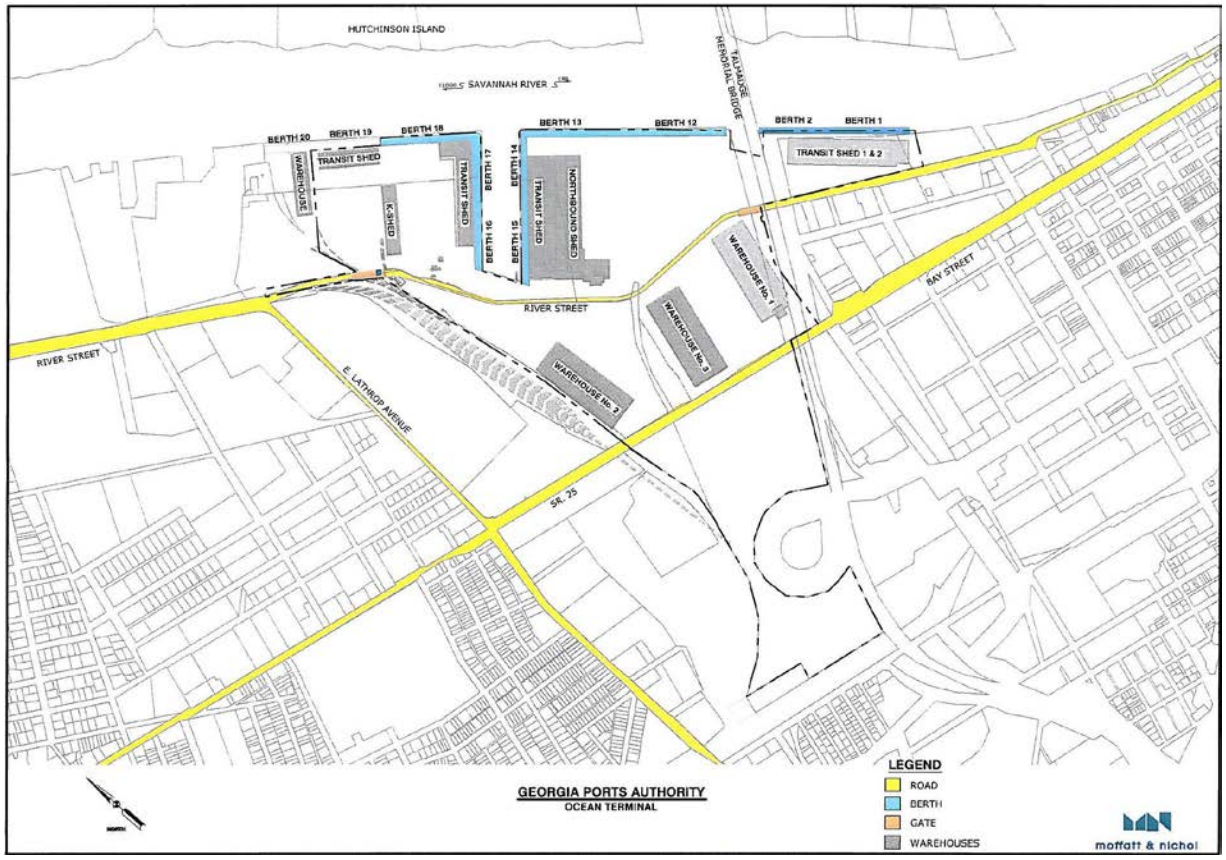
The terminal has two security gates connected by River Street providing access from the north to south of the facility. They are located approximately 2 miles from Interstates 516 and 16, and 10 miles from Interstate 95. Additionally the terminal is 2.5 miles from Highway 80, and 2 miles from Georgia SR 21 and Highway 17. The network of roads can be seen in **Exhibit 3.1.4A** in the back of this document.

The Ocean Terminal is served by Norfolk Southern and CSX railroads and has a rail storage yard adjacent to the facility. The rail network can be seen in **Exhibit 3.1.4D** the back of this document.

Ocean Terminal is located along the Savannah River Navigation Channel on the southwest shore of the Savannah River. According to the latest hydrographic survey conducted by the USACE in 2008, the overall width of the channel at the terminal is 500 feet with an average depth off the wharf of 42 feet at MLW. Ocean Terminal utilizes the King's Island Turning Basin (approximately 1,500 feet in diameter) and the Marsh Island Turning Basin (approximately 900 feet by 1,000 feet), which allows vessels to be turned.

The Ocean Terminal currently operates a Ship-to-Shore Crane and two Gantry Cranes. There are currently two 4-high top lifts and 20 forklifts on the terminal. **Figure 3.2** shows the current 'as-built' Ocean Terminal along with the nearby road network.

Figure 3.2 Ocean Terminal



3.1.6. Ocean Terminal Needs Analysis

The Ocean Terminal may be challenged from a roadway access perspective should the terminal be expanded in the future or used for a different type of cargo. Currently, the primary access point is from SR 25/Bay Street at the Lathrop Road intersection.

3.1.7. Garden City Terminal (Container Port)

The Garden City Terminal (GCT) is the largest and most flexible terminal in the southeastern United States. Owned and operated by the GPA, it is located along the western shore of the Savannah River in Chatham County, Georgia approximately 20 miles from the Atlantic Ocean.

According to the latest hydrographic survey conducted by the USACE in 2008, the overall width of the channel at the terminal is 500 feet with an average depth off the wharf of 42 feet at MLW for Berths 1, 4, 5, 6, and 7 and 48 feet at MLW for Berths 2, 3, 8, and 9.

The GCT currently operates 23 Ship to Shore Cranes and a total of 96 Rubber Tired Gantry (RTG) Cranes became operational in mid-2011. There currently are 30 five-high top lifts and 24 four-high top lifts, with 16 seven-high empty stackers. The terminal also currently owns and operates 48 forklifts and 2 portable generators. Additionally, there currently are six 4-high top

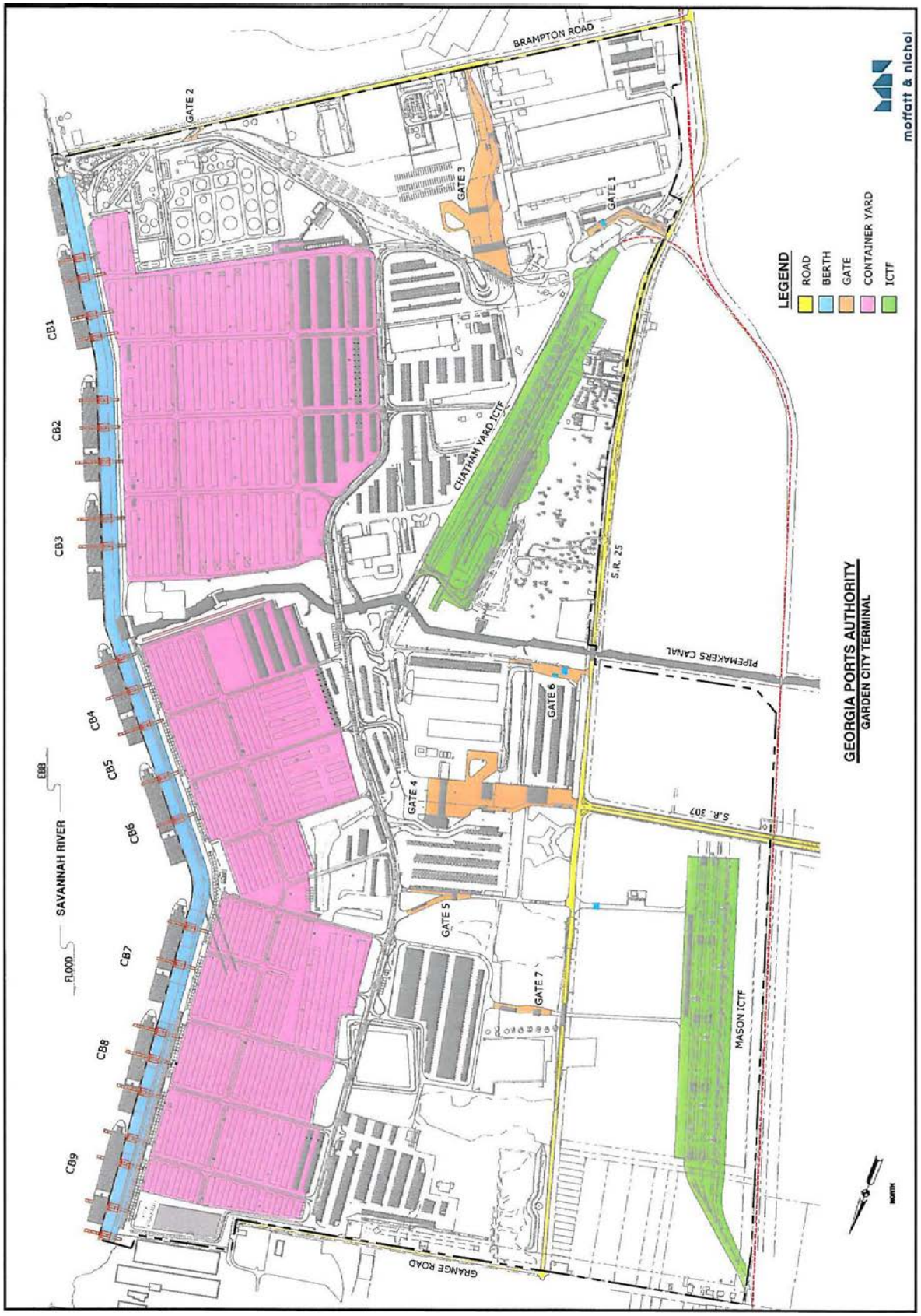
lifts and three 7-high empty stackers which are rented for use on the terminal. The Garden City Terminal layout is shown in **Figure 3.3**. This 1,200-acre terminal accounted for over 2.6 million TEUs in containers handled and GPA is making provisions to have capacity of 6.5 million TEUs by 2020. While not shown on Figure 3.3, new Gate 8 opened in 2016 to Mason yard serving 12,000 trucks per day. As part of the recent FASTLANE-funded "Mega-Rail" project, Gate 8 will increase the current eight lanes to a maximum of 16 lanes. That will give the Garden City terminal a total of 54 truck lanes.

Container Berth 1 has a 1,690-foot face for berthing. The depth alongside the wharf is 42 feet with a deck height of 15 feet. There are 37 acres of surfaced open storage area for containers. Container Berths 2 and 3 have a 2,358-foot face for berthing. The depth alongside the wharf is 48 feet with a deck height of 15 feet. There are 104 acres of surface open storage area for containers. Container Berths 4, 5, and 6 have a 2,369-foot face for berthing. The depth alongside the wharf is 42 feet with a deck height of 15 feet. There are 96 acres of surface open storage area for containers. Container Berth 7 has a 1,092-foot face for berthing. The depth alongside the wharf is 42 feet with a deck height of 15 feet. There are 41 acres of surface open storage area for containers. Container Berths 8 and 9 have a 2,184-foot face for berthing. The depth alongside the wharf is 48 feet with a deck height of 15 feet.

There are 61 acres of surface open storage area for containers. The terminal has an additional 81 acres of surface open storage area in the backlands for bare chassis, 'married' chassis, wheeled reefers (refrigerated), and empty containers.

GPA will continue to invest in the deepening of the berths from 42 feet to meet future ship demands. Additionally, the King's Island Turning Basin (approximately 1,500 feet in diameter) is near the terminal and allows vessels to be turned.

Figure 3.3 Current Garden City Terminal, As-Built



Garden City Terminal Road and Rail Network

The Garden City Terminal is located on SR 25, a collector road that parallels the Savannah River for the length of the terminal. The terminal is approximately 6 miles from Interstate 95 and Interstate 16. Exit 109 of Interstate 95 provides access to Georgia SR 21, which in turn provides direct access to the terminal by way of Bourne Avenue and Brampton Road. Exit 160 of I-16 provides direct access to SR 307, which is also named Bourne Avenue, before terminating at the entrance to the Garden City Terminal. The network of roads can be seen in **Exhibit 3.1.4A in** the back of this document.

Garden City Terminal currently is accessed by three primary truck gates: #3, #4 and #8. There are also four additional gates that serve as access for personal operating vehicles, construction equipment and vehicles accessing the Intermodal Container Transfer Facilities (ICTF).

The Terminal is open 24 hours a day, 7 days a week, 365 days a year and normally operates 361 days a year (non-operating days include New Years, July 4th, Labor Day and Christmas). The truck gates currently are open for 11 hours per day.

The GPA has reviewed going to extended hours or later hours to avoid traffic peaks; however, this presents a number of challenges. The gates are manned by International Longshoremen's Association (ILA) personnel. The distribution centers would have to accommodate the change in hours, which leads to additional challenges. At full build-out capacity, it has been determined that 16-hour gates will be required.

The Garden City Terminal also has Class I Rail service provided by Norfolk Southern and CSX. Both railroad services provide their own marshalling yards that are linked to the Garden City Terminal by way of two ICTF's. Norfolk Southern utilizes the Mason ICTF and CSX utilizes the Chatham Yard ICTF. The two rail companies have access to many major cities throughout the U.S., including a direct link to Atlanta as shown in **Exhibit 3.1.4D** in the back of this document. Improvements are being designed now as part of the FAST-LANE grant award from US DOT.

3.2. PORT OF BRUNSWICK

3.2.1. Overview of the Port of Brunswick

The Brunswick Harbor is comprised of the improved channel across the bar, St. Simons Sound, the Brunswick River, and the Turtle River, as shown in **Exhibit 3.2.1A** at the back of this document. The Port of Brunswick is on the east bank of the East River and is the second largest port in Georgia. The entrance to St. Simons Sound is obstructed by dangerous shifting shoals, forming a bar which extends for a distance of 5.5 miles offshore. The Brunswick River provides access for oceangoing vessels to the City of Brunswick, and has a deepwater channel for deep draft commercial vessels. The River divides into two branches, the northern branch is known as East River, where the City of Brunswick is situated and the southern branch is known as Turtle

River. Just southwest of Andrews Island (a dredge material containment area) the South Brunswick River feeds into Turtle River. The Brunswick Harbor Navigation Channel has an authorized Federal project depth of 38 feet through the bar, thence 36 feet deep in the Brunswick River and East River along Andrews Island. Beyond the South Brunswick River, Turtle River has a depth of 30 feet to the LCP Chemicals-Georgia Wharf.

The Sidney Lanier Highway Bridge is a concrete cable-stayed bridge that crosses over the main channel and serves U.S. Route 17 vehicular traffic. The vertical clearance of the bridge is 185 feet. There are no other vertical obstructions over the deep draft navigation channel.

The mean range of the tide is 6.5 feet on the bar and 7.2 feet at the City of Brunswick. Shoal areas and spoil areas are in the approaches at the entrance to the bar channel.

3.2.2. Port of Brunswick: East River, Lanier Docks & Mayor's Point Terminals

East River Terminal (ERT) and Lanier Docks is a 72-acre terminal owned by Georgia Ports Authority that handles Liquid Bulk, Break-bulk, and Dry Bulk commodities, with some Roll-on/Roll-off general cargo. Berths 1, 2, and 3 have a 1,640-foot face for berthing, while the Lanier Dock has 500 feet of berthing space. The Liquid Barge Berth has 276 feet of berthing space with dolphins. The depth alongside the berth is 30 feet with a deck height of 13 feet for all the berthing locations. There are also 8 Warehouses on the terminal that have 480,000 square feet of storage. See **Exhibit 3.2.2A** in the back of this document for an aerial of these two terminals.

Mayor's Point Terminal (MPT) is a 22-acre terminal owned by GPA that handles Break-bulk commodities. The Berth has a 1,750-foot face for berthing. The depth alongside the berth is 36 feet with a deck height of 13.5 feet. There are two sheds on the terminal, one has 305,000 square feet of storage with rail siding track and the other shed has 50,000 square feet of storage. See **Exhibit 3.2.2B** in the back of this document for an aerial of this terminal.

The ERT is located on the east coast of the East River near U.S. Routes 17 and 341, both of which are approximately 7 miles to Interstate 95. The network of roads can be seen in **Exhibit 3.2.2C** and the interstate system can be seen in **Exhibit 3.1.4B** in the back of this document. The MPT is located 1 mile north of ERT and shares the same road network.

The ERT and MPT have Class 1 rail services provided by Norfolk Southern and CSX as shown on **Exhibit 3.2.2D** in the back of this document. The two rail services have access to many major cities throughout the country as shown in **Exhibit 3.1.4C** in the back of this document.

The ERT and MPT are located on the east shore of the East River along the Brunswick Harbor Navigation Channel. According to the latest hydrographic survey conducted by the USACE in 2008, the overall width of the channel is 400 feet with an average depth off the wharf of 30 feet and 36 feet at MLW for ERT and MPT, respectively. The East River Turning Basin (approximately 1,040 x 1,220 feet) is near the terminals and allows vessels to be turned.

The Liquid Barge Berth, part of ERT is leased and operated by ST Services, also has a pipeline to three storage tanks that have 310,000 barrels of capacity. The rest of ERT is operated by Marine Port Terminals, Inc., Division of Logistec Stevedoring U.S.A., Inc. The Lanier Dock has portable conveyors that run to an open storage area and a covered storage area. The remaining berths serve a gantry crane, pedestal crane, full portal ship-unloading tower, mobile crane, receiving hopper to covered storage and open storage, and forklifts.

The MPT currently has 10 forklifts for movement of cargo between rail and warehouse.

3.2.3. Colonel's Island Terminal (Rolling Stock and Agri-Bulk Facility)

Colonel's Island Terminal (CIT) is owned by the GPA and is a major terminal for automobile importation. The 1,700+ acre terminal has an approximately 1,270-acre Autoport Facility with approximately 346 acres of paved open storage. The terminal has 3 Berths, each parallel to the south bank of the South Brunswick River and is accessed from the Brunswick Harbor Navigation Channel along the Turtle River approximately 400 feet in width. The terminal also has a 71-acre Agri-bulk facility with Flat Storage, 14 Silos and 2 Steel Tanks combining for 64,800 Short Tons of capacity. There is an additional 1,200 acres of developable area on the south side of the terminal. See **Exhibit 3.2.3A** and **Exhibit 3.2.3B** in the back of this document for aerial exhibits of this terminal.

The CIT is located on the south coast of the South Brunswick River near U.S. Route 17, and has direct access to Interstate 95 approximately 3 miles northwest. The terminal is only 1 hour away from both Interstates 16 and 10. The network of roads can be seen in **Exhibit 3.2.2C** in the back of this document.

Operating 3 engines, the Golden Isles Terminal Railroad connects with two Class I rail providers: Norfolk Southern and CSX. The CIT has an on-site rail yard, known as Myd Harris Yard, an off-site rail yard, known as the Anguilla Yard, and off-site rail storage, known as CI Southside Marshalling Storage tracks. There is an average of 1 train per day leaving the facility (and up to 2 on peak days). The two rail services have access to many major cities throughout the country as shown in **Exhibit 3.1.4C** in the back of this document.

The CIT is located near the junction of the South Brunswick River and Turtle River along the Brunswick Harbor Navigation Channel. According to the hydrographic survey conducted by the USACE, the overall width of the channel is 400 feet with an average depth off the wharf of 36 feet. The South Brunswick River Turning Basin (approximately 1,200 feet diameter) is near the terminal and allows vessels to be turned.

Colonel's Island Terminal Agri-bulk facility has ship loaders and unloaders and inbound and outbound conveyors that allow grain to move through cleaning, blending, drying, and weighing areas. The terminal is also equipped with samplers, a reclaimer, and a truck dump, and has an onsite Federal Grain Inspection Service.

3.3. INLAND PORTS

3.3.1. Overview of Inland Ports

In addition to the deep water ports previously reviewed, the State of Georgia also has several waterways that provide access to multiple inland ports. The two primary inland waterways are the Apalachicola-Chattahoochee-Flint (ACF) Waterway (or Tri-River System) in southwestern Georgia and the Intracoastal Waterway along the coastline. The GPA owns two inland ports that are located on the Tri-River System. The waterways continue to be authorized for classification as Federal Navigation Channels, but are not currently maintained and thus are not used for inland barge traffic due to lack of required draft. The two facilities that GPA owns are used strictly for storage and transfer from landside freight access.

Navigation along the Tri-River System, is provided by a Federally authorized 9-foot by 100-foot channel constructed on the Apalachicola River, the Chattahoochee River segment to Columbus, Georgia, and the Flint River segment to Bainbridge, Georgia, and provides access to the Gulf of Mexico. The Tri-River System also provides for power generation, water supply, water quality, flood control, stream flow regulation, and recreational opportunities. The Tri-River Waterway is the hub of inland ports for the State of Georgia.

Inland Ports have many advantages, including: cheaper movement of cargo, more energy efficient moves, less congestion on highways, and ultimately less traffic accidents. Inland Ports provide competition to the typical rail and truck transportation services that are found in inland areas. This competition allows for lower freight fees and promotes the growth and investment of inland facilities. For these industries to be economically viable there must be investment to maintain the authorized channel depths along the river.

While the U.S. Army Corps of Engineers (USACE) is authorized to perform the needed maintenance dredging, litigation with the State of Florida has halted much of the maintenance of the Tri-River Waterway. This has led to channel degradation that allows fewer vessels to travel the rivers; fewer vessels means less revenue for dredging and a reduction of the total number of vessels that can navigate the channel. This reduction in vessel traffic has caused the USACE to reduce funding for the maintenance of the channel. On the contrary, the Tri-River Waterway Development Association argues that the reduction in vessel traffic is due to the lack of maintenance dredging in the first place.

3.3.2. The Port of Columbus (Liquid Bulk Facility)

The Port of Columbus is located on the Chattahoochee River with access to the Gulf of Mexico. The 14-acre terminal is leased and operated by S.T. Services and dedicated to liquid-bulk via barge traffic. The terminal is served by Norfolk Southern Railroad, see **Exhibit 3.3.2A**, and has access to Interstate 185 five miles from the terminal, see **Exhibit 3.3.2B** (both exhibits are in the back of this document.) There is a 27,280 square-foot warehouse on the terminal along with

multiple tanks for liquid-bulk storage. The terminal has 402 feet of berthing space, with a channel depth of 9 feet and dock height of 13 feet.

3.3.3. The Port of Bainbridge (Dry Bulk Facility)

The Port of Bainbridge has 4 warehouses and 1 shed totaling 93,000 square feet of space. The primary cargo of the terminal is dry-bulk goods. The terminal is 107 acres and located within 1.5 hours of Interstate 75 and less than 1 hour from Interstate 10, see **Exhibit 3.3.3A**, and served by CSX Transportation, see **Exhibit 3.3.3B** (both exhibits are in the back of this document.) The terminal has a 421-foot berthing space for liquid-bulk and a 529-foot berthing space for dry-bulk. The depth alongside the berth is 9 feet with a dock height of 13 feet. The Terminal is outfitted with a truck crane, rail unloader, 2 forklifts and 2 front end loaders.

3.3.4. Additional Private Facilities

There are numerous private facilities along the Apalachicola-Chattahoochee-Flint Waterway. These industries are limited on the amount of barge traffic because the channels are not maintained.

3.3.5. Challenges of Inland Ports

Channel degradation is a true concern of the Tri-River Waterway. Siltation of the channel can significantly increase when reductions in the natural flushing velocities of the river occur. This means that any maintenance dredging that occurs can be nullified by the increase in siltation during low flow rates. Due to significant droughts in recent years, flows have slowed significantly, increasing siltation and the need for maintenance dredging. As drought conditions intensify, the guidelines in the Water Control Manual for the ACF Basin reduce the amount of water available for augmenting navigation flows. This can account for extremely limited seasons of navigation through the channel or no barge access along the river.

In addition to navigation concerns, the river has power contract commitments that may be hindered, the quantities of potable water for residential areas is reduced to minimum levels, and environmental impacts become evident as lake waters recede. The USACE uses a system of Dams along the Chattahoochee and Flint Rivers to mitigate during times of drought. These dams have locks that provide access from the Gulf of Mexico to the northern stretches of the navigation channel and they form large retention areas upstream which inundate the floodplain and form long narrow lakes.

Additional degradation of the channel can be accounted for by the diversion of the flow of water. The largest diversions of water are used to irrigate the vast amounts of farm land in western Georgia and Eastern Alabama. But all municipal diversions of the ACF basin account for less than 10 percent of the annual water flow. However, the Chipola Cutoff, a diversion channel that was made in the late 1800s by the USACE, successfully diverts as much as 30

percent of the Apalachicola River's flow. The cutoff feeds the Dead Lakes in Gulf County, Florida, which significantly restricts the amount of water flowing through the natural river path. The amount of water that flows through this cutoff reduces the velocity enough that there is no flushing of silt down portions of the Apalachicola River. This is evident in that 85 percent of the dredging of the Tri-River System is done on the Apalachicola River.

Conflicts from the states of Georgia and Alabama with the State of Florida have led to little maintenance along the Tri-River System. Minimal industry in the Florida Panhandle, due to increased prices of land acquisition compared to the Alabama and Georgia counterparts and taxes on industry throughout the State, has fueled the argument against maintenance dredging of the channel. The 112-mile Apalachicola River is unregulated, meandering from the Georgia-Florida state line to the Gulf of Mexico.

When fuel prices spiked in 2005 and again in 2008, the inland ports of Georgia were called on, but could not guarantee water depths of 4 feet throughout the river. This was due to lack of maintenance dredging and the inability to release water from the reservoirs to provide navigable waterways. The potential clients had to go west, and ended up using the Mississippi River to serve the Southeast.

Should the State of Georgia determine to capitalize on the opportunities of this inland waterway, the issues associated with the maintenance of the channel will need to be addressed.

3.3.6. Atlantic Intracoastal Waterways

The usable portion of the Atlantic Intracoastal Waterway (AIWW) extends through the coastal tributaries between the barrier islands from the Savannah River to Fernandina Beach in Florida. The AIWW has a Federally authorized depth of 12 feet. Due to budget shortfalls and lack of use, the channel currently is not maintained. As a result, it is common for the AIWW to be as shallow as 7-feet due to excessive shoaling. This waterway is not suitable to handle inland barge traffic in its current condition.

3.4. Physical Capacity

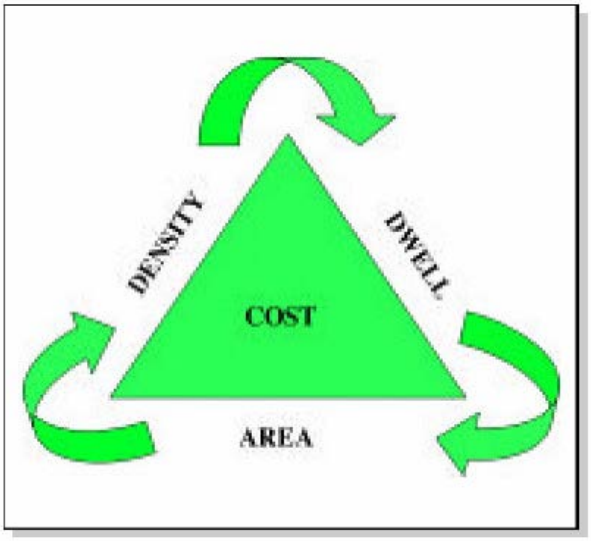
The physical capacity of a container port is not a fixed, static measure, but is a dynamic concept that is affected by a number of variables, as **Figure 3.4** shows.

The size and number of vessel berths is a constraint on the number of vessel calls that can be accommodated at the port. The number and size of quay cranes that can be assigned to a vessel at the berth, as well as the rate at which the cranes can serve the vessel effects the speed at which vessels can be serviced and therefore the number of vessels calls that can be handled by an individual berth. In addition, the capacity of the channel serving the port, in terms of channel depth, width (to accommodate two-way travel in the channel) and the degree to which

there are any bridges or other structures that effect the "air draft" for vessels all effect the size of vessels that can be accommodated at the port.

If a port is not berth constrained, there are several additional factors that affect capacity. The number of acres available to store containers, the density of container storage, and dwell time of containers in storage (their rate of turnover) taken together impact the number of containers per year that can be accommodated at the port.

Figure 3.4 Typical Variables Impacting Container Port Capacity

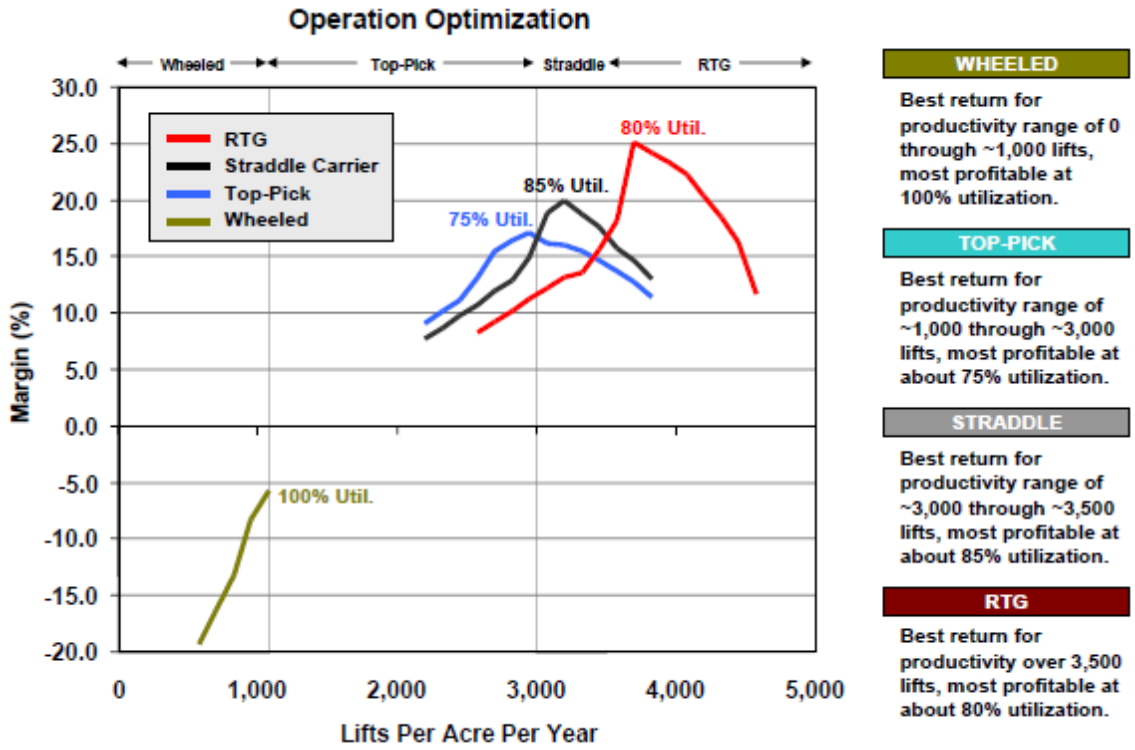


Source: Project team analysis.

Each of these factors has cost implications for the terminal operator; therefore, depending on the specific conditions at a particular port terminal the terminal operator will manage its resources to optimize its financial return. For example, if land is scarce, terminal equipment can be used to achieve higher density by stacking containers. Dwell times can be reduced by reducing "free time" and charging higher storage (demurrage) rates.

Figure 3.5 is a conceptual illustration of how various handling methods may be used to optimize financial performance under different operating conditions.

Figure 3.5 Illustration of Handling Methods and Operational Optimization



Source: Project team analysis.

Figure 3.6 offers a summary of benchmarks for capacity under different assumptions. As indicated, the ultimate estimate of capacity per acre can vary considerably. Note that "RTG" refers to a rubber-tired gantry crane which is used to stack and retrieve containers stored in the container yard. 'Top-picks' and 'side-picks' are stacking equipment (somewhat similar to forklifts) that are also used to stack and retrieve containers, which do not achieve the same density as RTGs. Also, the least dense mode of storage is containers "on wheels," or stored on the container chassis. Straddle carriers are wheeled mobile gantry crane.

Several rail-mounted gantry crane (RMG) terminals are in the conceptual planning stage in the U.S. Some west coast U.S. terminals have achieved container throughput rates of more than 8,000 TEU per acre per year, and some Asian terminals have achieved rates exceeding 10,000 TEU. *Note: TEU stands for "twenty foot equivalent unit"; the typical shipping container is 40' long = 2 TEUs.*

Figure 3.6 Summary Benchmarks for Capacity Under Different Assumptions

Throughput density (TEU/gross acre)	Description of operating strategy
6,500	This is the maximum capacity of current mixed RTG mode. ▪ Current west coast dwell times of 3 to 6 days ▪ Imports stored in RTG stacks and on wheels ▪ Exports stacked by top-picks ▪ Empties stacked by side-picks ▪ Chassis stored on terminal
8,000	This represents an all-RTG mode. ▪ Reduced dwell times ▪ Empties stacked by side-picks ▪ Chassis stored on terminal
10,800	This represents an RMG terminal. ▪ Dwell times further reduced ▪ Minimal empties stored on terminal, stacked by side-pick ▪ Chassis stored/owned off-terminal

Source: Project team analysis.

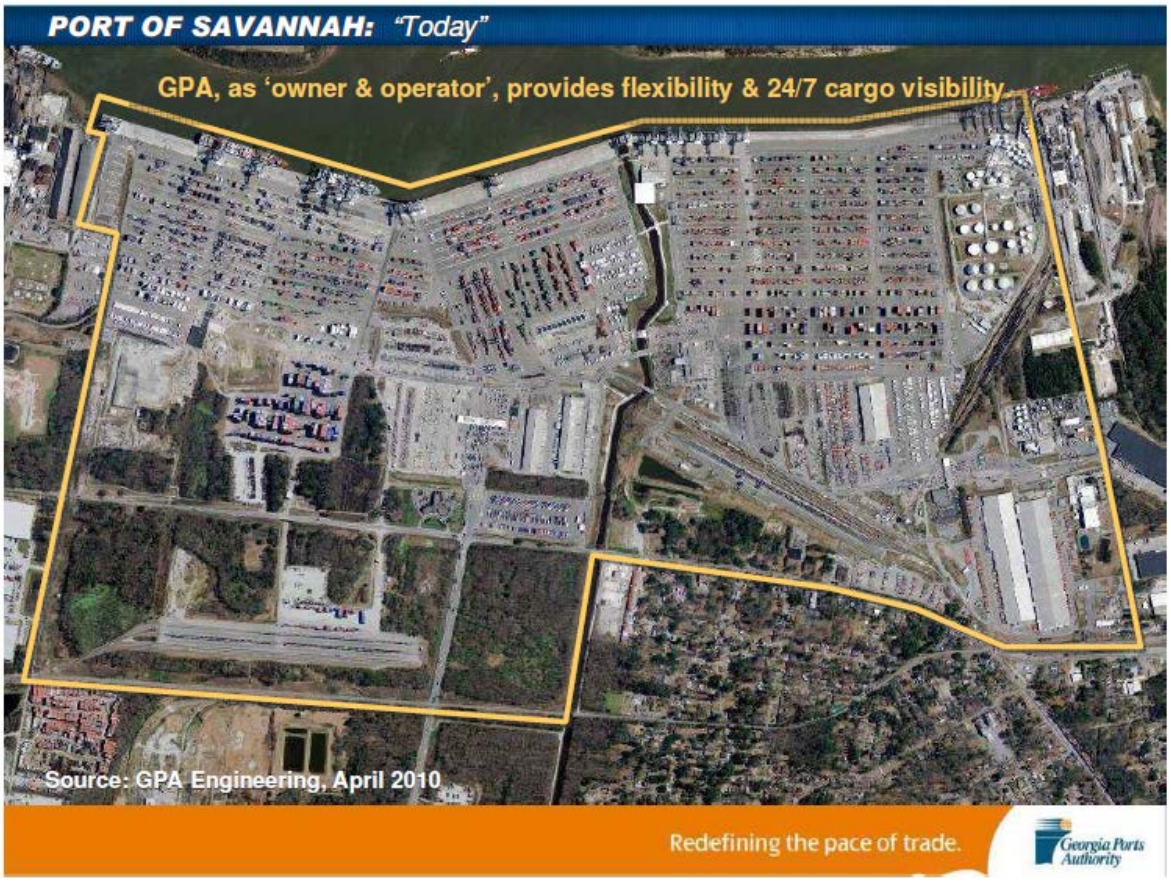
3.5. Historic Dates at the Port of Savannah's Garden City Terminal

The Port of Savannah has a long history of proactive investments in its cargo-handling facilities, as the following brief summary below: (additional more recent milestones are listed in Task 2 doc.)

