PORT EVERGLADES 2014 MASTER/VISION PLAN

ELEMENT 3 PLAN DEVELOPMENT

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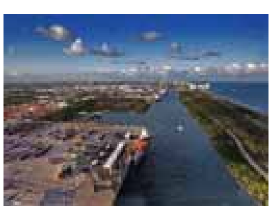
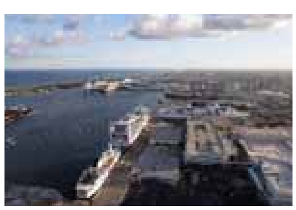
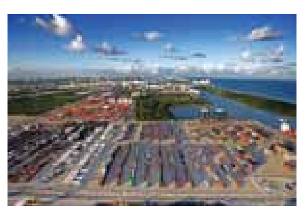
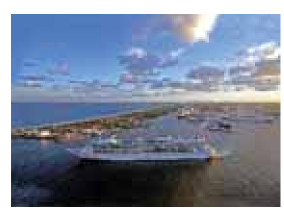





PLAN DEVELOPMENT

3.1 Introduction

This third element of the update to the 2014 *Port Everglades Master/Vision Plan* (the Plan) starts with a summary of the updated market assessments prepared for the Port's four business lines: cruise, petroleum (liquid bulk products), containerized cargo, and non-containerized cargo (dry bulk and neo-bulk commodities) and the facility needs to meet the market opportunities forecasted over the 20-year planning horizon. It then summarizes the status of the projects proposed in the 2009 plan and identifies those projects proposed in that plan which require further examination and refinement for this 2014 plan update. The element continues with a review of design trends for both cruise and cargo terminals, discusses potential operational enhancements, and then describes the projects proposed in this 2014 Plan, concluding with an analysis of parking and anticipated truck traffic to be generated by the forecasted container growth.

At the start of Phase II, the 5-year planning horizon was changed from 2014-2018 to 2015-2019 for consistency with the Port's capital improvement program (CIP) to be promulgated at the end of the planning process. This change is reflected in Elements 3, 4, 5 and 6.

3.2 Conceptual Planning Process

The planning process for this 2014 Master/Vision Plan involved an on-going collaborative effort among the consultant team, the Port's senior staff, tenants, and stakeholders to achieve the Port's goal of creating a plan that maximizes market share and revenue through a realistic 5-year CIP within the 10- and 20-Year Vision Plan framework. Through public meetings and forums, this initiative also included the Broward County Administration and sister agencies such as the Broward County Aviation Department and the Broward Sheriff's Office as well as the Greater Fort Lauderdale/Broward County Convention Center. State and federal agencies were also included in these public meetings and forums for comments and direction; these included the U.S. Army Corps of Engineers (USACE), the U.S. Coast Guard, the Customs and Border Protection (CBP), the Florida Department of Transportation (FDOT), the Florida Fish and Wildlife Commission (FWC), the Federal Aviation Administration (FAA) and others.

Existing Port tenants, prospective tenants, and other affected parties were contacted and interviewed throughout the planning process to understand their current and future operational requirements. In November 2013, charrettes with Port tenants and others were conducted and the input and comments received by the consultant team were incorporated into the Phase I document.

3.2.1 Common Charrette Themes

In the course of the charrettes conducted with representatives of each of the business lines, several concerns common to all were identified. One of the most significant of these was internal traffic circulation. Whether petroleum trucks having to stop on Spangler Boulevard while waiting to access terminals; automobiles, buses, taxis, vans, and provisioning trucks entering or exiting the cruise areas, particularly in what is called the "lollipop" area, with Cruise Terminals 21, 22, 23, 24, and 25; or trucks carrying containers waiting to enter or exit through the McIntosh Road security gate, the need for a comprehensive study of the Port's traffic circulation system was paramount in the eyes of the Port's tenants and users. Other concerns identified, as the Port looks to advance its infrastructure development, relocate certain uses, and improve operational efficiencies, include short-term and long-term taxi and bus staging, the potential need to relocate the tugs that currently berth in the Tracor Basin, and the flow pattern of containers to and from the new intermodal container transfer facility (ICTF).

The maintenance of operations during construction, the potential need for liquefied natural gas or compressed natural gas (LNG/CNG) facilities for bunkering or truck provisioning as the use of these fuels becomes more common, and the availability of land for future ferry operations were also of interest to the Port's tenants and other stakeholders. Some of these matters have been addressed during this planning process; others remain for the Port to study in the future.

3.2.2 Iterative Planning and Design

The consultant team used an iterative planning and design process to evaluate and refine the land use alternatives for the future Port layout. This iterative process involved working through many alternatives, using a collective review technique, selecting the preferred attributes of each alternative, refining the selected elements into a revised plan, and repeating the process until a preferred plan was selected with concurrence of Port staff. The results from the market forecasts, capacity analysis, and needs assessment were used to balance the Port's land use options and size the terminal facilities to balance with the projected cargo growth. This and the subsequent elements of this plan evaluate and refine project opportunities and provide phasing plans for the 5-Year Master Plan, as it is reflected in the CIP, and the 10-Year and 20-Year Vision Plans.

3.2.3 Plan Drivers

Two planning components provide the essential predicate for the plan development process discussed in this element**.** The first is the market assessment presented in Element 2 that updates the forecasts for the Port's four business lines. The second is the status of the projects in the 2009 Master/Vision Plan, particularly key projects, such as the extension of the turning notch, the harbor deepening and widening, the ICTF, and the Eller Drive overpass. In conjunction with the updated market forecasts, these projects provide the foundation for the consultant team's review of what projects may need to be added during the conceptual planning process for this 2014 Plan and what projects may need to be revised.

Market Assessment Summary. The market forecast update presented in Element 2 and summarized in Table 3.2-1, on the next page, re-assesses the market for the Port's four business lines: cruise, petroleum (liquid bulk products), containerized cargo, and non-containerized cargo (dry bulk and neo-bulk commodities). These updated forecasts inform decisions concerning the infrastructure projects needed for the Port to meet estimated throughputs at the 5-year, 10-year, and 20-year planning horizons. Consequently, to support these forecasts, previously programmed and new infrastructure projects were analyzed and developed in consultation with the Port staff. The resulting key market directives and proposed infrastructure improvements are as follows:

Cruise. The cruise market projections and assessment determined that a ninth cruise berth was a high priority for Port Everglades to expand its current market position and stay competitive with competing ports. Discussions with cruise line stakeholders also revealed that improvements to the Port's existing terminals and ground transportation areas were also a priority.

Table 3.2-1
SUMMARY OF FORECASTS FOR 2014 MASTER/VISION PLAN MILESTONES

Business Line	Forecast Level	Milestone Year		
		2019	2023	2033
Cruise (Total Revenue Passengers, including multi-day and single day)	Low	4,292,841	4,456,002	4,813,066
	Medium	4,604,841	5,214,862	5,385,066
	High	4,864,841	5,575,797	5,697,066
	High Unconstrained	4,864,841	6,043,797	6,321,066
Containerized Cargo (TEUs)	Baseline	1,109,910	1,282,710	1,282,710
	Baseline Plus	1,162,475	1,344,604	1,710,714
	High	1,351,096	1,562,591	1,988,055
Non-Containerized Cargo (Dry Bulk / Neo-bulk) (Tons)	Baseline	1,923,769	2,078,355	2,388,036
	Baseline Plus	1,923,769	2,078,355	3,288,036
	High	1,923,769	3,878,355	5,388,036
Liquid Bulk Cargo (Petroleum) (Barrels per Day)				376,000
				137,240,000
(Barrels per Year)* (Tons)**				18,057,894

* Based on 365 days per year. ** Based on an average of 7.06 barrels per ton.

Petroleum. The liquid bulk market projections and assessment are largely supported by the need to modernize petroleum operations through a reconstruction program involving Berths 7 through 13. This modernization program would be implemented in phases, continuing throughout the 20-year plan. The goal of this program is to create three Post-Panamax berths consistent with the planned harbor deepening and widening and have built–in redundancy to handle product throughput.

Containerized cargo. Ongoing and planned improvements at the Port, such as the Southport turning notch extension, the ICTF being built in collaboration with the Florida East Coast Railway (FEC), the Eller Drive overpass being built by FDOT, the McIntosh Road realignment, and the USACE channel widening and deepening will support the Port's forecasted containerized cargo market growth and competitive position. In addition, the market assessment also confirms the need for continued Southport improvements, such as reconfigured berths, new cranes, densification of yard operations, and use of available land for requisite container yard functions.

Non-containerized cargo. Non-containerized cargos, including niche cargos, such as neo bulks, are projected to realize steady growth. Based on the anticipated need to relocate or reconfigure existing facilities, while maintaining current operations to meet market projections, new storage areas are required for these neo-bulk cargos. Also, to support the future anticipated future market for crushed rock imports, berth access and storage area must be reserved.

Status of Projects in 2009 Master/Vision Plan. To recapitulate what was presented in Element 1 (Section 1.5), Figure 3.2-1 shows the locations of the projects in the 2009 5-Year Master Plan and Table 3.2-2 summarizes the status of these projects. The subsequent Tables 3.2-3 and 3.2-4 simply list the projects in the 2009 10- and 20-Year Vision Plans as they have no status updates given their implementation time frame. Several of these projects have, however, been revisited in the course of this planning process, as discussed later in this element.

Figure 3.2-1
LOCATIONS OF PROJECTS INCLUDED IN 2009 5-YEAR MASTER PLAN

Table 3.2-2
STATUS OF PROJECTS INCLUDED IN 2009 5-YEAR MASTER PLAN

Port Area	Project	Status
Northport	Slip 1 New Bulkheads and Reconfiguration - Phase 1	Request for proposal to be released fall 2014
	Seaport Convention Center Security Improvement Project	Underway - completion summer 2015
	By-Pass Road	Removed from program
	Cruise Terminal 2 Improvements	Completed
	Cruise Terminal 4 Improvements	Completion end of 2014
	Slip 2 Westward Lengthening	Completion summer 2016
	New Petroleum Tank Farm	Removed from program; proposed for new use
Midport	Cruise Terminal 19 Improvements	Completed
	Cruise Terminal 21 Improvements	Completed
	Cruise Terminal 26 Improvements	Completed
	Cruise Terminal 18 Parking Garage	Remove from program
	Tracor Basin Finger Pier Replacement with Catwalk-Dolphin	Pier removal completed; catwalk cancelled
Southport	McIntosh Road Improvements	Completed
	Upland Mangrove Enhancement	Underway –construction completion spring 2015
	Westlake Mitigation	Planning, design, permitting underway; construction commencement mid to late 2016
	Super Post-Panamax Crane (1)	Under design for two cranes
	Turning Notch Extension	Construction 2016; completion early 2018
	Intermodal Container Transfer Facility	Underway; completion summer 2014
	USACE Deepening and Widening Design	Feasibility study released June 2013; under review
	USACE Deepening and Widening Construction	Schedule dependent on study completion; target implementation end of 2022

Table 3.2-3
PROJECTS INCLUDED IN 10-YEAR 2009 VISION PLAN

Port Area	Project
Northport	Berths 1, 2, and 3 New Bulkheads Cruise Terminal 4 Parking Garage
Midport	Berths 16,17, and 18 New Bulkheads Multimodal Facility – Phase 1
Southport	Turning Notch Extension – Contract 2 Crushed Rock Facility Foreign-Trade Zone + Customs and Border Protection Relocation Super Post-Panamax Cranes (2) Container Yard Improvements
Portwide	USACE Deepening and Widening

Table 3.2-4
PROJECTS INCLUDED IN 20-YEAR 2009 VISION PLAN

Port Area	Project
Northport	Slip 2 New Bulkheads and Widening Slip 1 New Bulkheads and Reconfiguration – Phase 2 Slip 3 New Bulkheads and Widening Berths 14 and 15 New Bulkheads
Midport	Berths 19 and 20 New Bulkheads Berths 21 and 22 New Bulkheads Berth 23 New Bulkhead Berths 24 and 25 New Bulkheads Multimodal Facility – Phase 2
Southport	Super Post-Panamax Cranes (2) Demolition of RO/RO Berths and Lengthening of Berth 33

3.3 Terminal Design Trends

This section discusses emerging design trends in marine terminals which are being considered at port facilities nationally and internationally. The discussion of emerging design trends identifies some of the key elements included in recently constructed terminals that are setting future design standards for consideration at other ports. The trends considered include vessel size, means of moving passengers and their baggage, modes of operation for landside cargo-handling, and storage, security, and cold ironing.

