A Comparative Analysis of Intermodal Ship-to-Rail Connections at Louisiana Deep Water Ports

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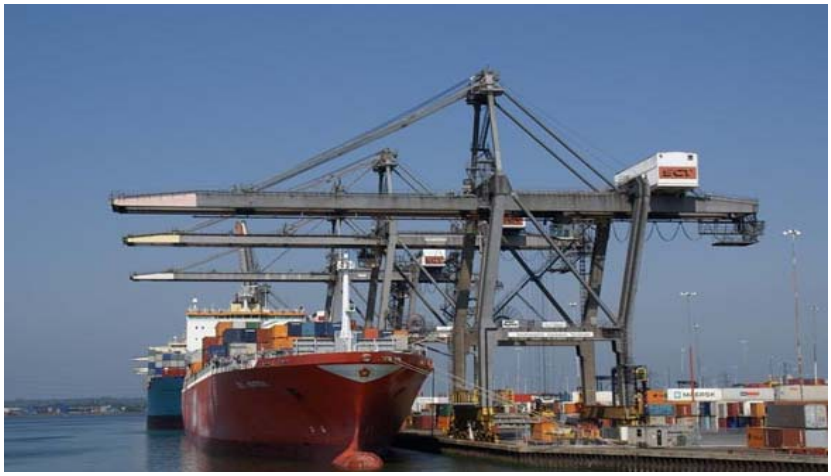

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I Executive Summary

The intent of this study is to compare Louisiana deep-water ports to selected competing ports (Mobile, AL; Jacksonville, FL; Savannah, GA; and Charleston, SC) in terms of the processes and configurations used to transfer containers from ship to rail. It should be noted that the Port of Houston was not included in this study because the container flow patterns are dissimilar to those of Louisiana and the other selected ports. The container traffic flowing through the port of Houston primarily serves the state of Texas.

The ability to deliver to and receive cargo from inland areas is vital to a port's future viability and competitiveness. This is largely dependent on the port's ability to access hinterland markets by other transportation modes, such as roadways, waterways and railroads. Generally, trucks are the primary mode within a 500 mile radius of a port. Rail connectivity at a port becomes increasingly important in attracting containerized cargo when the origin-destination pairs are more than 500 miles apart.

Louisiana's deep-water ports currently serve a number of markets with a variety of commodities handled primarily in bulk, breakbulk and neo-bulk groups. These commodity groups generally require movement via barge or rail to achieve economies of scale in transportation costs. Although these cargoes are currently the most important to the state's economy, the growing container cargo sector in the Gulf and South Atlantic regions and the competitiveness in handling this traffic will be the focus of this report.

Ports are investing heavily in the expansion of container terminals and a key component of these projects is the infrastructure necessary to efficiently transfer marine containers to/from various modes of land transportation.
Louisiana has some advantages in that it can reach key inland markets via the Class 1 networks in the state, and it has a natural deep-draft waterway to accommodate larger vessels. The key question for future planning of container facilities in the state becomes whether investments should be made in existing facilities, where land is scarce, or whether a new larger complex should be developed at another location, requiring significant transportation infrastructure investments.

The following section provides a technical overview of the findings of the study.

II Technical Overview

According to port officials, approximately 70% of Louisiana's containerized traffic originates from or is destined to remote hinterland areas outside the state. A portion of this traffic is moved by rail, referred to hereafter as intermodal (IM) traffic. This study examines the competition for handling this IM traffic. It is based on a comparative analysis of Louisiana's deep-water ports (primarily the Napoleon Avenue container terminal) with four other ports: Mobile, AL; Jacksonville, FL; Savannah; GA; and Charleston, SC. The comparison focuses on rail connectivity, especially the ship-to-rail transfer process and the port-related IM yards used in this process.

The analysis reveals that the studied ports employ a wide variety of IM yards configurations. There is, however, a trend away from the on-dock configuration, in which the yard is located inside the marine terminal, towards the near-dock configuration, in which the yard is located adjacent to but outside of the terminal. The main reasons underlying this trend are:

- The scarcity and limited size of waterfront land does not allow for construction of on dock IM yards that can efficiently handle double stack unit trains
- The desire to combine the handling of marine and domestic containers to achieve better utilization of the IM facilities and enhance rail services
- The difficulties involved in switching long trains to/from marine terminals, interrupting traffic both inside and outside the terminal and adding to costs and time

New Orleans's Napoleon Ave. Terminal is the only container terminal in Louisiana that is involved in IM traffic. The terminal's IM handling system is based on a temporary arrangement of an on-dock IM yard with limited capacity. The port plans to develop the Stuydocks yard as a new on-dock IM yard. Presumably, this yard could also serve as a regional yard for the entire New Orleans area, replacing some of the existing off-dock IM yards of other railroads that handle marine and domestic cargo.

New Orleans' Napoleon Ave. Terminal, with 2,000 ft of berth line, 80 acres of waterfront land and about 250,000 TEU of throughput is considered a midsize terminal. The proposed Stuydocks IM yard development, while relatively small in comparison to near-dock yards of other ports, will have sufficient capacity to accommodate growth beyond the current IM traffic of Napoleon Avenue.

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III General

III.1 Background and Problem Re-Statement

This study examines the competition for handling containerized traffic among Louisiana (LA) deep-water ports and out-of-state ports. Presently most of Louisiana's containerized traffic, estimated by port officials to be up to 70%, originates from or is destined to remote hinterland areas outside the state. A portion of this traffic is moved by rail, referred to hereafter as intermodal (IM) traffic. IM traffic is at the center of this competition, since advances in rail transportation systems, especially unit-trains and double-stack technology allows ports to vastly expand their reach into far-away hinterlands.

The effectiveness of IM transport systems is critically dependent on the process by which IM marine containers are transferred between ship and rail. The ship-to-rail transfer process usually takes place in special port-related IM rail yards. These yards are commonly classified according to their relative location vis-à-vis the marine terminal as on-dock, or within the terminal boundary and inside the Customs area; near-dock, or adjacent to the terminal gate; and off-dock, or far away from the marine terminal (see the elaborated discussion in the following chapter).

Presently, the Port of New Orleans is using an improvised on-dock IM yard located within the container yard in its main container terminal, Napoleon Avenue. Although New Orleans has access to six Class 1 railroads, this yard serves only one, so in addition to the port yard, there are six separate off-dock yards, one per railroad, scattered on both sides of the Mississippi River. To improve the present IM operation, the port is considering an investment in a new, larger, dedicated on-dock IM yard. Other Louisiana deep-water ports are presently not involved in IM operations.

III.2 Objectives

The objective of this study is a comparative review and analysis of the IM status at Louisiana's deep-water ports and four other competing ports: Mobile, AL; Jacksonville, FL; Savannah; GA; and Charleston, SC. Knowledge of the IM systems in competing out-of-state ports is intended to provide the LA deep-water ports with important input in determining possible IM efficiency improvements, and also to guide future plans for additional IM connections, especially IM yards. This input is considered by the authors as critical to pending decisions on State IM investments that would accommodate marine container traffic.

This review focuses on the ship-to-rail process, including description of the ship-to-rail transfer operations, facilities, labor and equipment involved, along with an assessment of capacity, actual throughput, productivity and cost. It should be noted that some of the data is unavailable since it is considered commercially sensitive. The review relates to both present facilities and future development plans (if any).

III.3 Sources of Information

The main sources of information for this study were:

- visits to the various ports and IM yards, with on-site observations of their operations
- meetings and discussions with the personnel there
- a series of telephone interviews with port authorities, port operators, and railroad and shipping line representatives.
- an extensive review of ports' and railroads' websites and trade magazines such as Journal of Commerce, American Shippers, WorldCargo and Containerisation International.

III.4 Report Organization

The report begins with a brief analysis of the various configurations of IM yards, their respective operating systems and a review of comparative advantages and disadvantages. The report then proceeds with the case-studies of the targeted ports, beginning with Louisiana ports, and followed by out-of-state ports. Each port is discussed in a separate chapter which includes: (a) a preliminary general section dedicated to the port's overall setting and the traffic it serves; (b) a section on container terminals, focusing on those involved in IM traffic; (c) a section on the port's rail connections to Class I railroads; and (d) a section on the main IM facilities and their operations. A final chapter summarizes the findings of the study along with subsequent recommendations.

IV Intermodal Yards and the Ship-to-Rail Transfer Process

IV.1 On-, Near- and Off-Dock IM Yard Configurations

There are many options for locating IM yards and performing the intermodal transfer of marine containers between ships and railroads. The basic classification is based on the location of the IM yard vis-à-vis the marine terminal. The three main configurations are: on-, near- and off-dock, however additional factors to consider are yard configuration, operating system, type of handling equipment, labor, and type of traffic served. Table 1 presents the characteristics of the five configurations considered most typical to US ports.[1] Following is a brief review of each configuration. For brevity, the description of the handling process only relates to ship-to-rail or import (inbound) boxes. The handling of export (outbound) boxes is similar, but in the reverse order.

IV.2 On-Dock "Live" IM Yard Configuration

In this configuration, the IM yard is an integral part of the container yard (CY) and usually handles the IM boxes in the same way and by the same yard equipment

[1] IM transfer is also common in European ports but the system there is different, mostly based on wide-spanning Rail Mounted Gantry (RMG) cranes. Also, double-stack articulated railcars are not used in Europe. Most Asian and South American ports are not intermodally oriented.

used in the CY. For example, in rubber-tired gantry crane (RTG) -based yard systems, the IM boxes are moved directly from ship-side to the RTG which handles railcars, without intermediate storage either at the CY or at a special IM storage (buffer) near the working tracks, hence the name “live”. The location of the working tracks is usually in-between the CY stacks. This is the present situation at both Napoleon Ave. and Savannah’s Garden City Terminal for CSX. It also is the common arrangement for non-container cars, such as boxcars, using siding along transit sheds, etc.

The live system is operationally the most efficient, since it eliminates additional lifts as well as storage space for the IM boxes. Likewise, it provides for the fastest ship-to-rail process. However, a live transfer mandates that all boxes are pre-cleared by Customs and that the ship stowage matches the rail stowage, which is difficult to achieve. Altogether, a true live system is practical only in the case of line-controlled, dedicated unit-trains or when there is not sufficient on-dock trackage for a full train (5,000 to 8,000 linear ft).

IV.3 On-Dock “Drop” IM Yard Configuration

In this configuration the IM yard is inside the marine terminal, but physically separated from the CY. Typically, the working tracks are located at the back of the terminal, and the ship-to-rail process is indirect. The IM boxes are first stored in the CY, and after they are released, the boxes are transferred to the IM by yard hustlers, whereby they are loaded on railcars by yard equipment.

The disadvantage of the drop system relative to the live one is the extra in-terminal drayage, which in a large terminal may involve long distances and an extra lift to/from the CY stack. The internal drayage may cost about $20 and each lift about $40, or a total of about $100 per box. Another disadvantage of the drop system compared to live is the longer processing time it usually takes to clear Customs. The on-dock drop is presently in practice at the Napoleon Ave. Terminal and is also the planned configuration for the new Stuydocks yard, located immediately adjacent to Berth “C”.

IV.4 On-Dock, “Double Storage” IM Configuration

This is a variation on the drop configuration except that the boxes brought from the CY are first dumped in temporary storage at the IM yard. The double-storage system is used especially in configurations where the IM yard is located far away from the CY or when IM boxes are scattered at many CY stacks. The temporary storage at the IM yard serves as an intermediate buffer intended to facilitate the rail handling. It acts to reduce waiting either by the yard hustlers or reach-stackers that handle the boxes in the IM yard.