- **1991** The Talmadge Bridge replaced with cable-stayed bridge to provide adequate 'air draft' over the Savannah harbor.
- **1994** Dredging operation carried out to accommodate larger ships up to 4,800 TEUs.
- **2002** Mason rail intermodal container transfer facility open.
- **2005** Two super post-Panamax cranes come online.
- **2006** Container berth 8 opens.
- **2008** Four new "super post-Panamax" cranes were placed into operation:
  - 14 new rubber-tired gantry cranes come online;
  - Phase One reconstruction of Container Berth Two completed; and
  - 14 new refrigerated container racks placed into operation.
- **2009** Chatham intermodal container transfer facility opens:
  - Brought four new "super post-Panamax" cranes online;
  - 11 new rubber tired gantry cranes come online;
  - 10 electrified refrigerated container racks come online; and
  - New 10,000-ton grain storage tank was completed.

The Garden City Terminal is 1,200 acres and is the largest single terminal container operation in North America. The terminal has 9,693 linear feet of berth and comprising nine berths. Garden City Terminal is unique with its two *on-dock* intermodal terminals: one served by CSX and the other by Norfolk Southern. **Figure 3.7** provides a visual representation of the facilities.

Figure 3.7 Visual Representation of Port of Savannah



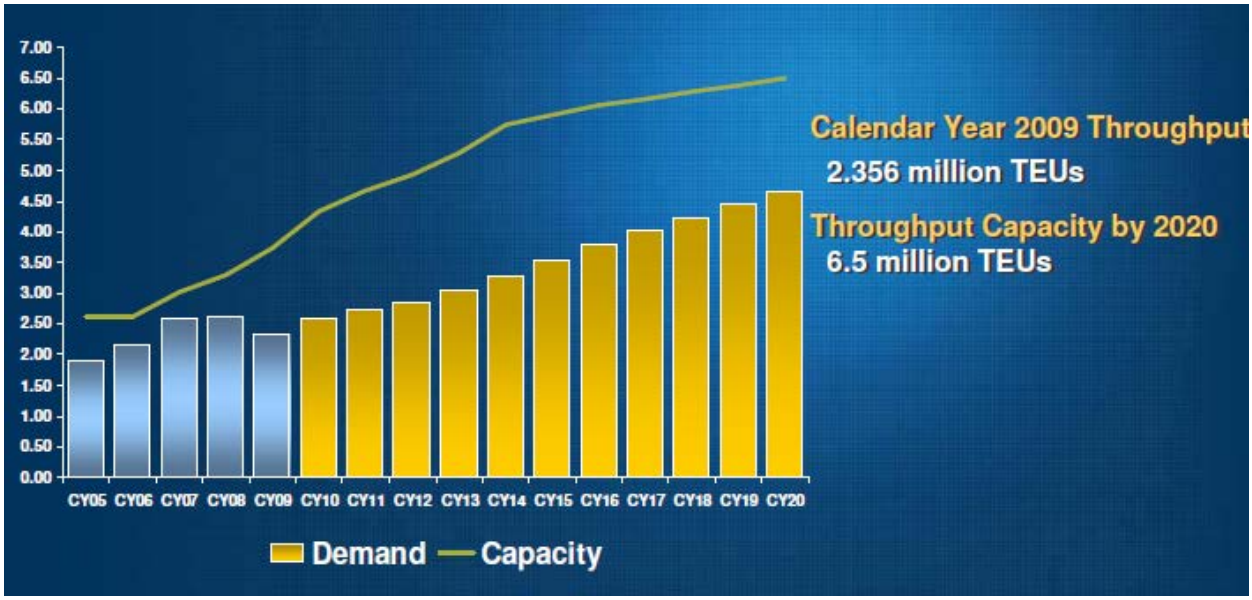
Refer to section 3.1.7 for details on the specific characteristics of the Garden City Terminal.

The main channel has a depth of 42 feet at MLW with a significant tidal variation, which provides some opportunity for larger vessels to serve the terminal. There is a multiyear U.S. Army Corps of Engineers project, known as – The Savannah Harbor Expansion Project (SHEP) – which is in process of deepening the main channel.

The Garden City Terminal has nearby access to three Interstate Highways, with both I-16, I-516 and I-95 less than six miles from the terminal. In addition, there are more than 20 major importer distribution centers in the immediate vicinity of the Terminal -- one of the largest such concentrations on the East coast. This facilitates the rapid movement of containers from the terminal to the distribution center, with a positive impact on terminal capacity.

The GPA has a plan to increase the capacity of the Garden City Terminal to 6.5 million TEU by 2020, as shown in **Figure 3.8**.

Figure 3.8 Garden City Terminal Capacity to 2020



Source: GPA.

This 6.5 million TEU capacity includes the following assumptions:

- Build up to 32 ship-to-shore container cranes along the berth;
- Build up to 169 rubber-tired gantry cranes within the container yard;
- Expanded truck gate, Gate 8 off of Grange Road;
- Reduce container dwell times; and
- Implement 16-hour truck gate operation.

3.6. Competitive Position of Other Southeastern U.S. Ports

To assess the potential capacity of each of the identified southeastern U.S. competitive ports, basic descriptive physical information has been gathered from various public sources, including port authority web sites, bond official statements, and press reports. Based on this information, an estimate of the annual TEU capacity of the port can be made. This information was used to develop the port estimates described in the following sections.

3.6.1. Hampton Roads – Virginia Port Authority

The Virginia Port Authority (VPA) owns a major network of cargo handling marine terminal facilities in the Hampton Roads region, including those outlined in **Table 3.2**. VPA develops, maintains, and through its affiliate VIT, operates container and break bulk cargo facilities.

Virginia International Terminals, Inc. (VIT), the not-for-profit affiliate of VPA, operates the VPA's three existing marine terminals in the Hampton Roads region of Virginia and its

intermodal facility located at Front Royal, Virginia. The construction of VPA's fourth marine terminal, Craney Island Marine Terminal ("Craney"), is in the design phase.

The Virginia Port Authority competes with Savannah for cargo in the South-Atlantic and Midwest. Over the last several years, rapid acceleration in cargo volumes has allowed all ports along the Southeast to grow, minimizing the competitive impacts of intra-port range competition. The Port of Virginia has actively expanded capacity by adding storage area and improving on-dock rail access, which has helped improve Norfolk's container capacity.

In addition, the Virginia Port Authority had signed a multiyear-year lease agreement with APM Terminals America that effectively gives the agency control over all operations at the 291-acre terminal APMT Virginia, the most technologically advanced facility in the world. The lease agreement unifies all the marine cargo container terminals in the Hampton Roads harbor under VIT operating control for the next two decades.

The containerized cargo capacity for Hampton Roads port facilities, including APMT's new terminal, increased to over 4.0 million TEU by FY 2009. There was sufficient short-term capacity for growth above that volume figure.

The Port of Virginia is well positioned to receive deeper draft ships because of its existing 50-foot channels, no air draft restrictions, supporting terminals infrastructure and cranes capable of servicing the largest ocean-going vessels in service.

The primary focus of the VPA Master Plan is the final build out of Craney Island. The terminal will be constructed in 4 phases, with a total annual capacity of 5.0 million TEU. When the first phase commences operations in 2022, partial automation of operations is expected.

The 2040 Master Plan continues to focus in these key areas:

- **Capacity Improvements:** Infrastructure and equipment investment to handle continued growth which has averaged over 8 percent per annum since 1978;
- **Craney Island Marine Terminal:** New state-of-the-art highly automated terminal will see operations commencing sometime around 2022; and
- **Distribution and Logistics:** Exploiting opportunities and challenges with inland transportation infrastructure, multimodal capabilities, and distribution-related activities; Front Royal.

In 2007, APM Terminals invested over $500 million in a new automated container terminal. In 2010, Virginia International Terminals reached an accord with APM Terminals to take-over operations of this facility.

The Crescent Corridor initiative involves rail improvements along sections of the 1,400 miles between Norfolk to Memphis as well as new or expanded intermodal facilities. Norfolk

Southern Railroad proposed to spend $2.5 billion (3P) to expand and upgrade existing rail lines along the corridor to accommodate fast freight trains and also purchase new locomotives and freight cars, and build new terminals.

Of these investments, the Crescent Corridor may have the most potential impact as it increases Port of Norfolk's reach laterally through Port of Savannah's market area. Additional investment in improved access by both truck and rail will be important to allow Savannah to respond to this competition.

Table 3.2 Summary Overview of VPA Marine Container-Handling Facilities

Terminal	Size (Acres)	Berthing Wharf (Feet)	No. of Cranes	Max Berth Water Depth (Feet)	Current Capacity (TEU)
NIT	800	7,300	14	50 feet	2.1 million
PMT	285	4,515	9	43 feet	1.3 million
NNMT[a]	141	3,292	5	40 feet	0.3 million

Source: Moffatt & Nichol.

[a] *NOTE: NNMT is now a break-bulk/Ro-Ro facility, container operations were centralized at other VPA facilities in August 2008.*

3.6.2. The Port of Wilmington, North Carolina

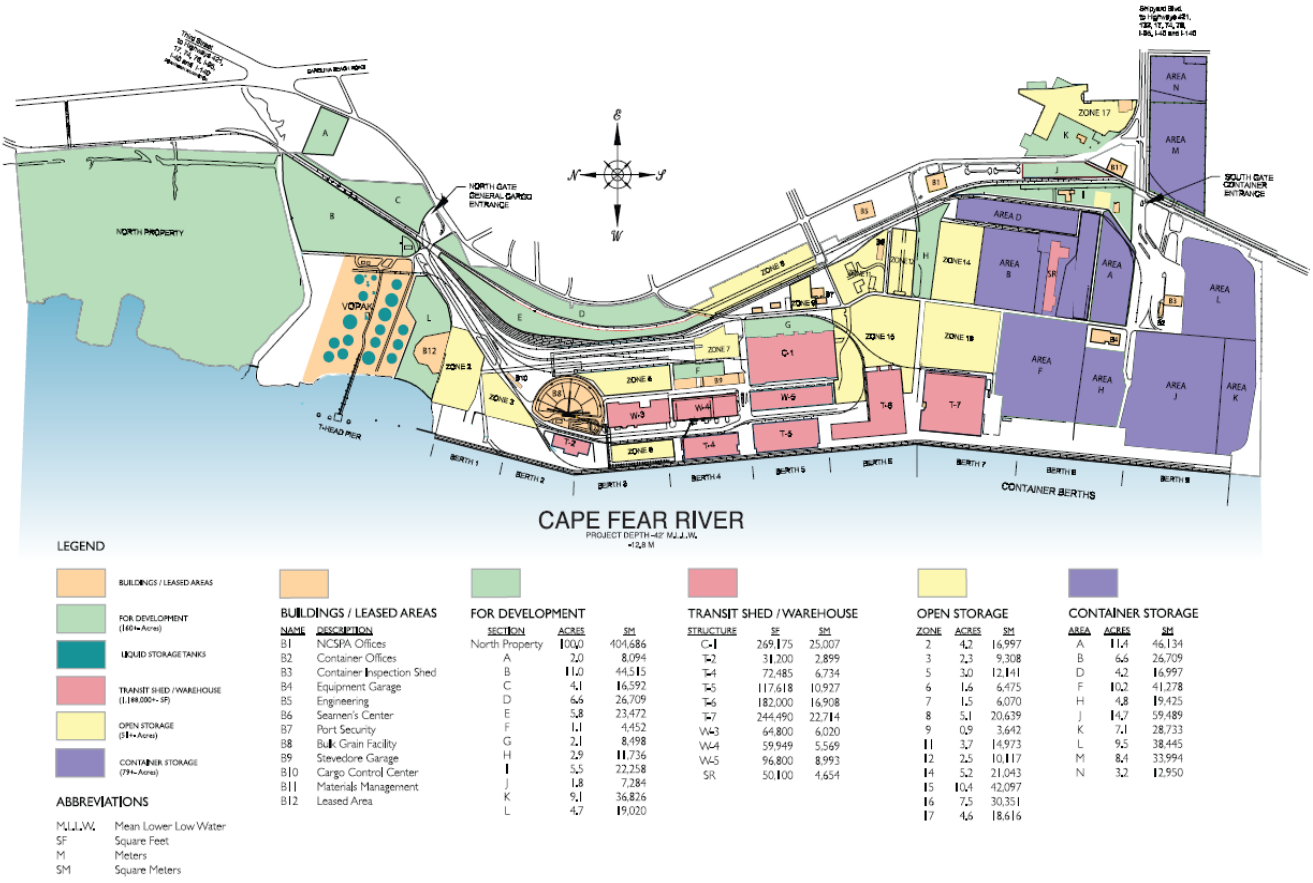
The Port of Wilmington is on the eastern bank of the Cape Fear River, as **Figure 3.9** shows, 26 miles from the Atlantic Ocean and encompasses approximately 200 total acres excluding an additional 100 developable acres owned by the Authority directly north of the existing facility. The channel is dredged to a level of 42-feet making it capable of accommodating Panamax container vessels. This refers to the largest size ship, in terms of beam and draft, which currently can pass through the existing Panama Canal.

The Port of Wilmington handles a mix of commodity types, including bulk and break-bulk, also known as general cargo, as well as containerized goods. The general cargo volumes are loaded, unloaded and warehoused in the northern half of the property. The northern most piece of the property is leased to Vopak, which handles liquid bulk commodities.

Further south is the dry bulk and break bulk transfer and storage facilities. This includes 1.1 million sq ft of covered and sprinkler storage structures. There currently are approximately 100+ acres of open storage with 80 acres designated as container yard mainly in the southern portion of the property. An additional 25 acres of semi-paved storage area is available for development as demand necessitates.

Design plans exist to increase total throughput capacity from the current approximate 350,000 TEUs per year to 500,000 TEU per year.

Figure 3.9 Overview of Port of Wilmington



BUILDINGS / LEASED AREAS

NAME	DESCRIPTION
B1	NCSPA Offices
B2	Container Offices
B3	Container Inspection Shed
B4	Equipment Garage
B5	Engineering
B6	Seamen's Center
B7	Port Security
B8	Bulk Grain Facility
B9	Stevedore Garage
B10	Cargo Control Center
B11	Materials Management
B12	Leased Area

FOR DEVELOPMENT

SECTION	ACRES	SM
North Property	100.0	404,686
A	2.0	8,094
B	11.0	44,515
C	4.1	16,592
D	6.6	26,709
E	5.8	23,472
F	1.1	4,452
G	2.1	8,498
H	2.9	11,736
I	5.5	22,258
J	1.8	7,284
K	9.1	36,826
L	4.7	19,020

TRANSIT SHED / WAREHOUSE

STRUCTURE	SF	SM
C-1	269,175	25,007
T-2	31,200	2,899
T-4	72,485	6,734
T-5	117,618	10,927
T-6	182,000	16,908
T-7	244,490	22,714
W-3	64,800	6,020
W-4	59,949	5,569
W-5	96,800	8,993
SR	50,100	4,654

OPEN STORAGE

ZONE	ACRES	SM
2	4.2	16,997
3	2.3	9,308
5	3.0	12,141
6	1.6	6,475
7	1.5	6,070
8	5.1	20,639
9	0.9	3,642
11	3.7	14,973
12	2.5	10,117
14	5.2	21,043
15	10.4	42,097
16	7.5	30,351
17	4.6	18,616

CONTAINER STORAGE

AREA	ACRES	SM
A	11.4	46,134
B	6.6	26,709
D	4.2	16,997
F	10.2	41,278
H	4.8	19,425
J	14.7	59,489
K	7.1	28,733
L	9.5	38,445
M	8.4	33,994
N	3.2	12,950

Source: North Carolina State Ports Authority.

The Port of Wilmington has nine berths with 6,768 feet of continuous wharf. Berth 8 and Berth 9 are designated for container vessels. There are eight container cranes, including four 100-foot gauge, three 50-foot gauge and one 32-foot gauge. The Authority also owns and maintains a fleet of yard handling equipment, including 11 new side-picks and has one 30-ton mobile crane, one 100-ton gantry crane, and one 150-ton gantry crane.

The Port of Wilmington is directly connected to the U.S. Interstate system via U.S. Highways 17, 74, 76, and 421, as well as Interstate 40. Interstates 85 and 95 are also accessible.

NCSPA had announced their intention to develop the NC International Terminal in Brunswick County 20 miles south of Wilmington and four miles from the Atlantic Ocean, which would include deepening the channel to 50 feet. However, the port authority had recently stated that this project was "on-hold" and was considering all other potential options for additional cargo capacity, including at its existing facilities.

3.6.3. Charleston – South Carolina State Ports Authority

Port of Charleston is Savannah's nearest neighbor, traditionally competitive in all trade routes, but primarily on those to South America. Over the past several decades, Charleston did not make the investments to attract Asian trade and focused on improving productivity and not expansion of capacity thus maintaining their South American and Transatlantic trade volumes.

There are three terminals in Charleston that handle containers.

1. **Wando Welch Terminal** is a 325-acre terminal which is the main container terminal in Charleston. While it represents about 52 percent of the terminal acreage in Charleston, it is estimated that it handles about 65 percent of the container volume. Wando Welch Terminal has 242.3 acres of container storage space and 3,800 continuous feet (1,128 m.) of berth space, making up four vessel berths. These berths are served by 10 container cranes; six are Super Post-Panamax, with the remaining four being Post-Panamax.

2. **North Charleston Terminal** is a 175-acre terminal which represents about 28 percent of the total acreage and is estimated to handle less than 25 percent of the total container volume. With 129.7 acres of open storage, the North Charleston Terminal also handles breakbulk and RO-RO cargo. The terminal has three container berths totaling 2,500 feet of berth space and six container cranes; two Super Post-Panamax and 4 Post-Panamax.

3. **Columbus Street Terminal** is a 120-acre terminal which represents about 19 percent of the total acreage and is estimated to handle less than 15 percent of the total container volume. Columbus Street Terminal has 78 acres of open storage for containers and other cargo. With 3,500 feet of continuous berth space it has six berths, two container berths and four break-bulk berths. There are five container cranes at the terminal, including two Super Post-Panamax, two Post-Panamax and one Panamax.

Current container capacity in Charleston has been estimated by SCSPA at 3 million TEUs. SCSPA is planning a new 280-acre container terminal at the former Navy Base which is expected to be completed by 2020. When fully completed, the facility will increase container capacity by 1.4 million TEUs, based on SCSPA estimates. That is equivalent to approximately 5,000 TEU per gross acre.

The inner channel in Charleston was deepened to 45 feet Mean Low Water (MLW) in 2004, and the Army Corps of Engineers is conducting a feasibility study of further deepening. There are no serious air draft issues in Charleston with the Cooper River Bridge offering 186 feet of clearance at Mean High Water (MHW).

There is no on-dock intermodal service in Charleston, but both Norfolk Southern and CSX offer near-dock intermodal service. Interstate Highway 26 is the primary highway artery serving the port. I-26 connects directly to I-95, I-20, I-77, and I-85.

3.6.4. Jacksonville, Florida Port Authority

There are three terminals at Jacksonville that handle containers.

1. **Blount Island Terminal** is a 754-acre terminal with about 250 gross acres (150 net) dedicated to container operations with four container terminal tenants. The terminal also handles Ro-Ro, break-bulk and bulk cargo. Blount Island Terminal has 5,280 feet of berth at 40 feet depth alongside and 1,350 at 38 feet. The terminal has six container cranes (three 50-ton, one 45-ton, two 40-ton).

2. **Talleyrand Marine Terminal** includes 173 acres and serves as the common user terminal for containerized cargo as well as autos, liquid bulk and various break-bulk cargoes. Talleyrand Marine Terminal has 4,800 feet of berth recently deepened to 40 feet alongside. It has six container cranes (one 50-ton, two 45-ton, three 40-ton) as well as 120,000 square feet of refrigerated/freezer space.

3. **Dames Point Terminal** is located on 585 acres of land owned by the Authority. Dames Point Terminal is the site of the recently developed 158-acre MOL/TraPac terminal with stated capacity of 1 million TEU. The Terminal has two 1,200-foot berths with 40 feet of water depth alongside. The berth is served by six Post-Panamax cranes (two 50-ton, four 40-ton). In addition, the Terminal handles bulk aggregate cargo on about 34 acres and also has a cruise facility. Dames Point is the site of planned 90-acre Hanjin Terminal, expected to open in 2013, with stated capacity of 800,000 TEU. Hanjin currently was in negotiation with ILA regarding automation at their planned terminal, however in March 2013 it was announced that plans have been canceled.

The main channel in Jacksonville, which runs 23 miles from mouth of river to Talleyrand Terminal, was recently deepened to 40 feet, with a plan to be deepened to 42 feet by fall 2010. The long term of the Authority is to achieve 47 feet and in June 2017 their Board allocated the first phase of port funding to the U.S. Army Corps of Engineers for construction and environmental monitoring. Construction is set to begin by early 2018.

As was the case with Charleston, the Port of Jacksonville threatens to take a share of Savannah's Asian market with the following developments:

- Mitsui OSK Lines opened new TraPac container terminal at start of 2009 with two 1,200-foot berths, 6 gantry cranes and a total area of 160 acres;
- Jaxport budgeted $70 million for infrastructure and terminal capital projects in 2010;
- In 2009, secured more than $10 million of state and Federal funding for capital improvement projects;

- In mid-2010, the third phase of harbor deepening project was completed at a cost of $50 million – now offers a uniform depth of 40 feet;
- New terminals will increase container capacity but water depth of 40 feet still limited compared to major regional competing ports; and
- Jacksonville-based CSX said it plans to spend up to U.S.$40 million to redirect its rail line away from downtown Jacksonville and to an intermodal container facility at or near the Dames Point Marine Terminal.

The effectiveness of these investments to provide additional capacity will be impacted by the port's limited water depth of 40 feet. Based on the acreage available for containers, and a conservative estimate of 5,000 TEU per gross acre, Jaxport would have a capacity exceeding 3 million TEU, and likely higher with additional development and higher storage density.

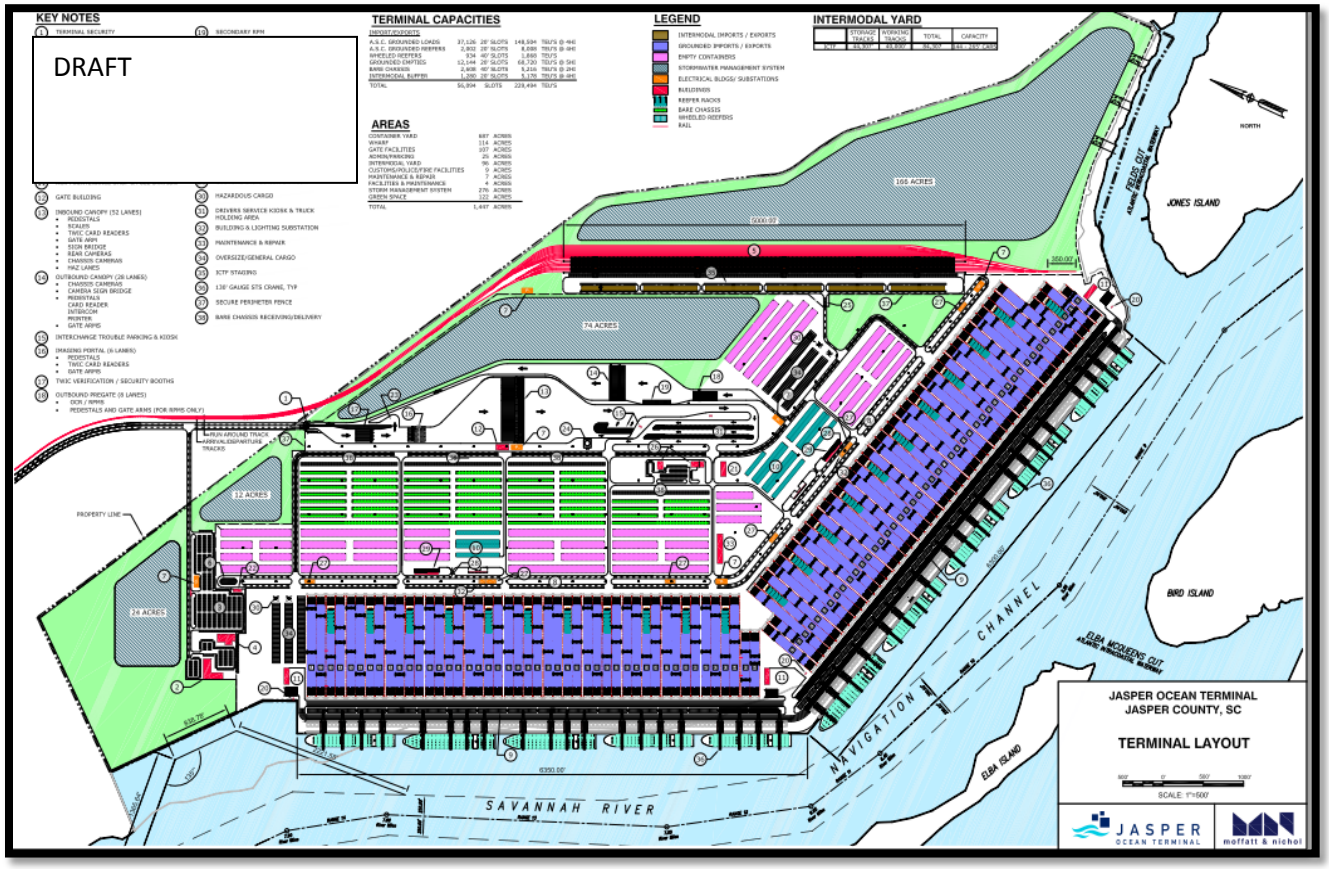
3.6.5. Jasper Ocean Terminal *(proposed)* – South Carolina/Georgia

In 2008, the Joint Project Office (JPO) for the Jasper Ocean Terminal (JOT) was created under an Intergovernmental Agreement between South Carolina and Georgia. Later that year, the JPO purchased 1,518 acres from the GDOT.

The proposed project remains in the preliminary design phase, however preliminary concept plan yields a throughput capacity of approximately 7 million TEU's and is planned to be a state of-the-art terminal. The project will go through a lengthy design and permitting process; some propose the facility would be needed to open as soon as 2025. **Figure 3.10** shows the proposed location of the terminal in the Savannah area relative to the Garden City terminal. **Figure 3.11** is a preliminary draft layout. [Much more info on this topic is in "Task 5 Recommendations" report.]

Figure 3.10 Jasper Ocean Terminal Proposed Location in Savannah Area

Figure 3.11 Jasper Ocean Terminal Concept Plan



3.6.6. Port of Mobile, Alabama

Large-scale improvements by the Port of Mobile will transform it into a credible competition to the Gulf ports overlapping with Savannah's market:

- Since 2000, Alabama State Port Authority (ASPA) invested nearly $500 million in capital improvements and expansion projects to serve containers, bulk & break-bulk commodities; in 2017 it added two new cranes as part of $47.5 million expansion at APM terminal.
- In the last decade, the new 350,000 TEU per annum Mobile Container Terminal opened, with APM Terminals (80 percent) and CMA CGM's Terminal Link (20 percent) responsible for operations;
- The terminal offers modern container handling equipment, 45 feet of water depth and is linked to Class I railroads;
- Full build-out will increase annual capacity to 800,000 TEU in a series of phased future developments;

- In July 2010, APM Terminals acquired the 20 percent share held by CMA CGM; and
- During 2009, ASPA commenced the process to gain private investment for its $75 million, 74-acre Garrows Bend Intermodal Container Transfer Facility at Choctaw Point, with a desire to complete the process within three years.

There are also several private terminals in the Savannah region. These terminals are operated by private companies and are primarily used to load and unload bulk commodities. The amount of goods moved through these ports is very small rerlative to the volumes moved through the Savannah and Brunswick terminals operated by the Geogia Ports Authority.

4. Trends and Forecasts for Commodities and Containers at Georgia Ports

In 2016, 27.8 million tons flowed through the Port of Savannah, which represented 3.6 million TEUs. Besides the Port of Savannah, this chapter describes trend information on the commodities that move through both of Georgia 's ports. It also provides forecasts of port operations into the future.

4.1. Key Import/Export Commodities at the Ports of Savannah and Brunswick

As previously discussed, there are various industrial users of the Savannah and Brunswick Rivers, however the Georgia Ports Authority (GPA) accounts for the majority of the cargo on these waterways. Therefore, for the purposes of this report, we have focused on volumes generated by the GPA at the ports of Savannah and Brunswick.

The Port of Savannah consists of Garden City Terminal and Ocean Terminal and specializes in the handling of container, reefer, break-bulk and RoRo (Roll-on Roll-off) cargoes. The variety of types of cargo handled at Savannah is shown in more detail in the next two pages **Table 4.1**.

The Port of Brunswick specializes in the handling of break-bulk, agri-bulk and RoRo cargoes handled at Mayor's Point Terminal Colonel's Island Terminal RoRo Facility, Colonel's Island Terminal Agri-bulk Facility and Marine Port Terminals.

Port of Savannah

Five Year History for Top 10 Commodity Groups for <u>Exports</u> via Savannah (Fiscal Year)

Last updated: September 2016 (GPA Marketing)

Detail Summary:

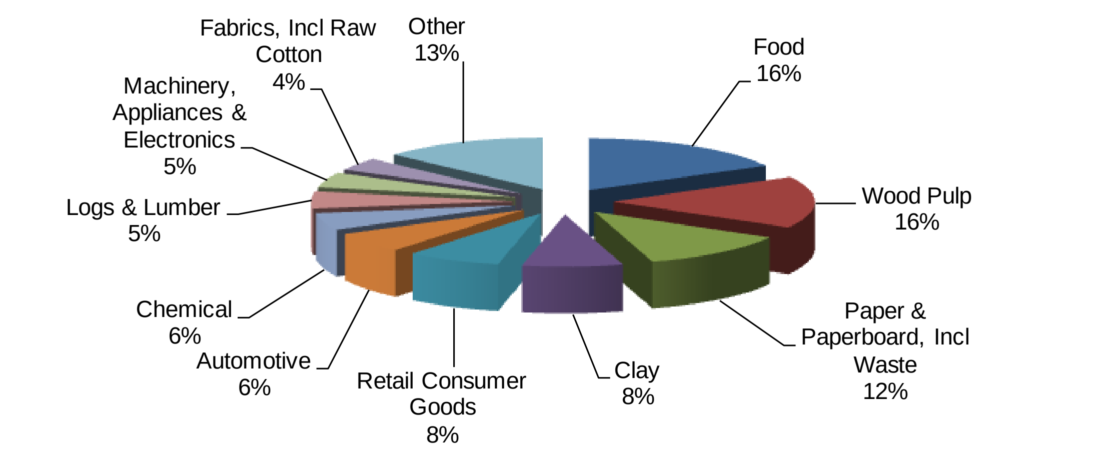
- In Fiscal Year 2016 (FY16), Food including fresh & frozen poultry, pet & animal feeds, and edible nuts was the top export commodity group via Savannah, which led South Atlantic ports for this commodity group.
- Wood Pulp had the most growth between FY15 and FY16, increasing 13,882 TEUs.
- Of Savannah's top ten export commodity groups in FY16, Savannah had the highest market share among ports in the South Atlantic for five.

Five Year History for Top 10 Commodity Groups for Exports via Savannah (Fiscal Year)

Commodity Grouping	2012	2013	2014	2015	2016	% Growth (5YR)
Food	157,531	172,338	201,981	197,686	206,254	31%
Wood Pulp	178,654	175,419	175,060	180,532	194,414	9%
Paper & Paperboard, Incl Waste	144,710	152,826	128,997	141,704	145,845	1%
Clay	97,054	97,577	99,800	97,117	97,091	0%
Retail Consumer Goods	63,299	50,565	107,698	100,415	90,867	44%
Automotive	87,778	83,042	78,191	87,499	76,385	-13%
Chemical	73,872	65,853	70,212	77,014	64,899	-12%
Logs & Lumber	41,148	48,635	61,907	55,946	64,324	56%
Machinery, Appliances & Electronics	80,760	68,139	60,524	62,719	57,099	-29%
Fabrics, Incl Raw Cotton	74,877	93,535	74,378	63,721	48,157	-36%
Other	234,197	195,252	179,565	175,697	159,492	-32%
Total	1,233,879	1,203,183	1,238,312	1,240,052	1,204,827	-2%

Source: PIERS (Loaded TEUs)

FY16 Top 10 Commodity Groups for Exports via Savannah



Port of Savannah

Five Year History for Top 10 Commodity Groups for Imports via Savannah (Fiscal Year)

Last updated: September 2016 (GPA Marketing)

Detail Summary:

- In Fiscal Year 2016 (FY16), Retail Consumer Goods was the top import commodity group via Savannah, which led South Atlantic ports for this commodity group.
- Retail Consumer Goods also had the most growth between FY15 and FY16, increasing by 35,041 TEUs.
- Of Savannah's top ten import commodity groups in FY16, Savannah had the highest market share among ports in the South Atlantic for seven.

Five Year History for Top 10 Commodity Groups for Imports via Savannah (Fiscal Year)

Commodity Grouping	2012	2013	2014	2015	2016	% Growth (5YR)
Retail Consumer Goods	132,244	122,590	183,068	211,688	246,729	87%
Machinery, Appliances & Electronics	121,482	121,398	143,459	180,192	205,833	69%
Furniture	143,412	153,535	148,712	179,556	196,123	37%
Automotive	96,576	109,617	123,864	153,623	179,909	86%
Hardware & Houseware	98,877	93,640	104,309	127,485	140,799	42%
Food	80,078	76,473	76,897	82,979	91,533	14%
Apparel	55,800	52,363	58,481	87,511	84,622	52%
Mineral	49,373	52,698	56,322	66,059	82,673	67%
Toys	49,666	37,603	39,540	56,978	57,829	16%
Chemical	36,436	37,628	40,149	45,431	51,299	41%
Other	220,900	221,781	241,920	304,690	339,316	54%
Total	1,084,844	1,079,326	1,216,721	1,496,193	1,676,666	55%

Source: PIERS (Loaded TEUs)

FY16 Top 10 Commodity Groups for Imports via Savannah

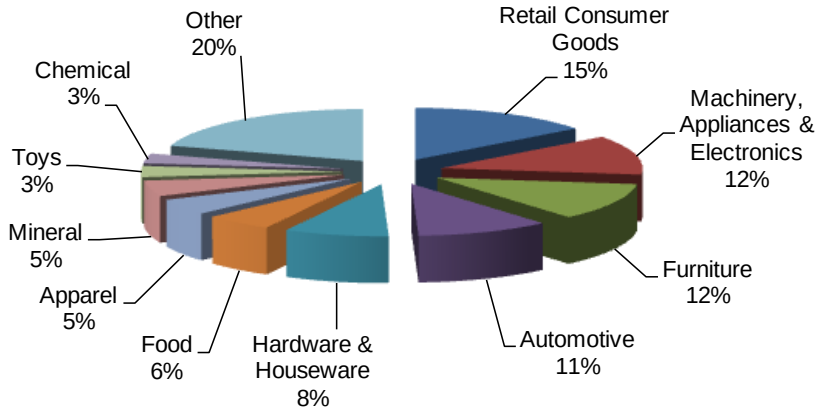
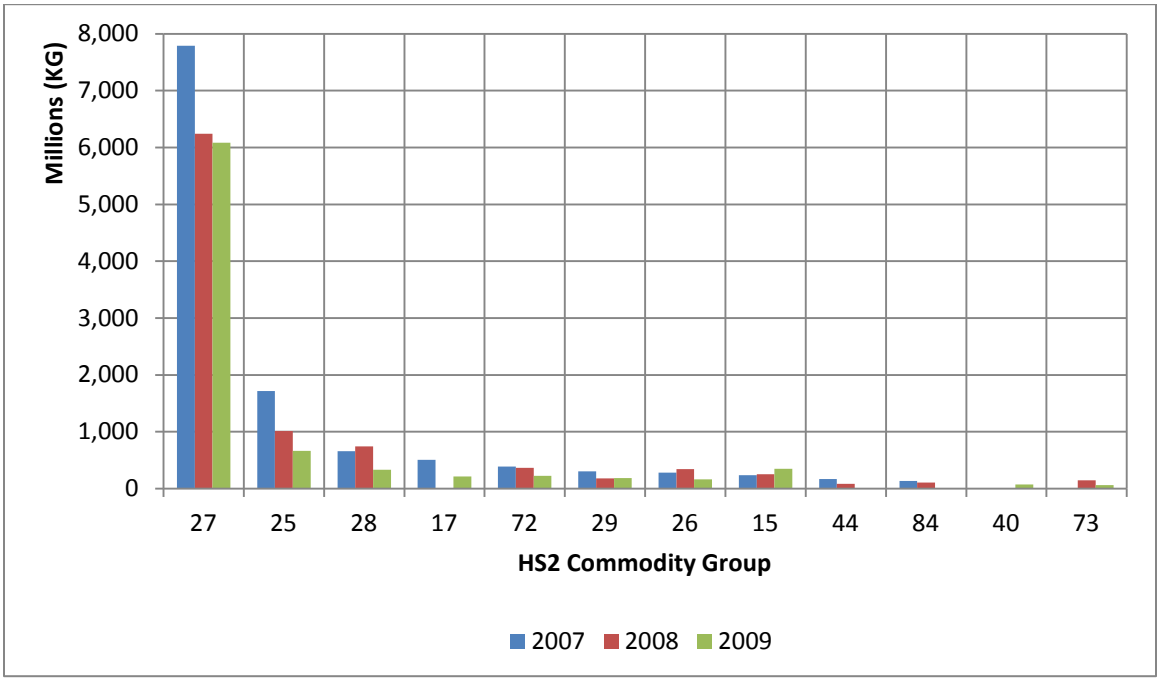


Figure 4.1 Noncontainerized Imports through Savannah (2007-2009)



Source: U.S. Census Bureau/Project team analysis.