3.3.1 Cruise Terminal Trends

Eighteen new cruise passenger ships are currently on order or under construction. Each cruise line has its unique design features and preferred size. The common trend, however, is toward larger ships, as documented in the cruise market assessment conducted during the planning process for this 2014 Plan (see Element 2).

To accommodate these larger cruise ships, cruise terminal design needs to consider several main elements, namely:

- Multi-level terminal.
- Simultaneous embarkation and disembarkation.
- Type and number of passenger boarding bridges (gangways) and "window of accessibility" (WOA).
- The ground transportation area.
- Baggage-handling areas.
- Federal inspection facilities.
- Security.

Each of these elements is discussed below.

Multi-level Terminal Design. Cruise terminal design has evolved in keeping with the dynamics of the maritime industry. Several factors influenced the direction of cruising as a popular tourist alternative, but perhaps most important was the all-in one-value. Being able to provide the average tourist an affordable, packaged vacation was so appealing that the industry grew rapidly. As passenger demand grew, so did the need for increasingly larger ships as well as larger terminals to accommodate them. Terminal size today ranges from 60,000 square feet for an entry level terminal, to 180,000 square feet or larger to accommodate mega cruise ships.

In the early years, cruise ships commonly shared wharves and warehouses with cargo vessels. Single level warehouse structures required passengers to board the ship from a gangway extending from the wharf to a lower door on the ship. This continued for many years and, in some locations, it still does today; however, the prominence and popularity of cruising demanded a more exclusive facility. Thus the cruise terminal took on a design life of its own.

As the industry grew, the sophistication of the cruise terminal did as well. Although the primary terminal remained at the ground level as in the original warehouse structures, upper level concourses were designed to elevate the passenger above the wharf and onto the ship.

Multi-level design became a rational approach for several reasons. The most important is that it generally provides better accessibility to and from the ship. Separate levels are also used for interior zoning of embarkation and disembarkation movements which must be completely separated, as discussed below. Multi-level designs may also help speed embarkation and disembarkation by decreasing passenger travel distances between the ground transportation area and the ship. Each of these factors contributes to enhancing the passenger experience. An additional benefit results from the reduction in the building footprint on limited port real estate. As the travel industry continues to diversify, it is anticipated that cruise terminals will become more multi-functional and multi-level, as did airport terminals. Cruise line representatives participating in the charrettes held as part of the planning process for this 2014 Plan confirmed the desirability of multi-level operations in their terminals.

Simultaneous Embarkation and Debarkation. Passenger movement and flow are critical components of terminal design. Time is of the essence. The speed in which passengers can comfortably be processed through embarkation and disembarkation is an important component of the passenger experience. Similarly, maintaining a rigid time schedule is also a crucial factor to the cruise line. As the size of the cruise ships has continued to grow, the passenger population has followed suit. With larger ships carrying five thousand plus passengers, cruise terminals have had to expand and the embarkation and disembarkation process has become more time critical.

To mitigate the impacts of increased passenger populations, cruise terminal design has been modified to allow for simultaneous embarkation and disembarkation. This design is evident in the Port's state-of-the-art Cruise Terminal 18. The movement of passengers on and off cruise ships is strictly regulated. Disembarking passengers cannot leave the ship until Immigration officials have "cleared the ship. CBP regulations do not permit embarking passengers to enter the ship until all disembarking passengers have fully exited it. While the disembarking passengers are exiting, usually a two- to three-hour process, the new embarking passengers are being received in the terminal and processed in an area, physically separated from the disembarking passengers. After receiving their boarding credentials, they are directed to an expanded seating area until boarding begins. Terminals servicing large cruise ships with simultaneous embarkation and disembarkation are designed to seat 1,500 to 2,000 embarking passengers.

Passenger-Boarding Bridges and Window of Accessibility. The WOA of a passenger-boarding bridge is defined by both a vertical and a horizontal dimension (see Figures 3.3-1, 3.3-2, and 3.3-3). The maximum WOA with the greatest range of vertical and horizontal dimension provides access to the largest number of cruise ships in today's fleet and that of the future. Seaports planning cruise terminals cannot predict long-term uses (up to 40 years) of a terminal by a particular ship. Therefore, their terminals must be sufficiently flexible to accommodate the universe of cruise ships that may call at their port in the future.

The WOA is also determined by the ramp slope of the boarding bridge, inasmuch as the slope must comply with Americans with Disabilities Act requirements. The ramp slope must not exceed 1 vertical unit in 12 horizontal units. The WOA is also affected by the tidal range, which determines the vertical height of the passenger access openings (pax breaks) above the apron. The boarding bridge provides the passenger connection to the ship and must be designed to allow both horizontal and vertical ship movements and be provided with specific safety equipment such as a safety net and devices warning of ship movement.

A cruise terminal must thus maximize the WOA for passengers to enter and leave the new generation of cruise ships. Because all ships have different access locations, which also differ from port side to starboard side on the same ship, and because ships are of different lengths, it is critical to allow access to as many pax breaks as possible on the various cruise ships via the passenger-boarding bridge or bridges.