Before moving on from on-dock to near- and off-dock configurations a general comparison among these configurations is warranted. The main disadvantages of on-dock configurations vis-à-vis near- and off-dock ones are:

- ***Alternative Use of Waterfront Land*** -- On-dock IM yards require valuable waterfront land that could otherwise be used as a CY and increase the capacity of the marine terminal. This is true especially in the case of the larger double-storage configurations that require large on-terminal space. However, some of the loss of space in the on-dock is offset by the shortening of the dwell time for the IM boxes, which increases the utilization of the CY.
- ***Train Switching*** -- On-dock IM yards require the switching of trains to the marine terminals, often performed by local service railroads, resulting in additional costs and time. Also, switching trains to marine terminals, especially those located in the midst of urban areas, interrupts road traffic.
- ***Inefficient Rail Handling*** -- On-dock IM yards are usually small in size due to limitations imposed by the lack of space at marine terminals or inability to locate long working tracks. Consequently, their operation is likely to be inefficient both in terms of rail operation (breaking the train into many small cuts) and box handling (scale diseconomy).

The main advantage of on-dock over near- and off-dock yards is the avoidance or shortening of drayage. This, in turn, may also shorten the overall transit time.

IV.5 Near-Dock Adjacent IM Yard Configuration

This configuration is similar to the on-dock double storage, except that the location of the yard is outside the marine terminal and Customs area. Quite often these yards are larger than the on-dock ones. Also, being outside an individual marine terminal allows for the serving of several or even all the marine terminals in the port area.

The main advantage of the adjacent over the non-adjacent location is that in the adjacent, assuming the yard is within the general area of the port, the drayage from the marine terminals can be performed by hustlers, which can be better coordinated and may considerably save on cost and time. Additional savings can be generated if the traffic to the near-dock yard is processed through special gates to avoid waiting with the general traffic.

IV.6 Near-Dock Non-Adjacent IM Yard Configuration

This configuration is basically the same as that above, except that the IM yard is located close to but outside the port area, usually within a less than five mile radius. The drayage in this configuration is mostly on public roads and requires using outside trucks and a regular gate process, including the checking of cargo documents, the integrity of boxes and chassis, and preparing an Equipment Interchange Report, similar to a regular dispatch via truck.

The advantage of the non-adjacent over the adjacent near-dock configuration is that it allows handling of both marine and domestic containers. Another advantage is the lowering of costs and the freeing of waterfront land for other uses. Accordingly, non-adjacent IM terminals often are larger and more efficient

than adjacent terminals. A location away from the terminal also allows the employment of less expensive non-port labor. The main disadvantage is the higher drayage cost, which may reach $100 per dray, and the longer transfer time.

IV.7 Off-Dock IM Yard Configuration

This is the traditional configuration in which marine containers are sent to existing IM yards which can be located up to 20 miles away. In terms of operations, the process here is identical to near-dock non-adjacent. The difference is the much longer distance and respective increases in cost and time. Also the traffic composition of off-dock yards is usually mainly domestic.

The disadvantage of off-dock versus near-dock yards is the longer and more expensive drayage. The main advantage is the large size of these yards and wider selectivity of services due to the combination of domestic and marine containers. Another advantage is the elimination of rail switching. For example, at the Port of New Orleans, CN has to switch railcars from their main yard at Harahan to the Napoleon Ave. Terminal, about 10 miles away. The cost savings of switching in relation to truck drayage is dependent upon the number of cars and boxes per switch.

A preliminary conclusion that can be made at this early stage of discussion is that the decision on IM yard configuration is quite complex, requiring careful identification of all factors involved and quantifying the trade-offs among them.

Table 1 Typology of Port-Related Intermodal Yards

Configuration		Yard Location	Operating System	Equipment	Traffic
On-Dock	Live	Within Customs area and Terminal Gate	Ship-side Directly to Rail-side	Marine Terminal	International; Generated at the Marine Terminal
On-Dock	Buffer	Within Customs area and Terminal Gate	Ship-side Directly to IM Buffer	Marine Terminal	International; Generated at the Marine Terminal
On-Dock	Two-Stage	Within Customs area and Terminal Gate	Ship-side to CY; CY to Railcar-side (or IM buffer)	Marine Terminal	International; Generated at the Marine Terminal
Near-Dock Adjacent	Two-Stage	Less than 1 mile away	Ship-side to CY; CY to IM buffer	Marine Terminal	International; Generated at several Marine Terminal
Near-Dock Non Adjacent	Two-Stage	1 - 5 miles away	Ship-side to CY; CY to IM buffer	Non Marine Terminal	several Marine Terminal + Domestic
Off-Dock	Two-Stage	More than 5 miles away	Ship-side to CY; CY to IM buffer	Non Marine Terminal	Mainly Domestic

V Port of New Orleans

V.1 General

The Port of New Orleans has traditionally been a general cargo port, handling a variety of manufactured and consumer goods, steel, coffee, wood products and natural rubber. In the last decade, the port has invested nearly $300 million in new wharves, terminal access roadways, and a new container terminal.

V.1.1. Location and Access

The Port of New Orleans' main container terminal is located on the East Bank of the Mississippi River, about 100 miles upriver from the Head of Passes (AHP). Prior to Hurricane Katrina, the port also had container terminals on the Industrial Canal.

The access to the main container terminal is through the River's passes, requiring about 9 hours of navigation and 2 pilots each way. The authorized channel depth is 45 ft (13.7 m) though actual depth usually is at 47 – 48 ft.

V.1.2 Trades, Shipping Services and Throughput

The Port of New Orleans serves as a gateway to foreign trade with Latin America (mainly East Coast South America and Central America), North Europe and the Mediterranean.

The main liner services calling the port are Mediterranean Shipping Line or MSC (North Europe and East Coast South America), Hapag Lloyd / CP Ships (same regions), CSAV (West Coast South America), and Maersk (Central America). The largest ships calling the port are deployed on the MSC European service (which calls Charleston as its first and last port), with a length of 998 ft and capacity of 6,700 TEU.

Total projected throughput for 2007 is estimated at 258,000 TEU. Throughput for 2006 was 100,547 TEU for Napoleon Ave. and 75,358 TEU for Nashville Ave. /other terminals. Throughput for 2005 was 70,633 TEU for Napoleon Ave. and 80,232 TEU for Nashville Ave. /other terminals. According to PIERS data, the throughput from 2001 through 2004 remained steady between 200,000 and 240,000 TEU annually. As noted before, most of the traffic through New Orleans is non-intrastate, mainly to/from the Midwest.

V.1.3 Institutional Setting

The Port of New Orleans is a landlord port and all cargo handling operations are performed by private terminal operators. The arrangement at Napoleon is somewhat complex; the container berth is public and managed by the Dock Board but the container yard is divided and leased to two operators, Port America and Ceres, with the gate complex jointly operated by both.

V.2 Main Container Terminals

V.2.1 Present Terminals

The main container terminal at Napoleon Avenue is located at Mile 99.5 AHP. The landside access is through a dedicated road, the Clarence Henry Truckway, which connects the entire River terminals complex to I-10.

The Napoleon Ave. Terminal has a total berthage of 2,000 ft of which 1,400 ft is open dock and 600 ft is a transit shed. The terminal is part of a larger complex with a total of about 4,000 ft of berthage, which also includes the adjacent Nashville Avenue Terminal. In addition to containers, Nashville handles breakbulk cargoes, mainly neo-bulks such as steel, forest products, and rubber. The total area of the Nashville and Napoleon complex is 151 acres of open storage area, of which 61 acres are dedicated to containers, including 48 acres serving as a marshalling container yard. The container berth is equipped with four ship-to-shore multi-purpose gantry cranes. The yard equipment is a combination of 1+5 /1+6 rubber tire gantry cranes (RTG) and reach stackers. The terminal is also equipped with a computerized gate system and pre-gate parking.

V.2.2 Future Terminals

The Port plans to expand the Napoleon Ave Terminal by extending the existing dock downriver and adding a third berth (berth “C”) of about 1,000-ft. The berth has no back-up area since this area will be used as the new IM yard (see below). The investment required for the berth and equipment is estimated at about $100 to $150 million.

Further development options, presently not under consideration, could involve conversion of the adjacent Nashville Ave. multi-purpose terminal. This would require demolition of waterfront sheds and reconstruction of the dock and container yard.

Long-term expansion plans could involve the development of a new terminal complex at a different downriver location.

V.3 Railroad Connections

V.3.1 Class I Railroads

The Port of New Orleans is the only US port with direct access to six Class I railroads. This unique connectivity stems from the historical division of US rail systems as east or west of the Mississippi River, with New Orleans as a meeting point. Generally, New Orleans' railroads can be categorized according to their main service orientation as:

- ***North/ South*** – Canadian National (CN) and Kansas City Southern (KCS)

- ***East/ West*** – CSX and Norfolk Southern (NS) east of the Mississippi River and Burlington Northern Santa Fe (BNSF) and Union Pacific (UP) west of the Mississippi River

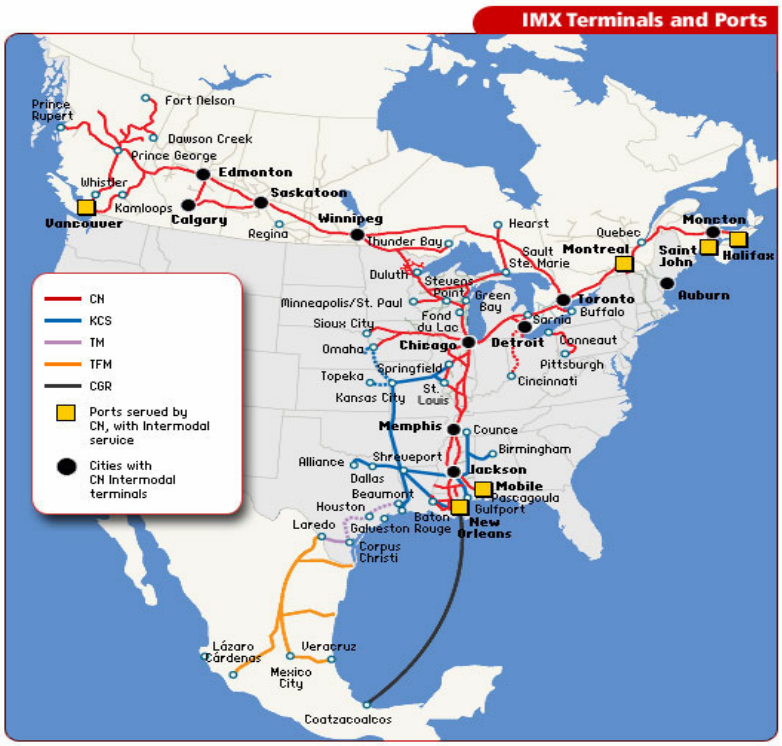
Presently, port-related traffic mostly uses the North / South railroads, since these railroads serve the port's main hinterland, the Midwest. However, there is a potential for expanding the port's hinterland to the east and west. For example, using NS and CSX and taking advantage of New Orleans' proximity to Central America, the Port of New Orleans could serve as a gateway for Atlanta's Central American trade. Another potential market is Dallas, utilizing the KSC and UP lines.

V.3.2 Main Rail Services

The main rail service of the Port is CN, which has a daily service to Memphis and Chicago with a connection to Montréal. CN's transit times are quite advantageous, providing next morning to Memphis and 2nd morning to Chicago. The service also handles domestic cargo, mainly containers, with marine and domestic containers sharing the same train. Figure 1 presents the CN network map for intermodal services.