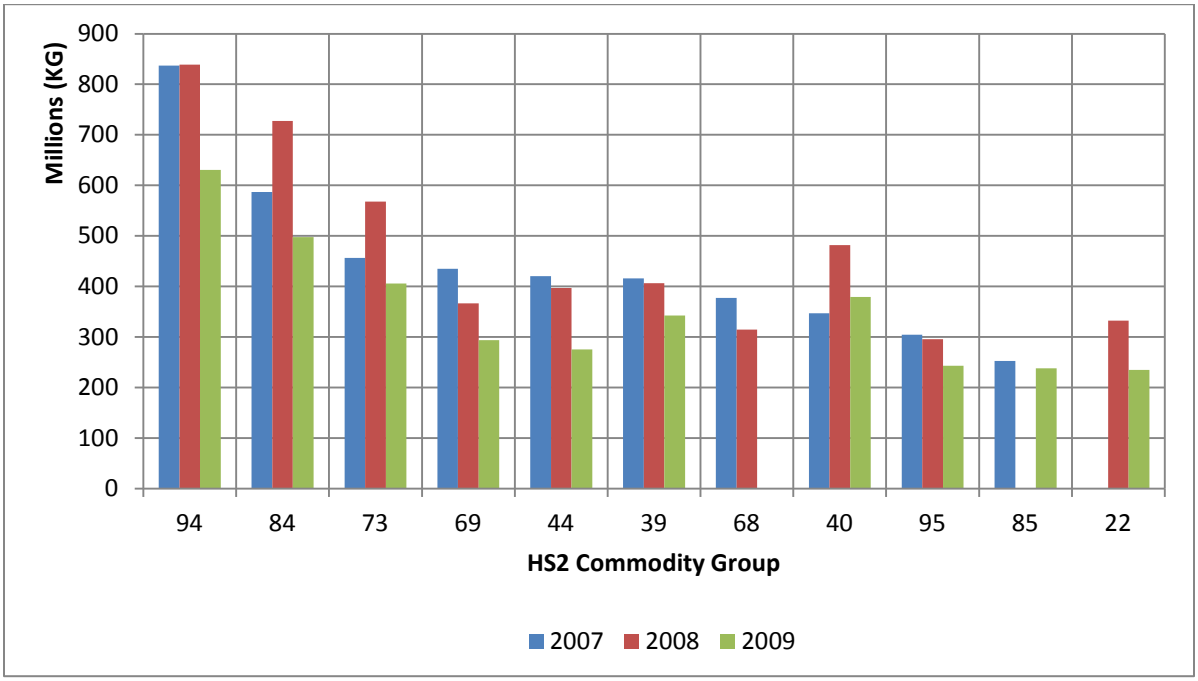
Table 4.2 Commodity Descriptions for Top Noncontainerized Imports through Savannah

HS CODE	COMMODITY
27	Mineral Fuel, Oil Etc.; Bitumin Subst; Mineral Wax
25	Salt; Sulfur; Earth and Stone; Lime and Cement Plaster
28	Inorg Chem; Prec & Rare-earth Met & Radioactive Compound
17	Sugars And Sugar Confectionary
72	Iron And Steel
29	Organic Chemicals
26	Ores, Slag And Ash
15	Animal Or Vegetable Fats, Oils Etc. & Waxes
44	Wood And Articles Of Wood; Wood Charcoal
84	Nuclear Reactors, Boilers, Machinery Etc.; Parts
40	Rubber And Articles Thereof
73	Articles Of Iron Or Steel

Source: U.S. Census Bureau.

Figure 4.2 and **Table 4.3** outlines containerized imports through Savannah by HS2 commodity groups, based on the top commodity groups in 2007. HS Code 94 (Furniture; Bedding Etc; Lamps Nesoi Etc; Prefab Bd) was the top containerized import by weight during 2007, with its containerized imported weight remaining high in 2008, although it fell slightly in 2009. In addition, HS Codes 84 (Nuclear reactors, Boilers, Machinery Etc.; Parts) and 73 (Articles of Iron or Steel) were, respectively, the second and third largest containerized imports by weight in 2007 and both of these commodity groups generated increases for 2008 and then saw declines in 2009, following the overall market demand trends.

Figure 4.2 Containerized Imports through Savannah (2007-2009)



Source: U.S. Census Bureau/Project team analysis.

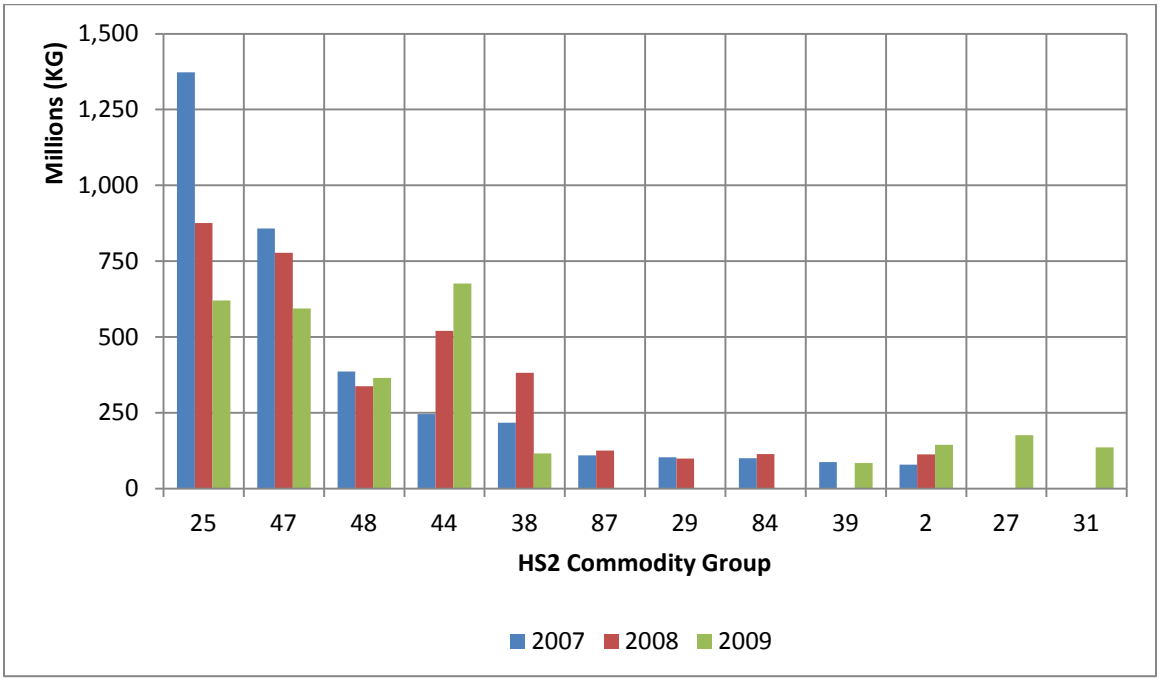
Table 4.3 Commodity Descriptions for Top Containerized Imports through Savannah

HS CODE	COMMODITY
94	Furniture; Bedding Etc; Lamps Nesoi Etc; Prefab Bd
84	Nuclear Reactors, Boilers, Machinery Etc.; Parts
73	Articles Of Iron Or Steel
69	Ceramic Products
44	Wood And Articles Of Wood; Wood Charcoal
39	Plastics And Articles Thereof
68	Art Of Stone, Plaster, Cement, Asbestos, Mica Etc.
40	Rubber And Articles Thereof
95	Toys, Games & Sport Equipment; Parts & Accessories
85	Electric Machinery Etc; Sound Equip; Tv Equip; Pts
22	Beverages, Spirits And Vinegar

Source: U.S. Census Bureau.

Figure 4.3 and **Table 4.4** highlights the noncontainerized exports through Savannah by HS2 commodity group based on the top commodity groups for 2007. For example, HS Code 25 (Salt; Sulfur; Earth and Stone; Lime and Cement Plaster) was clearly the dominant type of cargo in this category in 2007 before seeing declines in both 2008 and 2009. HS Code 44 (Wood and Articles of Wood; Wood Charcoal) was only the fourth highest noncontainerized export by weight through Savannah in 2007; however, for 2009, it was the highest among the commodity groups displayed in **Table 4.4**.

Figure 4.3 Noncontainerized Exports through Savannah (2007-2009)



Source: U.S. Census Bureau / Project team analysis.

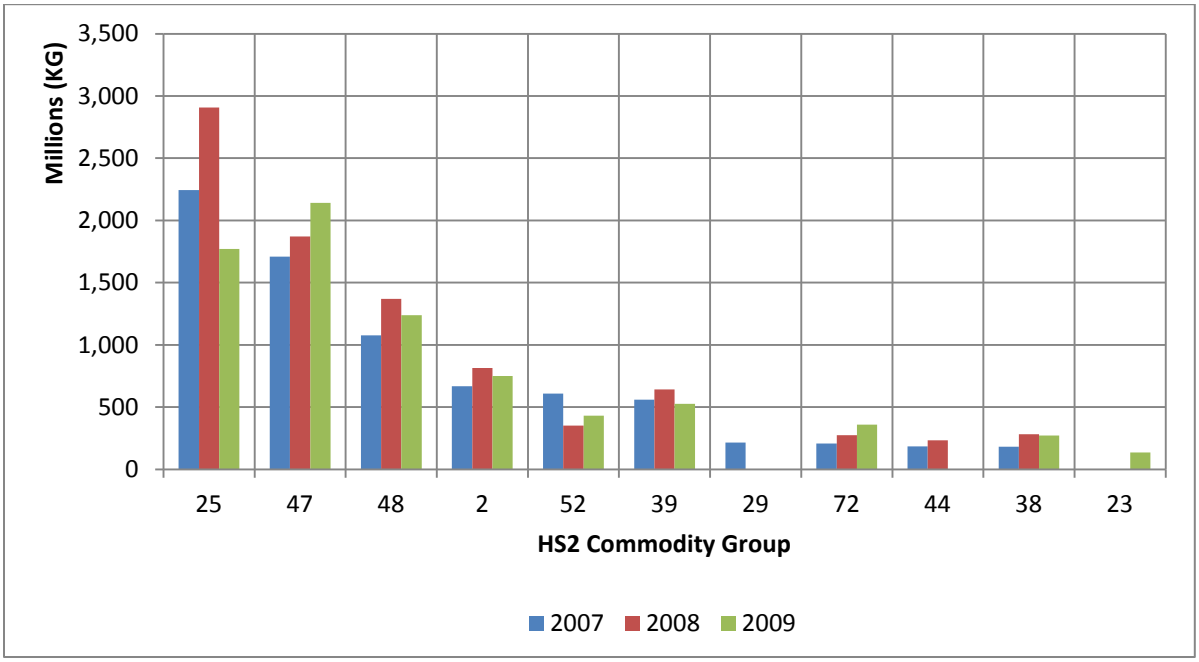
Table 4.4 Commodity Descriptions for Top Noncontainerized Exports through Savannah

HS CODE	COMMODITY
25	Salt; Sulfur; Earth & Stone; Lime & Cement Plaster
47	Wood Pulp Etc; Recovd (waste & Scrap) ppr & pprbd
48	Paper & Paperboard & Articles (inc Papr Pulp Artl)
44	Wood And Articles Of Wood; Wood Charcoal
38	Miscellaneous Chemical Products
87	Vehicles, Except Railway Or Tramway, And Parts Etc
29	Organic Chemicals
84	Nuclear Reactors, Boilers, Machinery Etc.; Parts
39	Plastics And Articles Thereof
2	Meat And Edible Meat Offal
27	Mineral Fuel, Oil Etc.; Bitumin Subst; Mineral Wax
31	Fertilizers

Source: U.S. Census Bureau.

Figure 4.4 confirms the containerized exports through Savannah by HS2 commodity group based on the top commodity groups for 2007. While HS Code 25 (Salt; Sulfur; Earth & Stone; Lime & Cement Plaster) was the largest noncontainerized export commodity through Savannah in 2007 (as Figure 4.3 shows), Figure 4.2 outlines that it was also the commodity group with the highest weight as a containerized export through Savannah in 2007. HS Code 47 (Wood Pulp Etc; Recovd (Waste and Scrap) ppr & pprbd) was the second highest containerized export in 2007, and due to growth in 2008 and 2009, became the highest containerized export in 2009 among the commodity groups shown in **Table 4.5**.

Figure 4.4 Containerized Exports through Savannah (2007-2009)



Source: U.S. Census Bureau / Project team analysis.

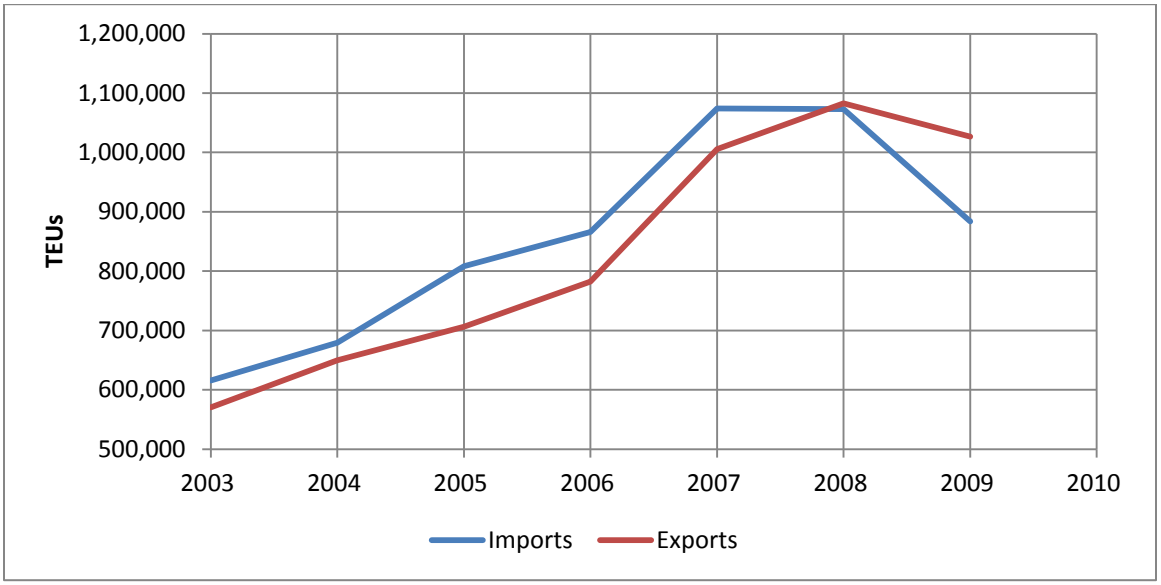
Table 4.5 Commodity Desciptions for Top Containerized Exports through Savannah

HS CODE	COMMODITY
25	Salt; Sulfur; Earth & Stone; Lime & Cement Plaster
47	Wood Pulp Etc; Recovd (waste & Scrap) ppr & pprbd
48	Paper & Paperboard & Articles (inc Papr Pulp Artl)
2	Meat And Edible Meat Offal
52	Cotton, Including Yarn And Woven Fabric Thereof
39	Plastics And Articles Thereof
29	Organic Chemicals
72	Iron And Steel
44	Wood And Articles Of Wood; Wood Charcoal
38	Miscellaneous Chemical Products
23	Food Industry Residues & Waste; Prep Animal Feed

Source: U.S. Census Bureau.

Figure 4.5 shows the yearly totals of imports and exports, in TEUs, of full containers at Savannah between 2003 and 2009. It can be seen that for a large part of the decade imports and exports of full containers at Savannah were growing. While imports suffered a tiny drop in 2008, both imports and exports suffered declines in 2009.

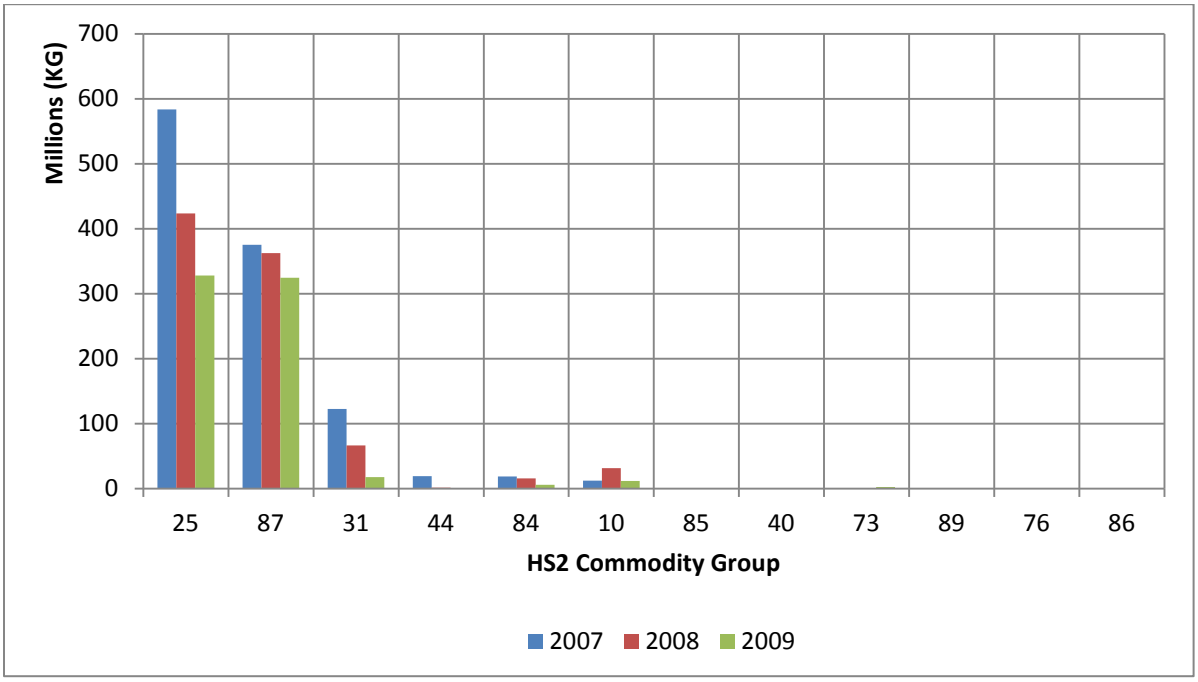
Figure 4.5 Annual Full Container Volumes through Savannah (2003-2009)



Source: GPA / Project team analysis.

Figure 4.6 highlights the noncontainerized imports through Brunswick by HS2 commodity group based on the top commodity groups in 2007. HS Code 25 (Salt; Sulfur; Earth & Stone; Lime and Cement Plaster) was the largest noncontainerized import through Brunswick in 2007, with HS Code 87 (Vehicles, Except Railway or Tramway, and Parts Etc) a more distant second place. By way of comparison, for 2007 no other commodity groups' numbers were close to these two cargo types. Among the commodity groups shown in **Table 4.6**, HS Codes 25 and 87 were also the only commodity groups to derive significant 2008 or 2009 volumes.

Figure 4.6 Noncontainerized Imports through Brunswick (2007-2009)



Source: U.S. Census Bureau / Project team analysis.

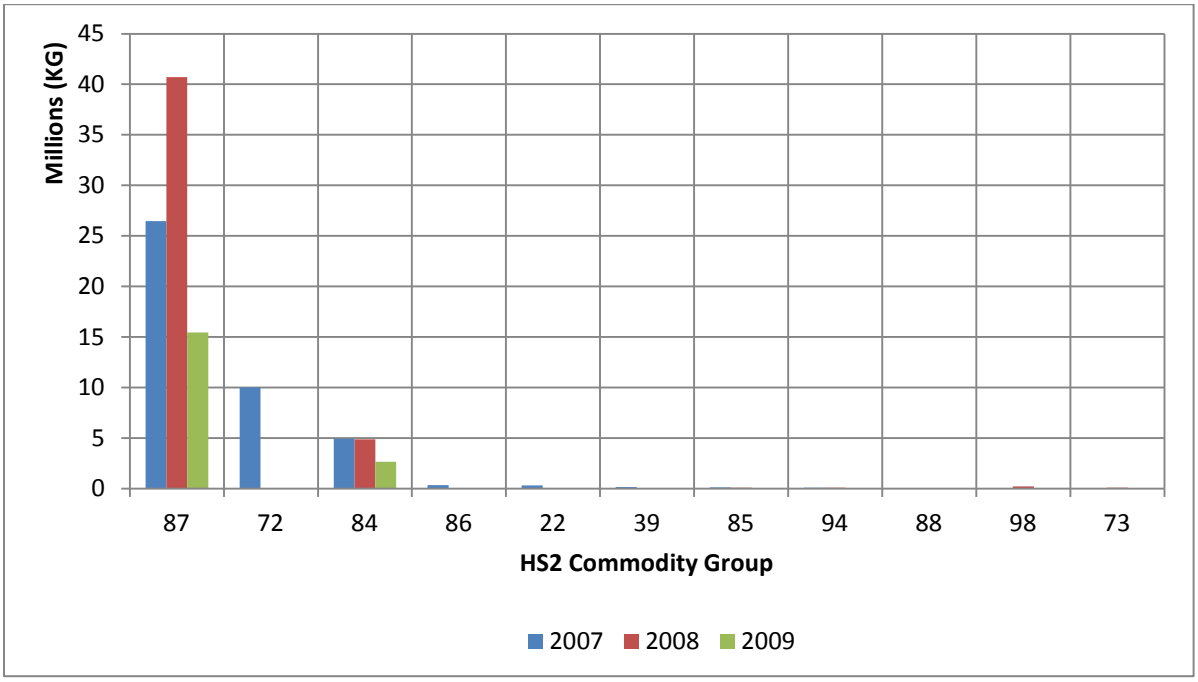
Table 4.6 Commodity Descriptions for Top Noncontainerized Imports through Brunswick

HS CODE	COMMODITY
25	Salt; Sulfur; Earth & Stone; Lime & Cement Plaster
87	Vehicles, Except Railway or Tramway, and Parts Etc
31	Fertilizers
44	Wood And Articles Of Wood; Wood Charcoal
84	Nuclear Reactors, Boilers, Machinery Etc.; Parts
10	Cereals
85	Electric Machinery Etc; Sound Equip; TV Equip; Pts
40	Rubber And Articles Thereof
73	Articles of Iron or Steel
89	Ships, Boats and Floating Structures
76	Aluminum and Articles Thereof
86	Railway or Tramway Stock Etc; Traffic Signal Equip

Source: U.S. Census Bureau.

Figure 4.7 shows the containerized imports through Brunswick by HS2 commodity group based on the top commodity groups in 2007. HS Code 87 (Vehicles, Except Railway or Tramway, And Parts Etc) was clearly the largest Brunswick containerized import by weight in 2007, with no other commodity groups close. HS Code 87 also showed large growth in its 2008 number, before suffering a large drop in 2009.

Figure 4.7 Containerized Imports through Brunswick (2007-2009)



Source: U.S. Census Bureau / Project team analysis.

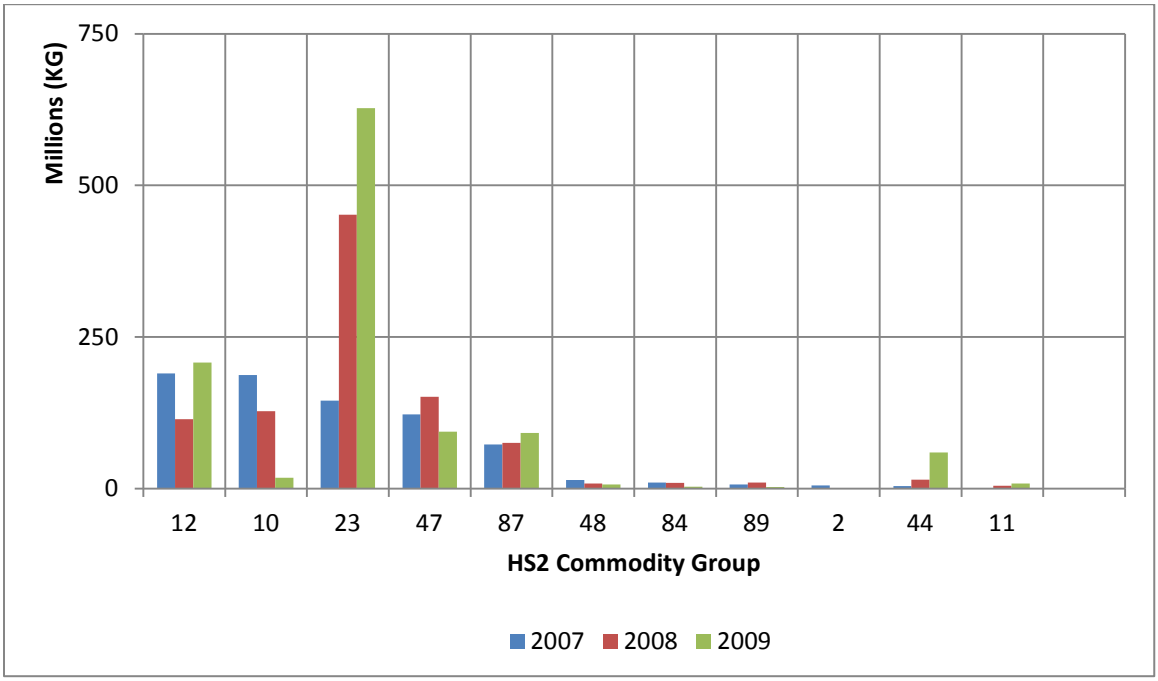
Table 4.7 Commodity Descriptions for Top Containerized Imports through Brunswick

HS CODE	COMMODITY
87	Vehicles, Except Railway Or Tramway, And Parts Etc
72	Iron And Steel
84	Nuclear Reactors, Boilers, Machinery Etc.; Parts
86	Railway Or Tramway Stock Etc; Traffic Signal Equip
22	Beverages, Spirits And Vinegar
39	Plastics And Articles Thereof
85	Electric Machinery Etc; Sound Equip; Tv Equip; Pts
94	Furniture; Bedding Etc; Lamps Nesoi Etc; Prefab Bd
88	Aircraft, Spacecraft, And Parts Thereof
98	Articles of Special Trade and Goods Unclassified
73	Articles Of Iron Or Steel

Source: U.S. Census Bureau.

Figure 4.8 provides the noncontainerized exports through Brunswick by HS2 commodity group based on the top commodity groups in 2007. While HS Code 12 (Oil Seeds Etc.; Misc Grain, Seed, Fruit, Plant Etc) was the leading commodity group in this category, other commodity groups were somewhat close. HS Code 23 (Food Industry Residues & Waste; Prep Animal Feed) showed significant growth in 2008 and 2009 to dominate the other commodity groups shown in **Table 4.8** for the two-year period.

Figure 4.8 Noncontainerized Exports through Brunswick (2007-2009)



Source: U.S. Census Bureau / Project team analysis.

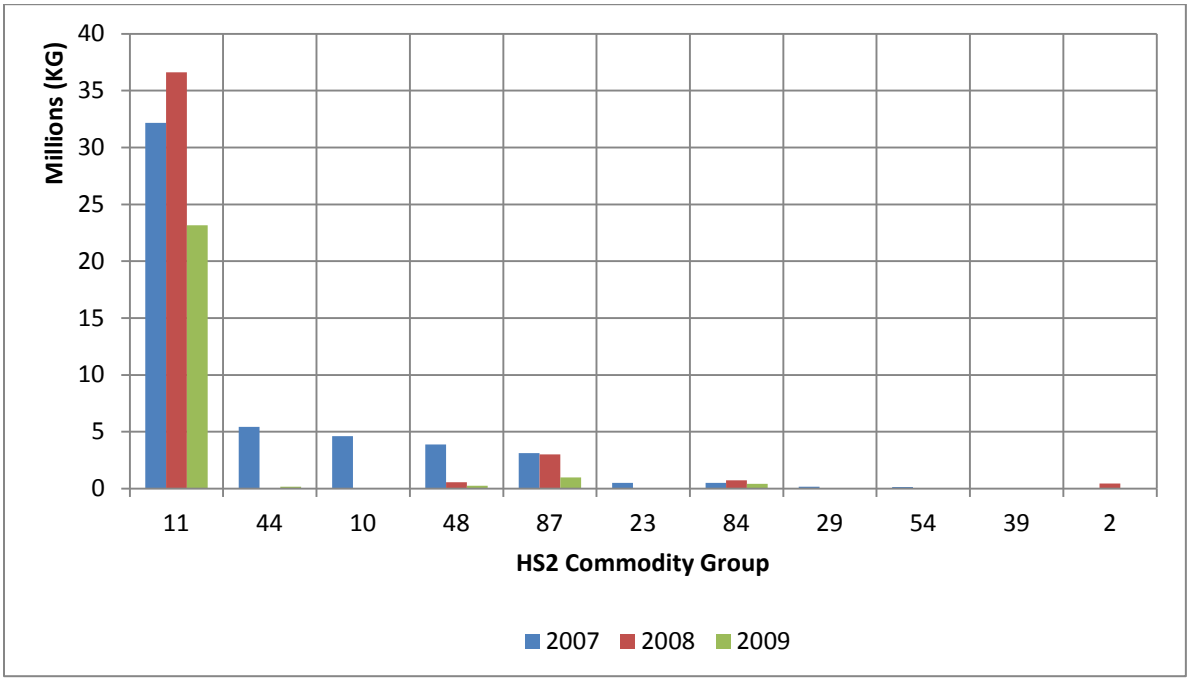
Table 4.8 Commodity Descriptions for Top Noncontainerized Exports through Brunswick

HS CODE	COMMODITY
12	Oil Seeds Etc.; Misc Grain, Seed, Fruit, Plant Etc
10	Cereals
23	Food Industry Residues & Waste; Prep Animal Feed
47	Wood Pulp Etc; Recovd (waste & Scrap) ppr & pprbd
87	Vehicles, Except Railway Or Tramway, And Parts Etc
48	Paper & Paperboard & Articles (inc Papr Pulp Artl)
84	Nuclear Reactors, Boilers, Machinery Etc.; Parts
89	Ships, Boats And Floating Structures
2	Meat And Edible Meat Offal
44	Wood And Articles Of Wood; Wood Charcoal
11	Milling Products; Malt; Starch; Inulin; Wht Gluten

Source: U.S. Census Bureau.

Figure 4.9 outlines containerized exports through Brunswick by HS2 commodity group based on the top commodity groups in 2007. It can be seen that HS Code 11 (Milling Products; Malt; Starch; Inulin; Wheat Gluten) significantly dominated the other commodity groups in 2007, with subsequent growth in 2008 but a drop in 2009. However, HS Code 11 still easily surpassed all other commodity groups shown in **Table 4.9** as far as weight of containerized exports through Brunswick in 2009.

Figure 4.9 Containerized Exports through Brunswick (2007-2009)



Source: U.S. Census Bureau / Project team analysis.

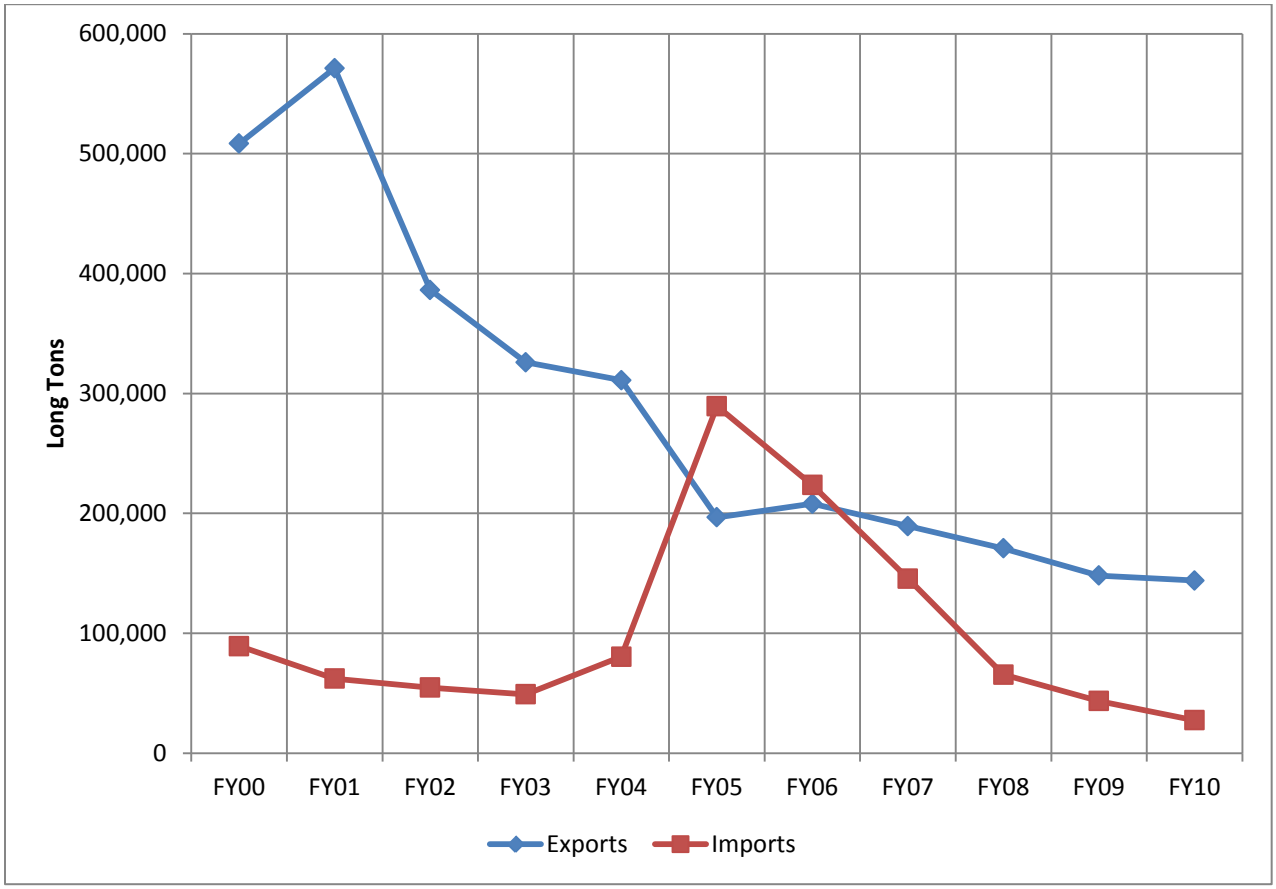
Table 4.9 Commodity Descriptions for Top Containerized Exports through Brunswick

HS CODE	COMMODITY
11	Milling Products; Malt; Starch; Inulin; Wht Gluten
44	Wood And Articles Of Wood; Wood Charcoal
10	Cereals
48	Paper & Paperboard & Articles (inc Papr Pulp Artl)
87	Vehicles, Except Railway Or Tramway, And Parts Etc
23	Food Industry Residues & Waste; Prep Animal Feed
84	Nuclear Reactors, Boilers, Machinery Etc.; Parts
29	Organic Chemicals
54	Manmade Filaments, Including Yarns & Woven Fabrics
39	Plastics And Articles Thereof
2	Meat And Edible Meat Offal

Source: U.S. Census Bureau.

Figure 4.10 shows the break bulk volumes at Brunswick for the fiscal year 2000 to 2010. As identified, break bulk exports tend to be higher than break bulk imports at Brunswick, although volumes for both imports and exports have been declining since FY 2006.