Figure 3.3-1
VERTICAL WINDOW OF ACCESSIBILITY

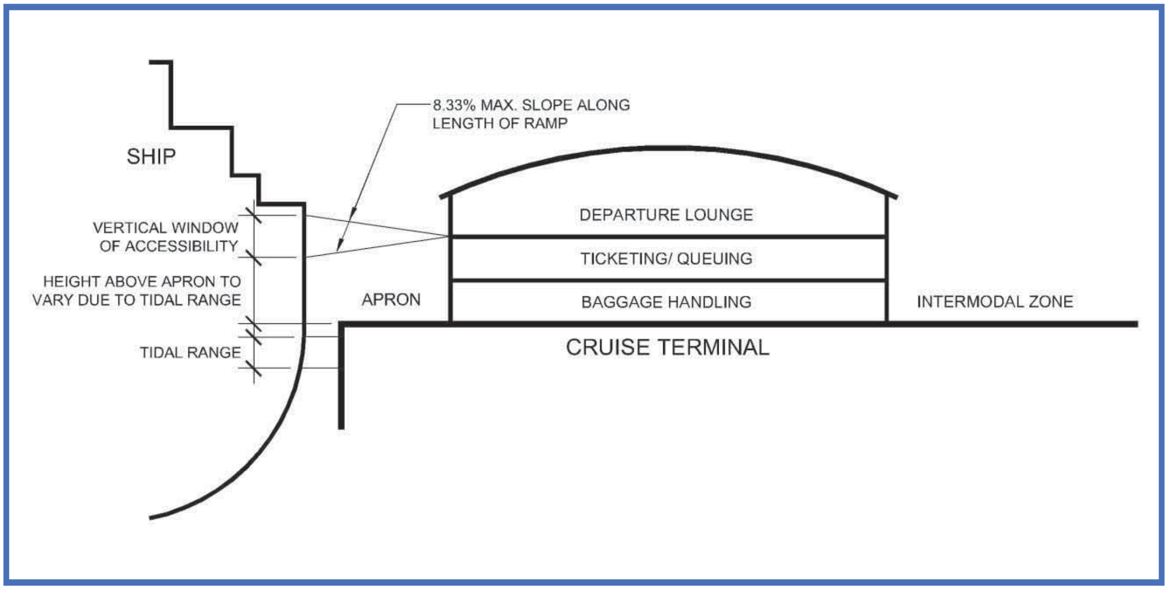


Figure 3.3-2
CURRENT HORIZONTAL WINDOW OF ACCESSIBILITY FOR PIVOT PASSENGER-BOARDING BRIDGES

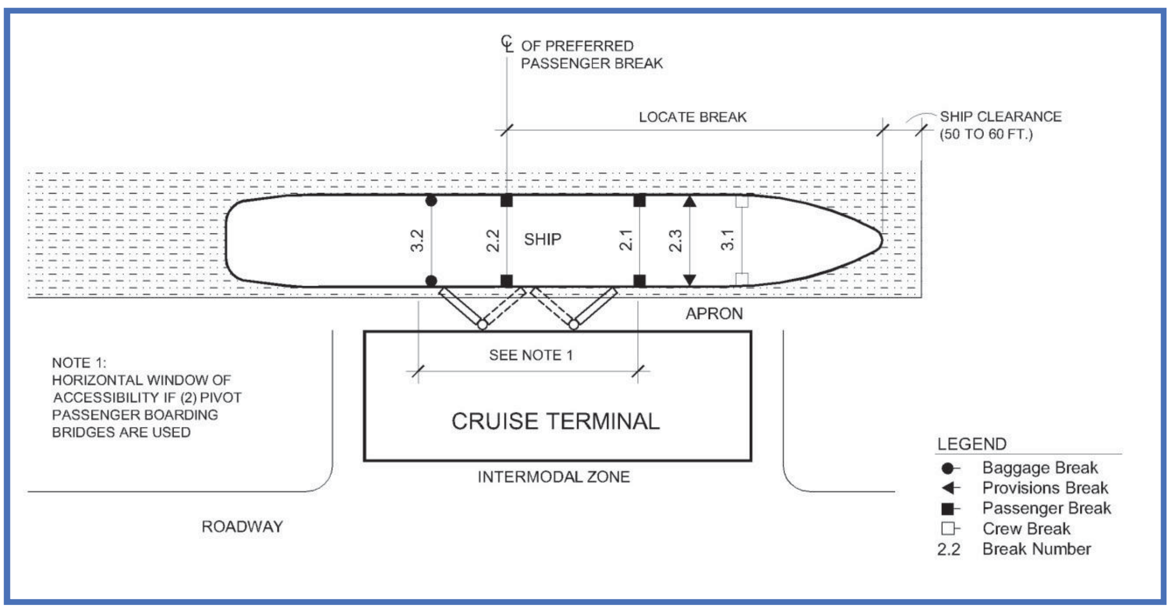
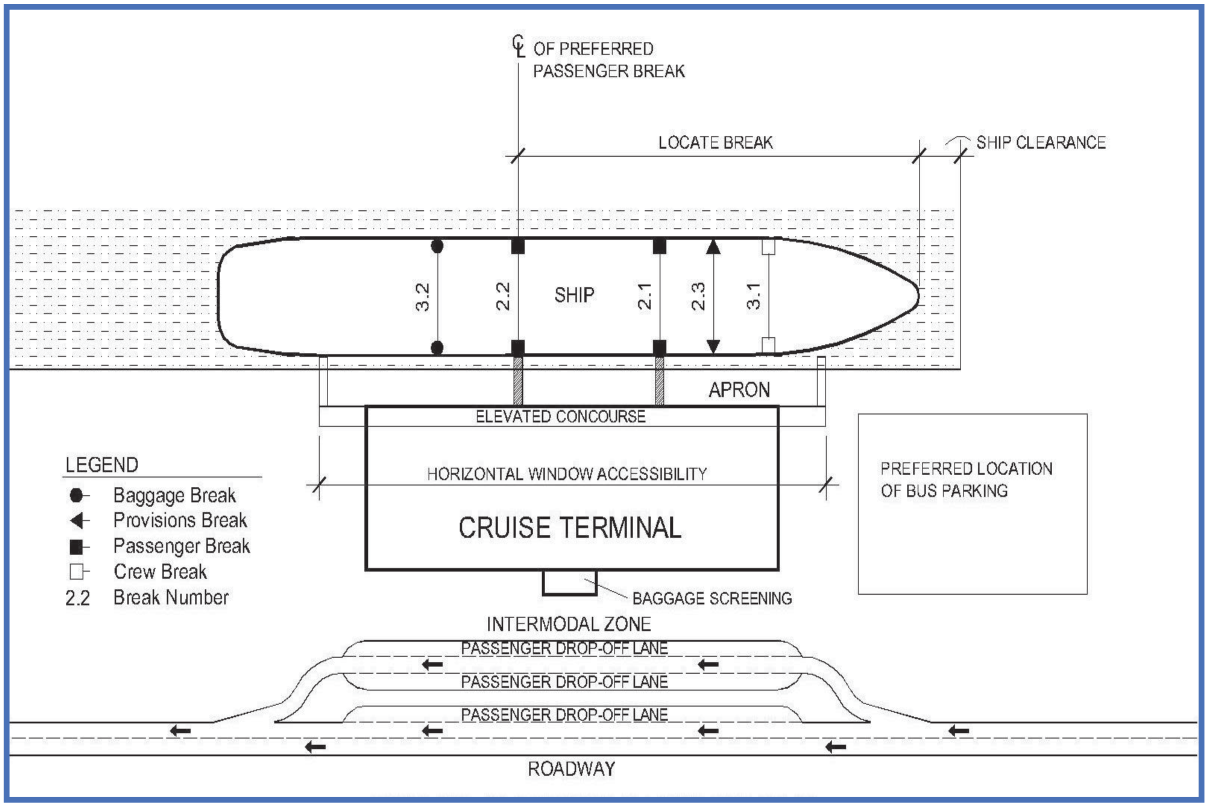


Figure 3.3-3
PROPOSED HORIZONTAL WINDOW OF ACCESSIBILITY FOR RAIL/MOBILE PASSENGER-BOARDING BRIDGES



At Port Everglades today, all passenger-boarding bridges are of the pivot type except for the bridge at Terminal 18, which has mobile elevated gangways. Other types of passenger-boarding bridges, such as rail and mobile, may provide a larger WOA.

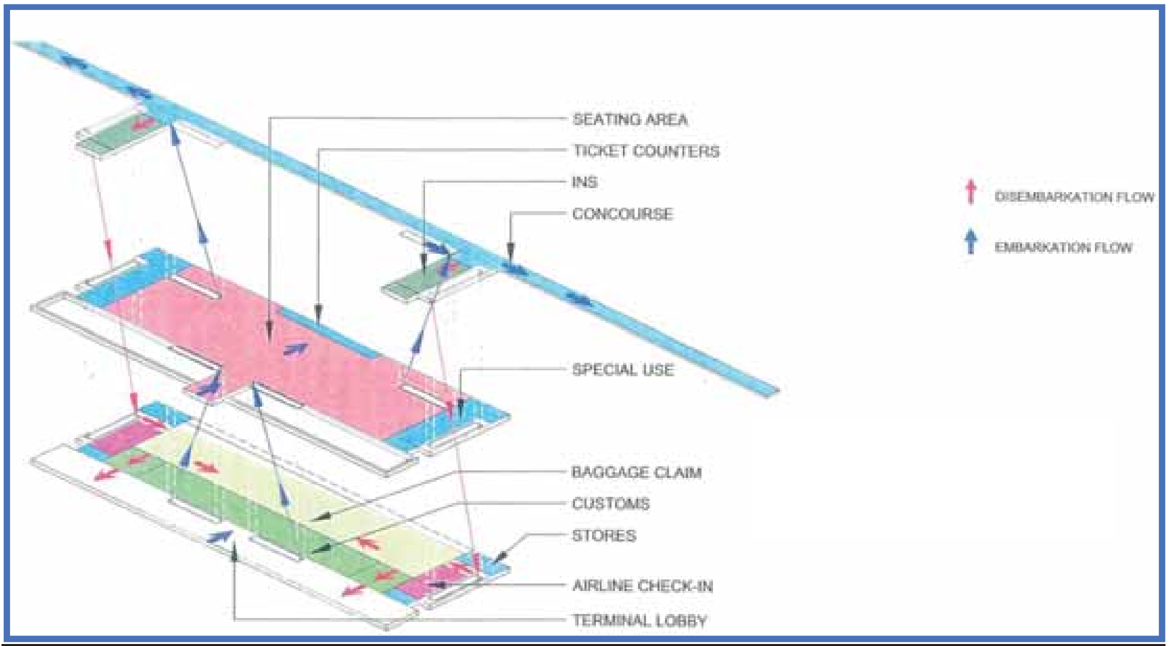
Ground Transportation Area. A cruise passenger's first and last experience at the cruise terminal is the ground transportation area, or intermodal zone as it is sometimes called, where buses, taxis, shuttles, and private automobiles load and unload passengers taking the cruise and their baggage. For cruise terminals serving the mega cruise fleet, the capacity of this drop-off and pick-up area, must be expanded to meet the needs of the larger passenger population. Way-finding signage in these areas is of great importance to minimize traffic congestion and direct passenger movement.

Some cruise lines offer their customers the opportunity, on disembarkation, to have their baggage transported to their departure airports through a private carrier. This procedure allows cruise passengers to hand their baggage over to the carrier, after processing through the federal inspection services at the cruise terminal, and pick up their baggage at their destination airports. Cruise lines may also offer through baggage services from the departure airport to the cruise ship and on-board airline check-in for the return home.

Baggage-Handling Areas. Port Everglades currently uses the "lay down" method for handling baggage. When planning the footprint for mega cruise terminals, the baggage-handling area is the largest area to program. Generally, one square meter, or 10 square feet, per passenger is the minimum needed to lay the baggage down. To this floor area, main circulation aisles, egress, and vertical circulation elements need to be added. This computes to an area of approximately 65,000 square feet or more. To reduce space, carousel-style baggage conveyers are used in new and renovated terminals. Other components in this area include the federal inspection service requirements (CBP), restrooms, etc.

To accommodate larger terminals, where the at-grade "footprint" of the structure would be approximately 100,000 square feet and the total floor area could be significantly more, the floor areas may need to be programmed into a three-level structure, as Figure 3.3-4 illustrates.

Figure 3.3-4
PASSENGER FLOW DIAGRAM



Federal Inspection Facilities. CBP facilities are provided by the cruise port and located at the end of the passenger disembarkation route. After leaving the ship, passengers are directed to the baggage area where they retrieve their luggage. With their luggage and personal belongings they proceed to CBP. All passengers are screened there to insure that contraband or agricultural materials are not brought into the country. Also, duty must be paid for items purchased outside the U.S. totaling more than $100.

Customs facilities include a primary and a secondary inspection area. Most passengers are screened at the primary inspection station and then exit the terminal. The secondary inspection facility is set apart and enclosed in a secured zone. If there is a question about a passenger's belongings, the passenger is directed to the secondary inspection area where a more detailed screening is conducted. The area consists of screening tables, interview rooms, a holding room, and several staff offices and the duty collection office. The duty collection cashier is positioned so as to allow passengers to pay duty from the general queuing area without having to enter the secondary inspection area. Other support facilities include a computer room, rest rooms for passengers and staff, a staff break room, and an agriculture inspection lab. An observation office is positioned to permit an officer to view all activities in the passenger queuing area. The total space will vary depending on the size of the terminal and other factors. The required area will occupy approximately 10,000 to 14,000 square feet.

The *U.S. Customs and Border Protection Design Standards for Cruise Ship Passenger Processing Facilities; Cruise Terminal Design Standards* should be referenced in the design of future cruise terminals at the Port, including renovations to existing facilities.

Security. Seaport landside and waterside security remains a high priority, starting at a port's entry gate and continuing to the ships. The primary security units under the U.S. Department of Homeland Security are the U.S. Coast Guard, the Transportation Safety Administration, Immigration and Customs Enforcement, and CBP. Additionally, a local security force used strictly for the port or a component of the local police force, such as the Broward County Sheriff's Office at Port Everglades, may also be present.

The Maritime Security System (MARSEC) is the primary standard used by the U.S. Coast Guard to advise all security forces and the maritime community about the level of threat that may exist regarding potential terrorist attacks. A three-level system defines the level of security that should be engaged. Level one is the minimal and level three is the highest.

On-site security begins at the entry gate where officers identify the individual(s) and their purpose for entry. Security is maintained throughout the port by officers monitoring various areas and with monitoring equipment. Port identification cards and/or Transportation Workers Credentials (the TWIC) are required to access secured zones such as wharves and other restricted areas.

3.3.2 Container Terminal Trends

International Container Carriers. The ocean transportation of international containers is handled by shipping lines primarily owned and operated by European and Asian international corporations. In recent years, the financial performance of these carriers has been impacted by increases in capacity outstripping growth in demand, falling freight rates, rising operating costs, and increased competition. According to SeaIntel Maritime Analysis, the top 20 container carriers have lost a total of $6.9 billion during the 2009-2012 period, based on the financial results of 20 of the 30 largest carriers that publish their financial results.[1] To limit operating costs, the shipping lines are increasingly deploying larger container ships so as to benefit from economies of scale and evaluating the cost advantages of using more fuel-efficient vessels.