The IM services of other Class I railroads are not directly related to the port traffic. KCS terminated its IM services to New Orleans after Hurricane Katrina.

Figure 1 CN Intermodal Network



V.4 Intermodal Facilities and Operations

V.4.1 Location, Facilities and Equipment

Each of the Class I railroads has its own IM yard in New Orleans area, all of which are off-dock and within 10 to 20 miles of Napoleon Ave. Figure 2 presents a map with the location and connection of these yards.

CN's IM handling of marine containers is presently done on-dock, using a paved (pad) track located within the CY at the Napoleon Ave. Terminal. CN's domestic containers and trailers, along with a small number of marine containers, are handled at the CN Harahan IM yard, located about 10 miles away from Napoleon Ave. The working rail trackage used for IM handling is limited and requires the continuous switching in / out of railcars. The handling of railcars is done by reach stackers. Currently, only the CN is involved in this on-dock IM operation.

The port has developed a plan to use the Stuydocks Yard as an on-dock IM yard. This yard formerly belonged to CN (and before that to the ICG railroad). It is located behind Napoleon Ave berth "C", directly connected to this terminal and hence can be developed as an on-dock IM yard. The yard area is about 40 acres and has five working rail tracks, each about 1,800 ft long. The yard area is presently unpaved and being used for storing empty boxes. Figure 3 presents a layout of the yard and track area.

Figure 2 Port of New Orleans Intermodal Connections - West

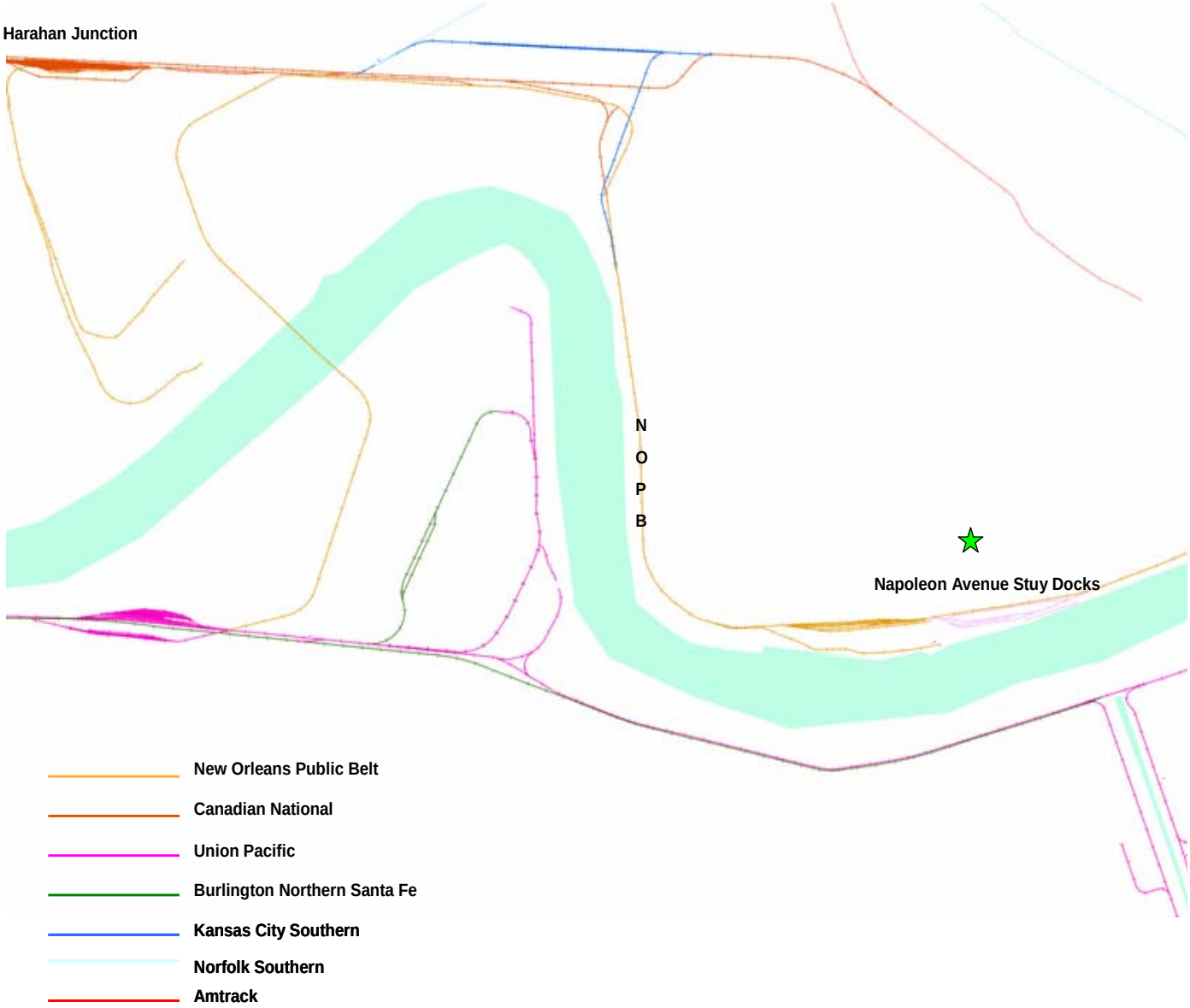
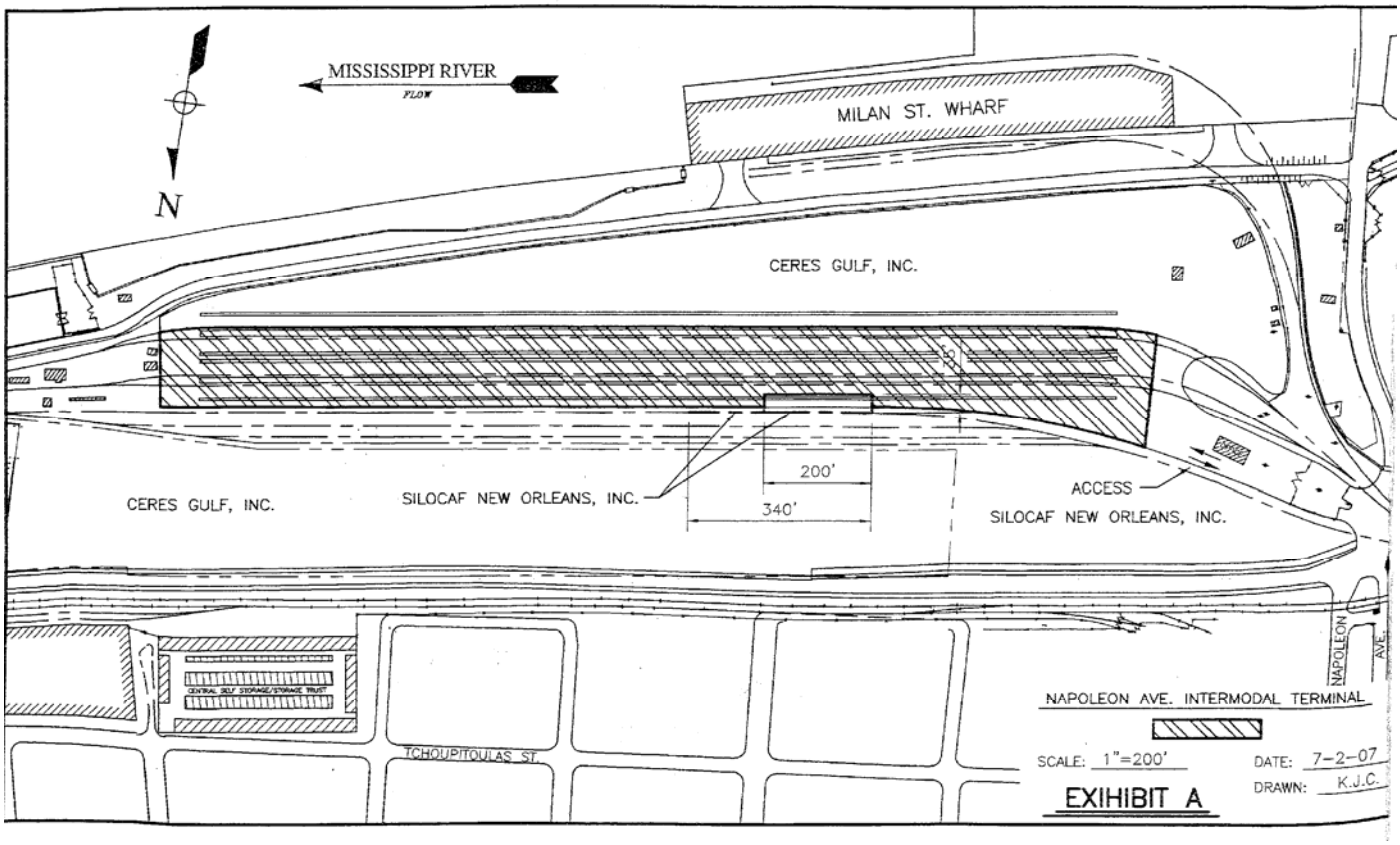


Figure 3 Napoleon Avenue Stuydock IM Yard and Trackage



V.4.2 Throughput and Capacity

No information is available about the rail throughput of the present Napoleon Ave. CY. It is understood that all import containers handled by rail are Customs-cleared and usually stay at the marine terminal for several days prior to being sent by rail. A rough estimate of the capacity of the limited on-dock trackage is 10,000 moves annually.

V.4.3 Rail Access and Rail Switching

The rail tracks leading to the Napoleon Ave. Terminal (as well as to the rest of the River terminals) are owned by New Orleans Public Belt Railroad (NOPB). NOPB switches railcars to/from this terminal using its own locomotive and labor. If necessary, NOPB can use a storage yard adjacent to Napoleon Ave. to house IM cars, which makes the switching process faster. NOPB also has tracks connecting East and West railroads, and in the future, could provide switching services for these railroads to the Stuydocks Yard.

V.4.4 Intermodal Operations and Cost

At present, the handling of railcars at the Napoleon Ave. CY is done by the terminal operator, Port America, using terminal labor and equipment. The rail operations, including switching railcars inside the terminal, is also done by the terminal operator, using a small locomotive with retrievable rubber wheels (Rail King). Due to the limited size of the rail trackage, the operation is limited and requires the frequent moving of railcars.

Future operations in the Stuydocks Yard will also be done by the terminal operator. According to the plan, imported boxes will be moved from the CY by terminal hustlers directly to their assigned railcars without intermediate storage. At the yard the boxes will be loaded onto railcars using terminal reach stackers.

The tariff rate for the entire CY-to-railcar handling process in Stuydocks Yard is $90 per 20 or 40-ft box. The on-dock rail loading saves the shipper drayage to CN's Harahan yard, an estimated cost of about $100.

VI Port of Baton Rouge

According to port officials, the Port of Baton Rouge is not handling any containers at this time. The container volumes previously handled were generated by Osprey Lines' Container on Barge service, which has ceased operations at the port. The port provides facilities for storing and preparing empty boxes (depot), storage for bulk cargo, CFS and an IM yard, all within the port's Inland River Marine Terminal (IRMT). The overall area of IRMT is 200 acres, including 5,000

feet of linear berthage on the US Gulf Intracoastal Waterway for shallow draft vessels (barges).