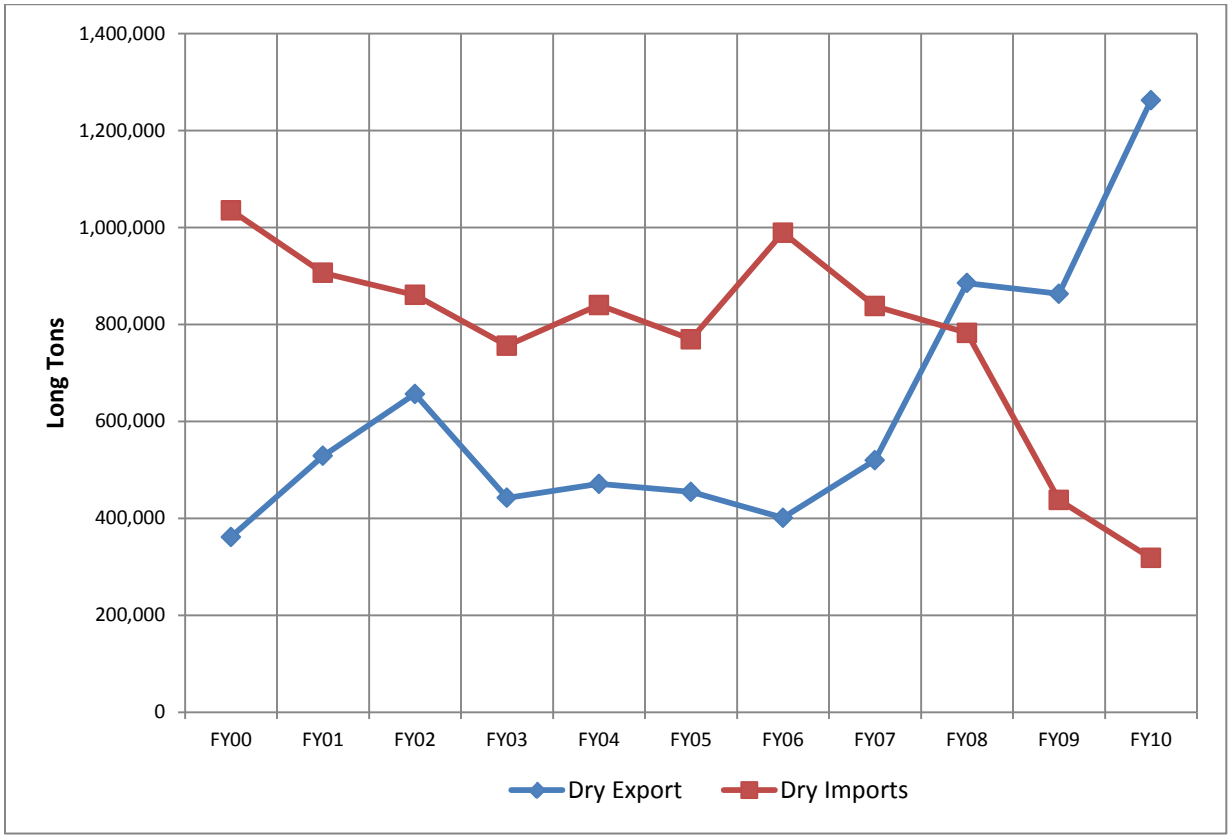
Figure 4.10 Brunswick Break Bulk Volumes



Source: GPA/Project team analysis.

Figure 4.11 confirms the dry bulk import and dry bulk export volumes at Brunswick for the fiscal years 2000 to 2010. It can be seen that while imports have tended to be higher than exports, mainly due to the rise in exports and a decline in imports since FY 2006, dry bulk exports are now significantly higher than dry bulk imports at this cargo-handling facility.

Figure 4.11 Brunswick Bulk Volumes



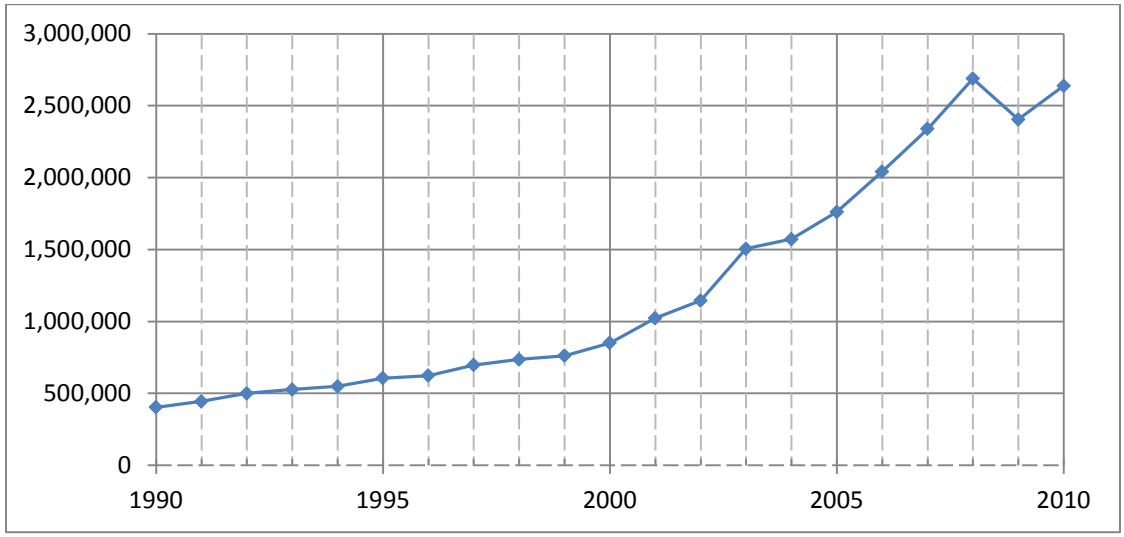
Source: GPA/Project team analysis.

4.2. Container Volume Trend and Outlook

As **Figure 4.12** identifies, container volumes at Savannah have grown from 404,000 in 1990 to more than 2.6 million by fiscal year 2010, reflecting a compounded annual growth rate of 9.8 percent. More recently the growth has been even more dramatic, between 2000 and 2010 the port's container volumes increased by an average of 12 percent per annum.

As a consequence of the continued increases in volumes handled, Savannah's growth has been the highest among similar size ports within North America and it has risen in the rankings of U.S. international container volume ports to become the fourth largest, surpassed only by the facilities at Los Angeles, Long Beach and New York/New Jersey.

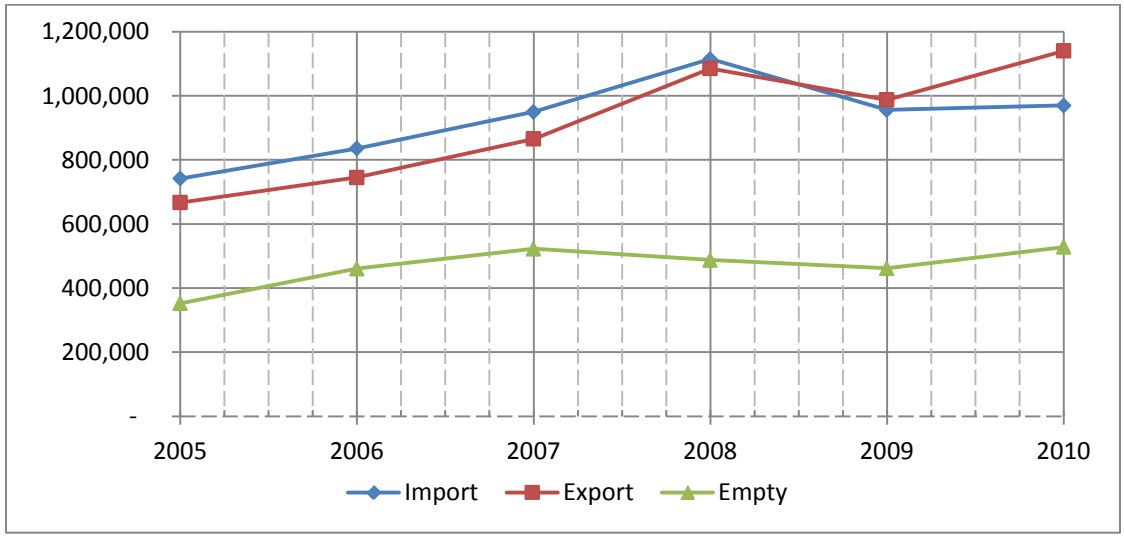
Figure 4.12 Total Container Volumes at Savannah, Fiscal Years 1990-2010



Source: Georgia Port Authority, American Association of Port Authorities.

With respect to a breakdown in the type of container activity at Savannah, imported and exported container volumes have grown in tandem. More recently exports exceeded imports during 2009 and 2010 due to better economic growth abroad than in the United States. **Figure 4.13** offers a summary outline of the port's import, export and empty container traffic between 2005 and 2010.

Figure 4.13 Savannah Container Volumes by Type, 2005-2010



Source: Georgia Port Authority, American Association of Port Authorities.

Underlying these strong trends is Savannah's connection with most of the world's ocean born container freight trade. Exports to the Asian trade lanes accounted for 50 percent of Savannah's container volumes in FY 2010, as **Table 4.10** shows.

Table 4.10 Top 10 Trade Lanes for Exports from Savannah, 2006-2010

Five Year History for Top 10 Trade Lanes for Exports from Savannah (Fiscal Year)						
Trade Lane	**2006**	**2007**	**2008**	**2009**	**2010**	**% Growth (5YR)**
Northeast Asia	334,355	333,655	375,268	359,110	400,974	20%
Mediterranean	103,677	130,177	161,339	140,384	166,220	60%
North Europe	82,937	98,942	120,094	97,927	110,519	33%
Southeast Asia	51,221	61,972	96,857	79,987	101,353	98%
Middle East	24,573	31,218	56,128	61,318	69,490	183%
Oceania	32,542	32,221	43,240	41,126	52,844	62%
Southern Asia/India	9,291	13,393	30,187	35,458	44,162	375%
East Coast South America	23,176	25,370	39,392	29,846	44,003	90%
West Coast South America	14,259	15,580	25,711	23,598	25,314	78%
Africa	5,901	4,750	17,073	18,218	21,806	270%
Other[a]	33,370	48,860	62,602	53,404	59,748	79%
Total	715,302	796,138	1,027,890	940,376	1,096,433	53%

Source: PIERS.

[a] Eastern Europe, Caribbean, Central America, and Puerto Rico.

On the import side, the Asian trade lanes account for 77 percent of Savannah's container volumes, as identified in **Table 4.11**. Growth of imports from North Asia trade lane countries is likely to be supported by expansion of the Panama Canal to be completed in 2015.

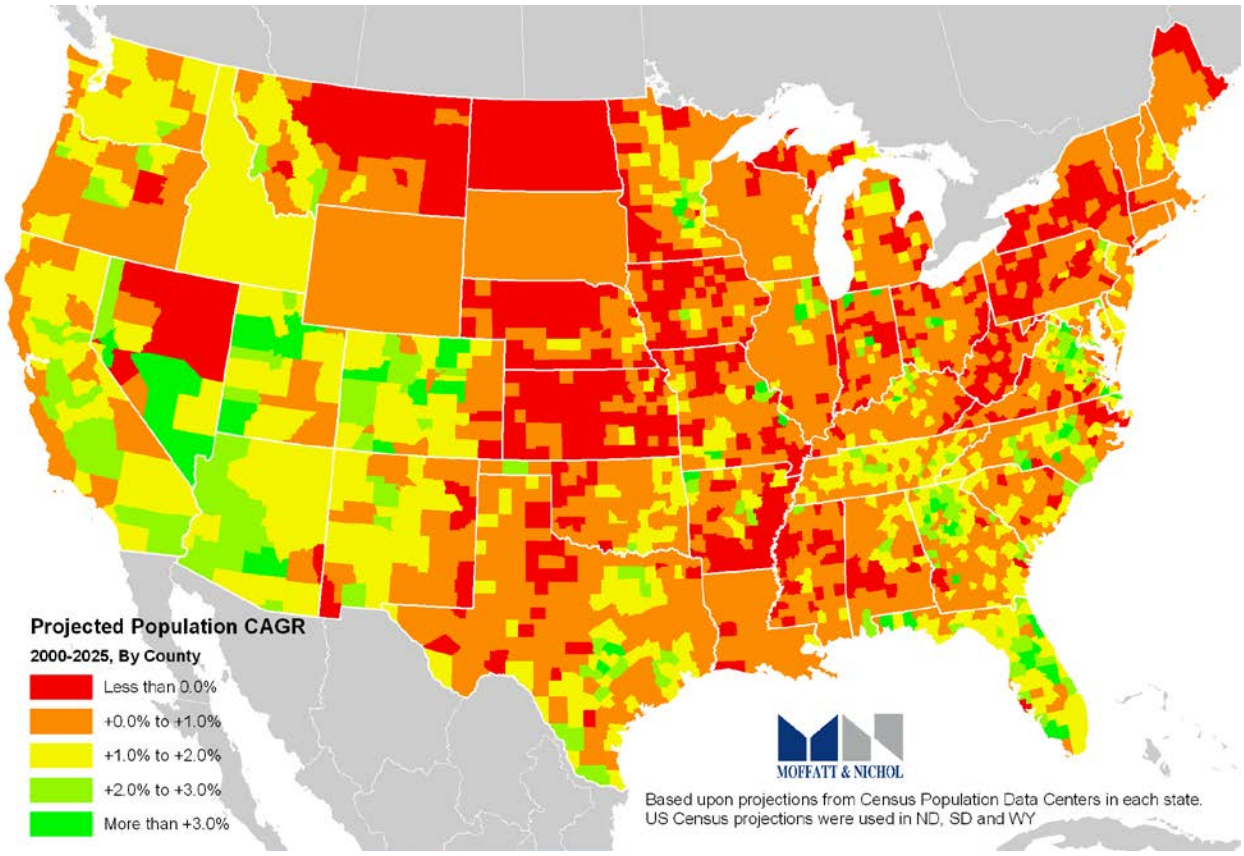
Table 4.11 Top 10 Trade Lanes for Imports to from Savannah, 2006-2010

Five Year History for Top 10 Trade Lanes for Imports into Savannah (Fiscal Year)						
Trade Lane	**2006**	**2007**	**2008**	**2009**	**2010**	**% Growth (5YR)**
Northeast Asia	554,200	626,329	689,147	601,352	603,271	9%
Southeast Asia	79,297	93,533	119,233	111,511	108,502	37%
Mediterranean	80,322	85,763	82,713	69,112	71,499	-11%
North Europe	35,703	49,746	78,965	67,493	64,046	79%
Southern Asia/India	23,928	25,421	51,682	41,273	43,997	84%
East Coast South America	22,868	31,522	34,455	21,848	18,574	-19%
Central America	4,748	2,441	2,907	7,862	15,557	228%
Middle East	3,079	3,126	10,314	9,837	12,388	302%
Eastern Europe	6,581	7,087	11,479	11,443	12,054	83%
Oceania	9,509	11,687	15,094	13,657	11,552	21%
Other[a]	17,711	19,377	24,157	18,868	20,714	17%
Total	837,945	956,032	1,120,145	974,256	982,154	17%

[a]West Coast South America, North America, Caribbean, Africa, and Puerto Rico.

Container volumes in Savannah have grown as a result of various factors. At the local level these include the GPA's efforts to continuously invest in terminal improvements and support logistical business development in the region, such as distribution centers. Regionally, economic growth has been higher than that of the U.S. economy as a whole, primarily due to stronger population growth trends that are expected to continue, as shown in **Figure 4.14**. Savannah is well located geographically to service international trade given its proximity to the ocean and major highway and rail routes.

Figure 4.14 Southern and Coastal Regions Benefit More From Demographic Trends



Source: U.S. Census Bureau.

The Southeast continues to attract new manufacturing investment and remains an area of relatively higher manufacturing employment compared to the rest of the United States, which further supports Savannah exports. Recently, a trend towards containerization of agri-bulk products has emerged, which would also support container export volumes. The forecasts shown below allow for a modest further increase in containerization.

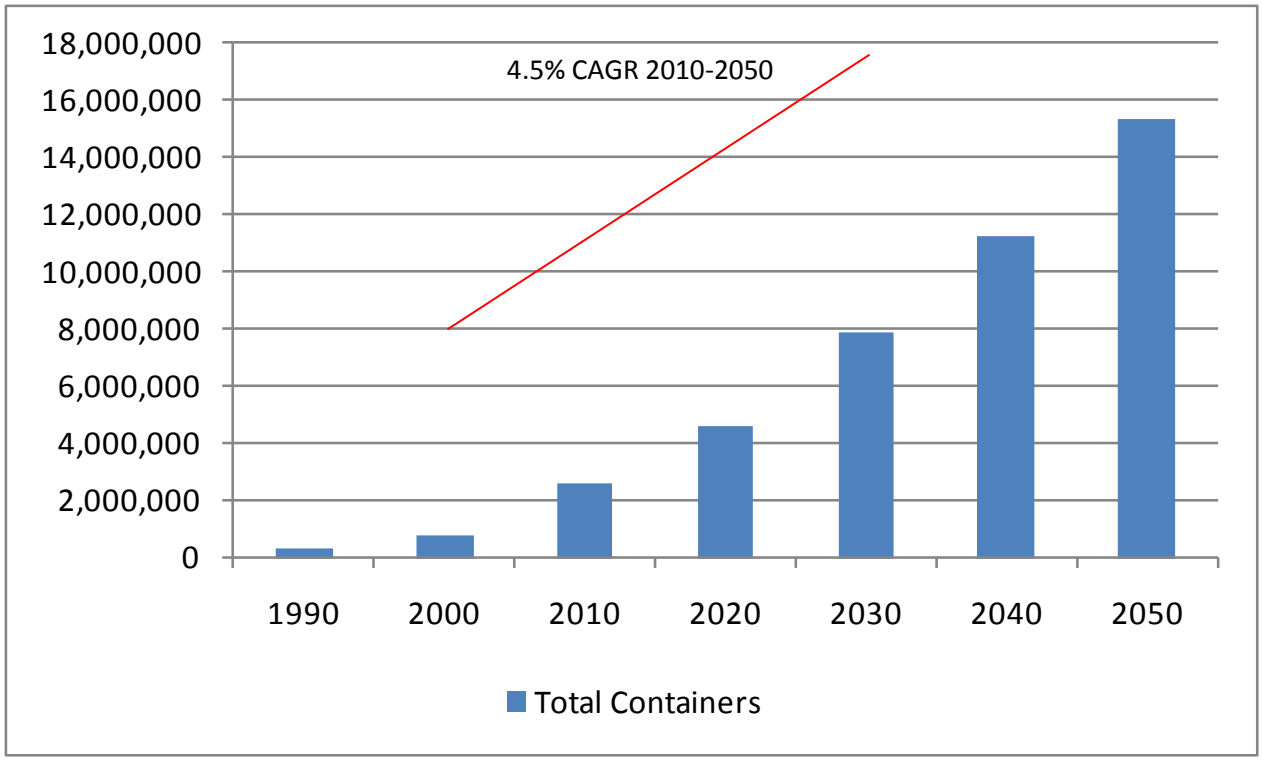
4.3. Container Forecasts

Imported container volumes are expected to continue growing due to a combination of economic growth and import substitution. While the Southeast can sustain increases in manufactured goods output, this is expected to be driven by high value added goods that use capital intensive means of production. Manufacturing of goods with lower profit margins are expected to continue to be off-shored to lower labor cost locations with faster-growing markets for manufactured goods such as Asia. For much of the forecast horizon, imported container volumes are expected to grow at a higher rate than U.S. real GDP.

As **Figure 4.15** identifies, including empty containers, total volumes are expected to reach 15 million TEUs by 2050, assuming that no constraints on capacity emerge. Underlying these

trends are forecasts for U.S. GDP to slow from its 3.1 percent pace of the two decades prior to 2008 to 2 percent towards the end of the forecast horizon due to slower population and productivity (output per capita) growth.

Figure 4.15 Unconstrained Long-Term Outlook for Savannah Container Volumes



Source: Georgia Port Authority, Project team analysis.

4.4. Ro-Ro Automobile Volumes

Except for vehicles traded with Canada and Mexico, all other imports and exports enter or exit the United States via a seaport. Terminals that handle the automobiles are referred to as vehicle processing facilities and are often operated by private enterprises such as AMPORTS which operates in Jacksonville, Brunswick and Baltimore.

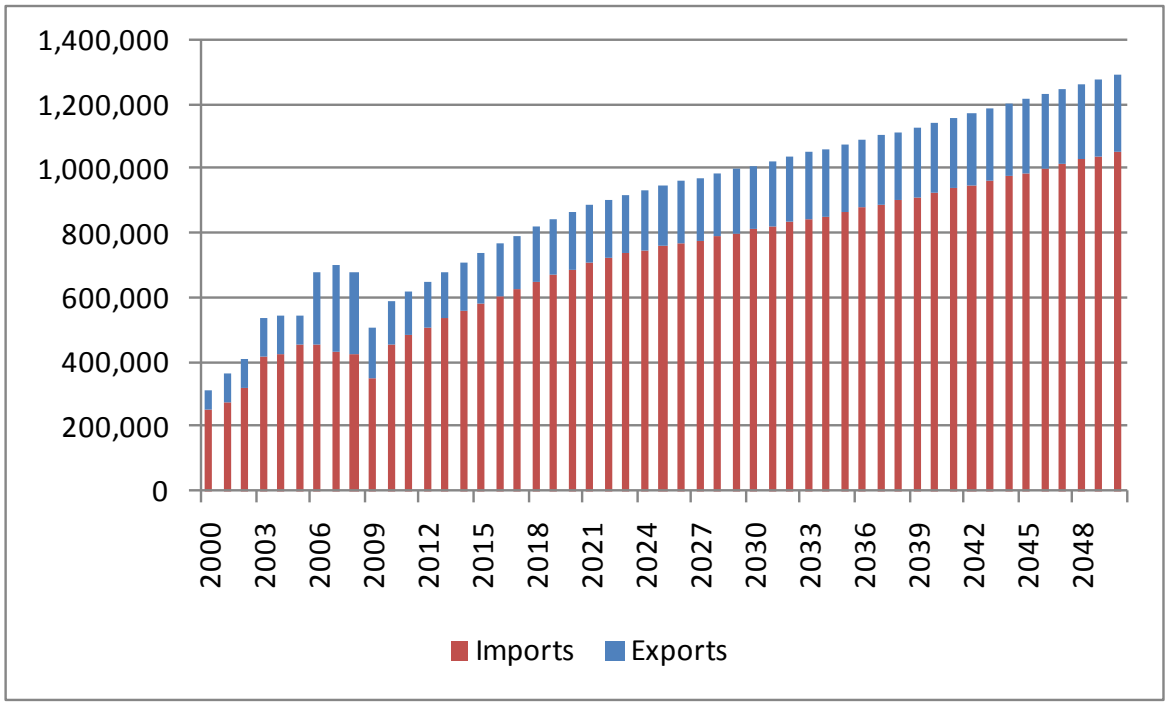
Brunswick's volumes account for approximately 5 percent of U.S. foreign trade in vehicles. Due to manufacturing relocation and demographic trends, this share is expected to increase throughout the forecast horizon.

The general background behind the outlook for GPA automobile volumes is one where total U.S. vehicle sales (cars and light trucks) are forecast to remain below 2007 levels of 16 million units until 2015. Beyond that auto sales are expected to continue to grow but more slowly than in the past several decades due to slower growth of the aging U.S. population. Imports should continue to grow faster than overall sales due to declining U.S. manufacturing capacity and low

profitability on smaller, more fuel efficient, vehicles which have increased their share of sales. Exports of larger and luxury vehicles are expected to continue to grow.

The forecasts shown in **Figure 4.16** call for imports of approximately one million units in 2050, compared to 460,000 units in FY 2010, and for exports to reach 240,000 units by 2050, compared to 130,000 in FY 2010. These forecasts do not take capacity constraints or expansion at Brunswick into consideration.

Figure 4.16 GPA Import and Export Vehicle Forecast: 1993-2050 (Units)



Source: Georgia Ports Authority, Project team analysis.

The forecasts outlined for vehicles are based on general economic trends rather than on industry-specific trends for several reasons. Competitive dynamics within the auto industry currently are unstable. The automobile industry has become increasingly global in nature in the last few decades and with the entry of large numbers of Chinese and Indian manufacturers, increasingly competitive. Governments around the world are pushing through legislation to protect the environment, which is impacting the automobile industry. Over the forecast horizon it is likely that alternative fuel vehicles, such as electric motor cars, will become the norm, with some initial phasing from pure combustion engines to hybrid gasoline/electric cars in the medium term. The rate at which the current fleet of automobiles is replaced with new ones with alternative fuels is difficult to predict. Nonetheless, current economic trends indicate that the United States is likely to become more dependent on imported manufactured goods, including automobiles.

4.5. Bulk and Break-Bulk Outlook

In addition to containers, the Port of Savannah also handles bulk and break-bulk cargos. Likewise, in addition to automobiles, the Port of Brunswick also handles a variety of bulk and break-bulk cargos. The outlook for these bulk and break-bulk volumes is detailed below. It is important to note that some factors which could affect trade trends for these cargos are by necessity not factored in these forecasts. Trade in bulk/break-bulk commodity products is often impacted by currency fluctuations and transportation fuel prices.

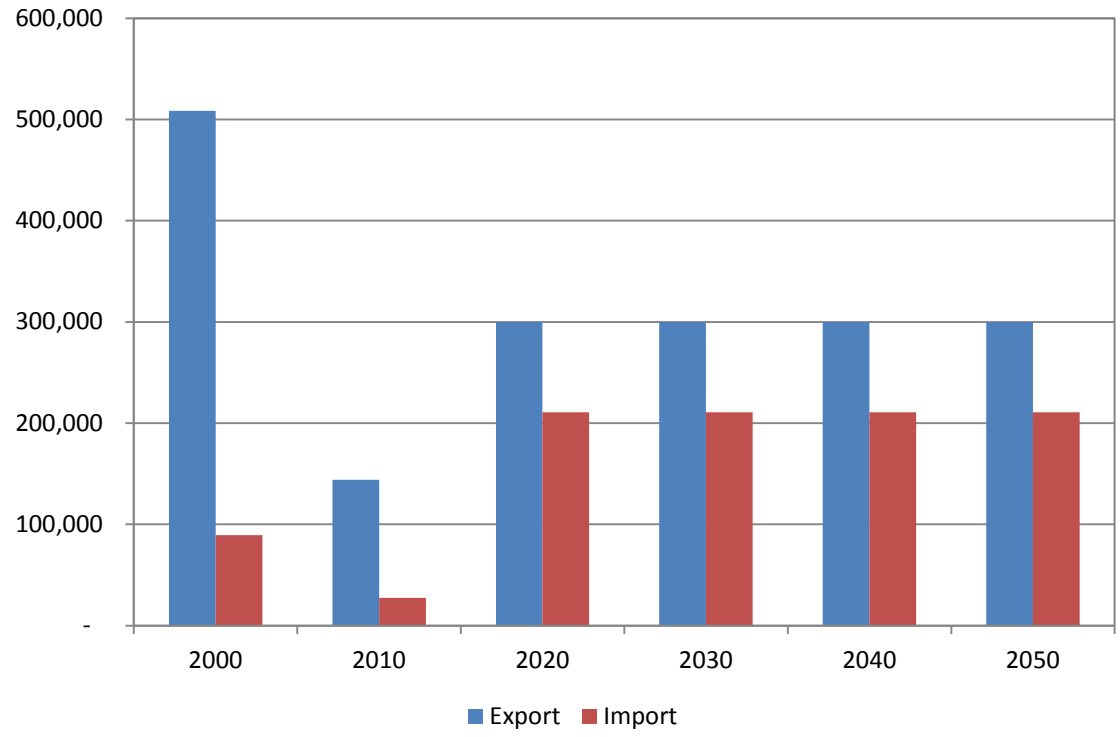
The forecasts for Savannah (Ocean Terminal) and Brunswick bulk/break-bulk exports and imports assume the U.S. dollar does not appreciate or depreciate enough to offset the impacts of income growth in the United States or in its trading partners, and that petroleum/bunker prices do not rise faster than the overall rate of inflation. Furthermore, it is possible that changes in environmental policies that impact transportation costs could negatively impact both import and export volume growth forecasts. Such events are difficult to predict and are therefore are not factored in this assessment.

4.5.1. Brunswick Break-Bulk Outlook

In addition to automobiles the terminals in Brunswick handle a variety of bulk and break-bulk cargo. The break-bulk cargo includes a wide range of cargo, however, both export and import volumes have been declining in the last several years. Exports have mostly consisted of linerboard and wood pulp, while imports have been dominated by machinery.

The forecasts indicated in **Figure 4.17** show volumes remaining at the average level of the last 10 years, for lack of evidence to indicate either continued decline or growth. No new or opportunity types of cargo are included in the forecasts.

Figure 4.17 Historical & Projected Break-Bulk Cargo Handled At Brunswick Terminals–Tons



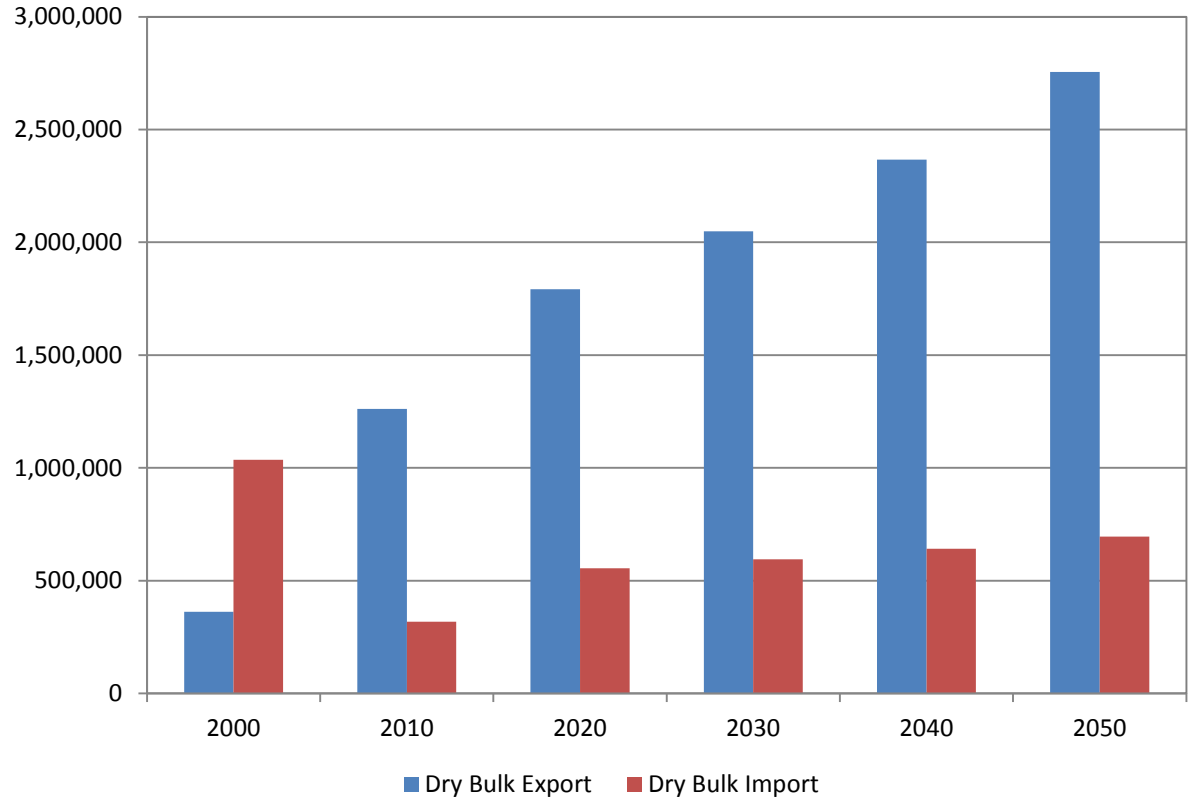
Source: Georgia Ports Authority, Project team analysis.

4.5.2. Brunswick Bulk Outlook

Brunswick terminals have handled a wide range of dry and liquid bulk products over the last few decades. The main types of exports are: animal feed, barley malt, corn, soybean meal, soybeans, wood pellets and wood chips. During the past few years, soybeans and soybean meal have accounted for close to 80 percent of exported volumes whereas in 2000, only soybeans were exported and accounted for 20 percent of volumes. Dry bulk imports consist of fertilizer, gypsum, plaster, limestone, perlite, salt and oats. Gypsum, plaster and limestone were the main imports in the last decade. Volumes of those products were supported by the real estate industry but declined with the U.S. housing market in the last few years. Import volumes, particularly of the housing-related products are expected to recover but not reach the peak levels of 2006 and 2007.

As identified in **Figure 4.18**, bulk exports, particularly of soy and wood pellets/chips are expected to continue growing faster than imports over the forecast horizon. Soy is in high demand in emerging market countries where incomes are growing faster than in developed economies and the market for wood pellets is expected to continue growing, driven by environmental policies in Europe that promote the use of renewable fuels.

Figure 4.18 Historic & Projected Bulk Cargo Volumes at Brunswick Terminals–Tons



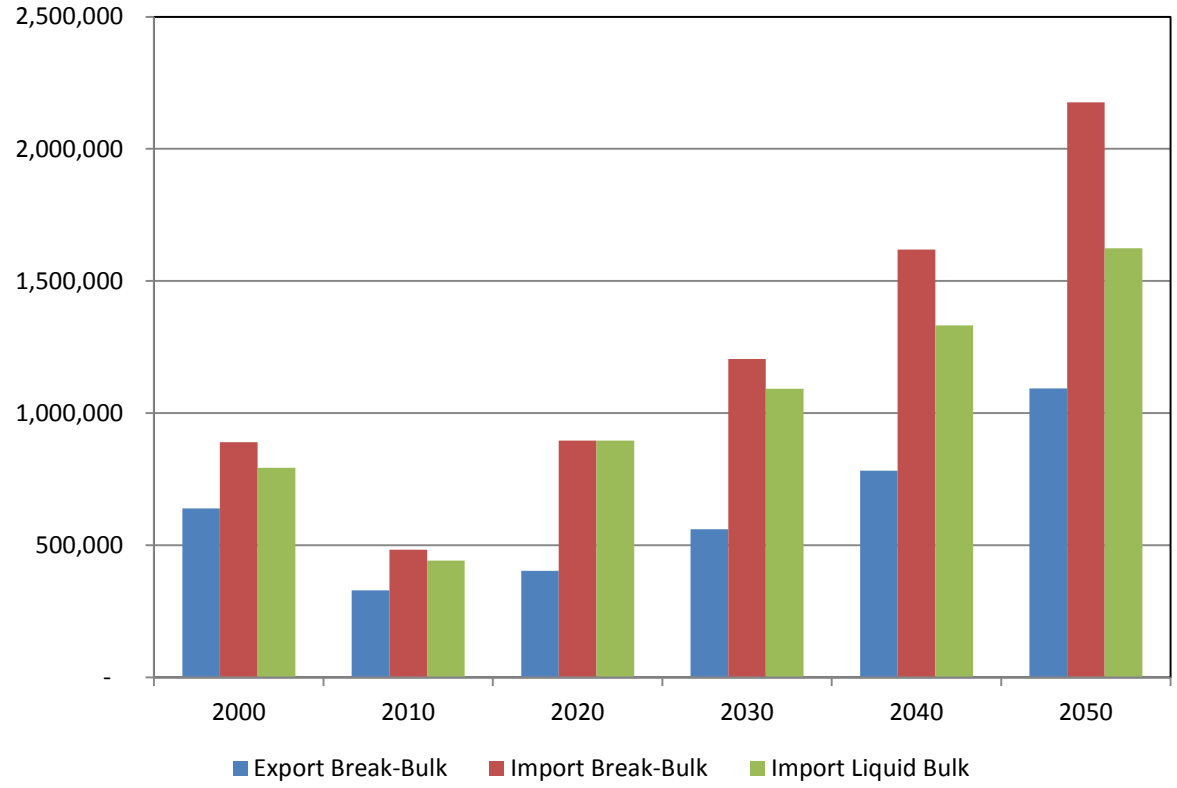
Source: Georgia Ports Authority, Project team analysis.

4.5.3. Savannah Bulk and Break-Bulk Outlook

In addition to successfully handling containers, the Port of Savannah is also responsible for the movement of autos, break-bulk, liquid, and dry bulk. Over the past 10 years, 98 different types of non-container cargo have been handled at Savannah's Ocean and Garden City Terminals.