Deployment of Larger Containerships. A carrier's costs are determined in part by the size of ship that can be used for its services, with larger vessels deployed on longer distance, high-volume trade routes being the most cost competitive. As a result, shipping lines are using

[1] http://shippingwatch.com/carriers/article5333574.ece.

significantly larger containerships and revising their deployment strategies. This development is changing the composition of the global commercial vessel fleet with an emphasis on Post-Panamax vessels. The major implication of these fleet developments is that large ship capacity is and will be deployed on North American services.

As ship sizes have increased, vessels in many trade lanes have called at fewer ports in a given port range. This has allowed shipping lines to minimize the costs and delays of coming into and out of multiple ports and to avoid excessive delays to the cargos/containers that would be discharged last. An important consequence of this service structure has been that a particular port's success may be linked to other ports through common vessel services, and competitive position may depend on where ports line up in the vessel service patterns. For example, being the first port-of-call in a port range is important for increasing a port's share of potential discretionary import cargo. Conversely, export volumes may be increased for a port located near the port range's departure point.

Panama Canal Expansion. The anticipated completion of the Panama Canal expansion by 2016 is expected to have principal impacts on Northeast Asia-U.S. container trade with use of larger ships lowering the relative cost of transportation to the U.S. East and Gulf Coasts. Larger container ships will be able to carry up to about 13,000 20-foot equivalent container units (TEUs), or 2.5 times more than current Panamax vessels, which can handle a maximum of about 5,000 TEUs. While some additional shifts may occur in container cargo movements from the US West Coast to the East or Gulf Coasts, as have been occurring for the past decade, such shifts may be limited. To contend with harbor and channel depth limitations at certain ports along the East and Gulf Coasts, carriers may work within them by modifying their service designs and timing of port calls.

It is also possible that carriers could expand the use of transshipment in Caribbean or Panamanian ports to serve U.S. South Atlantic and Gulf Coast ports. Those U.S. ports that serve a large market and/or have other assets such as distribution complexes or enhanced inland transportation connectivity are more likely to be called upon by the larger containerships as part of a Panama Canal all-water service.

Use of More Fuel-Efficient Vessels. Since fuel consumption accounts for a large share of the total costs (up to half) of a containership voyage, the use of alternative fuels could have a significant impact on a carrier's total operating costs. Fuels such as LNG could reduce fuel–related vessel-operating costs by about 30 percent as well as benefiting the environment. This prospective operational cost saving – along with recent environmental regulations, higher bunker fuel costs, a growing supply of alternative fuels, and new gas-fueling infrastructure developments -- has led to an increased interest in and construction of fuel-efficient containerships.

In the past ten years, LNG has been introduced as an alternative maritime fuel for coastal ships in Northern Europe, particularly in the short-sea shipping market. More than 20 LNG-powered vessels are currently in service globally and more are being developed, including tugboats, offshore vessels, high-speed ferries, LNG carriers, and roll-on/roll-off (RO/RO) and container ships.

In the U.S., carriers such as Tote Inc. and Crowley Maritime are building the world's first LNG-powered containerships (see Figure 3.3-5). The ships are anticipated to provide service between Florida (Jacksonville and/or Miami) and Puerto Rico.[2] In January 2014, Clean Energy Fuels Corp. opened an LNG fueling station in Jacksonville to service the new cargo ships.[3] Ports that invest in LNG infrastructure to support the future services will have a competitive advantage.

Figure 3.3-5
THE WORLD'S FIRST LNG-POWERED CONTAINERSHIPS
Source: TOTE, Inc.

U.S. Southeast/Gulf Container Ports/Terminals. The introduction of larger containerships from Suez Canal service routes in the past few years to U.S. Southeast and Gulf Coast container terminals has brought about significant capital investment and operational improvements, including more and larger super post-Panamax cranes, expanded container-handling facilities, and enhanced gate-processing assets that offer the terminal capacity needed to efficiently process the high-volume exchanges generated by such ships.

[2] For more information, see https://toteinc.com/worlds-first-lng-powered-container-ships-to-serve-puerto-rico-for-toteinc/ and http://www.crowley.com/News-and-Media/Press-Releases/Crowley-to-Build-Revolutionary-LNG-Powered-ConRo-Ships-for-U.S.-Puerto-Rico-Trade.

[3] http://www.cleanenergyfuels.com/pdf/January-2014-Bundle-Release-FINAL-DRAFT.pdf.

These investments are further justified by the pending expansion of the Panama Canal and increased trading opportunities with Asian partners. As many ports on the East and Gulf Coasts will need deep (up to 50 feet) channels and water depths alongside berths to accommodate the Post-Panamax vessels without tidal restrictions, there is also a significant movement to obtain clearance from the USACE to dredge these waterways to sufficient depths. As discussed in Element 1 and subsequent elements of this Plan, Port Everglades is in the midst of such a process.

While some ports have the financial resources to support these capital investments fully, other port entities have been considering alternative funding mechanisms, including public-private partnerships for terminal development or improvement. For example, Ports America Chesapeake, a subsidiary of Ports America, operates the vessel and terminal activities within the Seagirt Marine Terminal at the Port of Baltimore as part of a 50-year concession agreement with the Maryland Port Administration. This agreement allowed Ports America Chesapeake to add an additional 50-foot-draft berth and four new super post-Panamax cranes to the terminal using public-private financing.

Containerization of Break-bulk and Bulk Cargos. Increasingly, certain commodities that were once transported as break-bulk or bulk shipments are now being transported in containers. For example, one of the long-term trends in shipping is a decline in the use of dedicated refrigerated (“reefer”) break-bulk cargo ships that historically transported perishable goods such as fruits, vegetables, and meats. Instead, these cargos are now principally transported in refrigerated containers on container vessels. The dedicated reefer fleet has been increasing in age and declining in number of ships and total capacity, as older ships are scrapped and no new ships have been ordered. Given the origins of many refrigerated cargos in Central and South American countries, these shifts in refrigerated cargo transportation are especially relevant in the North-South container trade lanes important to Port Everglades.

An important development for Port Everglades is the potential for a dramatic change in the ocean routing of imported fruits. Historically, fruit has been imported through Philadelphia and other northern ports since these ports have colder climates that minimize risks for the spread of pests that could threaten local agriculture.

A pilot program allowing South American fruit to be directly imported into the U.S. through South Florida ports was started in late 2013, led by the Florida Perishables Trade Coalition in cooperation with U.S. CBP, the Florida Department of Agriculture and Consumer Services, and the U.S. Department of Agriculture. This pilot program allows a limited set of products (grapes and blueberries from Peru and Uruguay) to be imported directly into Florida in containers after completing a two-week cold treatment process in Panama and being cleared for unloading at Port Everglades and PortMiami. If this program is successful, the range of commodities and origins may be extended, expanding the refrigerated container market for Port Everglades. Given the shorter transit times and distances involved, this could affect Florida markets as well as inland markets in the eastern U.S. The principal implications for Port Everglades’ operations could be expanded demand for services and facilities to serve refrigerated container cargos (e.g., reefer plugs or fumigation facilities).

Landside Access. Efficient Internal circulation as well as unimpeded access to external road and rail connections are critical to maintaining a port's competitiveness. Recognizing the importance of moving goods efficiently and swiftly across the nation's roads and railways, the federal government is developing a nationwide freight network to enhance these movements. At the state level, Florida is also focused on improving freight connections to and from its seaports (see Element 1).

Key design and management strategies to address growing demand include:

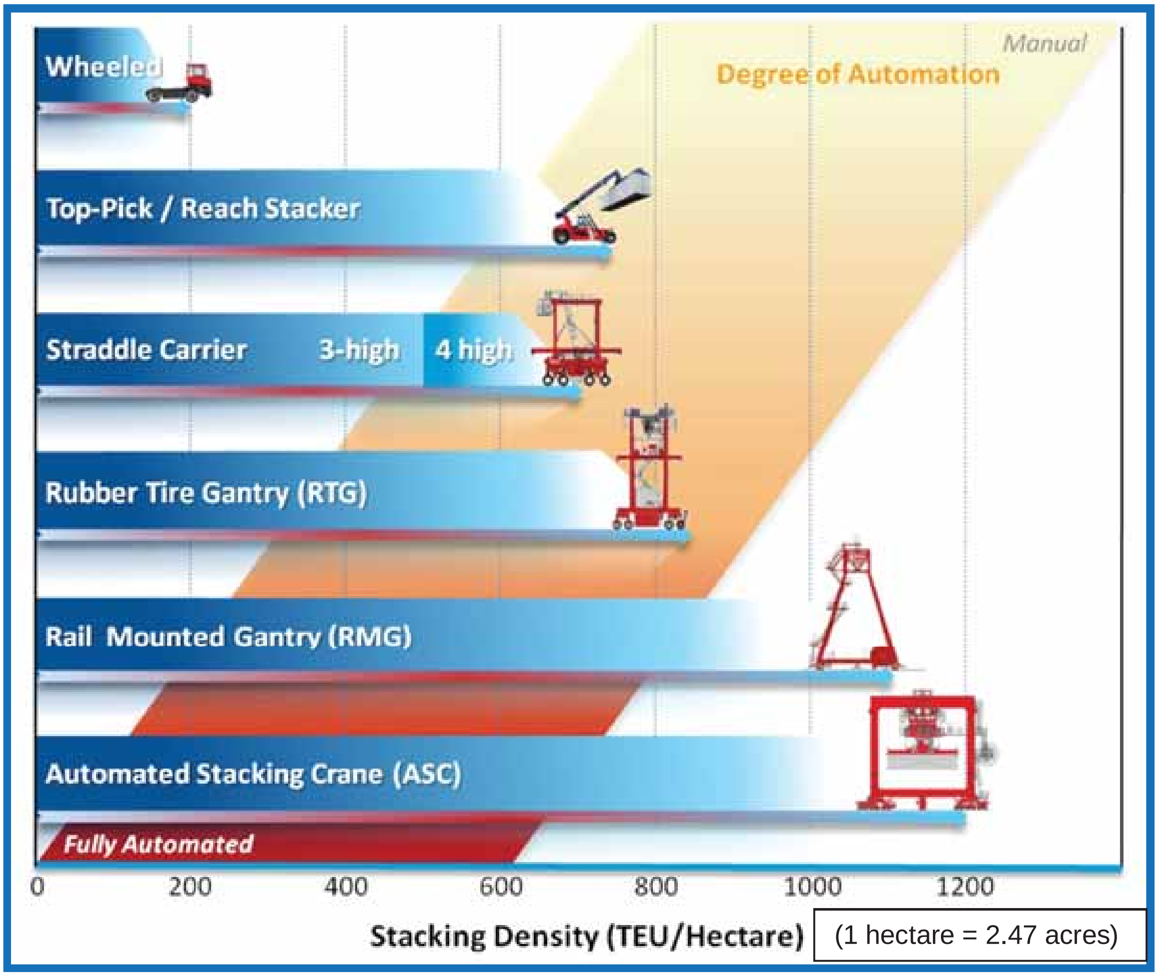
- **Increased utilization of on-dock or near-dock rail facilities.** The ability to move containers from ship to rail or rail to ship directly via an on-dock or near-dock rail facility, rather than having to dray containers by truck to a distant rail yard not only reduces traffic congestion, but also accelerates the landside transportation process. The imminent opening of the ICTF at Port Everglades' will allow the Port's container terminal operators to move some of their containers inland via rail, without first having to dray the containers to the previously used Andrews Avenue site, two miles from the Port. The ICTF is located in the Port's security area, which will speed processing, reduce traffic at the Port gates and on access roads.
- **Roads designed for trucks.** Access roads that are specially designed for trucks feature different geometries and controls, and may limit or even preclude non-truck traffic. While not completely truck-dedicated, the Port's completed McIntosh Road reconfiguration is creating a truck-friendly one-way loop with no left turn lanes and minimal points of conflict at terminal gate entrances.
- **Trucker appointment systems.** Truck appointment systems have been implemented at many major marine terminals across the U.S. With a truck appointment system, the trucker is provided with a scheduled time to enter the terminal to conduct a specific container exchange. An appointment system can increase gate efficiency, help reduce lengthy truck queues, reduce trucker wait times, and reduce air emissions due to truck idling. The system can also help the terminal operator achieve better utilization of equipment and labor by balancing the flow of truck arrivals spread throughout the day. Several Southport terminal operators at Port Everglades have implemented a truck appointment system and are integrating automated terminal operating systems (TOS) and equipment deployment activities to increase terminal productivity and improve terminal area utilization.
- **Off-peak incentives.** At the San Pedro Bay ports in California, a program called PierPass has been in place for several years. PierPass offers financial incentives to truckers and financial compensation to operators, for pickup and delivery during off-peak windows. Traffic at Port Everglades is far less congested than at the ports of Los Angeles and Long Beach, so the need for a comparable off-peak incentive program may