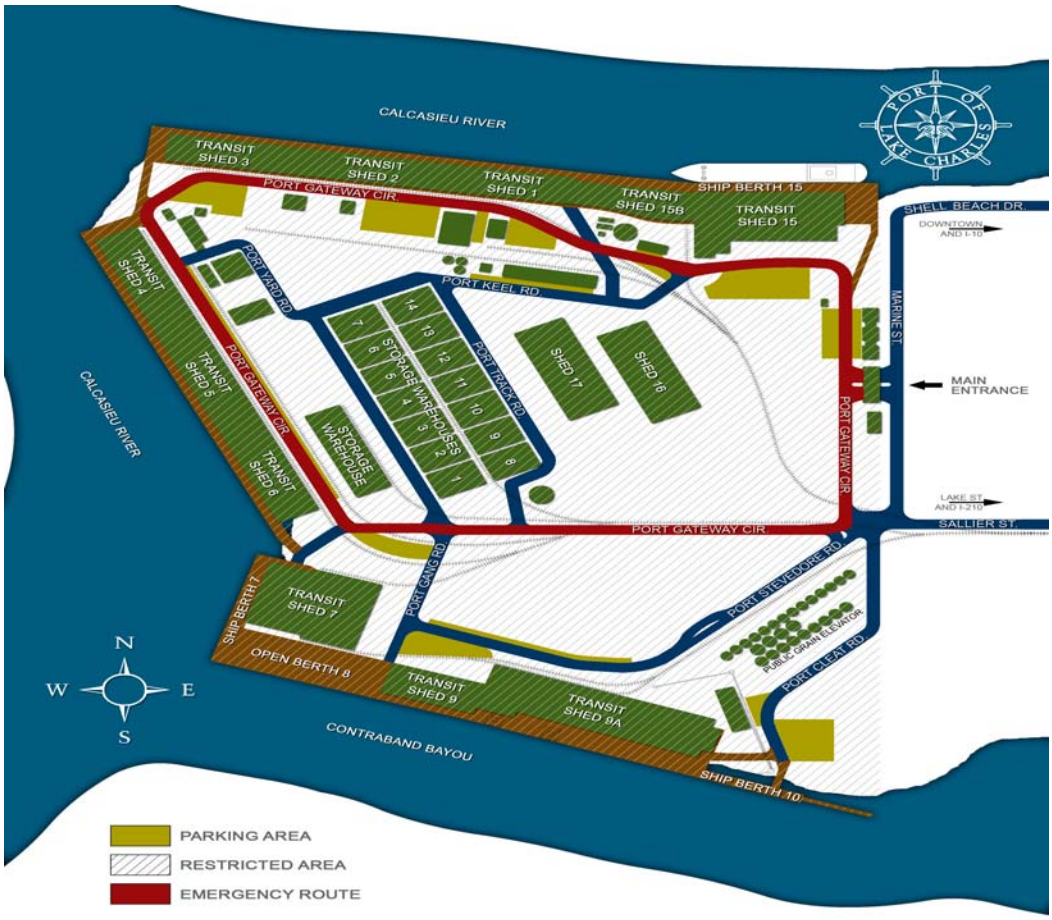
VII Port of South Louisiana

The Port of South Louisiana handles a small volume of containers at its Globalplex Intermodal Terminal located at mile marker 138.6 AHP. The 335-acre industrial park includes a 680’ by 204’ deep-draft General Cargo Dock equipped with two Manitowac-2250 Gantry Cranes mounted on rails to provide full dock access. While the port has a rail connection, it is only used for non-containerized cargo, mainly bulk. The German-based Gulf Africa Line utilizes six ships to transport cargo into the Globalplex Terminal approximately every two to three weeks to trans-load a variety of break-bulk, neo-bulk, and containerized products. According to the terminal operators, the current average monthly container volume is 127 TEU. The Globalplex terminal has a small paved area used for container storage and truck transfer.

VIII Port of Lake Charles

The Port of Lake Charles handles a relatively small volume of container traffic, although it has the potential of becoming a container load center for the West Gulf. Cargo is primarily trucked in, devanned and stuffed into containers at one of the port’s transit sheds. The loaded containers are then moved out via barge or truck for transshipment to domestic markets, with only about 25% destined to international markets. The port has an 18 acre area at the City Docks that is used as a container yard. Although the port does have rail access at the dock, only few containers are moved via rail. According to port officials, there are no plans for construction of a container terminal and respective intermodal yard at this time. The port does actively pursue container traffic, but considers itself to be a niche player in the intermodal container market. The main interest of the port is bulk and breakbulk cargoes.

Figure 4 Current Port Layout at the Port of Lake Charles



IX Port of Mobile

IX.1 General

The Port of Mobile has traditionally been a bulk and general cargo port, handling coal, liquid bulk, forest products, iron and steel products and poultry. The port has made some recent investments to existing facilities such as the conversion of the McDuffie Terminal into an export/import facility with barge loading operations and two additional cranes at the Berth 2 container terminal.

IX.1.1 Location and Access

The Port of Mobile is located near the mouth of the Mobile River, where it empties into Mobile Bay approximately 30 miles from the Gulf of Mexico Sea Buoy. Two interstate systems, I-10 and I-65, are within one mile of the port. The Port is served by five Class I railroads (versus six in New Orleans; UP does not serve Mobile). In addition, the port has access to the Tennessee - Tombigbee Waterway System via the Mobile River.

IX.1.2 Trades, Shipping Services and Throughput

The Port of Mobile serves as a gateway to foreign trade with Central and South America, the Caribbean, North Europe, and Asia. The main liner services calling the port are Zim Lines and Atlanticargo. Zim Lines connects Mobile to Central and South America, the Caribbean and North Europe with its Global services using Kingston, Jamaica as a hub port. Zim Lines' Asian service makes a weekly direct call at Mobile, as well as at Tampa and Houston. This service is operated as a partnership with Emirates Line and utilizes a string of nine 3,000 TEU vessels. Atlanticargo, a subsidiary of Star Shipping, services the North Europe trade lane with a weekly direct call at the port. CMA-CGM has indicated that it will call at the Mobile Container Terminal upon its completion but it is unknown which trade lane will be served. The carrier currently calls at Houston's Bayport Container Terminal with its PEX3 Far East service.

Total annual throughput has increased by 62% from 42,443 TEU in 2005 to 68,823 TEU in 2006. According to port officials the 2007 throughput will reach 94,000 TEU, all of which are international containers. Finished automobiles are the leading export from the state via the port. This sector has grown more than 83% from 2005 and accounts for approximately 36% of the state's total exports. It should be noted that a large portion of the finished automobiles are transported out of state by way of rail carriers. According to a study by the University of Alabama, the forecasted growth in rail traffic due to automobile production from 2003 to 2008 is estimated at 171%.

The inland markets currently served via truck and rail encompasses an approximate 350 mile radius that includes regions of Mississippi, Alabama and Georgia. The port authority estimates that 60% of the current total cargo volumes (bulk, general and containers) are carried via rail. The port's ability to provide seamless rail access to the Mid-West and Eastern hinterlands is perceived as the main asset in the development and marketing of the new facility. Based on market studies, port officials are projecting that 88% of the marine terminal volumes will be handled by rail as volumes increase to the levels needed to attract Class I rail lines to service the Lower / Upper Midwest and selected Eastern markets.

IX.1.3 Institutional Setting

The Port of Mobile is owned and operated by the Alabama State Port Authority. It functions as a department of the state and receives non-operating revenues, grants and/or appropriations on a regular basis. The terminal project under development is an 80/20 joint venture between APM Terminals North America and Terminal Link, a subsidiary of CGM-CMA. Under a 30-year lease agreement, APM Terminals will operate the terminal and the port authority will receive a combination of fixed and variable payments based on the volume of containers handled. This revenue flow will be used to support bonds issued by the port authority to fund the project. Private partners are investing $100 million in Phase 1 of the terminal, and will provide an additional investment of $150 million as the terminal expands. This agreement is the most recent and largest of a number of public-private partnerships at the Port of Mobile. Previous partnerships have expanded the port's grain elevator and allowed for construction of a freezer facility and a liquid bulk terminal.

IX.2 Main Container Terminals

IX.2.1 Present Terminals

The present container terminal is located at Berth 2 with landside access to Interstates 10 and 65 via a truck gate. The access channel is quite long, about 32 miles, and the present depth is 40ft. The total berth line is 900 ft and the container marshaling yard adjacent to the berth has 22 acres. The terminal is equipped with two gantry cranes and eight reach stackers. The current throughput is approximately 94,000 TEU, well above the estimated capacity of 75,000 TEU. This overcapacity requires daily movement of containers from the yard to delivery points.

Although there are no plans to expand the terminal in its current location at Berth 2, it will continue to be utilized by some of the existing carriers such as Atlanticargo, and marketed to other smaller niche market liner services.

IX.2.2 Future Terminals

In response to regional growth in manufactured products and the upward market trend toward container trade, the port developed a 20 year master plan to improve container handling capacity. According to a market analysis by Mofatt & Nichol Engineers, Mobile is considered to have a number of geographical and logistical advantages over other regional ports as a container entry point for the Midwest and Southeast corridors, as well as the growing industries within the state. As a result, the Alabama State Port Authority (ASPA) is developing a container handling center to be serviced by five Class I railroads. The proposed Choctaw Point complex will consist of the Mobile Container Terminal, the Garrows Bend Intermodal Container Transfer Facility (ICTF), and a value-added distribution area (VAD) adjacent to the ICTF. The total development will cover approximately 350 acres of land and sub-tidal area.

ASPA began construction on the 135-acre Mobile Container Terminal in early 2005, with the overall development consisting of two phases. The Garrows Bend ICTF is currently in the engineering and design development stage and will encompass approximately 76 acres. The 21-acre VAD will be located adjacent to the container terminal and transfer facility and be divided into three zones, with access via surface roads that connect to Interstate 10.

Current container traffic is generated on the Central and South American, North European, and Asian trade lanes. The markets supplied are primarily in the lumber and paper, chemicals, auto manufacturing, and aerospace sectors located in Mississippi, Alabama and Georgia. It is envisioned that the new terminal container volumes will grow by a minimum of 500% from the current volumes. This projected growth is forecasted as the result of various factors, including growth in the auto manufacturing and aerospace industries, expansion of Asian services via the Gulf of Mexico, and the promotion of the port as a rail gateway to the Lower and Upper Midwest markets.

The planned Mobile Container Terminal is being constructed in two phases. Phase 1 is scheduled to begin operations in Mid-2008, and will consist of 95 acres with two cranes designed to handle a projected demand through year 2010 of 350,000 TEU. The second phase will add 40 acres and two cranes to the terminal to enable it to accommodate the projected demand of 800,000-plus TEU through 2015. The berth will be 2,000 feet in length and able to accommodate up to six ship-to-shore gantry cranes.