Exports of liquid bulk and imports of dry bulk have been of a small order of magnitude compared to other types of cargo handled there. The forecasts shown in **Figure 4.19** are for break-bulk imports and exports, as well as liquid bulk imports.

Figure 4.19 Savannah Non-Container Trade Volumes, Tons



Source: Georgia Ports Authority, Project team analysis.

Savannah's main break-bulk exports are Linerboard, Wood Pulp and Machinery, which have grown at 5 percent, 17 percent, and 20 percent on average per year, respectively. Given the region's forest product base and growing industrial base, these volumes are projected to grow between 3 percent and 4 percent per year over the forecast horizon, in line with global economic growth projections.

The main break-bulk imports are Iron & Steel, Machinery and Rubber. These are projected to grow at 3 percent per year due to the region's growing automobile and other heavy farm and construction equipment manufacturing activities.

Ammonia, chemicals and vegetable oils are the main liquid bulk imports in Savannah. These are also projected at 3 percent like the main break-bulk imports.

It is possible that robust growth in container volumes may eventually constrain Savannah's capacity to handle non-container cargos. It is anticipated that such bulk and break-bulk cargos would mostly move to Brunswick facilities.

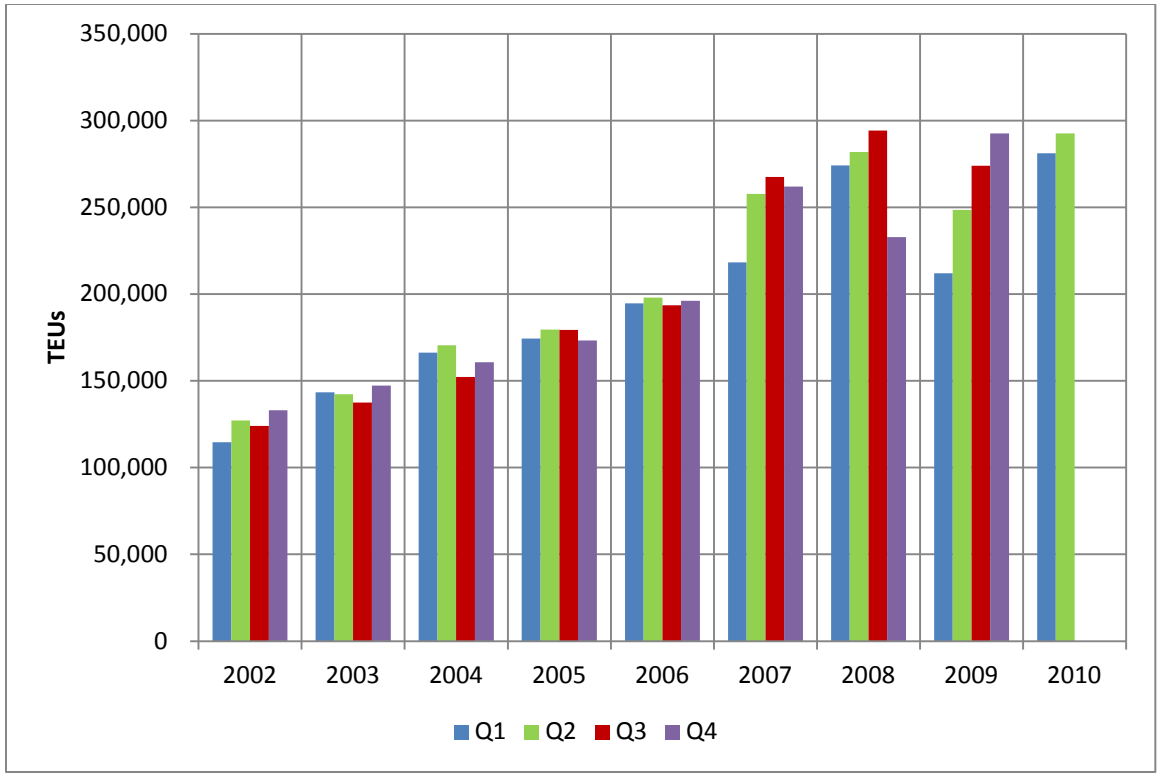
5. Demand for Deep Sea Marine Transportation

5.1. Georgia Peak Demand Periods and Impact of Current Recession

While the peak in demand fluctuates throughout the State from year to year, we have taken a look at the peak demands for the Georgia Ports Authority's Garden City Terminal. The data shown includes all gate transactions at the GCT.

Figure 5.1 shows the quarterly aggregated export volumes for the port of Savannah from 2002 up to the 2nd quarter of 2010. The chart shows that there are no quarter-specific trends; rather there is a gradual increase over time. It is important to identify the recessionary declines in 2008 and 2009.

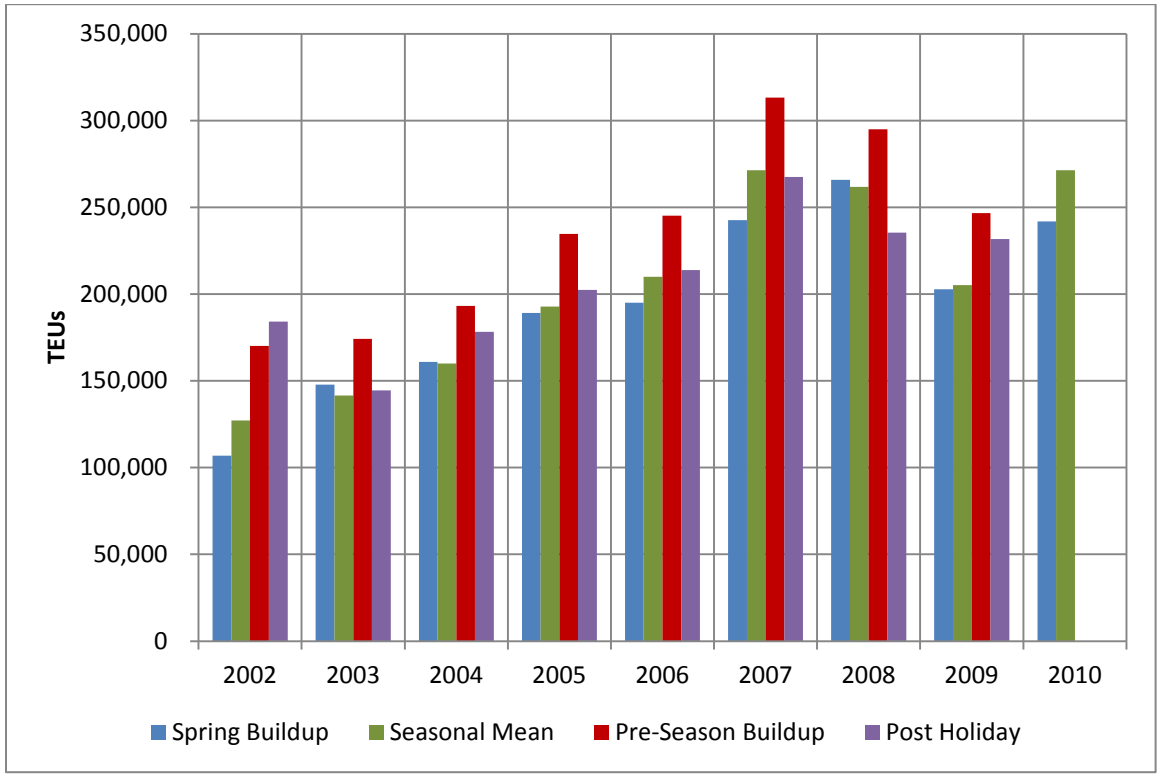
Figure 5.1 Loaded Exports for the Port of Savannah



Source: GPA/Project team analysis.

On the other hand, when analyzing the Import data, the quarters were modified to match the inventory buildup and holiday seasons. For example, the *Spring Buildup* "Quarter" spanned from February to April, the *Seasonal Mean* includes data from May to July, the *Pre-Season buildup* was considered from August to October and was the period when retailers built up their inventories for the upcoming holiday season and finally the *Post Holiday* "Quarter" was assumed to be from November to January for the next year. This data is presented in **Figure 5.2**.

Figure 5.2 Loaded Imports for the Port of Savannah



Source: GPA/Project team analysis.

Referring to **Figure 5.2** it is evident that the third quarter, the *Pre-Season buildup* accounted for the highest volumes within a year. The only exception being 2002, which could be attributed to the West Coast port 'lockouts' in October 2002, where cargo was diverted to the mid- and south-Atlantic ports. Thus the seasonality effect is clearly evident in **Figure 5.2**.

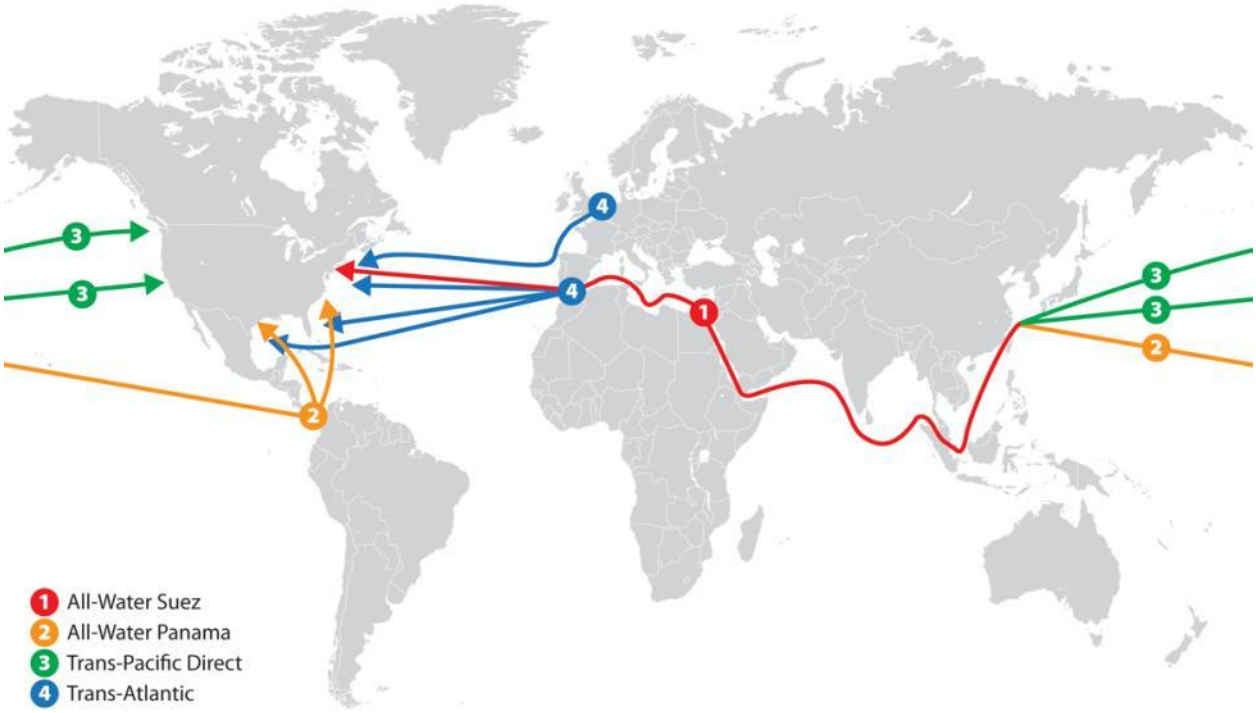
5.2. Georgia Ports Authority Ocean Connections

5.2.1. Ship Size by Trade Lane

As shown in **Figure 5.3**, GPA and other ports on the eastern seaboard of the United States serve several key East-West trade routes, including "All Water" options via the Panama and Suez Canals. Competing facilities on the East Coast have traditionally served the transatlantic trades to/from North Europe and the Mediterranean, but over the past 10 years number and frequency of Asian shipping line services have significantly increased to meet demand in the United States for Asian-sourced goods.

These different shipping line connections highlight the "connectivity" of a port with overseas trade regions. Although Europe and the Mediterranean remain a key part of trade moving to/from U.S. East Coast ports, North and South East Asia have taken a more dominant role.

Figure 5.3 Global East-West Container Shipping Trade Routes



Source: Project team analysis.

Trades to/from North-South locations, such as Latin America, Australia/New Zealand and Africa are significantly smaller in terms of vessel activity, deployment and volumes, often requiring niche specialism, as Philadelphia has developed with refrigerated cargo.

Ports on the Eastern seaboard of the United States serve both East-West and North-South deep-sea trade lanes. **Table 5.1** provides further insight into the various trade lanes linked to the Atlantic port range.

Table 5.1 Atlantic Port Range Deep Sea Trade Lanes Served

East-West Trade Lanes	North-South Trade Lanes
Transatlantic – Mediterranean	East Coast of South America (ECSA)
Transatlantic – North Europe	West Coast of South America (WCSA)
Asia All Water – via Panama Canal	Australia/New Zealand
Asia All Water – via Suez Canal	Africa
Mid East (& Red Sea, including India)	
Round-the-World/Multiregion	

Source: Project team analysis.

Note: Regional/coastal services have been excluded. The listed trade routes are regarded as deep sea.

Looking at the average ship size on a trade lane basis, **Table 5.2** outlines the recent development of routes served by Atlantic ports. In most cases the average size of ship operated has continued to increase, with the Far East, Mediterranean and Middle East & Red Sea seeing the largest increases and the biggest average size of container ship. Obviously, this continued increase in size of vessel being operated means that the access channel and berthing

depth offered by ports must be sufficient or dredged to allow the ships to continue to call or an obvious bottleneck scenario will be created, ultimately resulting in the port losing calls from a shipping line question. In essence, any port that cannot offer deep enough water will cease to appear on the schedules offered by liner companies if there is a viable alternative available in the same competing geographic region.

Table 5.2 Average Size of Ship Calling to Atlantic Ports per Trade Lane, 2008-2010

Average Ship Size (TEUs)	Q3 2008	Q3 2009	Q3 2010
Far East	4,044	4,495	4,722
North Europe	3,087	3,112	3,199
Mediterranean	3,524	4,080	4,058
Caribbean/Central America	2,661	2,211	1,950
Mid East & Red Sea	3,874	4,388	4,530
North Coast of South America	2,083	2,082	2,298
East Coast of South America	2,560	2,895	2,921
Australia/New Zealand	2,638	2,824	2,824
West Coast of South America	1,530	1,043	1,088

Source: Project team analysis, derived from published shipping line schedules Q3 2008-2010.

Most shipping line service strings tend to operate with ships of a similar size because the majority of the demand for vessel space is based on consistent contracts with shippers and projected demand gained from local sales offices. Based on published shipping line schedules, **Table 5.3** provides a summary overview of the largest individual vessel in service on each of the key trade lanes served by Atlantic ports, together with the operating ocean carrier and the maximum vessel draft that the specific ship will require (assuming it is fully loaded). There are several key conclusions to note:

- The current largest vessel able to pass through the Panama Canal waterway is generally accepted to be around 5,500 TEUs until the expansion is completed in 2015.
- The Suez Canal routing represents less of a bottleneck for ship size and the largest container ships currently in service, of up to 15,000 TEUs (on the Asia-Europe route) pass through this waterway.
- Ship sizes on North-South routes are generally smaller because of the restricting port infrastructure and water depth available in ports in Latin America and Africa. As ports in Brazil, for example, continue to dredge deeper, the largest vessels operated will also get bigger.
- MSC is prevalent in the list of shipping lines operating the largest ships. This ocean carrier is the second largest operating globally, based on TEU slots offered, and continues to aggressively expand its fleet where possible to gain better economies of scale. This trend is expected to continue in the future.

Table 5.3 Largest Size of Ship Calling to Atlantic Ports per Trade Lane

Trade Lane	Largest Ship in TEU	Shipping Line Operator	Maximum Vessel Draft – Feet
East-West:			
Transatlantic – Mediterranean	5,117	MSC	44.4
Transatlantic – North Europe	6,742	MSC	47.5
All Water – Panama	5,500	Yangming	44.4
All Water – Suez	8,400	MSC	47.6
Mid East	5,980	NYK Line	42.3
Other: Multi-region/RTW	8,200	Zim	47.6
North-South:			
East Coast of South America	5,050	MSC	44.3
West Coast of South America	4,809	MSC	44.3
Australia/New Zealand	3,100	Maersk Line	39.4
Africa	3,022	MSC	38.5

Source: Project team analysis, derived from published shipping line schedules Q3 2010.

Based on the information contained in this Section, the access channels at ports in Georgia are not deep enough to successfully receive the largest vessels in service on some trade lanes, such as All Water via the Suez Canal. As such, there is potential for the port's access to be regarded as a bottleneck in the transportation supply chain. This downside threat to the State's ports will increase further once the Panama Canal expansion is completed in 2015 when the size of ship able to use that transit waterway will also increase substantially.

5.3. Operating Strategies of Ocean Carriers and Trends

5.3.1. Container Vessels

Table 5.4 offers confirmation that in overall terms the key characteristics of container ships have continued to increase – and although this trend looks set to continue there is a ceiling that will eventually be reached, driven by the need for deeper water, larger cranes and long quays, factors that fewer ports are able to successfully accommodate. Indeed, a simple rule is that the bigger the ship gets, then the fewer the number of ports that can receive it. At the same time, historically as ships have increased in size, ports serving the vessels have also had to continuously update their supporting infrastructure and superstructure, which includes water depth at the berth and in access channels, size of cranes and supporting equipment and terminal size, yard size and configuration and gate-house operations.

Table 5.4 Historic Development of Container Ship Characteristics

Year	Length over All (LOA) (m)	Beam (m)	Draft (m)	Gross Tons (GT) – Fully Loaded Weight
1966	203	23	10.15	16,518
1976	290	32	13.0	55,889
1986	290	32	12.0	57,540
1996	318	43	14.0	81,488
2006	367	43	15.0	97,933
2012+	404	52	15.2	130,000

Source: Project team analysis.

In terms of what typical water depth requirements are for container ships, **Table 5.5** provides an outline of what can generally be expected. This should be regarded as a guide only because individual ship design components and age of the vessel will impact the figures provided, but is an acceptable reflection for the current and future size of ship calling at all ports on the U.S. Atlantic Coast. The totals listed reflect typical water depth requirements for fully loaded ships, with an additional 10 percent of the draft regarded as a general guideline for under-keel clearance.

Table 5.5 Typical Draft Requirements Based on Vessel TEU Size

Vessel TEU size	Typical Draft (ft)
2,000	34.2
4,000	42.3
6,000	45.1
8,000	47.3
10,000	49.7
12,000	53.6

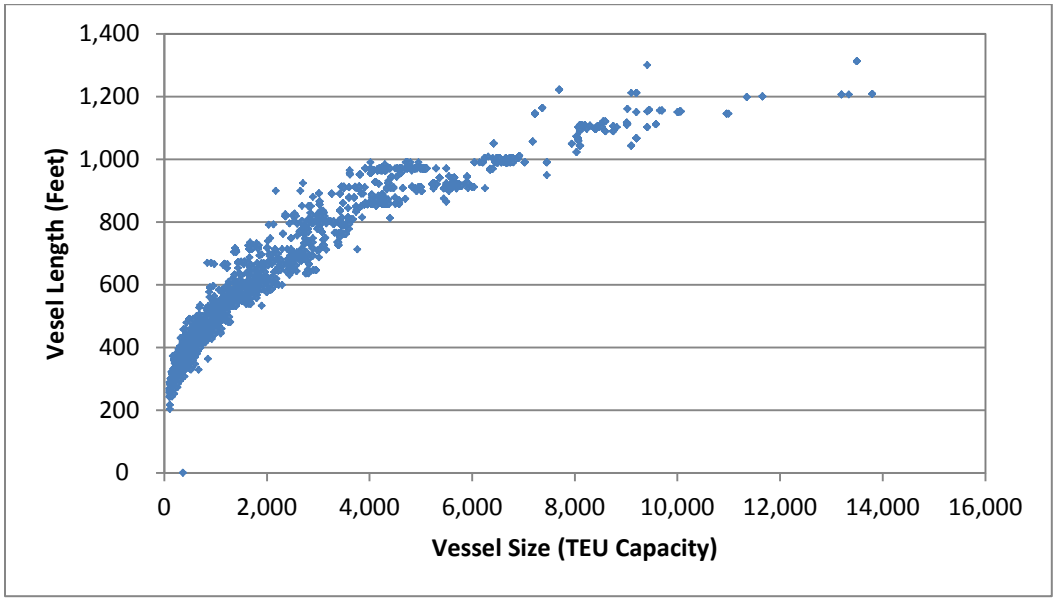
Source: Project team analysis.

NOTE: Above TEU sizes and draft requirements should be regarded as "typical" as there will always be individual ship design components causing deviation from these generally accepted figures. Ships also normally require approximately 10 percent of draft to accommodate for under-keel safety clearance.

The other useful reference for trends relating to the global container fleet that can be identified is the size of ship in relation to water depth draft requirements. As shown in **Figure 5.4**, the larger vessels will need deeper water and the majority of the existing fleet is under 8,000 TEUs, requiring a more shallow draft. This is reflective of the largest shipping line trade being intra-Asia, which uses a high proportion of smaller ships, with only Asia-Europe, and to a lesser extent the transpacific, trades serviced by the very biggest vessels.

However, the Atlantic port region is seeing the size of vessels calling continue to grow and it should be noted that the global container fleet is sufficient in size and critical mass to be able to introduce larger ships to trades served by Atlantic ports if both cargo demand and port infrastructure (notably water depth) were able to accommodate the vessels. Much larger ships already exist on a global basis and while it is not reasonable to expect to see the very largest ships in service calling to eastern seaboard facilities, due to insufficient demand, it is prudent to expect to see bigger units in the future. This means that there will be continued pressure on the port infrastructure and dredging initiatives being completed in order to accommodate the bigger ships.

Figure 5.4 Global Container Fleet by Size and Draft

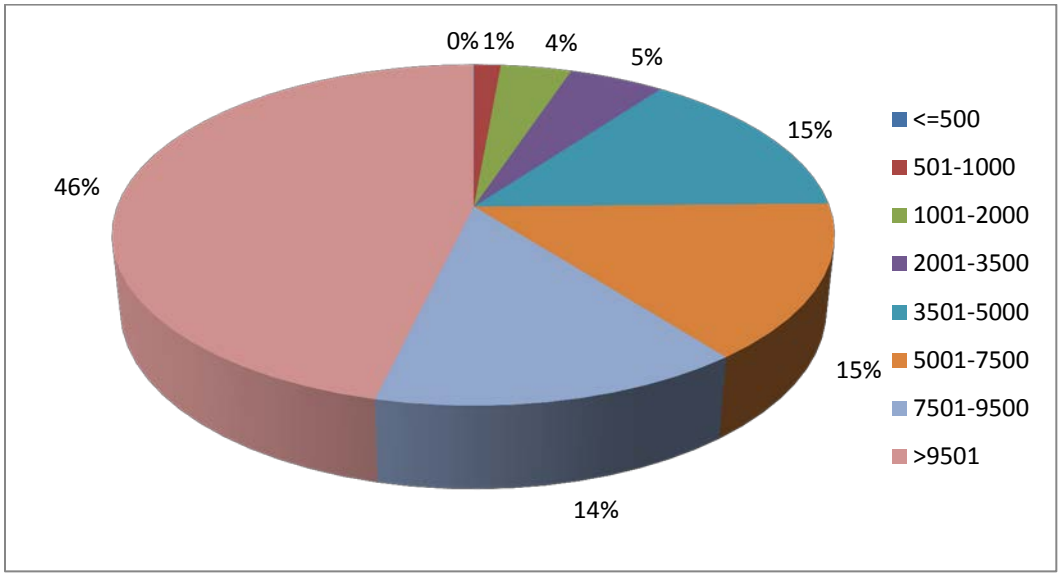


Source: Project team analysis, derived from Clarksons. 3Q2010

The role of larger container ships in the current known container order book is evident, based on **Figure 5.5**, which outlines the TEU capacity of new-builds.

The order book figures show the future of the containership fleet continuing a trend towards larger vessels. During 3rd quarter of 2010, around 46 percent of the total order book capacity related to vessels in excess of 9,500 TEU, further proving the continued shift on a global basis towards a greater use of bigger container ships.

Figure 5.5 Containership Orderbook by TEU Capacity



Source: Project team analysis

The current order books of the major container operators, shown in **Table 5.6**, indicates which ocean carriers have been more aggressive in the past – and in the eyes of some, perhaps too aggressive, based on the difficulties of some shipping lines, such as CMA CGM and Zim, for example, to meet new-build contractual obligations over the past year.

Based on the known shipping line fleets and orderbook data, it can be concluded that the ocean carrier industry will continue to look to increase vessel size where demand allows, while seeking to optimize the supply of TEU slot space with container demand. This will apply to all geographic regions, including the Atlantic Coast.

Table 5.6 Container Fleet and Order Book for Top 20 Container Shipping Lines

Shipping Line	Rank	Total Fleet TEU	Total Fleet Ships	Order Book TEU	Order Book Ships
World Fleet		**15,826,349**	**9,646**	**3,935,331**	**746**
Maersk Line	1	1,748,950	401	408,750	58
Mediterranean Shipping Co	2	1,635,758	394	353,200	32
CMA CGM SA	3	1,014,778	278	361,204	41
Evergreen Line	4	575,693	160	10,000	1
APL Co Pte Ltd	5	574,843	140	88,100	9
Hapag-Lloyd AG	6	567,942	129	56,678	7
Cosco Container Lines Ltd	7	546,819	148	340,728	42
China Shipping Container Lines	8	467,167	123	140,400	16
Hanjin Shipping Co Ltd	9	424,089	92	198,916	19
Mitsui OSK Lines Ltd	10	373,938	97	38,000	6
OOCL	11	341,920	74	51,600	6
K Line	12	337,183	85	77,730	16
NYK Line	13	330,821	70	37,200	4
Hamburg Sud	14	324,951	96	80,740	11
Yang Ming	15	314,305	75	115,222	18
CSAV	16	288,426	90	64,818	10
Hyundai Merchant Marine	17	277,822	56	1,888	1
Zim Integrated Shipping Services	18	269,528	72	180,618	19
Pacific International Lines Pte	19	214,523	98	33,054	7
CSAV NORASIA	20	192,067	40	5,086	1

Source: CI Online.

Note: Order book based on CI Online Data, 3rd Q 2010.

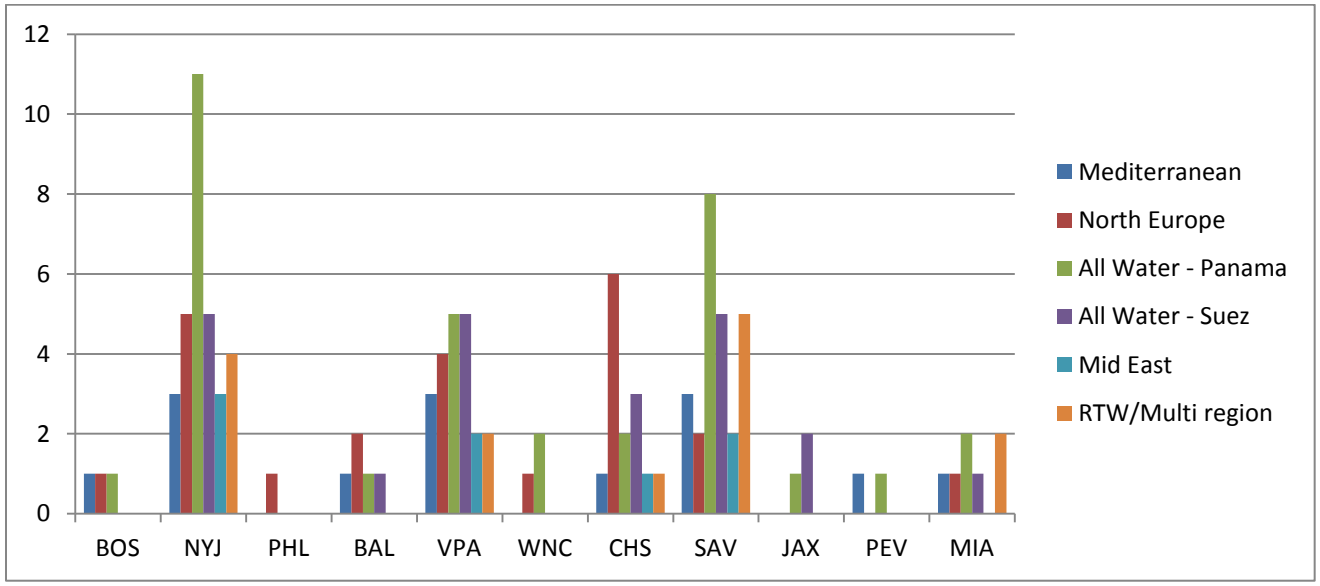
As **Figure 5.6** shows, current shipping line strategy is to utilize a range of different ports on the Atlantic Coast for each specific trade route option. This means it is commonplace for New York/New Jersey, Virginia Port Authority and Savannah; for example, to each see weekly calls from shipping lines on the same published schedule.

Other notable conclusions that can be drawn from the current strategies regarding the shipping line calls to Atlantic ports include:

- Only NY/NJ, VPA, Charleston and Savannah serve all trade lanes, which is reflective of the higher volumes handled at each of these facilities; and

- All Water from Asia via the Panama Canal and Suez Canal remains dominant in terms of the number of weekly port calls being generated.

Figure 5.6 Summary of Weekly Calls per Atlantic Port for East-West Trade Lanes



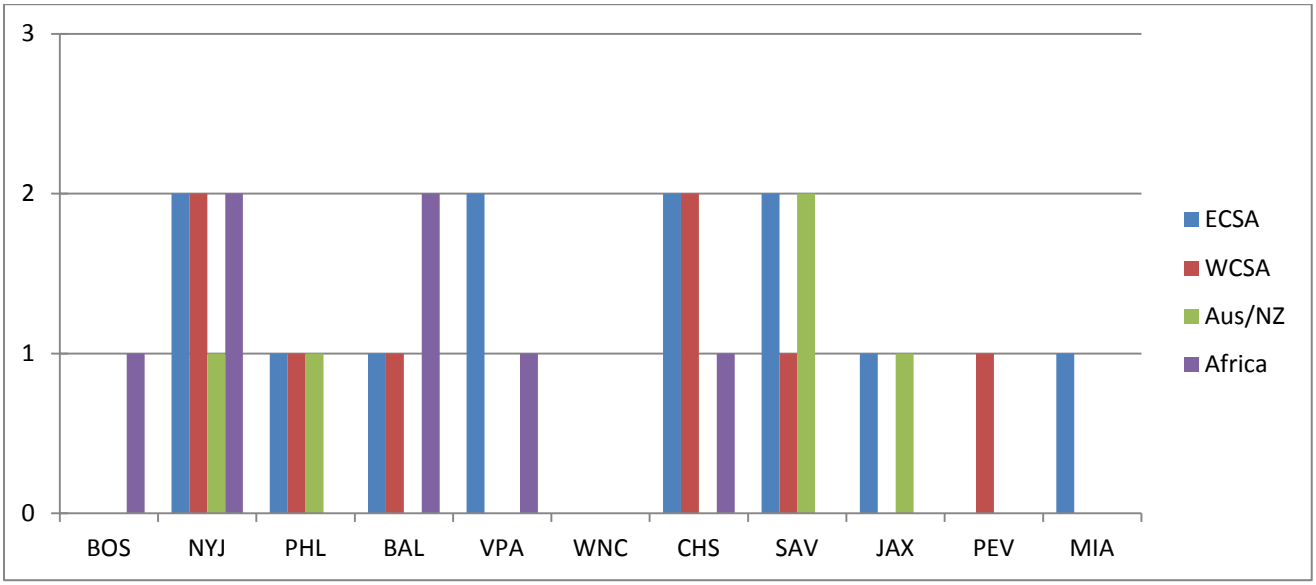
Source: Project team analysis, derived from published shipping line schedules. 3Q2010

Note: The same shipping line service will call to more than one port, so the total calls reflect multiple port calls in the same region on each service string.

The North-South trades to/from the Atlantic Coast carry smaller volumes, use smaller ships and generate fewer weekly calls. As **Figure 5.7** identifies, shipping lines are still utilizing a variety of ports across the Atlantic port range overall but the number of weekly calls in total and for all ports is much lower than for the East-West trades. Other notable conclusions include:

- NY/NJ is the only port receiving vessels serving all trade lanes and sees the highest number of calls overall; and
- Savannah and Philadelphia are on all schedules except to/from Africa.

Figure 5.7 Summary of Weekly Calls per Atlantic Port for North-South Trade Lanes



Source: Project team analysis, derived from published shipping line schedules. 3Q2010

Note: The same shipping line service will call to more than one port, so total calls reflect multiple port calls in same region on each service string.

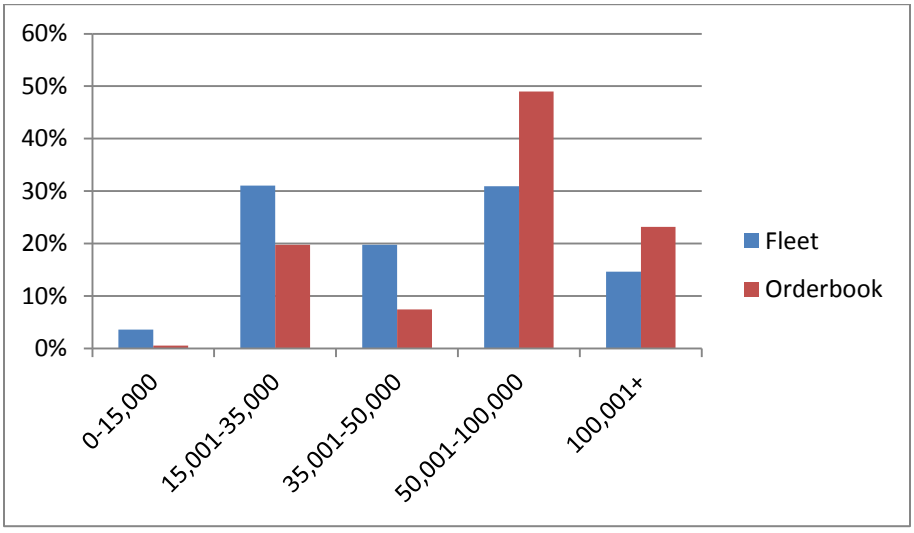
5.3.2. Noncontainerized Vessels

Most noncontainerized ships are not operating on published schedules in the same way that the container ships do and are often carrying cargo related to specific contracts, with ships chartered by the shipper directly, especially for the movement of bulk units.

As a somewhat generic trend, break-bulk and multipurpose vessels have also increased in size, as **Figure 5.8** testifies to, especially as the ships in the early days of carrying boxes were converted multipurpose units.

As **Figure 5.8** identifies, the bulk global ship fleet comprises over 30 percent of vessels in the 15,001-35,000 dwt (deadweight tonnage) classification and also between 50,001-100,000 dwt size, although in terms of the confirmed order book, the demand is clearly for larger ships, with almost 50 percent also between 50,001-100,000 dwt and over 20 percent being even larger, with the 100,001+ dwt size.

Figure 5.8 Share of Bulk Global Ship Fleet and Orderbook by Size

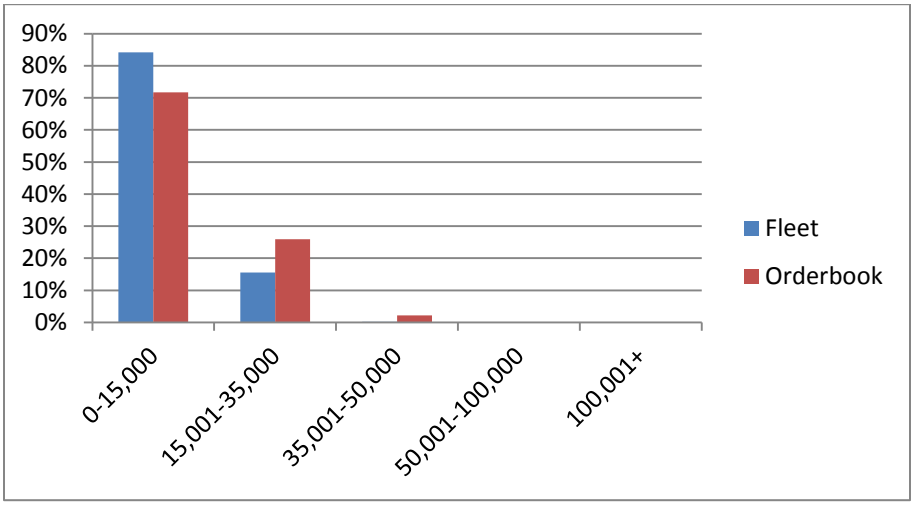


Source: Project team analysis, derived from Clarksons data. 3Q2010

Note: Ship size based on deadweight (dwt).