be years away. It should, however, be kept on the radar as a potential long-term strategy.

Densification of Container Terminals. With container throughput increasing and available land becoming scarce, ports and terminal operators are converting to grounded operations and container-stacking equipment that can increase the storage density on the terminal. A terminal's stacking density can be increased by shifting from a conventional mode of storage (wheeled) to high-density storage, such as top-picks, rubber-tired gantry cranes (RTG), rail-mounted gantry cranes (RMG), and automated stacking cranes (ASC). The choice of container-handling equipment[4] normally depends on several criteria such as required storage capacity versus available land, required container accessibility, labor skills and costs, terminal shape and configuration, and pavement limitations (load capacity). Using stacking equipment such as top-picks, RTGs, and/or RMGs, the terminals can stack the containers higher and increase the static storage capacity; however, as the storage density increases, more sorting and rehandling are required to service the gate and vessel traffic. Figure 3.3-6 shows the progression of container-handling equipment, based on its stacking density and level of automation.

[4] Container-handling equipment in a terminal performs the functions of moving and lifting containers.

Figure 3.3-6
STORAGE DENSITY OF CONTAINER HANDLING SYSTEMS
decisionSource: Parsons Brinckerhoff



A chassis/wheeled storage system is feasible for a terminal with an ample amount of storage area and lower throughput. This type of system is very flexible as no sorting and rehandling are required since the containers are stored on the chassis. Top-picks or reach stackers are capable of more densely stacking the containers, which increases static storage. Top-picks, however, can only access a stack in a two-dimensional approach, meaning that they can only service the container that lies directly in front of the machine. Reach stackers can only access the top container in either the first or second stack.

In contrast, RTGs and RMGs can provide a very high stacking density. They can work three-dimensionally, access an entire storage block, and dig through a stack faster. These cranes provide greater container accessibility and logistical flexibility, but travel on more restricted pathways. RTGs/RMGs require infrastructure improvements such as concrete runways (for RTGs) or rail (for RMGs) to distribute the wheel loads; this can be capital intensive with added higher equipment costs, although full-strength top-pick/reach stacker pavement is similar to that for RTGs on a cost-per-square foot basis in certain instances.

Automation and Electrification of Container-Handling Equipment. Marine terminals around the world are now shifting towards automation in container-handling equipment. APMT's terminal in Portsmouth, Virginia, is the first operational terminal in the U.S. with ASCs in the yard. ASCs are unmanned container-handling equipment that require sophisticated integration with the TOS to work automatically. The absence of human presence in the crane allows the crane to be operated at higher speeds. Crane automation has taken a new step with remote-controlled ship-to-shore (STS) cranes. Two new terminals at *Maasvlakte II* in Rotterdam will have their STS cranes operated remotely from a control room. This will help improve the crane performance by reducing cycle times.[5]

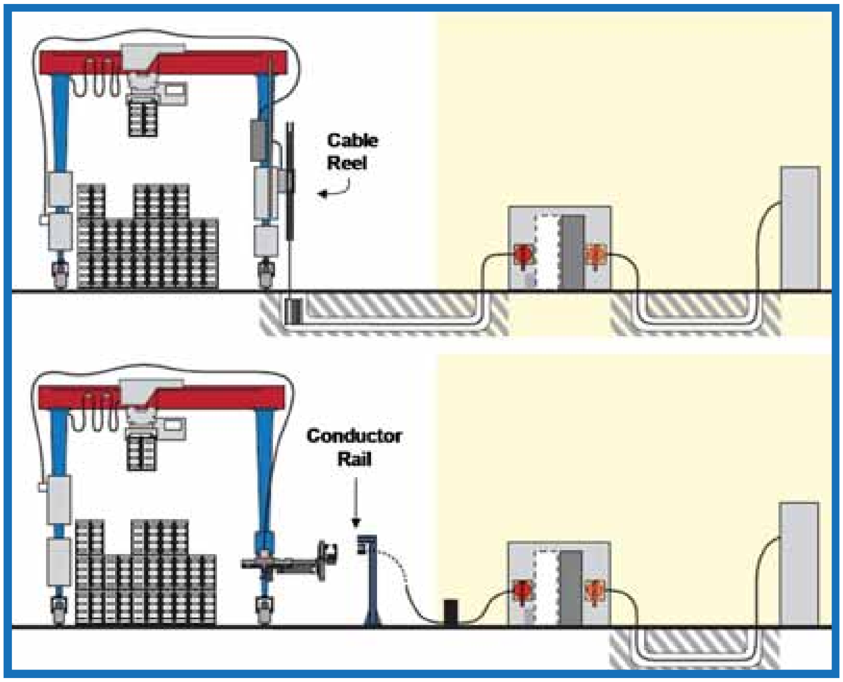
The majority of container-handling equipment in a container terminal is run on diesel fuel. This not only increases air emissions, but also has an impact on operating costs due to higher fuel prices. Ports are now moving towards minimizing air emissions by converting to yard equipment that runs on electric power. One effective approach is to use RMGs that typically run on electric power; RMGs are not flexible, however, and cannot be moved from one stack to another during terminal operations.

Electric-powered rubber tired gantry (E-RTG) cranes are being used at many container terminals around the world. E-RTGs run on electric power directly from the power grid while working in a stack and use diesel power for traversing between stacks and maintenance areas. This reduces the diesel consumption by 95 percent as it is only used to move between stacks.[6] There are different container-handling equipment manufacturing companies that offer various options for E-RTG, but two of the common solutions are motorized cable reel and conductor rail. Figure 3.3-7 shows a generalized systematic of a cable reel and conductor rail E-RTG solution.

[5] http://www.abb.us/cawp/seitp202/e2c5505880a803dfc1257a8400424e9c.aspx.
[6] http://www.conductix.us/sites/default/files/downloads/Brochure_-_E-RTG_Electrification.pdf.

Recently, the Georgia Ports Authority unveiled their plan to convert all diesel-powered RTGs to E-RTGs by 2022 which will allow them to eliminate 5.97 million gallons of diesel consumption each year and generate an annual net saving of about $10 million.[7] RMGs and E-RTGs not only reduce air emissions, but also could increase storage density and performance and could eventually have an application at Port Everglades.

Figure 3.3-7
E-RTG OPTIONS
Source: Conductix Wampfler



Container Crane Lifting Capabilities. Modernization and advancements in crane technology have increased both the lifting capacity of STS cranes and their container-handling efficiency, thereby decreasing the turnaround time of container vessels. STS manufacturing companies like ZPMC, Kalmar, and Liebherr have developed cranes that are capable of lifting multiple containers in one lift. Da Chan Bay Terminal in China has installed STS cranes, manufactured by ZPMC, that are capable of handling two loaded (see Figure 3.3-8) or three empty 40-foot containers in tandem (side by side). As these cranes have twin spreaders, they are heavier than their single hoist counterparts and exert higher wheel loads on the wharf structure. This issue can be addressed either by increasing the crane rail gauge or by strengthening the wharf structure, both of which are capital-intensive alternatives.

Chassis Management Pools/Empty Container Depots. The U.S. container market is one of the only remaining operations internationally that owns and maintains street chassis for the truckers. Container terminals in the U.S. have chassis pools located either in the terminal or at a

[7] http://www.gaports.com/corporate/tabid/379/xmmid/1097/xmid/7804/xmview/2/default.aspx.

satellite facility outside the terminal so as to utilize the on-terminal space for container handling. The chassis are owned either by shipping lines or by third-party chassis fleet owners. The chassis supply is generally managed by a chassis pool operating company, which may also be a fleet owner, or by a terminal operator.

Figure 3.3-8
TANDEM LIFT STS CRANE
Source: Da Chan Bay Terminal Website

In most cases, off-terminal supplies are managed by pool operators and on-terminal supplies are managed by the terminal operator. A truck coming to pick-up a container will go to the chassis pool (either a satellite facility or on-terminal) and select a chassis. The container will be loaded on the chassis, which will be taken to its destination by the trucker. The trucker will have to deliver the chassis back to the supplier in a stipulated amount of time, as per the contract, to avoid any overdue charges. Maintenance and chassis repair may be carried out by the terminal operator on a contract basis with the chassis owner.

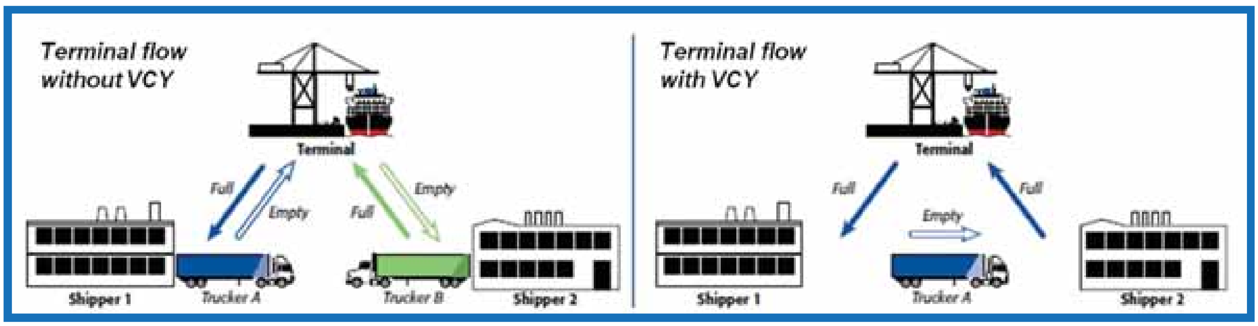
Empty container depots work similar to chassis pools, but the containers are owned by the shipping lines and the terminal operator acts as fleet manager. Empty container depots are located outside the terminal gate, which reduces unnecessary truck trips to the main terminal and further improves the productivity of the terminal gate.