Figure 5 Artist Rendering of Mobile Container Terminal/Garrows Bend ICTF
Source: Alabama State Port Authority

Figure 6 Port of Mobile Aerial Photo
Source: Alabama State Port Authority

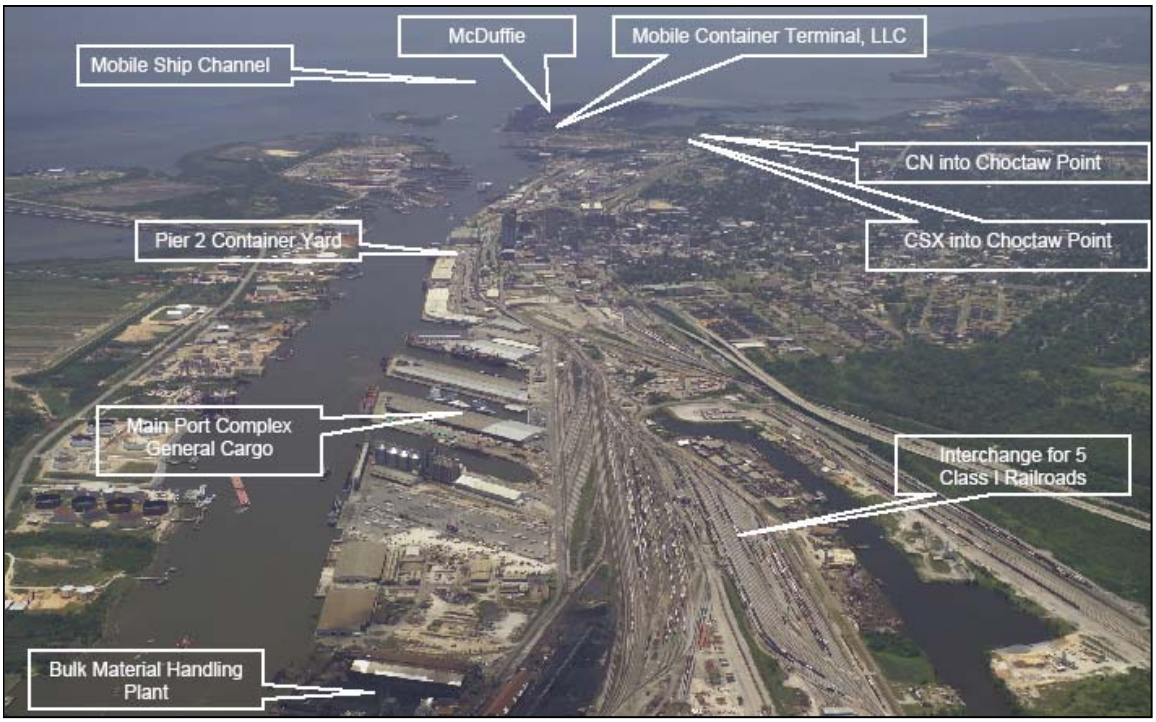


Figure 7 Port of Mobile Rail Connections Aerial Photo
Source: Alabama State Port Authority

IX.3 Railroad Connections

IX.3.1 Class I Railroads

The Port of Mobile is serviced by five Class I railroads including Canadian National (CN), CSX Transportation (CSXT), Norfolk Southern Railway (NS), Burlington Northern Santa Fe Railway (BNSF) via the Alabama & Gulf Coast Railway (AGR), and Kansas City Southern (KCS) through haulage rights over CN.

The port authority owns and operates a short line railroad, the Terminal Railway Alabama State Docks (TASD). TASD provides switching services to area industries located in and around the port and to all rail carriers via trackage rights on CSXT's mainline.

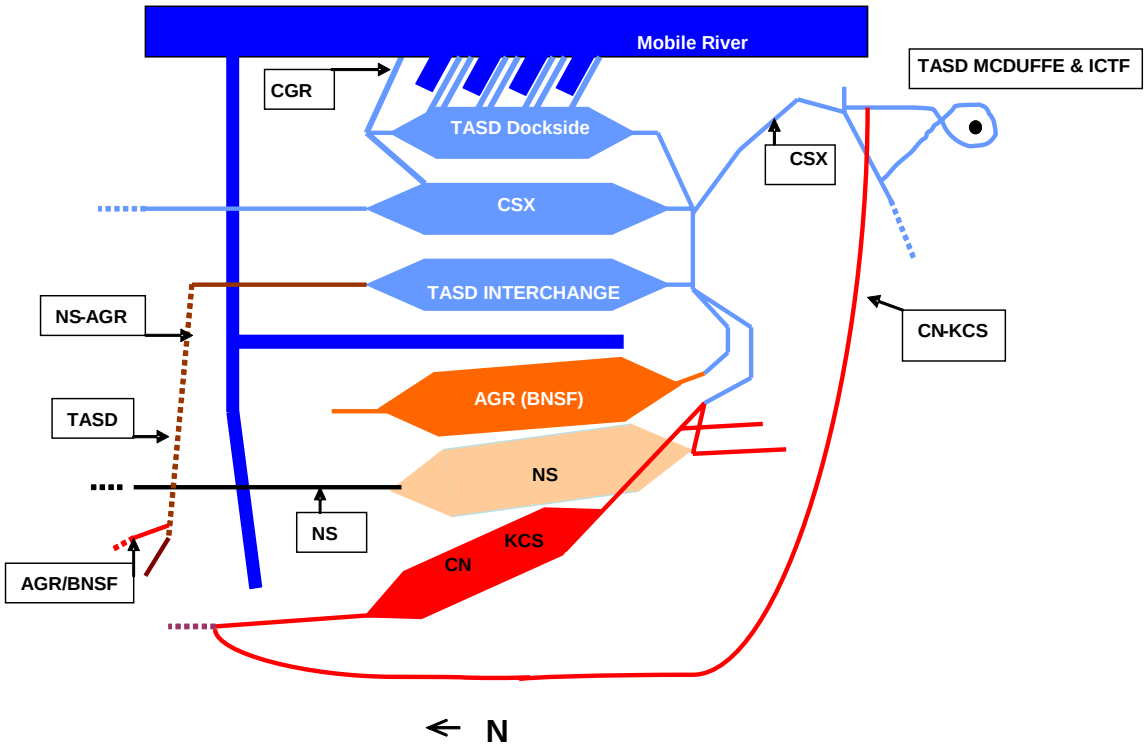
The port is a strategic hub for CSXT, utilizing the railroad's Sibert yard located east of the McDuffie Island/Garrows Bend area. The Sibert Yard handles about 35 trains a day of through traffic and provides a staging location for service to the Brookley and Theodore Industrial complexes. CSXT delivers coal to the McDuffie Island Coast facility from the Birmingham area and also handles agricultural products, minerals and paper.

CN serves Mobile with two routes into the city. The first interchanges with TASD near the Sibert Yard, and the other line branches off the mainline in the Springfield area of Mobile and serves the McDuffie Island Coal Terminal, Armstrong World Industries facility and the Brookley Industrial Complex.

CN and CSXT will have direct access to the Intermodal Transfer Container Facility (ICTF), while NS, BNSF/AGR and KCS will access the ITCF via TASD. TASD operates eight 1,500 HP locomotives on 75 miles of track and has a fleet of 246 50-foot boxcars utilized for transport throughout the United States, Canada and Mexico.

The CG Railway, which is a four-day rail ferry service to Coatzacoalcos, Mexico, is also served by TASD.

Figure 8 Current Rail System Serving the Alabama State Port Authority



IX.4 Intermodal Facilities and Operations

IX.4.1 Location, Facilities and Equipment

The Choctaw Point Complex will be located approximately 1.5 miles from downtown Mobile, AL on the west side of the Mobile River downstream from the Bankhead and George C. Wallace tunnel crossings. The distance to the container terminal from the Gulf of Mexico Sea Buoy via the Mobile River is 30 miles and the access channel depth will be 45 ft.

The Garrows Bend ICTF will be sited to the west of the Mobile container terminal and is envisioned to be connected by an 865 ft vehicular bridge on the north side. This facility can be classified as a large near-dock adjacent yard. In terms of operation, it is on-dock, since there is no need to transit the terminal gate in order to reach the yard. The planned facility will have an entry gate on the south side and a grade-separated structure will be constructed to connect the Mobile Container Terminal to Interstate 10. The entry gate will ultimately have eight covered lanes and one out-of-gauge lane and a projected capacity of 350,000 TEU.

The current design within the transfer facility envisions five working tracks of 8,100 feet each, five storage tracks, two arrival/departure tracks and a runaround track. ASPA has phased the project based on demand levels. The first phase will include three working tracks and chassis storage, considered sufficient to begin operations.

According to HDR Inc. the project's engineers, the overall design is intended to minimize conflicts between new and existing traffic and optimize the efficiency of operations. The configuration will allow access to the ICTF by CN and KCS without disrupting coal trains serving McDuffie Island via the CSXT line. The port plans to add a third track to the McDuffie Coal Terminal to meet the forecasted growth in coal export volumes as well as new business from coal-fueled power plants in the Southeast. This additional track will allow coal and intermodal traffic to grow simultaneously.

IX.4.2 Intermodal Operations and Cost

The terminal will be operated by Mobile Container Terminal LLC, a joint venture between APM Terminals North America (a subsidiary of Maersk, Inc.) and Terminal Link (a division of CMA-CGM).

At this point, the costs are unknown as the tariff has not been published. The future operator for the Garrows Bend ICTF had not been announced at the time of this study.

X Port of Charleston

X.1 General

The Port of Charleston handles a variety of commodities at its five terminals. The Columbus Street terminal is a multipurpose facility handling breakbulk, bulk, rolling stock, heavy-lift and project cargoes; the Union Pier Terminal is dedicated to breakbulk and Roll On/Roll Off cargoes; the North Charleston Terminal is capable of handling both breakbulk and containerized cargo; and the Wando Welch and new Veterans Terminals are dedicated to containerized cargo.

X.1.1 Location and Access

The Port of Charleston is located at the convergence of the Cooper and Wando Rivers, near a large inner harbor connected to the ocean. The access channel depth is 45 ft at MLW with high tide adding up to six ft. The container terminals are about one to three hours away from the ocean buoy.

X.1.2 Trades, Shipping Services and Throughput

The port is the fourth largest on the US East Coast (USEC), after New York, Savannah and Norfolk. The port's main trade is with Northern Europe and Asia, each accounting for about 1/3 of the total traffic, followed by Latin America and the Mediterranean. The port is served by many lines, the largest of which is Maersk, followed by MSC, Evergreen and others, providing a total of about 40 separate shipping line services.

Like other Atlantic ports, the port is making preparations to accommodate the new Suez Express services, or Asian (Far East) services routed through the Suez Canal employing large post-Panamax ships. This trend is expected to materialize in three to five years, as the Panama Canal approaches its capacity limits while the larger locks are still under construction. Present Suez-routed services are not "express"; they only reach Southeast Asia (not Hong Kong), they employ relatively small Panamax ships and their rotation has numerous intermediate calls.

A forerunner of the express trend is the new service of the New World Alliance (APL, OOCL, MOL, and HMM), the APX, which sails non-stop from Colombo, Sri Lanka to the USEC. Recently, the Port of Charleston signed a four-year contract with this service; however it is still based on relatively small ships of about 4,500 TEU. In comparison, the dominant ships of the Transpacific and Asia-Europe trade lanes are super-post-Panamax ships of 8,000-plus TEU. The largest ships that can traverse the Suez (SuezMax) are about 15,000 TEU and the future New Panamax (NPX) ships will be about 12,000 TEU.[2]

[2] However, these ships require at least a 52-ft channel, way beyond depth currently available or planned for Charleston and Savannah.

Presently, the largest ships calling Charleston (as well as New Orleans) are post-Panamax ships of 6,700 TEU employed by MSC Europe service.
Charleston throughput for 2006 was 1.97 million TEU.

X.1.3 Institutional Setting

The Port of Charleston is part of the South Carolina State Port Authority. The port is a hybrid organization, acting both as operator and landlord. The port allows lines to either select their own private port operator or use the port itself for operations. Likewise, the port allows “license agreements” of certain facilities (excluding berthage and ship-to-shore cranes), which are similar to leases. The result of the hybrid setting is that the terminals have parallel sets of gates and yards, each with different operating practices and equipment. It is understood, however, that the future Veterans Terminal to be built at the existing navy yard will be entirely operated by the Port.