With respect to the multipurpose global ship fleet and orderbook, over 85 percent of all ships are less than 15,000 dwt, with the orderbook showing a similar trend for units of this same size classification with around 70 percent of future vessels the same size, as shown on **Figure 5.9**.

Figure 5.9 Share of Multipurpose Global Ship Fleet and Orderbook by Size

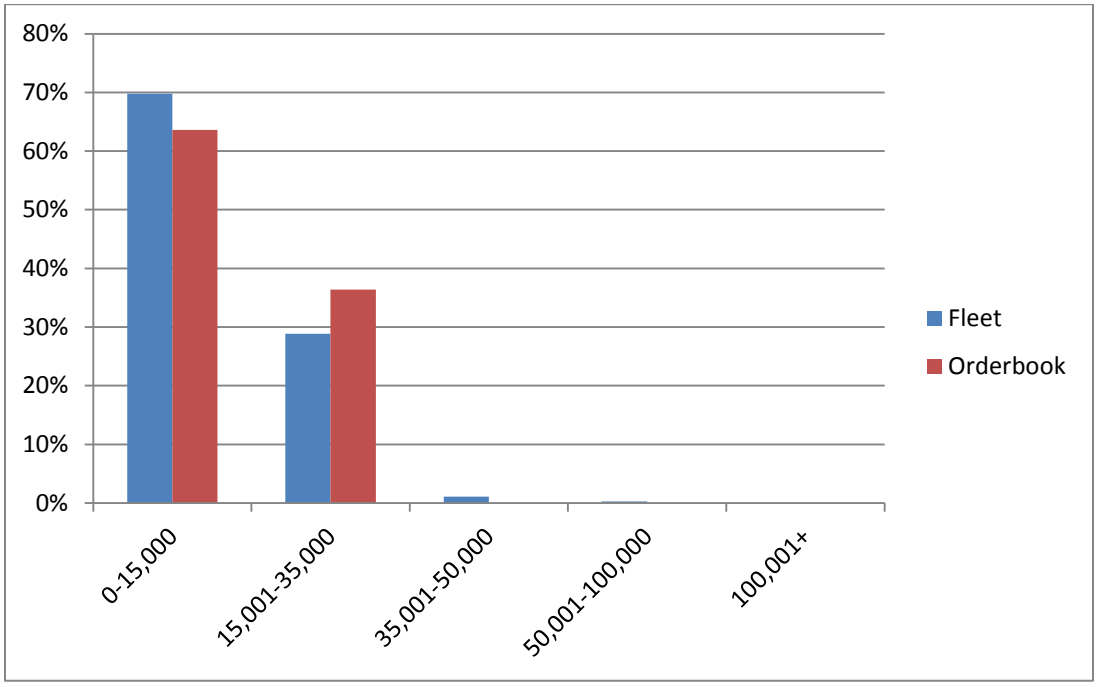


Source: Project team analysis, derived from Clarksons data. 3Q2010

Note: Ship size based on deadweight (dwt)

Of the global Ro-Ro ship fleet and orderbook, the units in service are also almost entirely smaller than 35,000 dwt. Currently, over 70 percent of the existing fleet operated is less than 15,000 dwt and over 60 percent of the known confirmed orderbook for ships of this type remain under the 15,000 dwt threshold, with the remainder less than 35,000 dwt. Refer to **Figure 5.10**.

Figure 5.10 Share of Ro-Ro Global Ship Fleet and Orderbook by Size



Source: Project team analysis, derived from Clarksons data. 3Q2010

Note: Ship size based on deadweight (dwt)

5.4. Unconstrained Potential Volumes

To estimate potential volumes at the Port of Savannah and competing Southeast ports, a review was conducted of publicly available documents, primarily through individual port authority web sites, supplemented with information from previous consultant experience.

For the purpose of this report, competing ports in the southeastern U.S. were identified as Hampton Roads (Virginia Port Authority), Port of Wilmington (North Carolina State Ports Authority), Port of Charleston (South Carolina State Ports Authority), and the Port of Jacksonville (Jacksonville Port Authority.)

Forecasts of unconstrained container volume at the southeastern U.S. ports through 2040:

Table 5.7 Unconstrained Container Volumes for South Atlantic Ports to 2040, in TEU

	Hampton Roads	Wilmington	Charleston	Savannah	Jacksonville
2008	1,971,990	196,040	1,635,537	2,616,185	718,467
2020	3,718,431	372,295	2,371,094	5,069,297	1,047,522
2030	5,764,930	620,131	3,571,933	8,087,137	1,462,524
2040	8,062,840	904,679	4,887,231	11,482,043	1,932,417

Source: Project team analysis.

These long-term container volume projections are based on analysis of long-term historical trends demonstrating that container volumes grow at more than twice GDP growth. The actual volumes observed for 2008 (and 2009 for Charleston and Savannah) were used as the starting point for the volume projections.

Generally, the growth rates are somewhat higher than those for the United States as a whole due to higher GDP growth expected in the southeast United States driven partially by higher population growth in the region. After 2025, growth rates are expected to decline closer to GDP growth due to an expected slowdown in outsourcing.

A review of publicly reported forecasts for these ports indicates the following:

- The Georgia Ports Authority estimates container volume for 2020 to be approximately 4.5 million TEU;
- A Norbridge Associates forecast for S.C. State Ports Authority projected approximately 3.5 million TEU by 2020;
- The Virginia Port Authority projects a long-term growth rate for containers of 5 percent; and
- The Jacksonville Port Authority projected container volume to grow to 1,379,800 TEU by 2020 assuming 'moderate' penetration with a 47ft deep channel. (according to JAXport Strategic Master Plan final draft (Dec 2013).

5.5. Summary SWOT

In consideration of the findings and analysis reviewed, a summary Strengths, Weaknesses, Opportunities and Threats (SWOT) assessment has been prepared in relation to GPA operations at Garden City Terminal, as Table 5.8 identifies.

Table 5.8 Summary SWOT of GPA Operations at Garden City Terminal

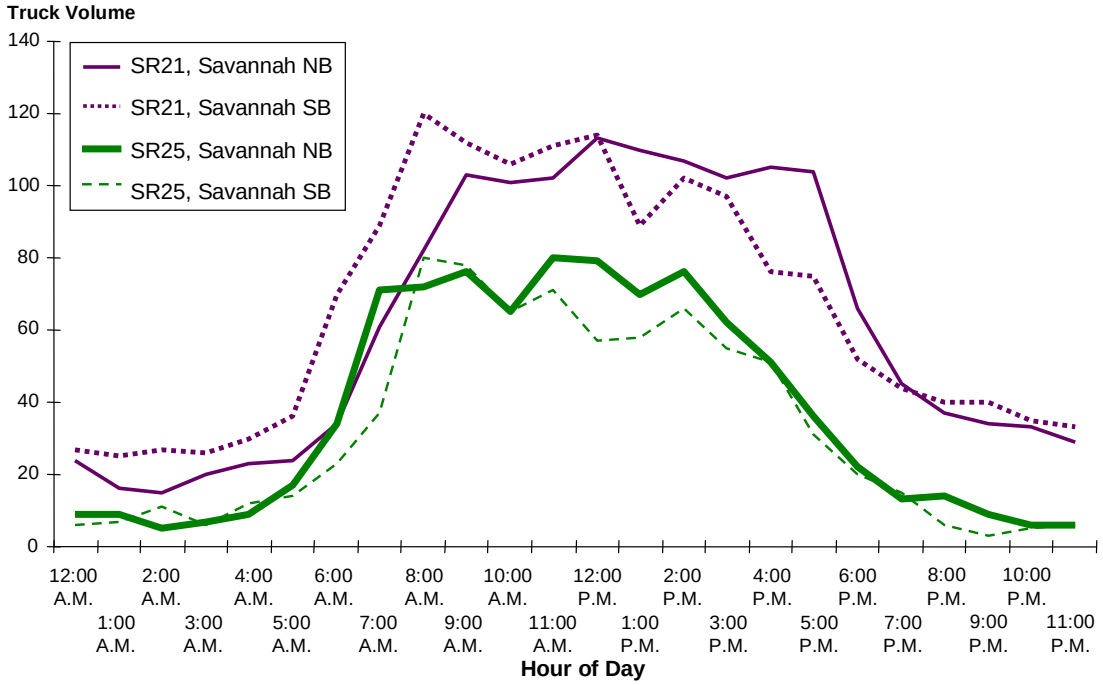
Strengths	Weaknesses
Relatively lower cost operator due to GPA operations (nonunion flexibility)	Current channel depth of 42 feet
Large single terminal offers flexibility – trucks can serve multiple shipping lines	
Good truck turn times, good gate access, rapid access gate facility	
Large array of liner shipping services from different ocean carriers across multiple trade lanes	
Two on-dock intermodal terminals (NS and CSX), serving multiple inland destinations	
Close to large, and growing, Atlanta market and the U.S. Southeast region	
Close to Interstate highways	
Largest concentration of retail import DCs on East Coast	
Balanced import-export trades offering efficiencies to liner shipping customers	
Opportunities:	**Threats:**
Growing southeastern markets in close geographic proximity to port	Expansion plans and competitive outlook of other East Coast ports
Expansion of Panama Canal can lead to capture of additional All Water cargo	Faster travel times from Asia via the West Coast and use of rail to some GPA inland markets
Growth of South Asia, including India, offerings Suez Canal growth potential	Failure to undertake and complete dredging projects to deepen shipping access channels
Wood pellets and other forest products are expected to see strong overseas demand growth	

Source: Project team analysis.

5.6. Truck and Rail Demand at Port of Savannah

As the Port of Savannah is the primary generator of truck activity in Chatham County, it is important to understand the relationship between port activity and truck trips. The 2005 GDOT Truck Lane Needs Identification Study collected vehicle classification count data at the two primary port gates at the Port of Savannah and the nearby roadways of SR 21 and SR 25. Hourly truck counts on these two roadways are shown in **Figure 5.11**. The data show a long peak between the hours of 8:00 a.m. and 4:00 p.m. and a severe drop-off during the evening and late night hours. This is consistent with the hours of operation of the port and reinforces the notion that trucks using these corridors are generated by port activity.

Figure 5.11 Hourly Truck Counts Nearby to the Port of Savannah



Source: GDOT Truck-Only Lane Needs Identification Study.

Estimates of truck volumes were calculated for 2010 and are projected out to 2050 based on port TEU throughput and constant mode split assumptions. These estimates are shown in **Table 5.9** Port TEUs were 1.76M in 2005, 2.6M in 2010 and are forecast to reach 6.5M in 2050. Additionally, in 2005 and 2010, 82 percent of throughput was transported by truck, and in 2050, 75 percent of throughput is predicted to be transported by truck (the remainder would be transported via rail). While overall cargo is expected to grow by nearly 150 percent between 2010 and 2050, truck volumes are estimated to grow by 125 percent due to the increasingly large portion of containers that are forecast to be carried by rail, as shown in **Table 5.10.**

Table 5.9 Daily Truck Counts in Savannah Region

Site	Direction	Truck Volume (2005 Count)	2010 Truck Volume (Estimate)	2050 Truck Volume (Estimate)
SR 21 Savannah	Northbound	1,494	2,238	5,043
SR 21 Savannah	Southbound	1,576	2,361	5,320
SR 25 Savannah	Northbound	901	1,349	3,042
SR 25 Savannah	Southbound	783	1,173	2,643
Port of Savannah	Gate 3	3,189	4,776	10,765
Port of Savannah	Gate 4	2,128	3,187	7,184
Port of Savannah	Gate 3 & 4 Total	5,317	7,964	17,949

Source: GDOT Truck Lane Needs Identification Study and Project team analysis

Table 5.10 Estimated Average Daily Trains Each Way

Estimated Average Daily Trains Each Way					
Mason ICTF (NS)		**Chatham ICTF (CSX)**		**Total**	
Year 2010	Year 2050	Year 2010	Year 2050	Year 2010	Year 2050
1.77	5.13	1.40	4.85	3.17	9.98

Source: Project team analysis

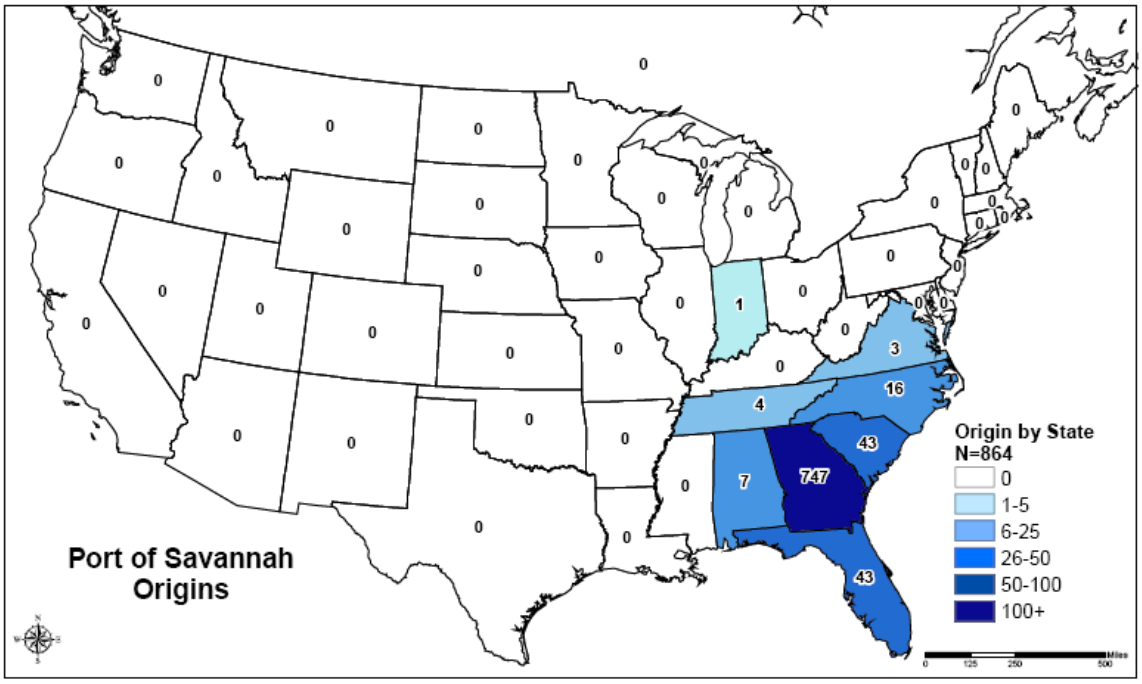
5.7. Port Gate Truck Origin-Destination Data

A series of truck origin-destination ("O/D") surveys were conducted as par of the GDOT Truck Lane Study to collect real -world information on truck movements and Origin/Destination pairs throughout the State. Of most relevance for marine transportation-related goods in Georgia were the numerous face-to-face surveys with truckers at the Port of Savannah, in cooperation of GPA: 411 surveys conducted at Gate 3 and 476 surveys conducted at Gate 4. These are the most heavily trafficked gates in the Port of Savannah representing roughly 80 percent of the total truck moves nearby in and out of the port gates.

The data collected through the port gate surveys is the most accurate available real-world depiction of the travel patterns of trucks generated due to port activity. As shown in **Figure 5**.12, the survey found that 86 percent (747 of 864 respondents) of trucks arriving to the Port of Savannah came from locations within Georgia, 5% came from the neighboring states of South Carolina and Florida, with the remainder coming from elsewhere in the Southeast (only one trucker reported originating from outside the southeastern United States.)

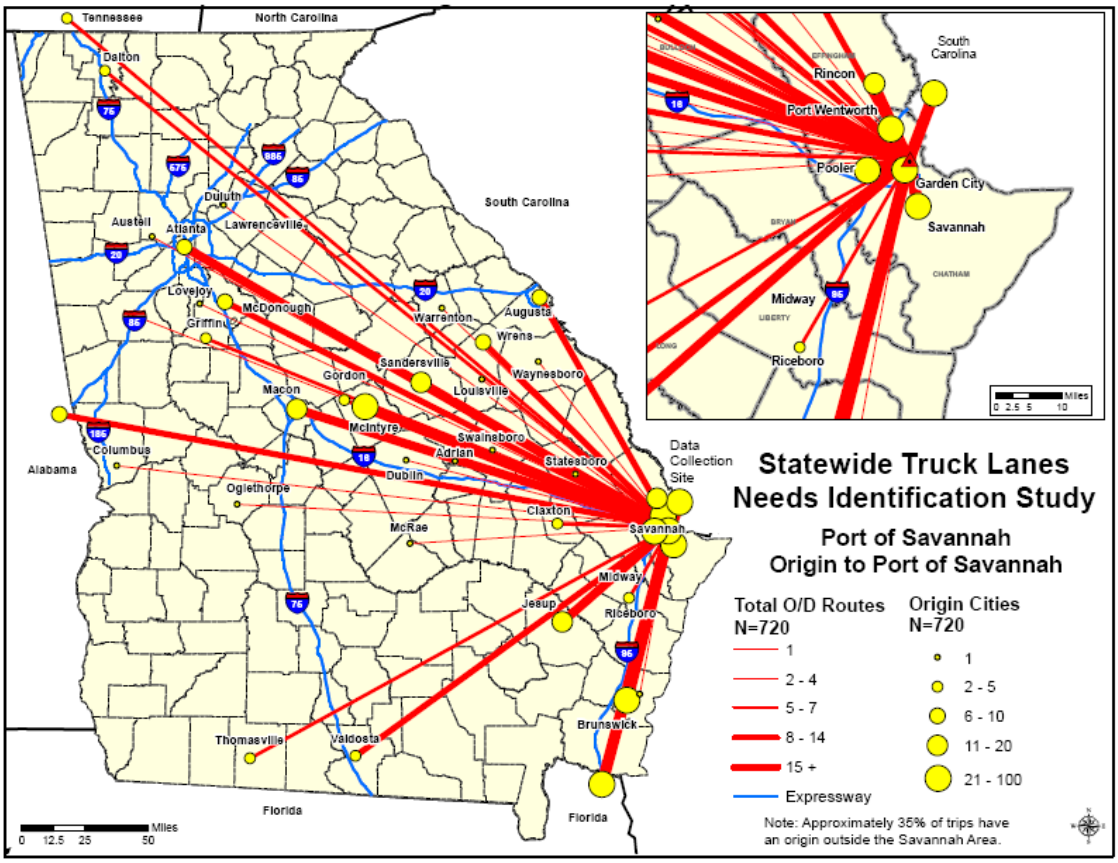
Figure 5.13 shows truck trip origins within the State of Georgia based on the port origin/destination surveys. Sixty-three percent of surveyed trucks had trip origins within Chatham County with the vast majority of those trip origins occurring within a few mile radius of the Port of Savannah, as shown in **Figure 5.14**. These survey results demonstrate that the vast majority of truck trips from the Port of Savannah are shorter-distance truck trips to/from the warehouse areas nearby to the port.

Figure 5.12 Distribution of Port of Savannah Truck Trip Origins within the United States



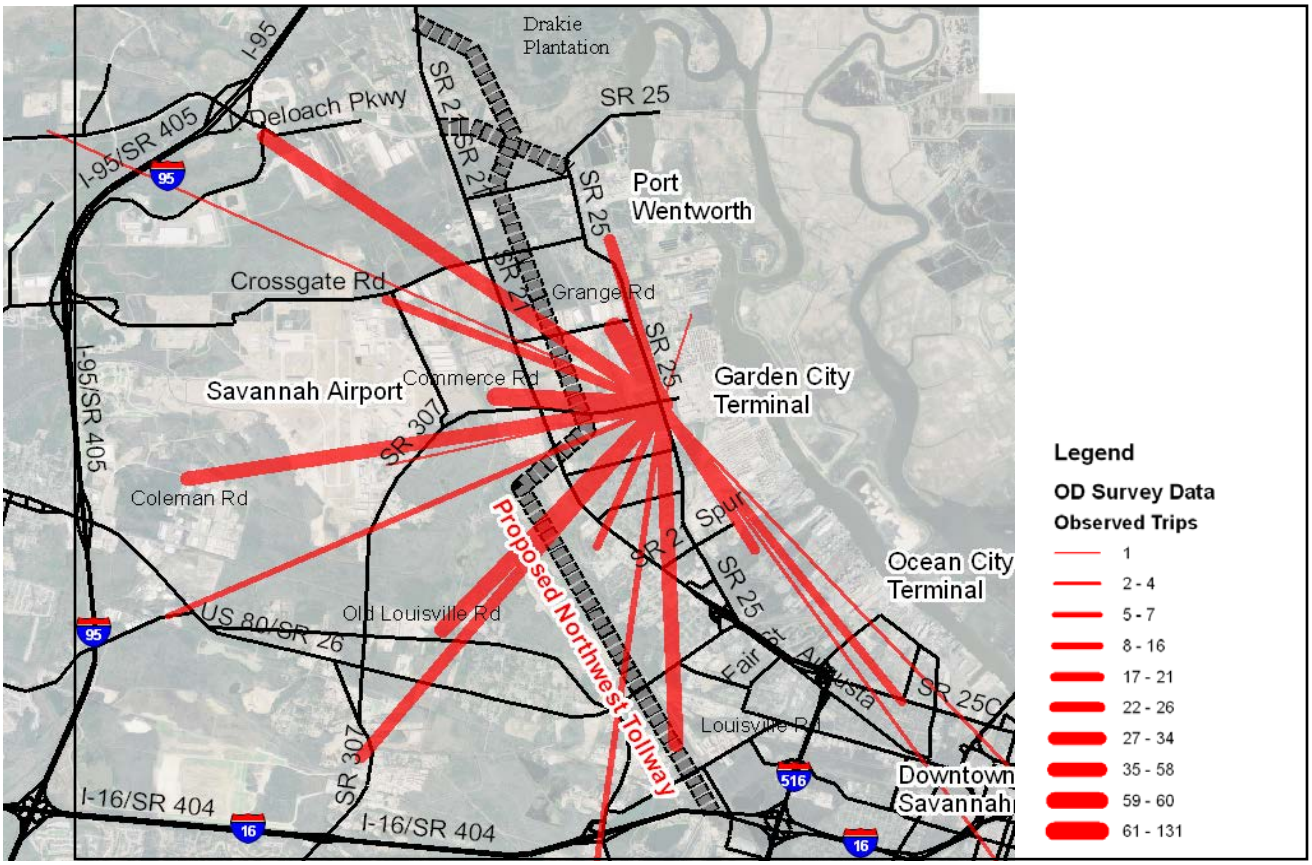
Source: GDOT Truck-Only Lane Needs Identification Study

Figure 5.13 Distribution of Port Truck Trip Origins within Georgia



Source: GDOT Truck-Only Lane Needs Identification Study

Figure 5.14 Distribution of Chatham County Port Truck Trip Origins



Source: GDOT Truck-Only Lane Needs Identification Study

5.8. Port Subarea Establishment Survey Data

The GDOT Truck-Only Lane Needs Identification Study also included a survey of a small sample of establishments in the warehouse district nearby to the port. Fifteen warehouse operators were identified for interviews for this study by the Savannah Economic Development Authority, including both facility operators that ship only their own goods and operators that ship goods for other companies. One of the primary reasons for conducting this survey was to get a general sense of what the travel patterns are for trucks as they leave the warehouses. Each warehouse operator was asked several questions, including the origin region for trucks entering the facility and the destination region for trucks exiting the facility.

As shown in Table 2 and Table 3, the vast majority of trucks leaving the warehouses were destined either for the Port of Savannah or an external region outside of Savannah. For trucks coming into the warehouses, an unweighted average of 7 percent of the trucks were coming from the Port with another 53 percent coming from external regions. For trucks leaving the warehouses, an unweighted average of 20 percent of the trucks are going to the port with 61 percent of the trucks destined for outside the Savannah region. While the sample for this survey is small, the results do indicate that the function of the warehouses is to transfer goods

from the Port to regions external to Savannah. Additionally, there is a general distribution center function of these warehouses where goods unrelated to the Port of Savannah use these facilities to store goods brought in from outside the Savannah region to be transported to other locations outside the region.

This establishment survey further indicates that typical trip chain of goods arriving to the Port of Savannah includes the following steps:

- Goods arrive to Port of Savannah;
- Goods are transferred from ships to trucks;
- Goods are delivered from the trucks to warehouses nearby to the port; and
- Goods are stored in warehouses until another truck picks up the goods for delivery to locations outside the Savannah region.

This trip chain also occurs in reverse for goods being shipped out from the Port of Savannah. It should be noted that while this is the typical trip chain, there are other important trip chains for goods related to the port. Thirty-seven percent of the trucks surveyed at the port gates leave the Savannah region. Also, a much smaller fraction of goods is shipped to one of the region's intermodal rail yards. Additionally, there is a large quantity of bulk goods that are transferred from ships directly to rail for delivery to points further inland.

Table 5.11 Origin of Inbound Trucks in Establishment Survey

Origin of Inbound Trucks	Average
Port	37%
North of Savannah Region	26%
West of Savannah Region	23%
South of Savannah Region	4%
Savannah Region	3%
Don't Know	7%
Total	100%

Source: GDOT Truck-Only Lane Needs Identification Study.

Table 5.12 Destination of Outbound Trucks in Establishment Survey

Destination of Outbound Trucks	Average
North of Savannah Region	31%
South of Savannah Region	21%
Port of Savannah	20%
Savannah Region	20%
West of Savannah Region	9%
Total	100%

Source: GDOT Truck-Only Lane Needs Identification Study.

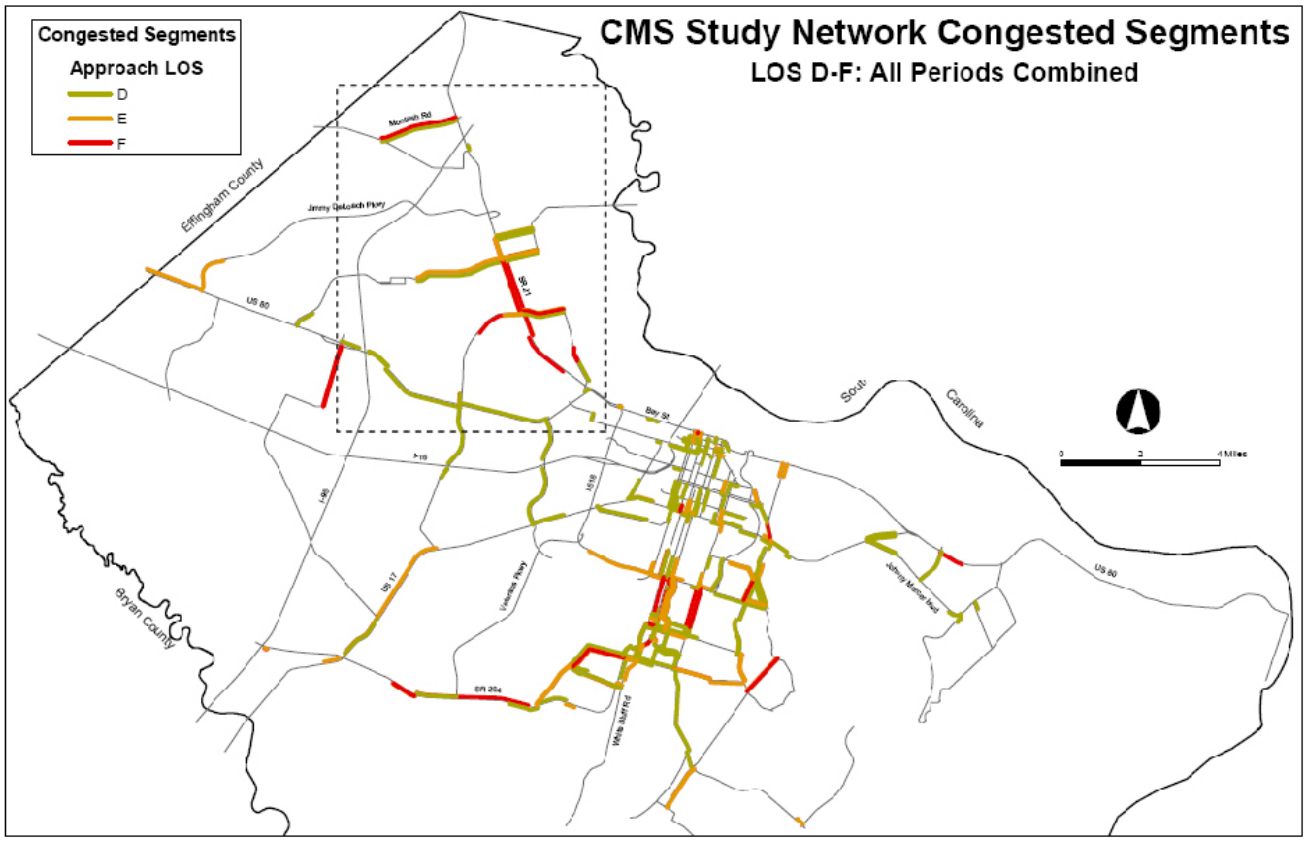
The growth estimates for trucks in the Port of Savannah subarea depict a picture of growing concern for traffic congestion in the region surrounding the port. The Chatham County-Savannah Congestion Management Study (CMS) was conducted to evaluate conditions of the existing roadway network. This study used GPS travel time runs to estimate operating

conditions on the roads surrounding the port. The results defined congested segments as those where average travel run speeds were less than 70 percent of the posted speed limit. These are shown in **Figure 5.15.** According to the CMS, the eastbound and westbound segments of SR 21 between Bonnybridge Road and just south of SR 307 are the 11th and 12th most congested segments in Chatham County. Other critical segments nearby to the Port include:

- Gulfstream Road between the Savannah Airport and SR 25 (Ocean Highway);
- Bourne Avenue between SR 25 (Ocean Highway) and just west of SR 21; and
- U.S. 80 between SR 307 and Chatham Parkway.

- Based on the results of these travel time studies, and the rapid growth forecast for the Port of Savannah, it is reasonable to conclude that there will be a significant amount of truck traffic growth on the local road system nearby to the Port of Savannah. This will impact truck and auto activity on these roadways.
- The update of the Savannah MPO's current Long Range Transportation Plan was underway; completion of the Jimmy Deloach Parkway Connector to SR 307 in May 2017 has improved traffic. This will be reflected in the next update of the Savannah MPO CMS and Long Range Trans. Plan.

Figure 5.15 Map of Chatham County Congested Locations



Source: Savannah Chatham-County 2030 Long-Range Transportation Plan

NOTE: Study area shown in dashed lines.

6. Marine System Transportation Needs

6.1. Savannah Harbor Expansion Project

The Savannah Harbor Expansion Project (SHEP) is the most critical need not only for the Garden City Terminal but also for many terminals up and down the Savannah River. The project includes the deepening of the harbor from the current 42-foot depth to 47 feet as well as improvements that would increase the efficiency and safety of cargo vessel operations. As vessels within the industry continue to get larger, there is the potential for the port's access to be regarded as a bottleneck in the transportation supply chain if the harbor is not deepened.

This limitation of the State's ports may become more evident once the Panama Canal expansion is completed in 2015, when the maximum size of the ships able to use the transit waterway will increase substantially, from around 5,500 TEU up to 12,000 TEU.

Deepening is underway with completion as early as 2020. Additional, ongoing status information is available on the Georgia Ports Authority website:
www.gaports.com/About/SavannahHarborExpansionProject.aspx

6.2 Savannah Port "Mega-Rail" Project

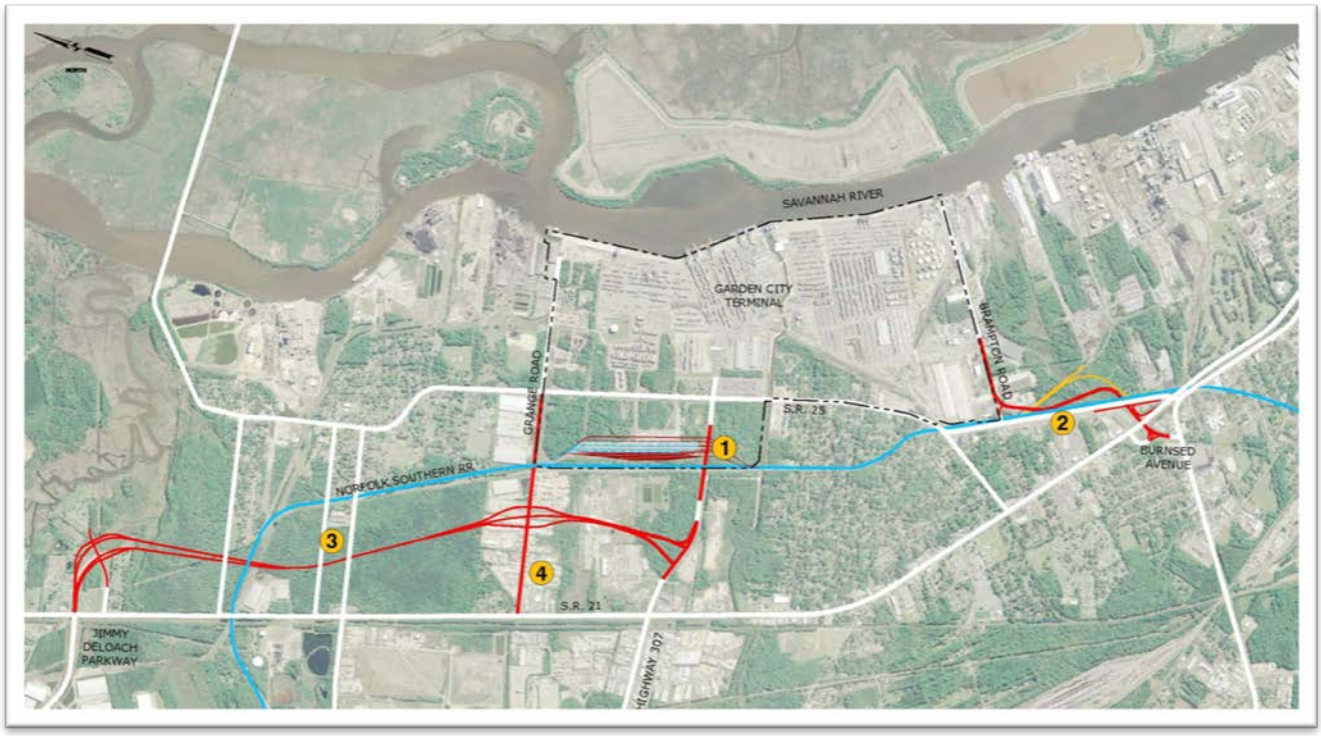
Another major improvement is to rail service on Port grounds. It will allow GPA to shift more cargo from trucks to trains, reducing highway traffic congestion. This $128 million rail expansion is funded in part by a $44 million FASTLANE grant administered by the U.S. Maritime Administration. Construction is expected to begin in 2018, with anticipated 2020 completion that will double the rail lift capacity at Garden City terminal to 1million containers per year through service from Norfolk Southern and CSX.

Additional, ongoing status information is available at www.gaports.com/About/StateofthePort.aspx In addition, the project is further discussed in the Task 5 memo.

6.2. Recommended "Last-Mile" Port of Savannah Needs

The Port of Savannah has identified the following roadway access projects to meet the current needs of Garden City Terminal, along with the demand of the terminal through 2020. **Figure 6.1** below shows the last-mile projects and the following sections describe each of the individual projects.

Figure 6.1 Last-Mile Projects



Highway 307 Overpass

NOTE: SINCE INITIAL WORK BEGAN ON THIS REPORT, THIS PROJECT WAS COMPLETED AND OPENED TO TRAFFIC IN Mid-2012.

This project shown at location #1 on Figure 6.1 proposed the construction of a bridge and approaches to carry SR 307 traffic over both the existing Norfolk Southern rail track and the existing and proposed Intermodal Facility railroad tracks. SR 307 was an at-grade crossing with the Norfolk Southern Foundation Lead track. The GPA has long-range plans to install up to 12 working tracks and eight storage tracks at the James D. Mason ICTF. Additionally, a connection from the working tracks and storage tracks on the south end of the ICTF is necessary for train movements into and out of the facility. These connecting tracks will eventually lead to 14 total tracks crossing SR 307 which would significantly disrupt efficient movement of traffic in the subarea if the overpass were not constructed. The need for the grade separation of SR 307 from the rail traffic was identified in the 1998 Chatham County Intermodal Freight Study.