The use of chassis pools and empty container depots at some U.S. South Atlantic and Gulf ports has provided additional capacity enhancement opportunities at container terminals. In

South Florida, however, chassis are owner-operated and there are no chassis pools. Only one of the terminal operators at Port Everglades has a chassis-based operation and that operator is looking to scale back its chassis ownership. With respect to empty container storage, as a landlord port, Port Everglades does not control how the respective terminal operators deploy their empty containers. Nevertheless, as land is at a premium at the Port, and increasingly costly, it is believed that terminal operators will find it to their advantage to use their facilities for more productive purposes than empty container storage.

Virtual Container Yards. Another concept that is aimed at decreasing the amount of empty containers stored in the container terminal is the virtual container yard, which also helps increase the storage area for loaded import and export containers. Figure 3.3-9 compares the workings of a regular terminal with a terminal implementing a virtual container yard. In the virtual container yard, the empty containers are reused outside the port rather than draying them back or picking up empties at the port.

Figure 3.3-9
VIRTUAL CONTAINER YARD
Source: International Asset Systems



With the virtual container yard, carriers can avoid unnecessary gate charges and storage fees for empty containers and truckers can avoid sitting in line at terminals to return empty containers.[8]

Technology-Related Process Improvement. As cargo throughput increases at Port Everglades' terminals, additional measures to improve yard processes will be necessary to use the currently available land area more efficiently and maintain acceptable customer-service levels. Among these measures, are the previously mentioned trucker appointment systems as well as pre-stowing cargo, maintaining a pool of empty containers on chassis, re-sorting storage areas to move boxes to the top of the stack, and other similar steps to prepare for the next day's activities.

Automated Data Collection on Ship-to-Shore Cranes. Container terminals need an efficient and reliable data collection system. Optical character recognition (OCR) is one of the most common automated data collection technologies used at container terminals. OCR technology is typically part of the gate operating system; but the same OCR technology is now

[8] The Virtual Container Yard: Reducing the operational and environmental costs of container management. International Asset Systems, http://www.interasset.com/pdfs/VCYWP.pdf.

being used on STS cranes. This allows the crane to collect the data from the containers as they are loaded and unloaded from the vessel. In a typical container terminal quay operation, a clerk/checker, standing below the STS crane, will manually input the container ID and equipment ID as the container is moved to and from the STS crane. OCR technology eliminates the manual entry process and allows the containers and yard-handling equipment to be identified automatically and matched under the crane. It also eliminates the need for a clerk/checker below the crane, which in turn improves worker safety.[9] The OCR system is connected with the terminal and gate operating systems to increase terminal efficiency and reduce the processing time at gates[10]. Figure 3.3-10 shows how cameras for the OCR technology are mounted on the sill beam of an STS crane. While the terminal operators at Port Everglades are not currently using OCR technology, as their operations expand, they may find it beneficial to explore this technology.

Figure 3.3-10
CAMERA ON STS CRANE
Source: Hi-Tech Solution Ltd.

<u>Electronic Data Interchange</u>. Previously, when a ship arrived at port, the cargo from the ship was loaded/unloaded as per the cargo manifest the port received as a hardcopy. Now, with the availability of the Internet, this process has become paperless. Using electronic data interchange (EDI), the manifest data are instantly downloaded into the TOS, eliminating manual

[9] OCR in Ports and Terminals, A Port Equipment Manufacturers Association (PEMA) information paper, 2013.
[10] The OCR systems use TOS data, such as vessel BAPLIE files, to help narrow the range of numbers being read to those that are already pre-lodged with the TOS.

data capture. The cargo manifest, bill of entry, container stowage plan, cargo dues, load/unload list, etc. can all be sent using EDI messages.[11]

This technology is applied in the terminal to assign work to the container-handling equipment and record all transactions. Truckers can use EDI to receive data when a shipment has arrived and is ready for pick-up. The yard location can be sent via cell phone, directing the trucker to a slot in the yard for the transaction. Once the truck exits the terminal, the gate-operating system registers the container number using the OCR technology and pick-up and delivery confirmation is transmitted to the trucking company electronically. Gate complexes that work completely without paper exchanges are now feasible and are being deployed at many of the larger ports.

Automation of the Terminal Operating System. The TOS is the primary instrument of record-keeping, planning, control and monitoring for the modern marine terminal. It allows the centralized computer system to automatically decide equipment assignments in the yard and container placement in the stack, which reduces operational overheads and increases efficiency. The main function of a TOS is to manage containers, equipment assignment, inventory control, billing (finance), and labor in the terminal. Connecting the terminal-operating and gate-operating systems, along with the OCR system using the EDI, brings the entire terminal operations under a single framework. With automated terminals being the next step in container terminal advancement, the interface between these three systems significantly improves terminal productivity and decreases the gate transaction time to service a street truck at the gate.

Several container terminal operators at Port Everglades are using some form of an automated TOS; others are exploring its use and looking at ways to enhance their operations through greater use of these automated systems.

3.3.3 Alternative Marine Power– Cold Ironing

Cold ironing is a shipping industry term that first came into use when all ships had coal-fired iron clad engines. When a ship would tie up at port, there was no need to continue feeding the fire and the iron engines would literally cool down, eventually going completely cold, hence the term “cold ironing.”

Cold ironing now refers to the process of providing shore-side electrical power to a ship at berth while its main and auxiliary engines are turned off. Cold ironing permits emergency equipment, refrigeration, cooling, heating, lighting, etc. to receive continuous electrical power while the ship loads or unloads its cargo or passengers. A ship can cold iron by simply connecting to another ship’s power supply or to a shore-side power source. Recently cold ironing has been looked to as a means to mitigate air pollution by significantly reducing and, in some cases, completely eliminating harmful emissions from diesel engines.

The California ports are facing stringent air quality measures to reduce port-related air emissions. These requirements call for a 50 percent reduction in on-board diesel power

[11] http://shippingandfreightresource.com/what-is-edi-and-what-is-the-importance-of-edi-in-current-day-shipping.

generation for vessel operations at berth by 2014, with increasing reductions over time, such that by 2020 these reductions will reach 80 percent from their initial baseline.[12] Applications are in operation along the West Coast at the ports of Los Angeles, Long Beach, Oakland, Seattle, and Tacoma to connect cargo and/or passenger vessels to electric shore power while at berth. The Port of New York and New Jersey will be the first port on the East Coast to have a shore-power facility, which is expected to be completed in 2014.[13] Funding for a majority of these projects has been supported by grants from the Environmental Protection Agency (EPA), the U.S. Maritime Administration (MARAD), and other federal and state agencies as well as the private sector.

To implement cold ironing, special design considerations are necessary at the wharf for the installation of power connections and cabling devices, along with provisions for additional landside power substations and switch gear. In addition to the power connections portside, ships need to be retrofitted or built with the ability to accept portside power. International standards for shore-power connections have been established by the International Maritime Organization, but implementation of these standards requires careful consideration of local power utility requirements. Element 6 provides an estimate from FPL of the cost to implement shore power at Port Everglades.

Several of the cruise lines whose ships call at Port Everglades also call at California ports and thus have equipped their ships with shore-power capability. Other cruise lines are taking different measures to reduce emissions and comply with Emissions Control Area (ECA) requirements[14] to reduce their emissions of nitrogen oxides, sulfur oxides, and fine particulate matter, as discussed in Element 2. These lines are introducing scrubbers on their ships to extract sulfur from the exhaust to meet ECA standards or are converting to ECA-compliant low sulfur fuel, weighing the cost of this conversion with the cost of adding shore-power capability to their ships.

An alternative option to cold ironing or scrubber technology in the future could involve the use of barges to provide electrical power to ships. As an example, an LNG hybrid barge is being constructed to supply low-emission electrical power to cruise ships in the Port of Hamburg, which will be the first port in Europe able to provide cold-ironing power to cruise ships. The world's first LNG hybrid barge is expected to be delivered by summer 2014 (see Figure 3.3-11).[15] To take advantage of the environmental benefits of an LNG hybrid barge in the U.S., states such as California would need to revisit the requirement that ships be plugged to the land-based grid, rather than to another site-local emissions source.

[12] Section 93118.3, Title 17, Chapter 1, Subchapter 7.5, California Code of Regulations (CCR).
[13] http://www.panynj.gov/press-room/press-item.cfm?headLine_id=1604.
[14] In March 2010, the International Maritime Organization amended the International Convention for the Prevention of Pollution from Ships to designate portions of the U.S., Canadian, and French waters as Emission Control Areas (ECA). ECA extends 200 nautical miles from the coast except for areas subject to the sovereignty of other states.
[15] http://www.lng-hybrid.com/2_projects/barge_intro.html.

Figure 3.3-11
LNG HYBRID BARGE
Source: LNG Hybrid

3.4 Operational Enhancement Opportunities

This section identifies opportunities for operational enhancements at Port Everglades' marine terminals. Operational enhancement opportunities consider technological, equipment, labor, and other operational changes that may improve a given terminal's performance. Some of the concepts are applicable to the conditions prevalent at Port Everglades; others are not.

3.4.1 Southport Container Terminals

The Southport area of the Port contains the majority of the high-throughput container operations, using low-profile gantry cranes on a public wharf along the Intracoastal Waterway and Turning Notch, with individual terminals located behind the wharf apron. The wharf apron serves as the load lanes beneath the cranes as well as wharf circulation and bomb cart storage areas. The southern end of the wharf, at Berths 33A – 33C, has been used to service RO/RO vessels. Four areas of opportunity require further discussion: overall berth length, wharf apron depth, crane deployment, and operating conflicts.

Overall Berth Length. The existing Southport wharf system consists of three berth segments and two RO/RO piers (without active RO/RO vessel activity). Berth 30, within the Turning Notch, is approximately 900 feet long. Berths 31/32 are located along the Intracoastal Waterway and provide an overall length of approximately 1,984 feet, or approximately 992 feet per berth. Berth 33A provides approximately 800 feet of berthing area. The two RO/RO piers -- Berths 33B and 33C -- are located adjacent to Berth 33A. As the LOA of the vessels calling at Port Everglades has increased over time, the existing berth lengths are no longer adequate to serve the larger vessels. Typically, a standard berth length is equal to the largest vessel calling at the berth, using the vessel length plus one-half beam on each end of the vessel for mooring lines, as shown in the formula below:

Berth length = Typical vessel LOA + (1 x Typical vessel beam)

The typical container vessel fleet calling at the Port's Southport terminals is estimated at 900 to 1,000 feet in length and has a beam of approximately 100 to 110 feet in width. Using the formula above, a typical berth length would be approximately 1,000 to 1,100 feet. To accommodate the existing and future vessel fleets calling at Southport, however, the availability of berth lengths in the 1,200-foot range will be desirable. Two projects proposed in the 2014 Plan address the anticipated need for additional berth length: the filling of the Tracor Basin and the reconfiguration of Berth 33, as discussed in Section 3.6.