X.2 Container Terminals

X.2.1 Present Terminals

The Port of Charleston has three container terminals; Columbus Street, North Charleston and Wando Welch. Columbus Street and North Charleston are midsize terminals located on the east bank of the Cooper River and encircled by urban areas. Both terminals have on-dock rail trackage. Wando, the largest and most modern of the Charleston terminals, is located on the Wando River, away from the city of Charleston. In recent years the area around the terminal has undergone an accelerated development, including the construction of upper-income residential neighborhoods that resist further commercial developments.

Wando Terminal, a modern 194-acre terminal, with 3,800-ft berthage and 10 gantry ship-to-shore cranes, has no rail connection. Moreover, the settlement agreement that the port signed with local residents specifies no future rail access can be constructed. Interestingly, and as will be explained below, port management does not see advantages in having an on- or near-dock IM yard.

Of the two terminals with rail connections, Columbus Street is the smaller facility with very limited on-dock rail trackage. The terminal is multi-purpose, handling both containerized, rolling and breakbulk cargoes. Hence, this terminal will not be reviewed here.

North Charleston is the only Charleston terminal with significant on-dock rail trackage. The North Charleston Terminal has three container berths totaling 2,500 ft and a total of 185 acres, of which 123 acres serves as the (CY). The

berths are equipped with six gantry cranes, four of which are post-Panamax. In addition, the terminal has a container freight station totaling 118,500 square feet.

X.2.2 Future Terminals

As indicated above, the existing Charleston terminals cannot be expanded except for the addition of small yard areas, which includes a 50-plus acre expansion yard at the Wando Welch Terminal and a conversion of about 10 acres of rail trackage in North Charleston. North Charleston also has a grain elevator and a dedicated grain berth, neither of which is in use and could be converted to accommodate container traffic. These conversions could provide an additional 400,000 TEU of handling capacity per year.

Longer term, Charleston's expansion plans revolve around a new three-berth container terminal on 280 acres at the former navy yard in North Charleston to be named Veterans Terminal. The terminal capacity is estimated at 1.4 million TEU and the total investment at $600 million, or about $200 million per berth. This terminal is expected to increase the port's capacity to more than 4 million TEU when completed in 2013. The terminal plan does not include either an on- or near-dock IM yard, although both railroads have access to it. According to the port staff, the existing CSX and NS yards are close enough to be considered as near-dock (see more in the IM section).

X.3 Railroad Connections

X.3.1 Class I Railroads

The port is connected to two Class I railroads, CSX and NS. These two eastern railroads serve all Atlantic ports providing a full coverage of all major cities east of the Mississippi River. Both railroads reach the Mississippi River at three points; New Orleans, Memphis and St. Louis. In addition, NS crosses the river in St. Louis and continues further west to Kansas City. Figure 3 presents the rail maps of these railroads focusing on the Charleston service areas.

X.3.2 Main Rail Services

The CSX and NS railroads have daily services for both marine and domestic containers, but not for trailers. CSX is the largest railroad that serves Charleston, and has a daily service to Savannah. In Savannah the services splits; the larger section continuing west to Atlanta and subsequently to Charlotte, Nashville, Memphis, etc., while the smaller section continues southwards to Jacksonville and eventually New Orleans. The CSX service primarily handles marine containers along with some domestic containers carrying port-related content.

Much like CSX, NS also has a daily service in Charleston, though its focus is on Atlanta and Chicago to the west and Birmingham to the south. NS also has five unit trains per week to Tuscaloosa, AL, (near Birmingham), serving the Mercedes assembly plant there. For both railroads, Atlanta is by far the largest hinterland point served.

X.4 Intermodal Facilities and Operations

X.4.1 Location, Facilities and Equipment

As already noted, both CSX and NS have off-dock yards (although in port publications they are referred to as near-dock), both located in North Charleston near I-26. The distances to these IM yards are about 10 miles from North Charleston, 12 miles from Wando and 10 miles from Columbus. Accordingly, drayage cost is estimated to range from $100 to $150, depending on distance and special arrangements made with truck lines. However, as will be further elaborated upon below, switching railcars to on-dock IM yards seems to not cost much less and may take much longer time.

CSX appears to be the more active railroad in Charleston. Their IM yard has a total of 66 acres and 12,000 ft of trackage, including two 3,000 ft, two 2,800 ft and one 800 ft storage tracks and two 1,700 ft working tracks. There is also an additional 2,600 ft track for storing empty railcars. Main yard equipment includes five reach stackers (Taylor) and seven yard hustlers. The yard provides a total of 1,200 parking slots, 600 of which are paved, and handles COFC (containers on flat cars) but not TOFC (trailers on flat cars). Present throughput is about 12,000 lifts per month with a capacity of approximately 16,000 lifts per month.

The NS yard is located adjacent to CSX's. It is a midsize yard with a total of 28 acres and two 3,300 ft working tracks. Like CSX, the yard only handles COFC.

The North Charleston marine terminal has a small but well designed on-dock IM yard consisting of two 1,500 ft working tracks arranged perpendicular to the berth line. To support the rail operation, there is also an on-dock storage yard. According to the port managers, the on-dock IM yard has not been used in recent years and all IM boxes are being drayed to the IM yards of CSX and NS. Telephone interviews with these railroads revealed that port-generated traffic is responsible for most of the traffic in these yards. According to the port and the railroads, it takes a day to get a string of cars to the terminal and another day to get them off the terminal, and it costs roughly the same as drayage. This is the reason why the yard is not in use. It should be noted that the switching of railcars on-dock is done by a state-owned, short rail line. Figure 10 presents a drawing of the North Charleston Terminal with the on-dock IM yard.

In contrast to the North Charleston Terminal, the on-dock yard in Union Pier Terminal, which mainly handles autos, is fully utilized. In this terminal, all autos are brought in and sent out by three-level auto carriers, which are off-loaded on-

dock. It should be noted the Union Pier Terminal is a relatively small terminal located in downtown Charleston.

X.4.2 Throughput and Capacity

The capacity of the on-dock yard in North Charleston is limited, with a rough estimate of 20,000 moves annually.

X.4.3 Rail Access and Rail Switching

The rail access is via tracks owned by the State, and switching services are provided by a local short rail line operated by the State.

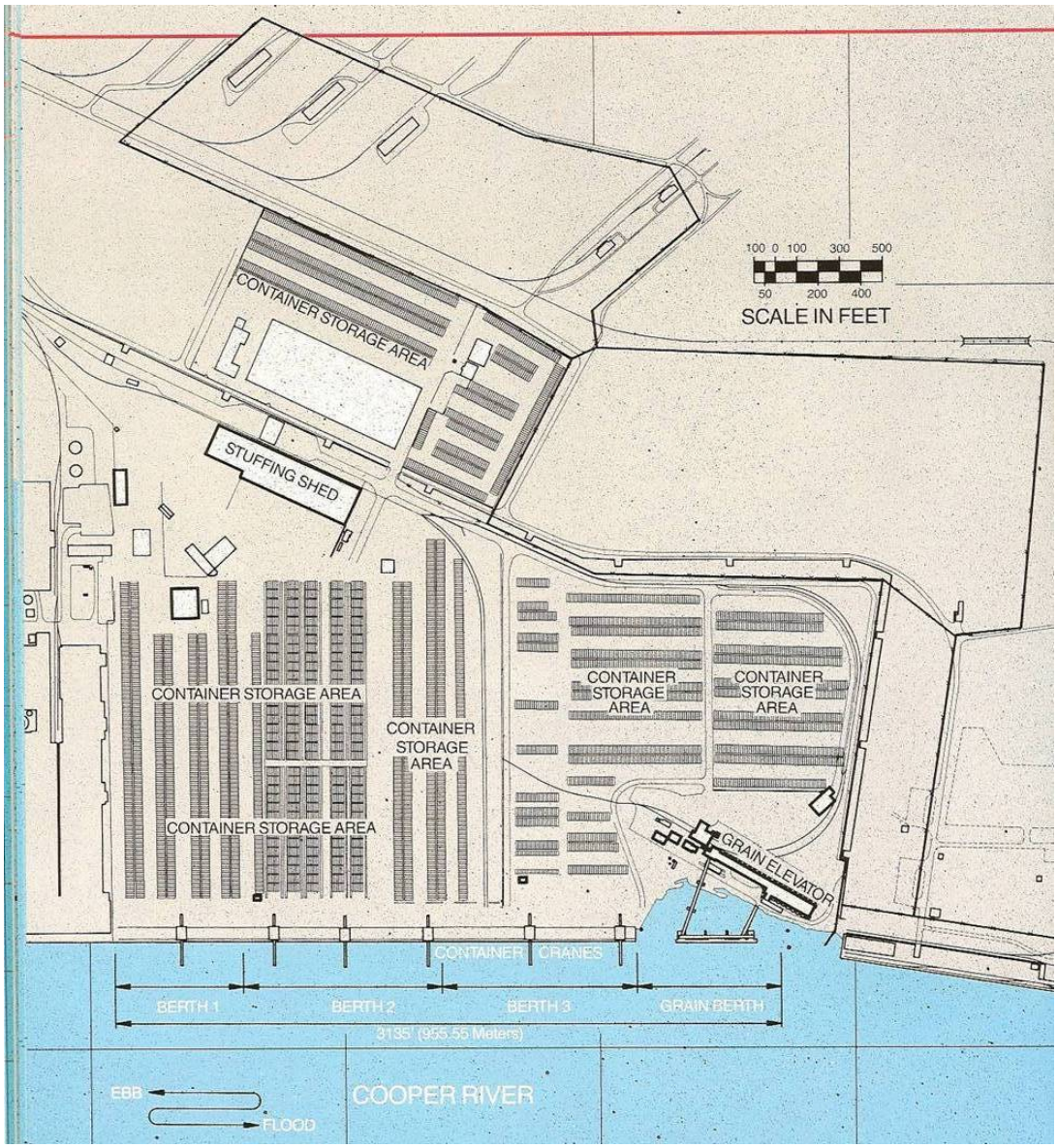
X.4.4 Intermodal Operations and Cost

No IM operation is conducted at the Port of Charleston's terminals.

Figure 9 NS Service via the Port of Charleston

Figure 10 CSX Service via the Port of Charleston

Figure 11 North Charleston Terminal



XI Port of Savannah

XI.1 General

The Port of Savannah consists of three terminals, two dedicated to bulk, breakbulk and Roll On/Roll Off cargoes and the other for containerized cargoes. The Ocean Terminal and Mayors Point Terminal handle a variety of forest products, steel, heavy equipment, automobiles, and project cargoes. The Garden City Terminal is dedicated to containerized cargoes only.

XI.1.1Location and Access

The Port of Savannah is located on the southern bank of the Savannah River, about 20 miles and two to three hours of steaming time from open sea. This river is narrow and shallow and requires constant dredging. Current channel depth is 42 ft and plans have been approved for deepening it to 48 ft MLW. However even with the deepened river, Savannah will have great difficulties in handling super-post-Panamax ships of 8,000-plus TEU (the dominant ships of Transpacific services) not to mention the larger NPX of 12,000 TEU or SuezMax of 15,000 TEU.