This project provides a grade separation between rail and vehicular traffic. The project consists of the construction of a 930-foot long by 76-foot-wide bridge with mechanically stabilized earth (MSE) walls at each end. It contains two 12-foot-wide travel lanes in each direction, two 10-foot-wide shoulders, and an 8-foot-wide median. A temporary detour road was constructed to divert SR 307 traffic around the bridge construction site. The total project length is approximately 0.54 miles.

Brampton Road Connector

Shown at location #2 on Figure 6.1, the Brampton Road Connector would improve a route that currently serves as an access point to various industrial facilities, including Gate 3 of the GPA's Garden City Terminal. An existing Norfolk Southern railroad track (the Chatham Lead) runs parallel to the east side of SR 25 and intersects Brampton Road at grade. All traffic accessing the terminal at Gate 3, and traffic accessing the other industries located on Brampton Road, is required to cross these tracks when entering and exiting on Brampton Road. Currently, trains utilizing these tracks, especially the spur line which services the port and adjacent warehouses, can cause significant delays to trucks trying to enter and exit the terminal.

The proposed Brampton Road Connector project consists of a new 1.2-mile roadway corridor. The corridor starts at the intersection of Burnsed Avenue and SR 25 and will tie into Brampton Road east of its intersection with SR 25 and the at-grate rail crossing. The new roadway is planned to be four lanes wide with two lanes in each direction. The Norfolk Southern line will also be relocated as part of the project. These improvements are necessary to improve the safety of truck traffic into and out of the terminal from SR 25. The project will also provide direct connectivity to I-516. The project is in the Savannah MPO's current Long Range Transportation Plan with some phases in the TIP.

Grange Road Upgrades

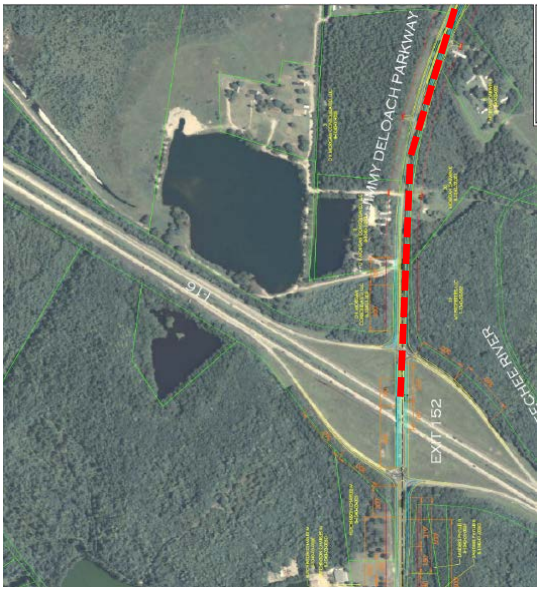
Another planned project shown at location #4 on Figure 6.1 consists of upgrades to Grange Road, which extends from SR 21 to SR 25 and then to the northern boundary of the Garden City Terminal. Grange Road currently provides access to multiple industrial facilities. The current proposed improvements consist of the widening of approximately one mile of roadway from SR 25 to SR 21. The project was let in 2015 and is now under construction.

NOTE: SINCE INITIAL WORK BEGAN ON THIS REPORT, CONSTRUCTION HAS COMPLETED.

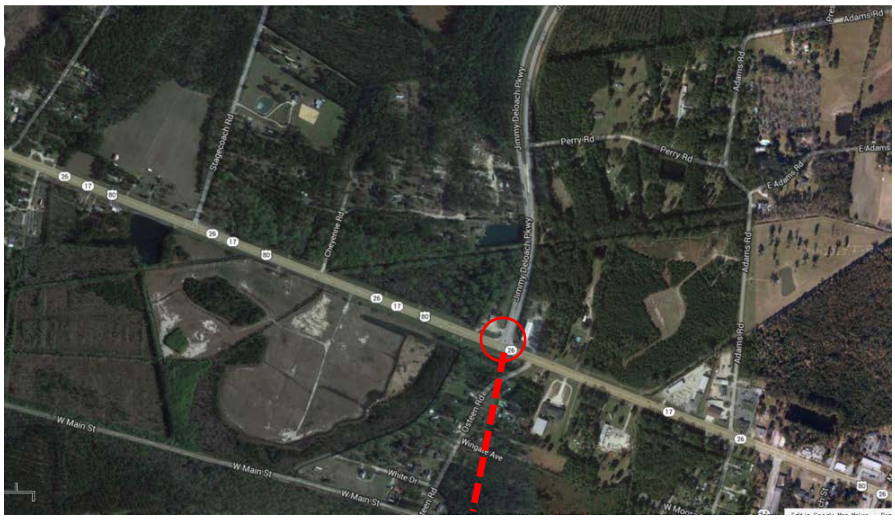
and Jimmy Deloach Parkway. The project will be approximately 3.1 miles in length with a typical section consisting of four 12'-wide lanes (two in each direction) separated by a median.

Jimmy Deloach Parkway: Phase II extension and Interchange at US 80

From the Port area, Jimmy Deloach Parkway continues from west across I-95 and connects to an area with many exsiting and planning warehouse/distribution and logistics-related businesses. The Savannah MPO's current Long Range Transportation Plan and TIP includes two proposed projects to improve this corridor south to I-16 and add an interchange at US 80. These projects further support the growth at the Port of Savannah and provide Port-related trucks more efficient access to the Port, current and proposed warehouse/logistics businesses, and existing interstates. Below are images showing the general southern limit of the Phase II portion (at I-16) and the general northern limit and proposed interchange at US Route 80.



Jimmy Deloach Parkway Phase II (showing southern terminus at I-16)



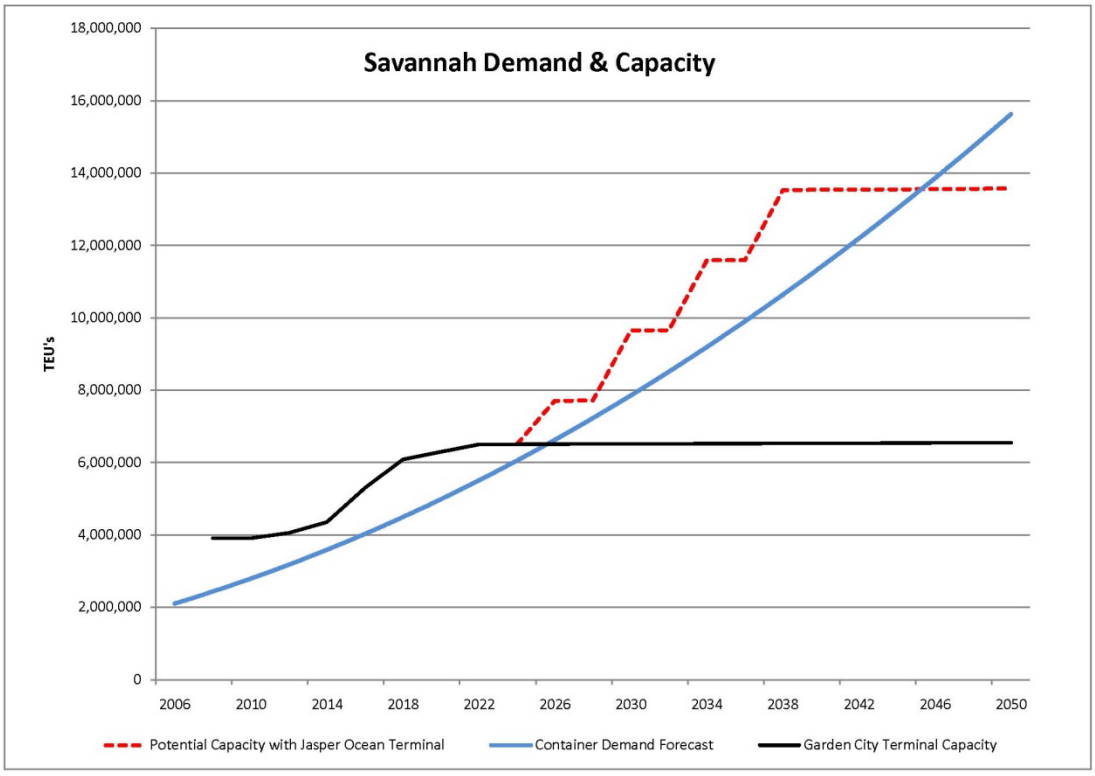
Jimmy Deloach Parkway interchange at US 80 (also showing the northern terminus of Phase II project)

6.3. Need for an Additional Port in metro Savannah (a.k.a. proposed "Jasper Port")

For Georgia and particularly Savannah, containerized trade is a significant percentage of total volume of imports and exports. It is anticipated that by 2050 there will be a demand of approximately 15 Million TEU's. As **Figure 6.2** shows, the capacity of the Garden City Terminal is 6.5M TEU's. Assuming current capital and infrastructure is in place to accommodate this future demand, additional capacity will be needed. As mentioned previously, the states of Georgia and South Carolina are in the conceptual planning phase of the tentatively planned future Jasper Ocean Terminal located in Jasper County South Carolina, which could accommodate some of this container demand.

In June of 2015, the Georgia Ports Authority and the South Carolina Ports Authority each committed to contributing $1.25 million to the FY 2016 work plan for the proposed port. The work plan for the year will consist of further studies of the site design, sediment, access corridor and channel improvements necessary for the largest container ships, as well as efforts to initiate the environmental im pact study.[2] Additional info on project is in Task 5 Recommendations report.

Figure 6.2 Savannah Demand versus Capacity



[2] http://m.savannahnow.com/exchange/2015-06-25/portside-jasper-ocean-terminal-plans-progressing#gsc.tab=0

6.4. Long-Term Road and Rail Access Needs

As a result of the significant long-term growth in container traffic forecast in the Savannah region, the road and rail access networks also will have significant long-term needs. The proposed "last-mile" road projects and the deepening of the Port of Savannah address container growth needs through 2020. However, to address access issues through 2050, a long-term vision of road and rail access needs to be developed and implemented.

This report has provided information on truck access to the Garden City Terminal based on port gate surveys of trucks and establishment surveys of warehouses and distribution centers nearby to the Port. However, a more comprehensive study of truck trip patterns from the Port needs to be conducted:

- Update truck trip travel patterns from the port. Origin-destination survey data was collected in 2006 and needs to be updated.
- Gather more comprehensive information on truck trips to and from warehouses and distribution centers within the area serviced by the Port;
- Incorporate land use data and economic development data into understanding the likely locations of future warehouses and distribution centers;
- Develop a truck route network in the Port subregion that matches with the long-term growth forecast of the Port;
- Gain a more thorough understanding of the long-term rail access needs in Savannah along with available land use to accommodate increased usage.

6.5. Port of Brunswick Needs

The Port of Brunswick, comprised of the East River Terminal, Lanier Docks, Mayor's Point Terminal and the Colonel's Island Terminal has a good infrastructure network from a rail and roadway perspective. In 2002, GDOT opened the new Sidney Lanier Bridge which carrys US Route 17 over the Brunswick River replacing the previous lift bridge which caused delays in vessel access. Additionally, in 2008 GDOT completed the US Route 17 overpass at the entrance to the Georgia Ports Authority Colonel's Island Terminal which allowed it to access and develop additional terminal space south of US Route 17, without having to conflict with traffic on US Route 17.

The roadway and rail infrastructure at the Colonel's Island Terminal is sufficient to meet the current freight volumes and it is anticipated that the roadway infrastructure will also be adequate to meet future volumes. However, based on interviews of Georgia Ports Authority staff, it is anticipated that the rail spurs and storage yards will need to be upgraded in the future to accommodate anticipated increases in volume.

Another particular issue at the East River Terminal and Lanier Docks is the rail access. Currently, there is only one rail access route which goes through downtown Brunswick; this lead also includes multiple at-grade crossings. The lead is shared by Norfolk Southern and CSX from the City yard to the Mayor's Point Terminal. In order to accommodate future demand at the East River Terminal, it is anticipated that additional upgrades will need to be implemented on rail access in the corridor. Roadway access into East River Terminal is considered sufficient: southbound I-95 traffic accesses the terminal via SR 25 and US Route 17; northbound I-95 traffic accesses the terminal via US Route 17. However, it should be noted that the last half mile of roadway prior to entering the gate is routed through a residential neighborhood. This has the potential to cause future conflicts between rail movement and residential activities.

Mayor's Point Terminal has sufficient roadway access off of Bay Street/US Route 341 and provides direct access to I-95 via US Route 17/SR 25. The rail access has similar challenges as the East River Terminal.

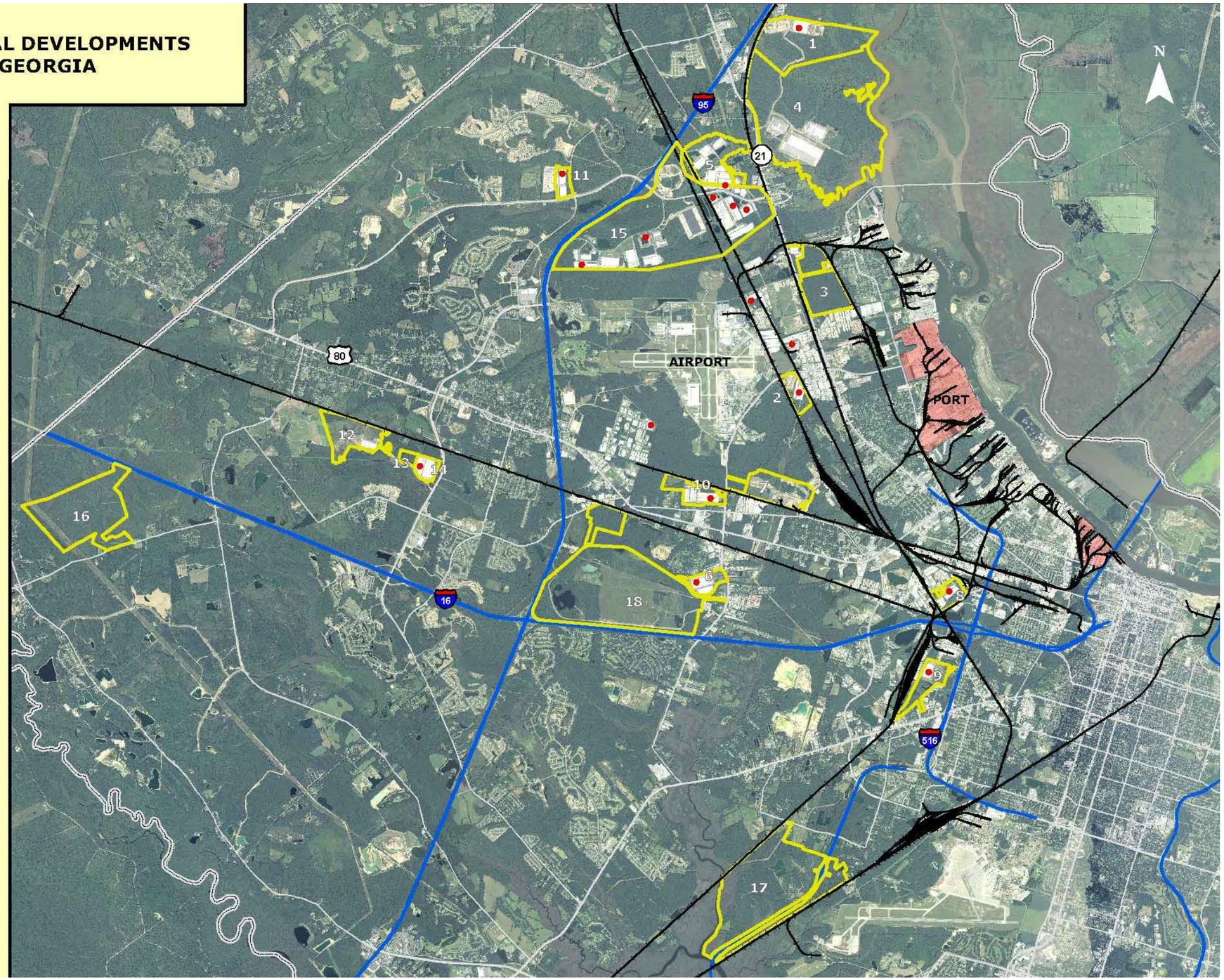
6.6. River Ports Needs

The primary need for Georgia's river ports and waterways is a positive resolution of the water issues between Georgia, Alabama, and Florida. The inland ports do not have sufficient water to operate efficiently, but they do have the potential to handle additional traffic and support nearby businesses if water can be restored at these locations. The inland ports at Columbus and Bainbridge currently have a sufficient roadway and railroad network to meet the current volumes; it is anticipated that by the year 2050 they would also have sufficient capacity based on the assumption that water issues would not improve their opportunity for goods handling.

7. EXHIBITS

SAVANNAH AREA INDUSTRIAL DEVELOPMENTS
CHATHAM COUNTY, GEORGIA

1	NorthPort	Solution Property Group
2	WestPort	Solution Property Group
3	Crossgate	Solution Property Group
4	Savannah River Int'l Trade Park	Georgia Ports Authority
5	Crossroads Expansion	Duke Realty
6	LogistiPort	DP Partners
7	CenterPoint IntermodalCenter	CenterPoint Properties
8	Georgia Commerce Center Telfair	McDonald Development
9	Tremont Intermodal Center	Johnson Development
10	Dean Forest Bus. Center	NorthPoint Industrial
11	Tradeport Business Center	Commonwealth Comm.
12	AMB Morgan Business Center	AMB Property Corp.
13	Morgan Industrial Site	Commonwealth Comm.
14	Savannah Logistics Park	Alexander & Baldwin
15	Crossroads Bus. Center	SEDA/IDI
16	Newton Tract	Harry Kitchen
17	Rockingham Farms	Wardlaw
18	Megasite	State of Georgia



Rail
County Boundary
Interstates
Industrial Development
Available Industrial Space (>100,000 sq. ft.)

Miles
0 1 2 4

Prepared by

Savannah Economic Development Authority
www.seda.org

Updated June 2010.
SEDA makes no guarantee as to the accuracy of information provided herein.

NORTH

GDOT FREIGHT & LOGISTICS PLAN
SAVANNAH AREA INDUSTRIAL DEVELOPMENTS AERIAL
CHATHAM COUNTY, GA

EXHIBIT 2.4

UNITED STATES – EAST COAST

SOUTH CAROLINA – GEORGIA

SAVANNAH RIVER AND WASSAW SOUND

Mercator Projection
Scale 1:40,000 at Lat 32° 00'

North American Datum of 1983
(World Geodetic System 1984)

SOUNDINGS IN FEET
AT MEAN LOWER LOW WATER

For Symbols and Abbreviations see Chart No. 1

Additional information can be obtained at: nauticalcharts.noaa.gov

HORIZONTAL DATUM

The horizontal reference datum of this chart is North American Datum of 1983 (NAD 83), which for charting purposes is considered equivalent to the World Geodetic System 1984 (WGS 84). Geographic positions referred to the North American Datum of 1927 must be corrected an average of 0.16s northward and 0.63s eastward to agree with this chart.

CAUTION

The Tide Gate will operate automatically; therefore, the areas upstream and downstream of the gate have been designated restricted areas and are marked by a line of buoys.

SOURCE DIAGRAM

The outlined areas represent the limits of the most recent hydrographic survey information that has been evaluated for charting. Surveys have been banded in this diagram by date and type of survey. Channels maintained by the U.S. Army Corps of Engineers are periodically resurveyed and are not shown on this diagram. Refer to Chapter 1, United States Coast Pilot.

SOURCE		
A 1990-2005	NOS Surveys	full bottom coverage
B1 1990-1995	NOS Surveys	partial bottom coverage
B2 1970-1989	NOS Surveys	partial bottom coverage
B4 1900-1939	NOS Surveys	partial bottom coverage

SEDIMENT TRAPS

Sediment traps are designed to relay shoaling of the navigable portion of a channel by trapping advancing littoral material. Sediment traps may shoal at a rapid rate spilling over into the adjacent navigation channel, therefore, mariners should exercise caution when operating near them.

SAVANNAH RIVER CHANNEL DEPTHS

TABULATED FROM SURVEYS BY THE CORPS OF ENGINEERS - REPORT OF DEC 2007

CONTROLLING DEPTHS FROM SEAWARD IN FEET AT MEAN LOWER LOW WATER (MLLW)						PROJECT DIVISIONS	
NAME OF CHANNEL	LEFT OUTSIDE QUARTER	LEFT INSIDE QUARTER	RIGHT INSIDE QUARTER	RIGHT OUTSIDE QUARTER	DATE OF SURVEY	WIDTH (Feet)	LENGTH (NAUT. MILES)	DEPTH MLLW (FEET)
TYBEE RANGE	44.0	45.0	44.0	43.0	11-07	500	3.0	44
BLOODY POINT RANGE	43.0	45.5	45.5	43.5	11-07	500	5.0	44
JONES ISLAND RANGE	44.0	45.5	45.5	44.0	11-07	500	1.2	44
TYBEE KNOLL CUT RANGE	44.0	45.0	44.0	42.5	11-07	500	2.5	42
NEW CHANNEL RANGE (A)	38.0	41.0	42.0	42.0	12-07	500	1.5	42
L. I. CROSSING RANGE	41.0	42.5	42.5	42.0	12-07	500	2.5	42
LOWER FLATS RANGE	42.5	43.0	44.5	38.5	12-07	500	1.3	42
UPPER FLATS RANGE	43.0	44.5	44.0	43.5	12-07	500	1.2	42
THE BIGHT CHANNEL	44.0	46.0	46.0	46.0	12-07	500	1.5	42
FT. JACKSON RANGE	44.5	47.0	46.5	41.0	12-07	500	6.1	42
COLETHORPE RANGE	38.0	43.5	43.0	44.0	12-07	500	1.2	42
WRIGHTS CHANNEL (B)	42.0	43.0	46.0	42.0	12-07	500	1.5	42
CITY FRONT CHANNEL	43.0	45.0	44.0	37.0	12-07	500	1.5	42
MARSH ISLAND CHANNEL (C)	38.01	42.5	44.0	41.0	12-07	500	1.7	42
KINGS ISLAND CHANNEL (D)	39.0	41.0	42.0	41.01	12-07	500	3.1	42
WHITEMARL CHANNEL (E)	30.0	30.0	30.0	30.0	12-07	500	9.5	40-26
PORT WENTWORTH CHANNEL (F)	30.01	30.0	32.0	32.0	12-04/ 12-07	200	1.2	36

A. OYSTER BED I. TURNING BASIN-CONTROLLING DEPTH 43.0 FT, 38.0 FT 100 FT FROM BACKSIDE.
B. FIG ISLAND TURNING BASIN-CONTROLLING DEPTH 39.0 FT, 37.0 FT I 100 FT FROM BACKSIDE.
C. MARSH ISLAND TURNING BASIN-CONTROLLING DEPTH 34.0 FT, 29.0 FT 100 FT FROM BACKSIDE.
D. KINGS ISLAND TURNING BASIN-CONTROLLING DEPTH 40.0 FT, 39.0FT 100 FT FROM BACKSIDE.
E. ARGYLE ISLAND TURNING BASIN-CONTROLLING DEPTH 38.0 FT 160 FT FROM BACKSIDE.
F. PORT WENTWORTH TURNING BASIN-CONTROLLING DEPTH 32.0 FT, 27.0 FT 160 FT FROM BACKSIDE.
G. EXCEPT FOR A 41 FOOT OBSTRUCTION LOCATED BY MUNCE SURVEY AT 32°05'00.0"N 81°06'27.8"W.
H. EXCEPT FOR A 38 FOOT OBSTRUCTION LOCATED BY ANNCE SURVEY AT 32°05'18.29"N 81°06'56.99"W.
I. EXCEPT FOR A 36 FOOT OBSTRUCTION LOCATED BY AN NOS SURVEY AT 32°07'37.40"N 81°05'05.29"W.
J. EXCEPT FOR A 31 FOOT OBSTRUCTION LOCATED BY ANNCE SURVEY AT 32°07'59.67"N 81°05'11.46"W.

NOTE: AT MEAN HIGH WATER, DEPTHS ARE ABOUT 7 FEET GREATER AT LOWER END OF THE HARBOR AND 7.7 FEET GREATER AT UPPER END OF HARBOR.
NOTE: FOR THE LEFT OUTSIDE AND RIGHT OUTSIDE QUARTERS, DEPTHS GIVEN REPRESENT CONDITIONS 75 FEET INSIDE THE CHANNEL LIMITS.
NOTE: CONSULT THE CORPS OF ENGINEERS FOR CHANGES SUBSEQUENT TO THE ABOVE INFORMATION

POLLUTION REPORTS

Report all spills of oil and hazardous substances to the National Response Center via 1-800-424-8802 (toll free), or to the nearest U.S. Coast Guard facility if telephone communication is impossible (33 CFR 153).

INTRACOASTAL WATERWAY

The project depth is 12 feet from Beaufort, SC to St. Catherines Sound Ga.
The controlling depths are published periodically in the U.S. Coast Guard Local Notice to Mariners.

RADAR REFLECTORS

Radar reflectors have been placed on many floating aids to navigation. Individual radar reflector identification on these aids has been omitted from this chart.

AIDS TO NAVIGATION

Consult U.S. Coast Guard Light List for supplemental information concerning aids to navigation.

SUPPLEMENTAL INFORMATION

Consult U.S. Coast Pilot 4 for important supplemental information.

HEIGHTS

Heights in feet above Mean High Water.

AUTHORITIES

Hydrography and topography by the National Ocean Service, Coast Survey, with additional data from the Corps of Engineers, Geological Survey, and U.S. Coast Guard.

CAUTION

Limitations on the use of radio signals as aids to marine navigation can be found in the U.S. Coast Guard and Navigation and National

TIDAL INFORMATION

PLACE		Height referred to datum of soundings (MLLW)		
NAME	LAT (ALONG);	Mean (High) High Water	Mean (High) Low Water	Mean (Low) Low Water
		feet	feet	feet
Tybee Light	032°02 N/080°51'W	7.4	7.0	0.2
Beach Hammock	031°57 N/080°56'W	7.5	7.1	0.2
Kennedy Marsh Creek	031°58 N/081°00'W	7.7	7.3	0.2
Isle of Hope	031°59 N/081°03'W	8.4	8.0	0.2
Savannah	032°05 N/081°05'W	8.6	8.1	0.2
Savannah River Entrance	032°02 N/080°49'W	7.5	7.1	0.2

Dashes (---) located in data columns indicate unavailable data values for a tide station. Real-time water levels, tide predictions, and tidal current predictions are available on the Internet: http://tidesandcurrents.noaa.gov.

(Sec 2009)

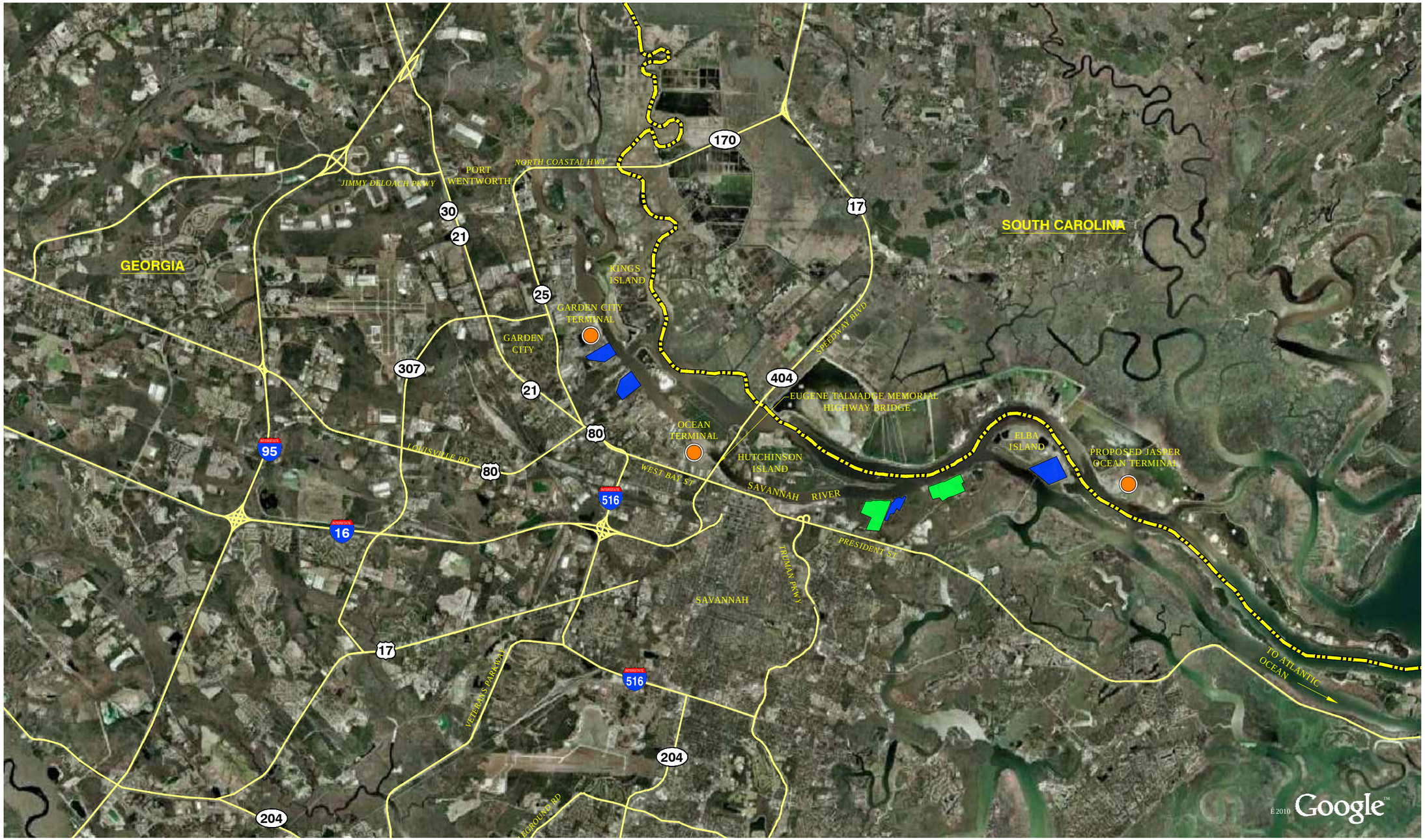
COLREGS: International Regulations for Preventing Collisions at Sea, 1972. Demarcation lines are shown thus: — — —

CAUTION

BASCULE BRIDGE CLEARANCES

For bascule bridges, whose spans do not open to a full upright or vertical position, unlimited vertical clearance is not available for the entire charted horizontal clearance.