Wharf Apron Depth. The existing wharf apron allows for a minimal circulation area behind the crane legs. Operations would benefit if traffic flow and loading could be accelerated on the wharf apron areas.

Crane Deployment. The existing Southport berths provide seven low-profile container gantry cranes that are shared among four berths. This provides for an average crane-to-berth ratio of 1.75 cranes per berth. Typically, most other container terminal operations in the region provide an average of two to three cranes per berth, depending on the level of berth activity and vessel call patterns. The 2014 Plan calls for the purchase of five additional cranes, which is expected to increase berth efficiency significantly, as discussed in Section 3.5.2.

Under the existing conditions, the Port controls crane assignments on a first-come, first-served basis unless a terminal lease contains preferential assignment clauses. The currently limited crane availability means that cargo transactions take more time and cause vessels to occupy the berths for longer periods. When more crane equipment is applied to a vessel, the cargo can be transferred faster and the vessel can leave the berth sooner. The daily cost operating a container vessel is extremely expensive. It is, therefore, imperative that the shipper receive fast service and quick turn-around to keep the vessel moving between destinations.

The redeployment of cranes or the ability to shuttle cranes between berths is another factor that can impact the ability to service a vessel quickly. The existing configuration of the Southport berths does not lend itself to efficient redeployment between berths because of the berths' angled alignment. The Port's cranes are equipped with articulated trucks that allow the crane to negotiate curves in the crane rail. In theory, it makes sense to have the ability to go around bends and corners in the wharf structure. In practice, however, this operation is time-consuming and burdensome to the wharf operations as an area of the wharf is cleared to allow crane movement.

At Southport, the cranes are not normally shuttled between berth segments unless there is an urgent need to work a vessel or an equipment failure has occurred. A straight wharf segment provides greater operational flexibility by allowing cranes to be quickly redeployed between vessel berths, as necessary. A longer berth segment can also accommodate numerous iterations of short and long vessels and create additional flexibility.

Operating Conflicts. The Intracoastal Waterway and the Southport landform create a narrow passage that required placing the RO/RO piers in proximity to Berth 33A. It is difficult to service a vessel at Berth 33A when a vessel is on berth at Pier 33B, and maneuvering a vessel into berth while another vessel is occupying a berth is a challenge. With the proposed reconfiguration of Berth 33, as well as the widening of the channel, this problem will be alleviated. In any case, although the RO/RO berths are capable of handling RO/RO vessels, there is no active RO/RO service at present, and no conflict due to those vessels.

Densification of Container Yard Storage Areas. Densification, as discussed in Section 3.3, is the process of increasing the number of containers that can be stored per gross terminal acre. When cargo throughput increases, but the terminal remains in the same configuration, the boxes are stacked on the terminal to increase storage capabilities.

With the majority of the stacking layout at Southport terminals in Port Everglades being wheeled and low-density top-pick, the Port can look into various options of high-density stacking in the future to align with a higher demand forecast. Further engineering investigations will be needed to determine the type and extent of required improvements to the terminal pavement to accommodate high-density handling equipment.

Another method used to enhance terminal operations and throughput is dwell-time reduction. Most of the wheeled cargo operations at the Port employ a just-in-time terminal delivery method. This effort is further supported by the use of off-terminal warehouses and consolidation facilities that can quickly deliver or retrieve cargo from the terminals. This approach has resulted in a fairly high cargo turnover and annual throughput per acre at the wheeled banana terminals.

Creation of a Free-Storage Limit. The Port currently allows unlimited free time for storage of loaded and empty containers within the terminals. Most of the regional ports and others across the U.S. have adopted free-storage limits on all container types to promote removing the containers from the terminal in a timely fashion and decrease the average dwell time that containers are stored on the terminal. Enacting this type of tariff, when combined with other cost-sharing incentives or minimum cargo-threshold limits, can also be used as an incentive to move more cargo through the facility. Combined, these policy changes can be used to enhance terminal operations. Typically, most ports use a tiered approach where empty containers can remain on site for 15 to 30 days and loaded containers are allowed free storage for 7 to 15 days. On the West Coast, free-time storage has been mandated at less than 5 days to allow for greater cargo throughput.

Typically, tariff changes of this magnitude require close coordination with the shipping community and terminal operators to develop an equitable approach to resolving this issue and encouraging higher rates of cargo turnover. The new tariff for the free-storage limits would need to be implemented portwide after an acceptable agreement had been reached with the tenants. An alternative method would be to implement the free-storage limits on a tiered basis to gradually ease the practice into operation. As an example of a tiered application, the initial tariff would be fairly easy to accommodate, based on existing practices, and the time frame would be reduced over a period of five years to achieve the more aggressive practice. This would allow for a gradual change with minimal operational disruptions.

3.4.2 Midport Cargo and Cruise Terminals

Midport comprises a patchwork of mixed land uses and multiple operations in a confined area. This area services all of the cargo types found at the Port, with the exception of petroleum products; it includes a mix of container, break-bulk, and cement terminals as well as significant cruise terminal operations and structured and non-structured parking.

Competing Traffic Patterns. These intermixed operations create competing traffic patterns of trucks and passenger cars, especially during the height of the cruise season. In addition to landside access issues on the roadways connecting these activities, the berthing areas are shared among the various users, with cruise vessels receiving the highest berthing priorities. Cognizant of the traffic and other operational concerns in this area, the Port is planning a comprehensive traffic study to examine and address these matters.

Dry Bulk Berthing Conflicts. The Midport cement terminals perform at fairly balanced berth/yard operations. The current fleet of bulk vessels calling at Port Everglades has an LOA of approximately 660 feet, which is longer than the berth length. The existing wharf structure at Berths 14/15 within Slip 3 has an overall length of 1,226 feet, or 613 feet per berth. Using the berth standard discussed previously, a typical cement berth should be approximately 750 feet, or 1,500 feet for a two-berth facility. The existing berth length requires non-standard mooring practices that place the vessels closer together than customary, limit mooring options, and require the stern of the ship to jut out beyond the limits of the wharf structure into the Midport basin.

The current berthing practice at Slip 3 also requires the ship at Berth 15 to relocate temporarily during vessel navigation activities at Berth 14. This delay, called the "cement shuffle," impacts vessel-loading activities and limits terminal efficiencies. Changes on the slip configuration proposed in the 2014 Plan should have a positive impact on this berthing issue, as discussed in see Section 3.6.

An opportunity exists to expand berth capacity in Midport by modifying the alignment of the bulkhead line at the Tracor Basin. Currently, Berth 29 is approximately 800 feet long; filling in the Tracor Basin would lengthen Berth 29, as proposed in the 2014 Plan and illustrated in Section 3.6. Berth 26/27 is approximately 1,340 feet long.

3.4.3 Northport Petroleum Terminals and Slips

The previous liquid bulk market assessments included in the 2006 and the 2009 plans recommended a number of terminal improvements to enhance the loading operations in Northport. These included replacing the manifolds and loading arms with larger piping and connecting the manifolds to allow higher transfer of cargo and distribute the flows more efficiently; addressing the narrow slips and adjacent berths; and implementing three petroleum tanker berths and one tanker barge berth. This 2014 Plan proposes addressing these recommendations (see Section 3.6).

The finger piers and narrow slip widths used to build Piers 1 and 2 are reminders of the Port's earlier development, when smaller vessels were common. These piers typically serviced the smaller petroleum and break-bulk vessels calling at the Port. Since the initial development of these piers, vessels have gotten larger and the amount of cargo transferred per vessel call has also increased, placing constraints on both the slip widths and the land area on the piers. In some cases, an adjacent berth in the same slip cannot be used due to navigational constraints. This is especially prevalent in Slip 2, with the larger cruise ships calling at Cruise Terminal 4. This 2014 Plan proposes addressing both the slip widths and the berth lengths needed to accommodate the larger fleet of vessels (see Section 3.6).

3.4.4 Portwide Break-Bulk/Neo-Bulk Terminals

The Port's primary break-bulk/neo-bulk terminal operations are located in Northport and Southport and share common berth and warehouse facilities with the cruise line operators. The terminal operators also use temporary storage yards adjacent to Slip 2 and in portions of Midport. These temporary lease assignments, referred to as "grid assignments," are renewed on a 10-day basis, as needed. This approach allows the Port the greatest operational flexibility for these shared use areas; however, it also limits the affected tenants' desire to invest in terminal upgrades to enhance operations. To free up land for the Cruise Terminal 4 reconfiguration and the Slip 2 lengthening, the 2014 Plan proposes relocating the neo-bulk storage area currently on Berth 5 (see Section 3.6).

3.5 Facility Needs Assessment

3.5.1 Capacity Measurement and Evaluation

There are accepted practices and measures in the maritime industry for the evaluation of capacity. These typically address the following operations:

- Ship-to-wharf transfer.
- Wharf-to-storage transfer.
- Storage.
- Storage-to-gate transfer.
- Gate processing.

Using estimates of practical utilization and throughput on a per unit basis (number of cranes, linear feet of wharf, acres of storage, pieces of equipment, number of lanes, etc.) the analyst can determine a statistical maximum throughput capacity for each of these terminal operating components. This is especially helpful in identifying the lowest-capacity components as candidates for near-term improvements.

Historically, stepping up in capacity is accomplished through measures like more or faster cranes, longer and deeper berths, more and faster yard equipment, denser storage, shorter dwell times, and faster/automated gates. Typically, each of these items costs someone money – be it the port (to build infrastructure), the terminal operator (to staff the facility), or the drayman (who has to wait for a box to be fished out of a stack, rather than hooking directly to a chassis and hauling away with no wait time).

In practice, terminals can and do run at or above statistical capacity, particularly during peak periods. Nevertheless, it costs terminals substantial time and money (added labor, longer working hours, and more equipment) to do so. Additionally, terminals at statistical capacity lose flexibility to respond to conditions that are outside the optimum condition: equipment breakdowns, vessel delays, etc. Finally, terminals that must share assets – especially berths and cranes, such as at Port Everglades – may not always have access to the assets they need. In practical terms, it is usually difficult to operate at maximum capacity for extended periods. For this reason, planners often design facilities to a “sustainable capacity” or “practical capacity” set at some target percentage of the theoretical maximum.

From the perspective of a terminal operator, a port must provide three things:

- The ability to handle the anticipated amount of cargo over sustained periods, with excess capacity for peak periods.
- The ability to do so at a competitive cost, compared to alternative ports.
- The ability to respond flexibly to changing or unknown conditions.

In the discussion below, the consultant team presents analyses of statistical capacities for planned Port Everglades improvements, addressing the first of these needs. As a starting point, it is essential to determine whether planned improvements are properly matched to capacity needs. The Master/Vision Plan, however, must look beyond statistical capacity and also consider whether improvement projects and strategies maintain or enhance operator cost competitiveness, day-to-day flexibility (to address non-optimal occurrences), and long-term flexibility (allowing their operations to evolve with bigger/more vessels, new vessel schedules, and different storage technologies). By meeting basic capacity requirements as well as these cost and flexibility goals, Port Everglades puts itself in the most competitive position to retain current business and attract new business.