Regardless of its problematic location, Savannah is the fastest growing port in the Atlantic region. The port's success is attributed to the development of a network of distribution centers (DC) in its vicinity, taking advantage of the availability of land and inexpensive labor. The result is that Chatham County, in which Savannah is located, has 17 million sq ft of warehouse space in operation and under development, all within 10 miles of the Port.

Much like Charleston, the port is gearing itself for Asian trade, especially the anticipated development in Suez-routed services (see above).

XI.1.2 Trade, Shipping Services and Throughput

The trade lanes served by Savannah are similar to those served by Charleston, except that Savannah has captured a much larger share of Asian cargo, accounting for about 60% of its overall trade.

The port is served by many lines, the largest of which are Hapag-Lloyd, followed by Maersk Line and Zim, providing 40 separate shipping services.

Savannah throughput for 2006 was 2.04 million TEU, and is expected to reach 2.3 million in 2007, an increase of 12.7%.

XI.1.3 Institutional Setting

The Port of Savannah is owned and operated by the Georgia Port Authority. All terminal operations, except for ship stevedoring, are performed by non-union state employees. Ship stevedoring is conducted by private stevedores employing ILA labor. The employment of non-union labor provides the port with flexibility, including the recently introduced flexible shift system, which allows for adjusting the number of workers and machines to operational loads without incurring expensive stand-by times.

XI.2 Container Terminals

XI.2.1 Present Terminals

Savannah has two terminals involved in handling containers, Ocean Terminal and Garden City Terminal. Ocean Terminal is a multi-purpose terminal that mainly handles rolling and breakbulk cargoes along with overflow of containers from Garden City. The terminal has a total area of 208 acres and a total berth line of 6,674 ft. However, only 47 acres serve as a dedicated CY, and the terminal only has one container crane. There is on-dock trackage but not in use for containers.

Garden City is the largest terminal in the US with a total area of 1,200 acres, of which 495 acres are paved and serve as a CY. The total berth line is 9,700 ft equating to a total of nine berths. The terminal is equipped with 18 gantry cranes, eight of which are super-post-Panamas with an outreach of 22 rows across ship.

XI.2.2 Future Terminals

Expansion of the Garden City Terminal is underway. Recently, the port has completed the construction of Berth 8 and Berth 9 along with the paving and overlay of 30 acres of container storage for those berths. The plan will add 42 acres of container yard by the first quarter of 2008. Longer-term though still unspecified expansion plans will increase the current capacity of 2.62 million TEU to 6 million TEU in 2018.

As noted above, the Garden City Terminal is located at the end of a narrow river, with a current depth of 42 ft and a planned depth of 48 ft, which is insufficient to handle NPX ships. These ships could be served at a new Jasper County terminal with about 11,000 ft of berth line and 2,000 acres. The proposed site is located at the mouth of the Savannah River on the South Carolina side, approximately eight miles from the sea buoy. The proximity to open sea would allow for providing a deep channel at a reasonable cost. However as there are no road or rail connections to the site, the development of it may take 10 to 15 years and may

involve major investments. The proposed development will be undertaken by a new bi-state South Carolina and Georgia agency.

XI.3 Railroad Connections

XI.3.1 Class I Railroads

The Port of Savannah, very much like the Port of Charleston, has connections to two Class I railroads; CSX and NS. Unlike Charleston, the dominant rail line in Savannah appears to be NS.

XI.3.2 Main Rail Services

The main rail service connects Savannah to Atlanta. According to the NS schedule, this service has 10 weekly trains, including a daily train Monday through Sunday with a second daily train on Monday, Thursday and Saturday. All NS trains are “pure” marine containers, all handled at the Garden City IM yard and all going to Atlanta. In Atlanta, the marine containers are mixed with domestic trailers and containers, and continue their journey using the regular NS network of services. According to sources at the port, the main destinations are Charlotte and Memphis.

CSX has rail services similar to NS, though according to the published schedule, the focus is on a daily train to Atlanta and Memphis and a thrice-weekly train to New Orleans. It is understood that the CSX train from Charleston goes first to Savannah and from there to Atlanta.

XI.4 Intermodal Facilities and Operations

XI.4.1 Location, Facilities and Equipment

The main IM yard in Savannah, referred to as the Mason Intermodal Container Transfer Facility (ICTF), is located adjacent to the Garden City Terminal. The yard has a direct connection to the marine terminal with no gate in-between the two. Hence, while in terms of location the yard is near-dock, in terms of operation it is on-dock. The ICTF has a gate on a public road, which will be used for processing domestic boxes originating at local DCs.

The ICTF is a large IM yard, with a total of 150 acres. It has four 2,500 ft working tracks, two 2,500 ft storage tracks and one 2,500 ft bypass track. This yard serves NS exclusively, and it is the only IM yard that this railroad has in Savannah. Rail handling is performed by reach-stackers.

The CSX railroad uses a separate on-dock yard consisting of three sets of 2,500 ft on-dock working tracks for handling marine containers. In addition, CSX has a domestic IM yard, located 5.8 miles away from the marine terminals. Current

CSX on-dock activity is inefficient, and the port is finalizing plans to construct a second ICTF nearby the existing NS yard for CSX, roughly the same size as the existing one.

Both NS and CSX have storage yards adjacent to the Port.

XI.4.2 Throughput and Capacity

The total rail throughput handled in Savannah amounted to 230,000 lifts in 2006; 125,000 for NS and 105,000 for CSX. It should be noted that Atlanta, the main destination of Savannah's IM containers, is only 230 miles and 4.5 trucking hours away. Also, a large portion of the port's throughput is destined to adjacent distribution centers (DC). Capacity estimates for the IM yards is unavailable.

XI.4.3 Rail Access and Rail Switching

The switching of both railroads is performed by Rail Link, a private small rail line based in Jacksonville.

XI.4.4 Intermodal Operations and Cost

The Port of Savannah is an operating port. Since the IM yard is a port property, it is also operated by port labor. The port has a special unit in charge of all IM handling both at the ICTF and the on-dock tracks; however, the port does not operate any equipment for moving railcars, all of which is conducted by the short line railroad.

Port Tariff No.10 indicates that the charge for lift to/from railcar is $59/box and $60/box for the drayage, or a total of $119/box for a complete CY-to-Rail transfer.

Figure 12 Garden City Terminal and Intermodal Container Transfer Facility

James D. Mason Intermodal Container Transfer Facility

XII Port of Jacksonville

XII.1 General

XII.1.1 Location and Access

The Port of Jacksonville is located on the St. John's River. The port's shipping channel extends 21 miles from the Atlantic Ocean to just north of downtown Jacksonville. In 2002, the US Army Corps of Engineers undertook the St. John's River Deepening Project and has a maintained depth of 40 feet on about 14 miles of the river.

XII.1.2 Trade, Shipping Services and Throughput

According to port officials, about 90% of port's current container traffic is on the north/south trade lanes. In terms of total import and export tonnage, the port's major trading partners are the Caribbean (41%), followed by South America (36%), North America (9%), Europe (8%), Asia (3%) and Africa (1%). Over a dozen ocean carriers call the port including Maersk, MSC and Crowley.

XII.1.3 Institutional Setting

The day-to-day operations of the port are not funded by public money. The port operates as a landlord port and generates revenues through user fees, leases and other charges. Funds for capital improvements are generated through the Florida Seaport Transportation and Economic Development Council, which provides 50-50 matching funds from motor vehicle registration taxes.

XII.2 Container Terminals

XII.2.1 Present Terminals

Presently, Jacksonville has two container terminals, Blount Island and Talleyrand. Blount Island handles 80% of the 700,000 TEU that move through the port annually. It is located north of the Fulton Dames Point cutoff channel nine nautical miles from the Atlantic Ocean. The entire terminal is 754 acres, of which 150 acres is dedicated to container storage. The container berth is equipped with three 50T, and three 45T gantry cranes. The terminal has 5,280 feet of berthing space on a depth of 41 feet, and an additional 1,350 feet of berthing space on 38 feet of water. It should be noted that Blount Island also has berths equipped to handle roll on/roll off (autos), breakbulk and general cargoes. Blount Island is one of the largest vehicle import-export centers on the East Coast.

The Talleyrand Marine Terminal is located approximately 21 miles from the mouth of the St. John's River. It handles South American and Caribbean

containerized cargoes, breakbulk commodities such as steel and paper, imported automobiles, frozen and chilled goods and liquid bulk. The terminal has 173 acres and 38 feet of water-side depth. It is equipped with six container cranes, two RTG's, one multi-purpose whirley crane, and three 40T container stackers.

XII.2.2 Future Terminals

The Port Authority signed a 30-year lease agreement with Mitsui Osaka Lines, Ltd. (MOL), to build a 158-acre container facility at the Dames Point location at an estimated cost of $200 million. Project construction began in early 2006, and is currently slated for completion at the end of 2008 or in early 2009. The new terminal will be operated by Trans Pacific Container Service Corp. (TraPac), the terminal operating subsidiary of MOL. The TraPac Jacksonville terminal will initially process 200,000 TEU annually, with a projected increase to 800,000 TEU when fully operational. The terminal will have two 1200 ft berths utilizing six Post Panamax container cranes. In preparation for this terminal, the port is deepening the 12-mile channel from 41 to 45 feet. The new terminal will not have on-dock rail connection and port officials anticipate about 200 trucks per hour will transit the terminal gates. A new roadway connecting the terminal to New Berlin Road will be constructed to meet the increased capacity. It is expected that the majority of the trucks will head north on Florida 9A after exiting the terminal.

The project is primarily funded through special purpose facility bonds backed by MOL, city excise taxes, and a low-interest loan from the State Infrastructure bank of Florida. In March, the port authority signed an agreement to buy another 185-acre site northwest of Dames Point, designated as a second terminal presumably for another Asian line. There are several hundred acres of undeveloped industrial area at Dames Point that can be used for construction of support facilities, some of which are already underway, such as warehouses, cold storage, etc. According to port officials, real estate companies, developers and investors are purchasing commercial properties in the area to build distribution centers in anticipation of the increase container traffic that will be generated by the new MOL service.

XII.3 Railroad Connections

XII.3.1 Class I Railroads

The port is served by two Class I railroads, CSX and NS, and by the Florida East Coast (FEC). CSX provides access to a 23,000-mile network to 23 states, the District of Columbia and the Canadian provinces of Ontario and Quebec. NS has a 21,500-mile network with eight through freight trains into, and nine through freight trains out of Jacksonville daily. Additionally, NS operates six yard trains per day in the Jacksonville area. FEC offers intermodal service between

Jacksonville and Fort Lauderdale and Miami on six southbound and four northbound scheduled trains.