NOAA WEATHER RADIO BROADCASTS



NORTH

GDOT FREIGHT & LOGISTICS PLAN

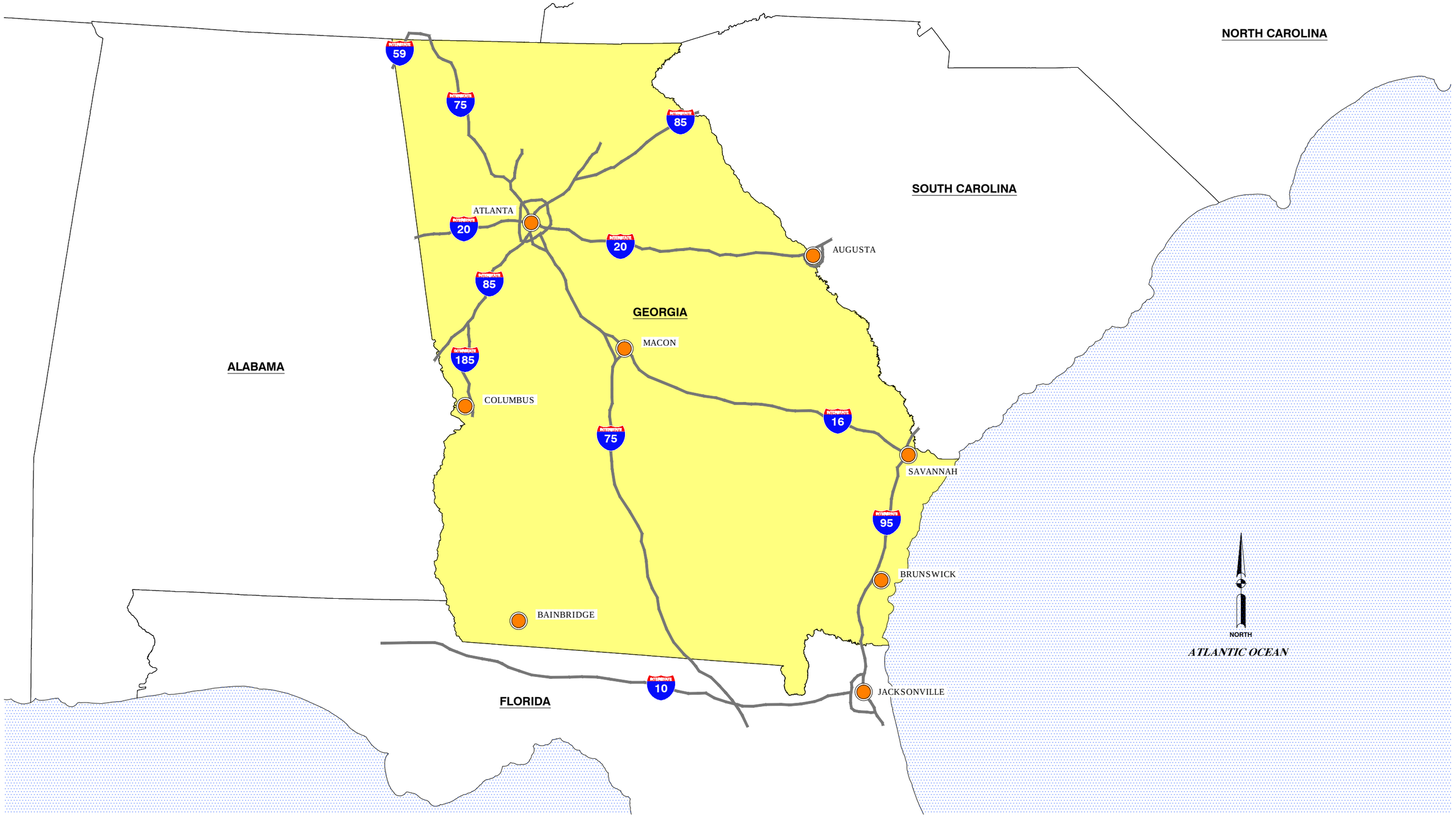
PORT OF SAVANNAH
INTERSTATE ACCESS PLAN

LEGEND

- STATE BORDER
- DRY-BULK
- LIQUID-BULK

EXHIBIT 3.1.4A

moffatt & nichol



LEGEND

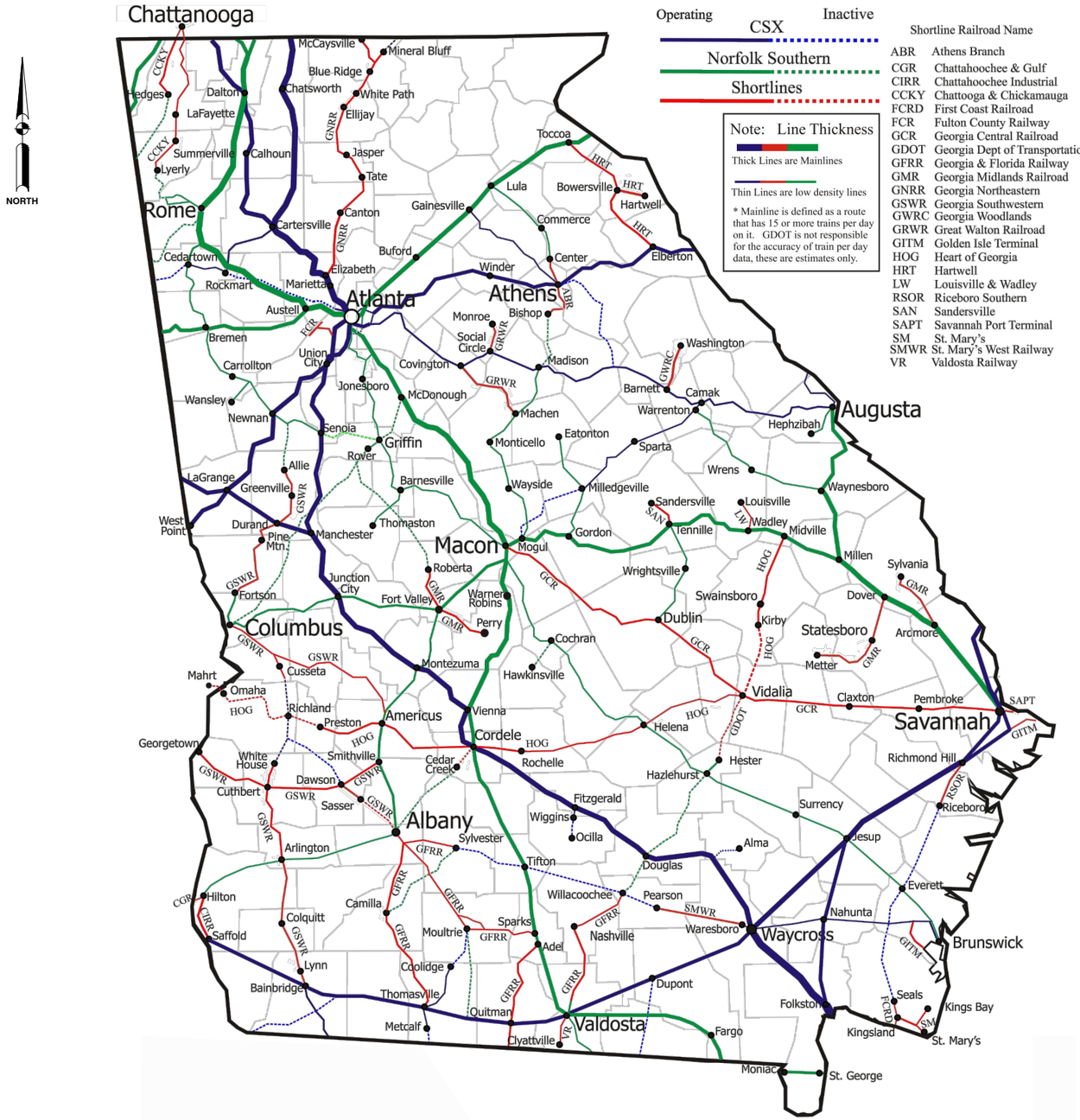
INTERSTATE

GDOT FREIGHT & LOGISTICS PLAN

INTERSTATE INVENTORY

EXHIBIT 3.1.4B

moffatt & nichol



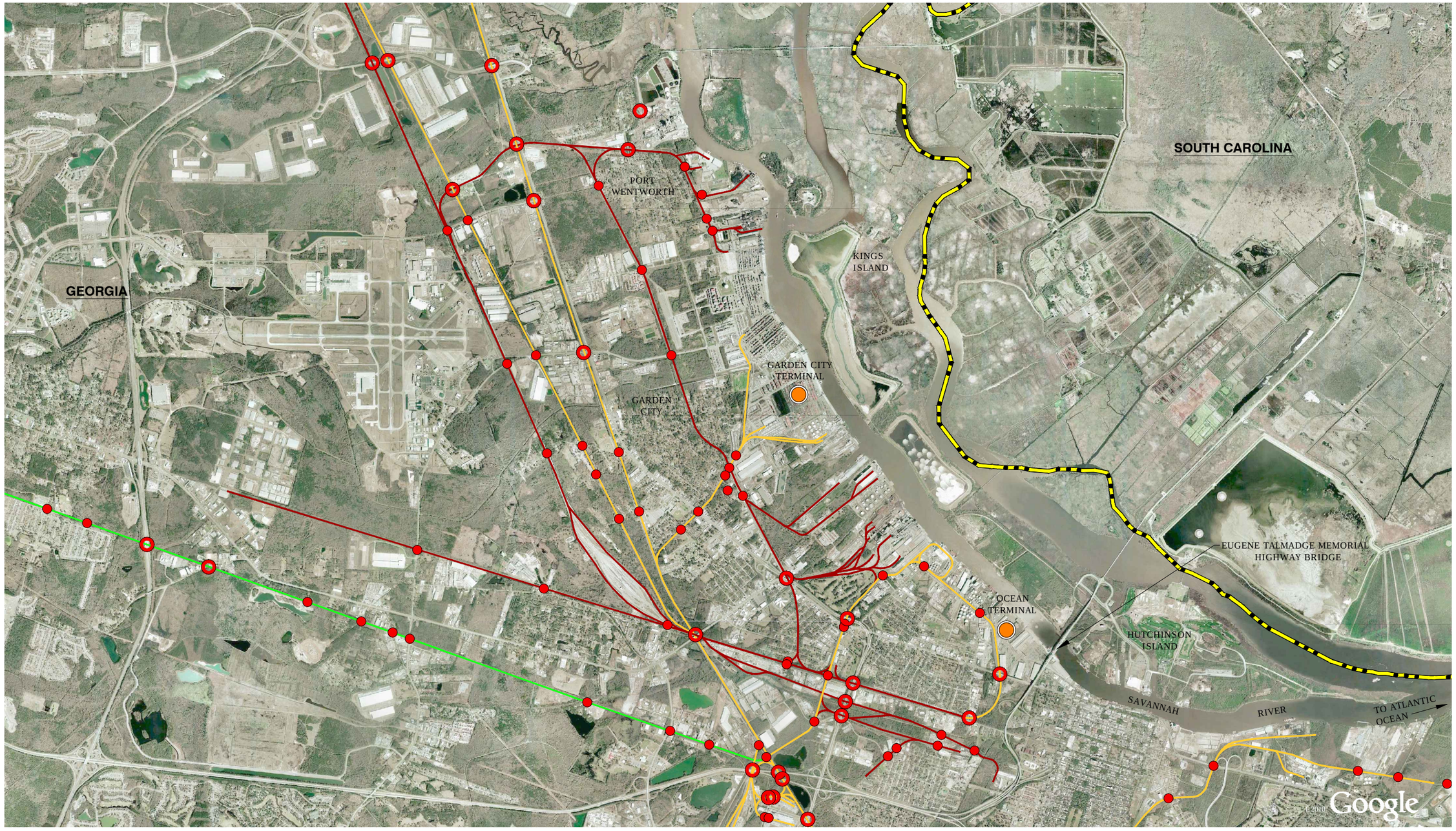
NOTE:
INFORMATION PROVIDED BY GDOT.

GDOT FREIGHT & LOGISTICS PLAN

GEORGIA RAIL SYSTEM
RAIL INVENTORY

EXHIBIT 3.1.4C

moffatt & nichol



NORTH

GDOT FREIGHT & LOGISTICS PLAN

PORT OF SAVANNAH
INTERMODAL ACCESS PLAN

LEGEND

- CSX TRANSPORTATION
- GEORGIA CENTRAL RAILROAD
- NORFOLK SOUTHERN CORPORATION
- STATE BORDER
- AT GRADE CROSSING
- GRADE SEPARATED CROSSING

EXHIBIT 3.1.4D

moffatt & nichol

GDOT FREIGHT & LOGISTICS PLAN

BRUNSWICK NAUTICAL CHART

EXHIBIT 3.2.1A

moffatt & nichol

NORTH

GDOT FREIGHT & LOGISTICS PLAN

LANIER DOCKS AND EAST RIVER TERMINAL AERIAL
PORT OF BRUNSWICK

EXHIBIT 3.2.2A

moffatt & nichol

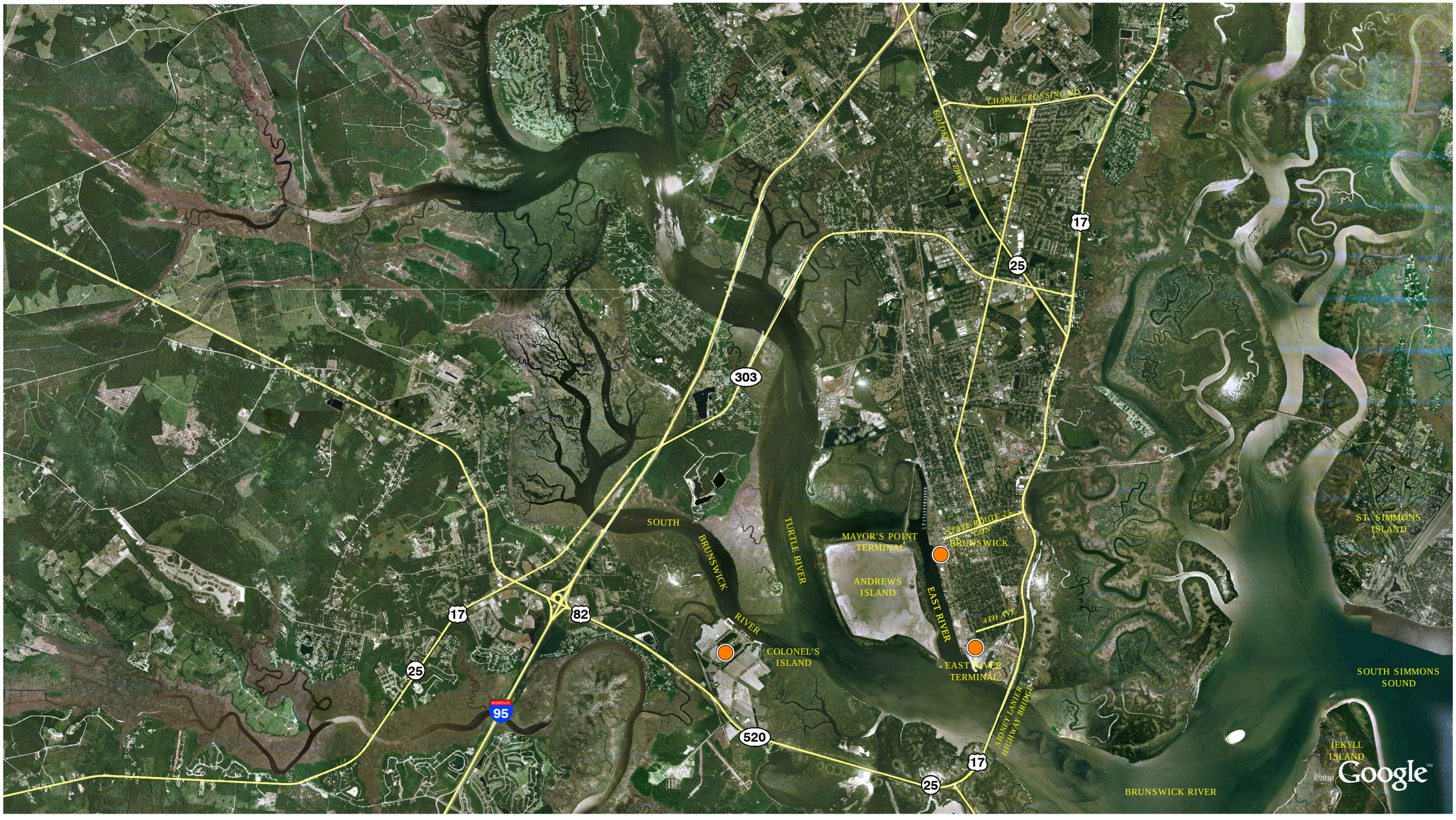
NORTH

GDOT FREIGHT & LOGISTICS PLAN

MAYORS POINT TERMINAL AERIAL
PORT OF BRUNSWICK

EXHIBIT 3.2.2B

moffatt & nichol



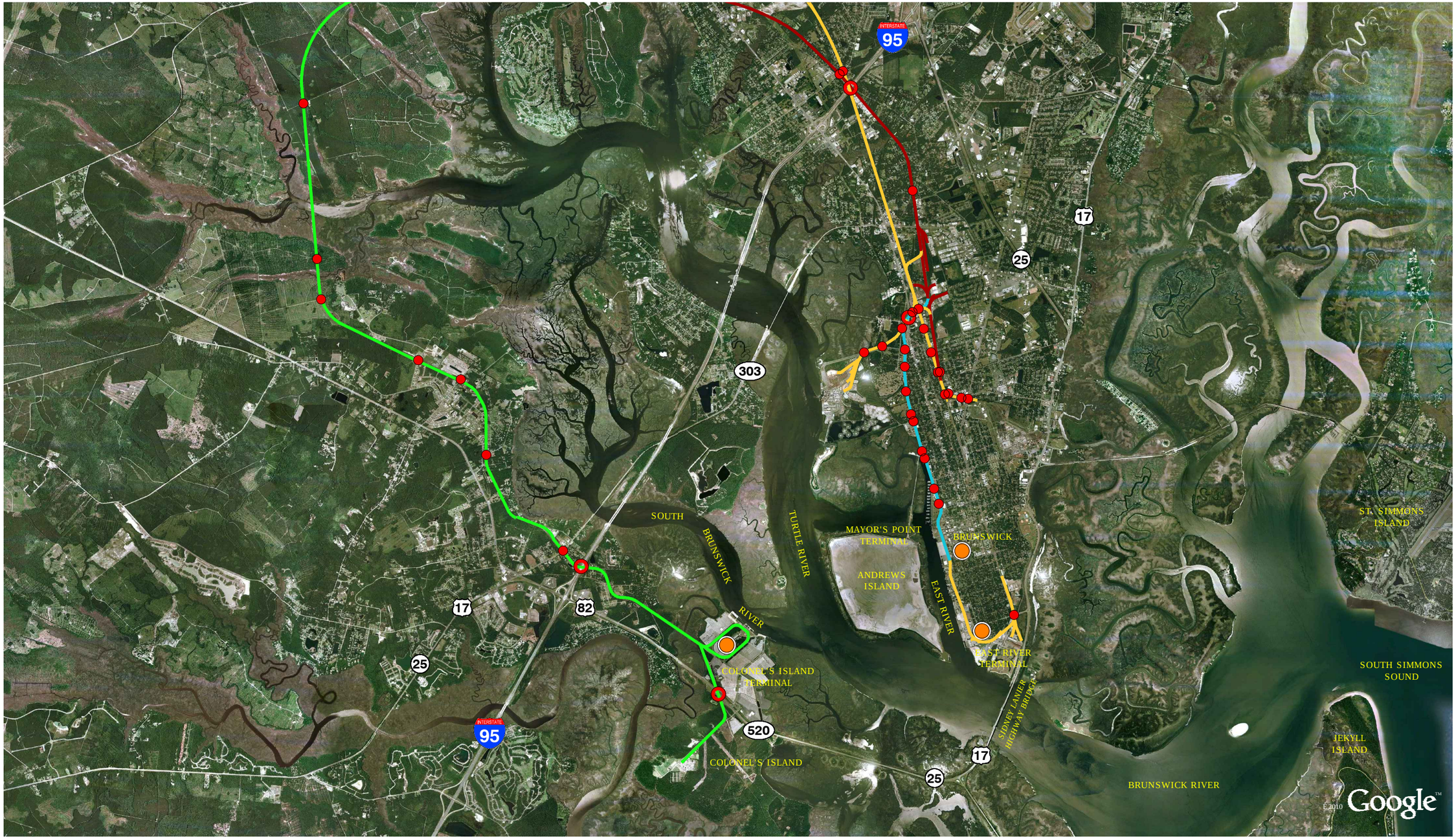
NORTH

GDOT FREIGHT & LOGISTICS PLAN

PORT OF BRUNSWICK
INTERSTATE ACCESS PLAN

EXHIBIT 3.2.2C

moffatt & nichol



NORTH

GDOT FREIGHT & LOGISTICS PLAN

PORT OF BRUNSWICK
INTERMODAL ACCESS PLAN

LEGEND

- NORFOLK SOUTHERN CORPORATION
- GOLDEN ISLE TERMINAL RAILROAD
- CSX TRANSPORTATION
- SHARED NORFOLK SOUTHERN & CSX RAILROAD
- AT GRADE CROSSING
- GRADE SEPARATED CROSSING

EXHIBIT 3.2.2D

moffatt & nichol

1. AVP
80 acres (32.4 hectares)
2. BMW
37 acres (15 hectares)
3. IAP
266 acres (107.6 hectares)
4. Mercedes-Benz USA, LLC
50 acres (20.2 hectares)
5. Future Development
6. Colonel's Island North-South Connector
7. Future Rail Yard
8. Myd Harris Rail Yard
9. Common-user Area
10. Agri-bulk Facility

Harbor Depth:
36 ft MLW (11 m)

Tidal Range:
7.6 ft (2.3 m)

Channel Width:
400 ft (121.9 m)

Terminal Area:
1,700-plus acres (688-plus hectares)

Turning Basin:
South Brunswick River 1,200 ft (365.8 m)

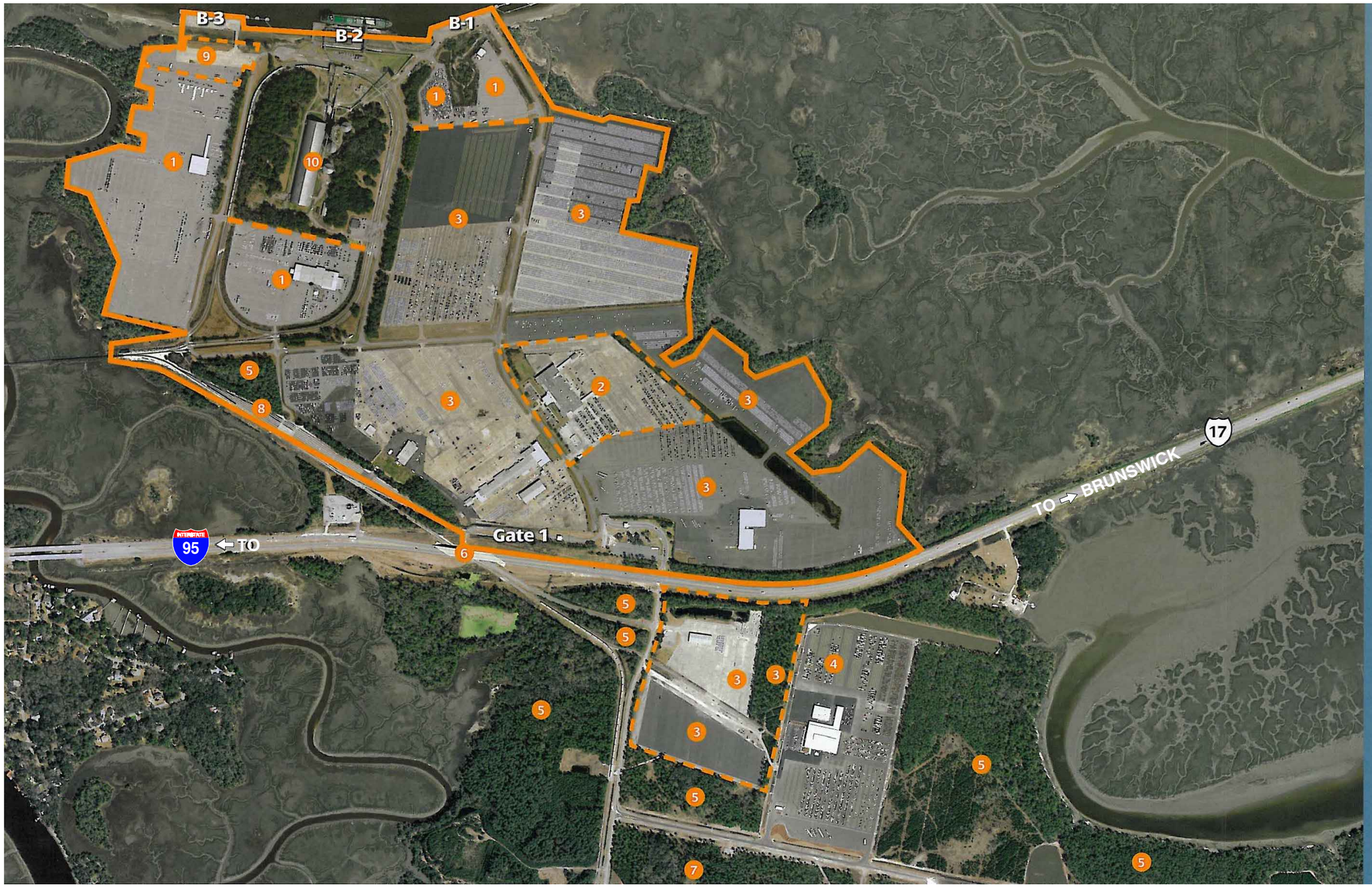
NORTH

GDOT FREIGHT & LOGISTICS PLAN

COLONEL'S ISLAND TERMINAL AERIAL
PORT OF BRUNSWICK

EXHIBIT 3.2.3A

moffatt & nichol



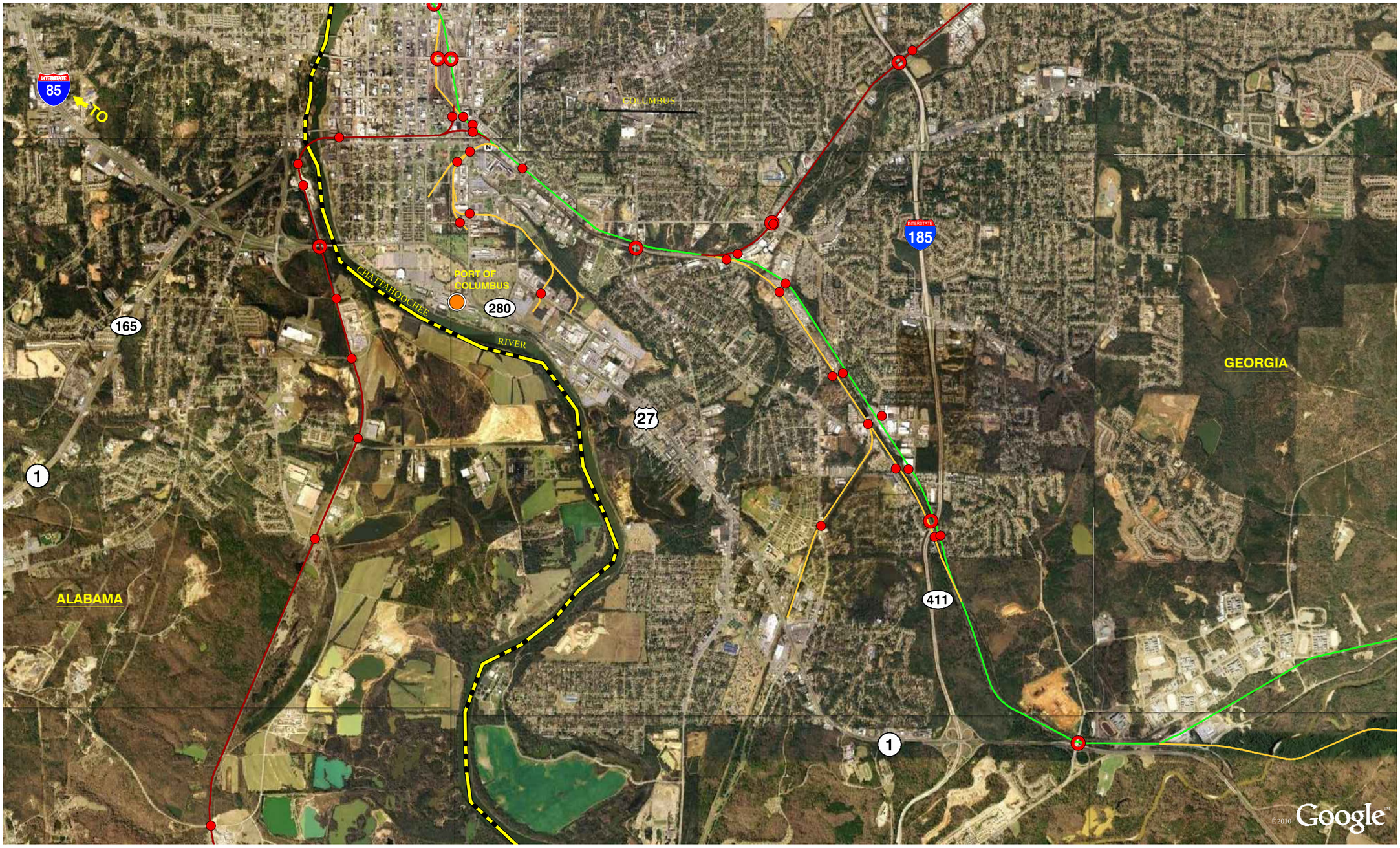
NORTH

GDOT FREIGHT & LOGISTICS PLAN

COLONEL'S ISLAND TERMINAL NORTH SIDE AERIAL
PORT OF BRUNSWICK

EXHIBIT 3.2.3B

moffatt & nichol



NORTH

GDOT FREIGHT & LOGISTICS PLAN

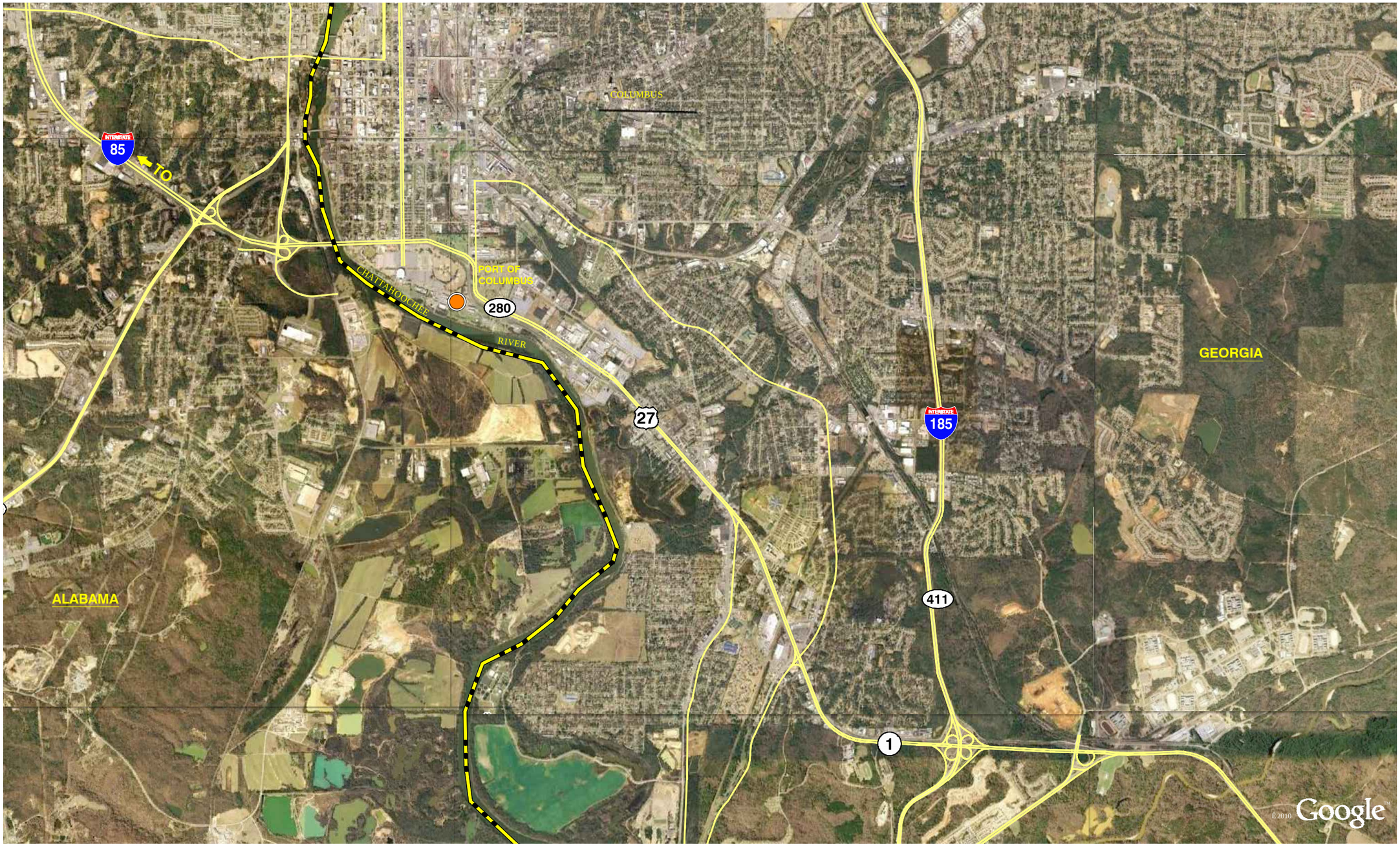
PORT OF COLUMBUS
INTERMODAL ACCESS PLAN

LEGEND

- GEORGIA SOUTHWESTERN RAILROAD
- NORFOLK SOUTHERN CORPORATION
- GEORGIA DOT OWNED
- STATE BORDER
- AT GRADE CROSSING
- GRADE SEPARATED CROSSING

EXHIBIT 3.3.2A

moffatt & nichol



NORTH

LEGEND

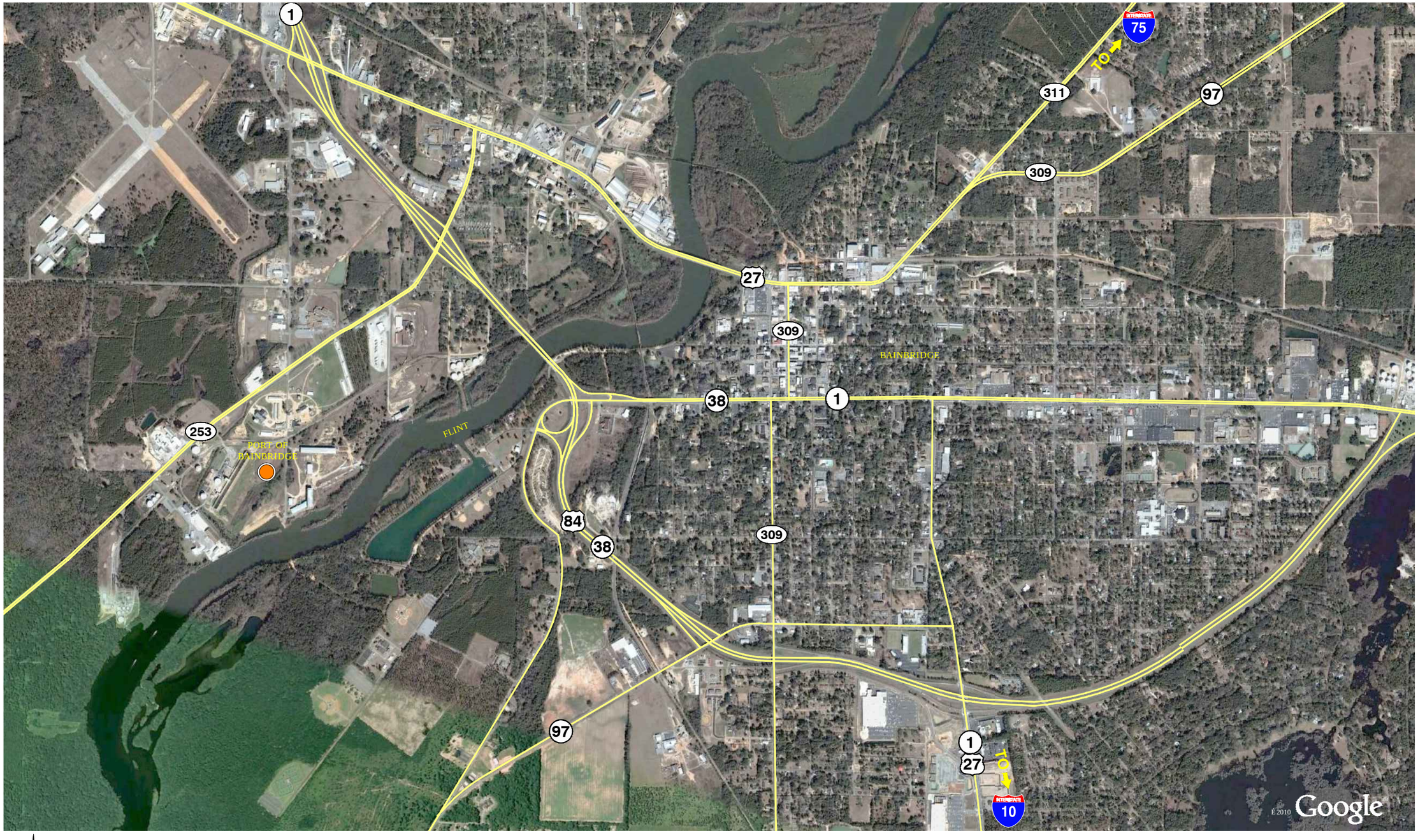
STATE BORDER

GDOT FREIGHT & LOGISTICS PLAN

PORT OF COLUMBUS
INTERSTATE ACCESS PLAN

EXHIBIT 3.3.2B

moffatt & nichol



NORTH

GDOT FREIGHT & LOGISTICS PLAN

PORT OF BAINBRIDGE
INTERSTATE ACCESS PLAN

EXHIBIT 3.3.3A

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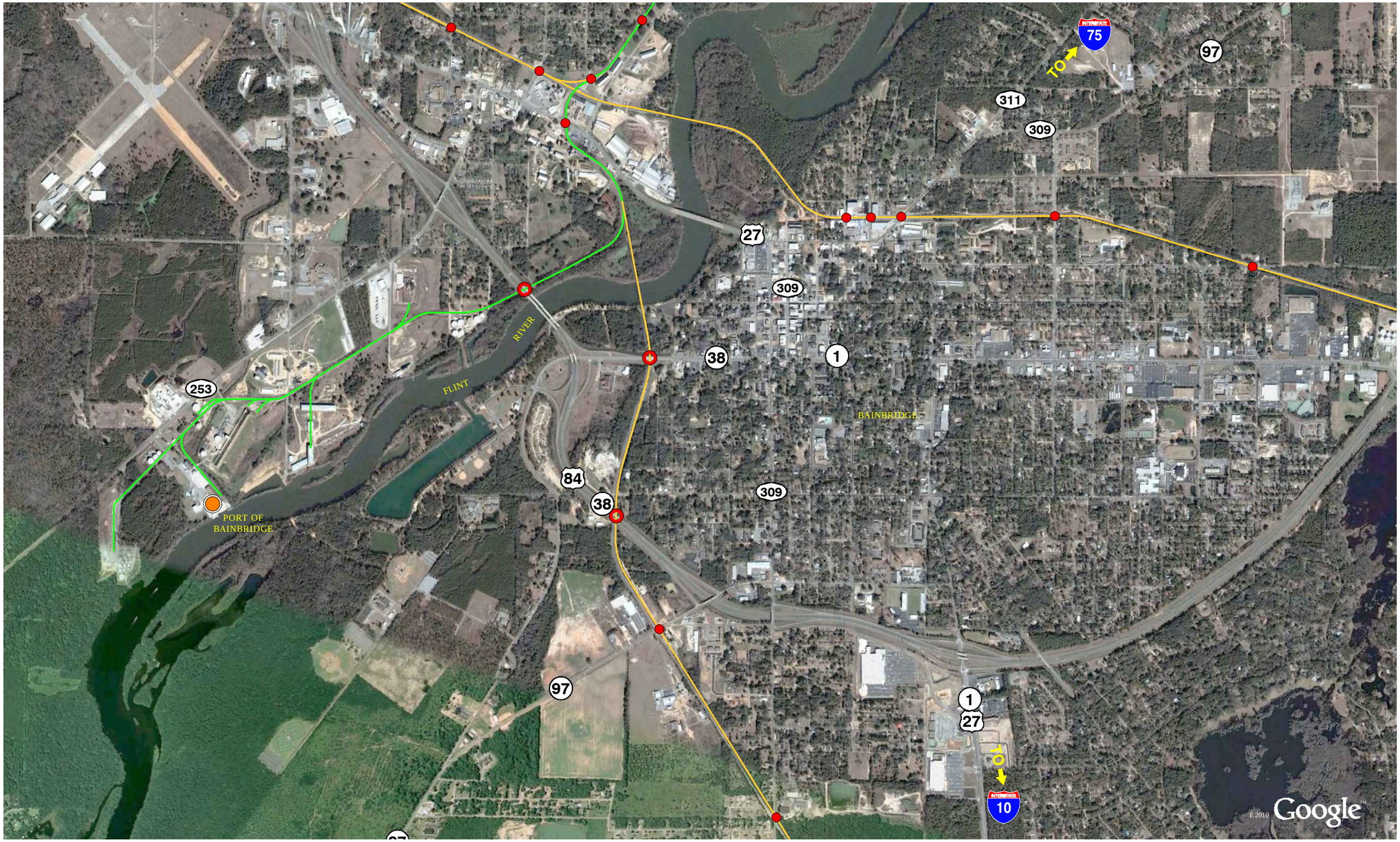

NORTH

GDOT FREIGHT & LOGISTICS PLAN

PORT OF BAINBRIDGE
INTERMODAL ACCESS PLAN

LEGEND

- CSX TRANSPORTATION
- GEORGIA SOUTHWESTERN RAILROAD
- AT GRADE CROSSING
- GRADE SEPARATED CROSSING

EXHIBIT 3.3.3B

moffatt & nichol