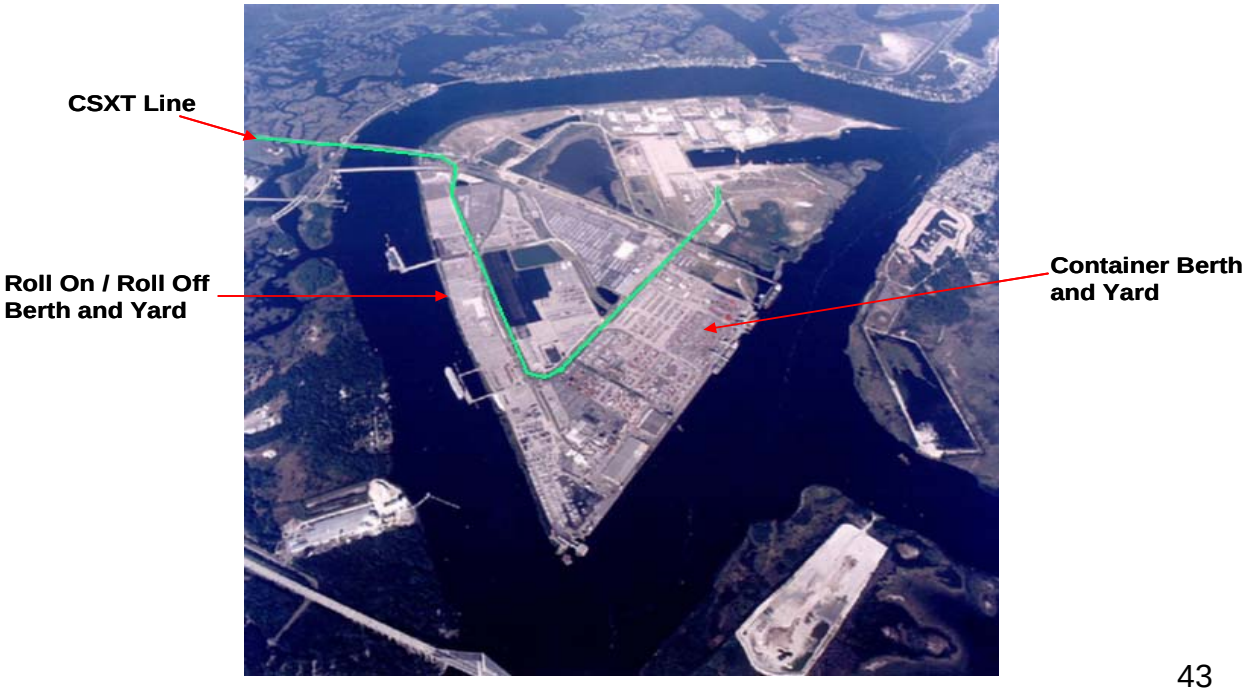
XII.4 Intermodal Operations and Facilities

CSX provides on-dock rail at the Blount Island Marine Terminal.
The Talleyrand Marine Terminal also has on-dock rail facilities run by Talleyrand Terminal Railroad, Inc., which provides direct switching for Norfolk Southern and CSX. The terminal is only minutes from FEC's intermodal ramp. The terminal also has the most direct truck route connecting to I-95.

Figure 13 Port of Jacksonville Aerial Photo
Source: Jacksonville Port Authority

Figure 14 Artist Rendering of the TraPac Jacksonville Terminal
Source: Jacksonville Port Authority

Figure 15 Blount Island Aerial Photo
Source: Jacksonville Port Authority



XIII Summary Findings and Recommendations

XIII.1 Summary Findings

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The study includes a comparative review of IM connectivity and related IM yards at the Port of New Orleans and four other out of state ports. The IM yards are classified into three generic categories; on-, near- and off dock. The on-dock is further divided into live, drop and two-stage, and the near-dock into adjacent and non-adjacent. Altogether, there are a total of five IM yard configurations by which the studied ports were analyzed.

The review revealed that the study ports employ a wide variety of IM yards configurations:

- ***New Orleans*** – Napoleon Ave.Terminal presently employs a temporary on-dock drop IM yard. The configuration of the proposed Stuydocks IM yard also will be on-dock drop. This yard would be better laid out and provide an additional 30 acres to the Napoleon Avenue complex, although its overall size is not comparable to the other studied ports.
- ***Mobile*** – The present Berth 2 terminal is a 22 acre facility with limited IM operations. The new Choctaw Point Terminal will have a 76 acre near-dock IM yard, connected directly to the marine terminal and serving both marine and domestic containers.
- ***Jacksonville*** – Blount Island Terminal and Talleyrand Terminal have on-dock IM yards. The new TraPac terminal has no IM yard.
- ***Savannah*** – Garden City Terminal has a large near-dock IM yard directly connected to the marine terminal which serves only NS. An on-dock drop IM yard serves CSX. Future development includes terminating the on-dock yard and moving CSX to a second near-dock IM yard. The two yards also will handle domestic containers.
- ***Charleston*** – North Charleston Terminal previously employed on-dock drop IM yard but terminated its operations. Presently, this terminal as well as the larger Wando use off-dock yards operated by NS and CSX. These yards will also serve the future Veterans Terminal, since its layout does not include an IM yard.

The studied ports have different approaches to their IM operations and configuration of IM yards. Though the selected ports are somewhat limited; it can be observed that there is a trend away from on-dock towards near-dock. In fact, none of the new terminals included in the review, Charleston's Veterans Terminal, Savannah's Garden Terminal expansion, Jacksonville's TraPac and

Mobile's Container Terminal at Choctaw Point have an on-dock IM yard. Possible reasons for this trend may be:

- The scarcity and limited size of waterfront land does not allow for the construction of on dock IM yards that can efficiently handle double stack unit trains
- The desire to combine the handling of marine and domestic containers to achieve better utilization of the IM facilities and provide better rail services
- The difficulties involved in switching long trains to/from marine terminals, interrupting traffic both inside and outside the terminal and adding to costs and time.

XIII.2 Stuydocks IM Yard Development Options

The Napoleon Ave. Terminal, with 2,000 ft of berth line, 80 acres of waterfront land and about 250,000 TEU annual throughput, is considered a midsize terminal. The current on-dock IM yard is a temporary arrangement with limited capacity. The plan is to further develop the on-dock Stuydocks IM yard which encompasses approximately 30 acres. While relatively small compared to near-dock yards of other ports, the planned development will provide sufficient capacity to accommodate growth beyond the current IM traffic of Napoleon Ave. Hence, theoretically, this yard can serve three types of traffic listed below according to the overall volume of IM traffic:

(a) Terminal-generated marine containers, CN only – The same as the existing yard
(b) Terminal-generated marine containers, all railroads – The above plus other railroads' international containers, mainly BN and NS
(c) Terminal and non-terminal marine and domestic containers, all railroads – The above plus domestic containers

Option (a) raises the question of whether the IM traffic of Napoleon Ave. justifies the tradeoff between using the area as an IM yard or as a CY.

Option (b), which involves handling other railroads' IM traffic, requires that the terminal generates significant IM traffic on these railroads, which currently is not the case. Another requirement is that NOPB provides switching service to these railroads located on the other side of the River. The larger volume may also require adding intermediary storage at the IM yard to avoid interfering with ship handling or changing the configuration from drop to two-stage.

Option (c) requires construction of a special gate for handling domestic containers.

XIII.3 Recommendations

XIII.3.1 In-Depth Study of the Intermodal Process and Options

The section above outlined three development options for the planned Stuydocks IM yard. If not already undertaken, the decision on the most desirable option would require an in-depth feasibility study by the port or other entity.
If this recommendation is implemented, the proposed study should include collecting data on switching and drayage to/from the various off-dock IM yards in New Orleans as well as a review of the operations of these yards. The proposed study should also include interviews with prospective users, lines, forwarders and shippers in order to assess the impact of IM connectivity on the marketing position of the port.

XIII.3.2 Alternative Usage of Waterfront Land

Determining the feasibility of developing the Stuydocks IM yards also depends on the alternative usage of this 30-acre area as a CY. The capacity of Napoleon Ave. marine terminal seems to be constrained by the lack of sufficient yard space, although one of the users is using low-density yard equipment. Hence, the development of 30 acres of CY may increase this terminal's overall capacity. If not already undertaken, it is recommended that a detailed assessment of terminal capacity under different traffic development scenarios be conducted.

XIII.3.3 Long-Term Developments of Louisiana's Container Terminals

The two previous recommendations are based on the findings of this study and relate to the short-term IM development of Louisiana deep-sea container terminals. The following recommendation relates to the long-term future of these terminals and it is not directly related to the study's objective and scope, although it indirectly stems from its findings.

A preliminary task conducted for this study included a review of future development plans of out-of-state ports, especially those considered as our competitors. The review revealed that all these ports are involved in the development of container terminals of increasing size, some of which include port-related industrial parks. Of special concern should be Mobile's, 300-plus acre terminal complex at Choctaw Point that also includes an 80-acre dual purpose IM yard. New Orleans and Mobile serve overlapping markets, with both ports having access to similar rail connections. With the new complex, especially the IM yards, Mobile may have better access to these markets than Louisiana's only deep-water container terminal.

As noted above, the present facilities at Napoleon and Nashville terminals are constrained by land availability, and road and rail accesses. It seems unlikely that a larger port complex similar to those developed by other ports, among them

Mobile, can be developed at this site. As stated in previous studies, the question that comes to mind is whether the State should invest in the necessary infrastructure required to promote the development of a complimentary site at another riverside location based on current and projected container traffic volumes via the Mississippi River.

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Glossary of Selected Terms

Breakbulk Cargo - non-containerized general cargo stored in boxes, bales, pallets or other units to be loaded onto or discharged from ships or other forms of transportation. Examples include iron, steel, machinery, linerboard and woodpulp.

Bulk Cargo - loose cargo (dry or liquid) that is loaded (shoveled, scooped, forked, mechanically conveyed or pumped) in volume directly into a ship's hold; e.g., grain, coal and oil.

Container on Flat Car (COFC) - the movement of a container on a railroad flat car. This movement is made without the container being mounted on a chassis.

Container Freight Station - the facility for stuffing and stripping a container of its cargo, especially for movement by railroad.

Container Yard - a yard used for storage of containers when not in use.

Drayage - the movement of a container or trailer to or from the railroad intermodal terminal to or from the customer's facility for loading or unloading.

Feeder Service - ocean transport system involving use of centralized ports to assemble and disseminate cargo to and from ports within a geographic area. Commodities are transported between major ports, and then transferred to feeder vessels for further transport to a number of additional ports.

General Cargo - consists of both containerized and breakbulk goods, in contrast to bulk cargo.

Intermodal- the transport of freight by two or modes of transportation.

Landlord Port - at a landlord port, the port authority builds the wharves, which it then rents or leases to a terminal operator (usually a stevedoring company). The operator invests in cargo-handling equipment (forklifts, cranes, etc), hires longshore laborers to operate such lift machinery and negotiates contracts with ocean carriers (steamship services) to handle the unloading and loading of ship cargoes.

Mean Low Water (MLW) - lowest average level water reaches on an outgoing tide.

Neo-Bulk Cargo - uniformly packaged goods, such as wood pulp bales, which stow as solidly as bulk, but are handled as general cargoes.

Operating Port - at an operational port, the port authority builds the wharves, owns the cranes and cargo-handling equipment and hires the labor to move cargo in the sheds and yards. A stevedore hires longshore labor to lift cargo between the ship and the dock, where the port's laborers pick it up and bring it to the storage site.

Reach Stackers – a heavy four wheeled vehicle with an extendable arm capable of lifting and stacking containers anywhere in a container yard.

Rubber Tired Gantry Crane (RTG) - track-mounted, shoreside crane utilized in the loading and unloading of breakbulk cargo, containers and heavy lift cargo.

State Agency Port - a port that is an agency of the state and receives state monetary support

Stevedores - labor management companies that provide equipment and hire workers to transfer cargo between ships and docks. Stevedore companies may also serve as terminal operators. The laborers hired by the stevedoring firms are called stevedores or longshoremen.

Straddle Carriers - mobile truck equipment with the capacity for lifting a container within its own framework.

Trailers - a rectangular shaped box with permanent wheels attached for the transport of goods on rail, highway or a combination of both.

Trailer on Flat Car (TOFC) - a rail trailer or container mounted on a chassis that is transported on a rail car. Also known as piggyback.

Yard Hustler - small "off-road" trucks used to ferry containers within a container cargo terminal.