3.5.2 Analytical Findings: Container Operations

In Phase I, the consultant team reviewed each berth in the Port with regard to the type of activity accommodated there. With regard to container traffic, the majority occurs in Southport, and this use is expected to grow as berths there are expanded and the harbor is dredged to allow larger ships to call at these berths. As discussed in Element 1 (Section 1.7), both the physical length of ships that call at the Port, and the vessel productivity of these calls were reviewed and these statistics were combined to create a unit of berth efficiently called the berth-foot-hour.

An example of how the berth-foot-hour and related berth-foot-hour/move are calculated is shown below. (Smaller numbers for berth-foot-hour per move indicate higher efficiency as fewer resources are required to move each container.)

- An 800-foot-long ship calls at a port, with 600 container moves to do.

- The ship remains in port for 20 hours, for a mean berth productivity of 30 moves per hour.
- This ship occupies 800*20 = 16,000 berth-foot-hours of resources.
- 16,000/600 = an efficiency of 26.7 berth-foot-hours per move.

Having examined the Port's historical data from FY 2008 and FY 2012, the consultant team found that, while berth productivity had increased somewhat at Southport, the length of ships calling the Port had increased by a roughly similar proportion, so that the mean berth-foot-hour per container moved (35.5) was nearly identical between these two years.

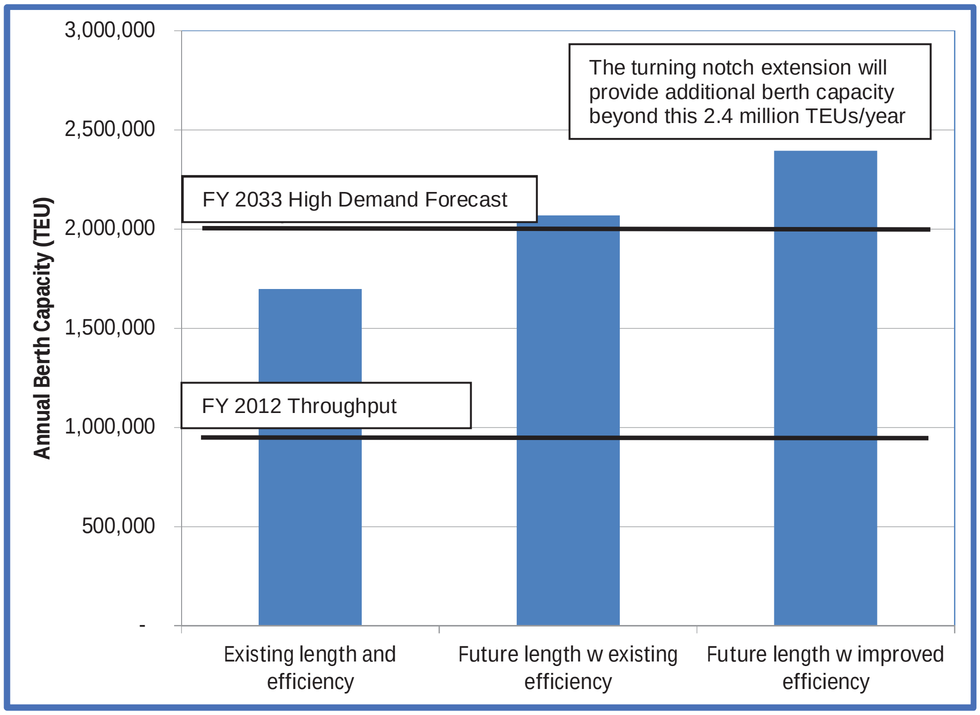
The FY 2012 level of efficiency for each berth segment, along with its fraction of time dedicated to container activity, was used to compute the berth capacity of the Port's existing infrastructure at its existing level of efficiency. The berth capacity was then reanalyzed with the 1,500-foot' extension of Berth 30 taken into account.

Extension of Berth 30 is not the only project envisioned by the Port that will affect its container-handling capabilities. The planned harbor deepening to -48 feet from the current -42 feet and purchase of five new container dock cranes for Southport will allow larger ships to call, and the increased number of cranes will improve the efficiency of berth operation on Berths 30-32.

At present, Berths 30-33 have a combined length of 3,700 feet and are equipped with seven cranes for a mean coverage of one crane every 530 feet of berth. After the expansion of Berth 30 and installation of the new cranes this same region of the Port will consist of 5,200 feet of berth with 12 cranes, or one crane every 430 feet. This approximately 20 percent increase in crane density will increase berth efficiency by a similar ratio.

As a sensitivity analysis, the consultant team calculated the future capacity of the Port with the increase in efficiency at Southport resulting from the addition of the new container cranes. Figure 3.5-1 shows the results this analysis compared with the FY 2012 throughput and the most optimistic long-term capacity projection in the 2014 Plan. The future crane density of one per 430 feet of berth is not terribly aggressive by world standards (some ports operate with one crane every 250 feet) so the 2.4 million TEUs per year future berth capacity shown is not necessarily an upper limit for the Port once the turning notch extension is complete.

Figure 3.5-1
PORT EVERGLADES CURRENT AND FUTURE BERTH CAPACITY

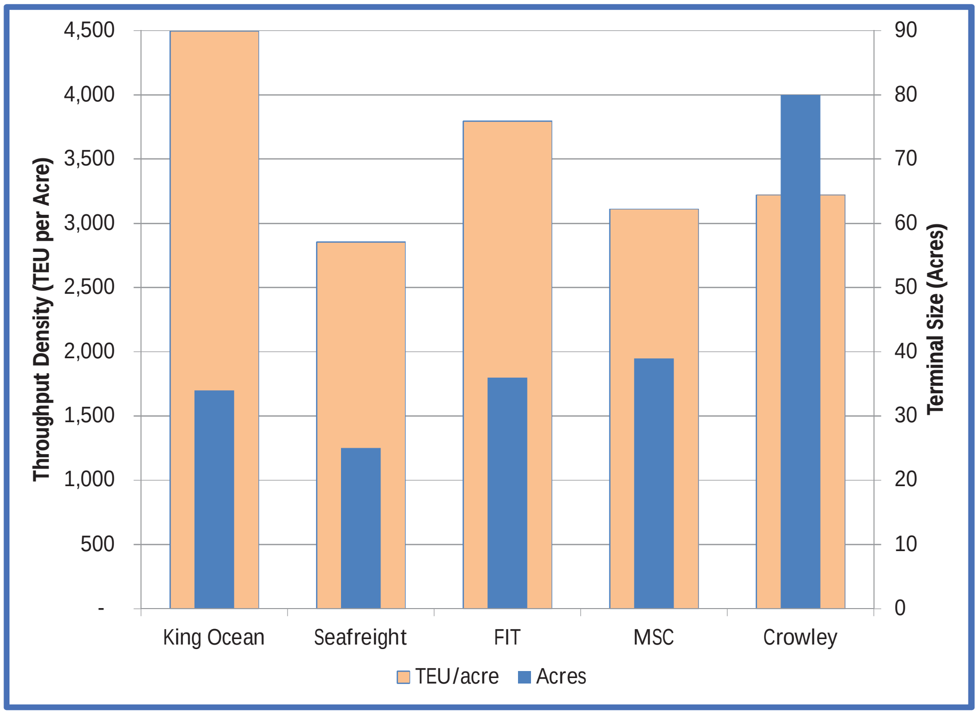


Container terminals can also be limited by their container yard capacity, but the consultant team found that Port Everglades as a whole will be able to generate sufficient container yard capacity to match the most optimistic berth capacity by gradually shifting operations from a combination of wheeled and top-pick to RTG cranes. As a general rule of thumb, top-pick operations have twice the capacity of wheeled operations, and RTG operations have twice the capacity of top-pick operations. The Southport operators, who use a mixture of wheeled and top-pick operations, could theoretically triple their overall container yard throughput capacity without any new land by shifting to RTG operations.

RTGs are more costly to own and operate than other modes, but this marginal increase in cost is more than overcome by the marginal benefit of moving more throughput across very expensive berth and backland infrastructure. RTGs are the most common mode of operation in the world, and are used extensively in the U.S., notably at Savannah and Charleston on the U.S. East Coast.

One tactical challenge facing the Port is that the five major Southport container terminal operators do not utilize terminal land at the same rate. Figure 3.5-2 shows the current terminal size and throughput density for each Southport operator.

Figure 3.5-2
SOUTHPORT CONTAINER TERMINAL SIZE AND DENSITY

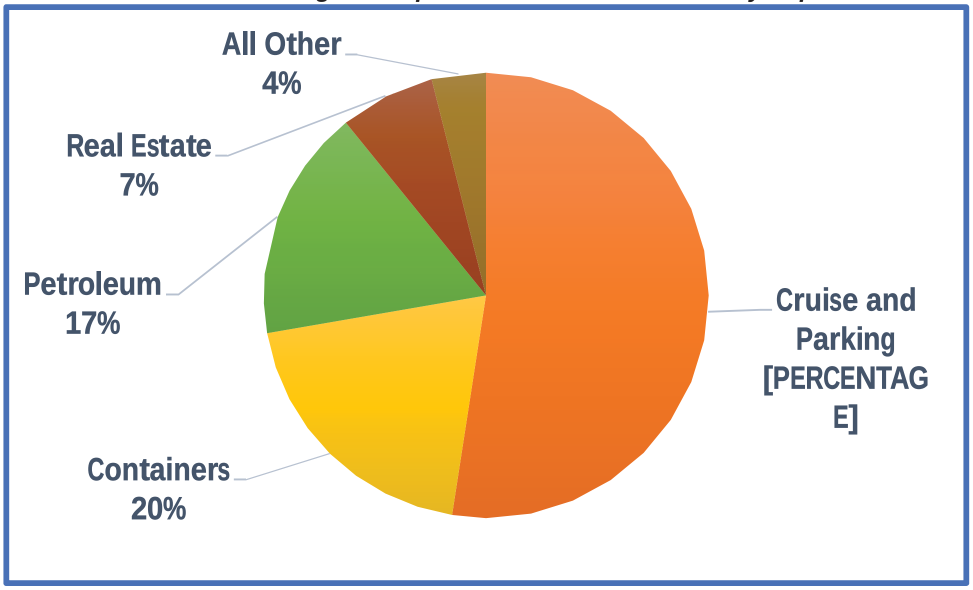


Making rational moves toward expansion, lease negotiations, and possible shifting of boundaries will be an ongoing challenge for the Port. The guiding principal should be that each operator be paying fair market value for land and that terminals have the opportunity to grow or shrink guided by market economics that benefit the Port as a whole. Although the Port theoretically has adequate container yard capacity, the consultant team recommends the Port consider all reasonable options to add space at Southport and that, if any tenants cease operations, their terminal land first be offered to existing tenants for expansion.

3.5.3 Analytical Findings: Non-Container Operations

In terms of revenue, cruise, containerized cargo, and petroleum are the Port's three dominant business lines, as shown in Figure 3.5-3, which uses data from the Port's *April 2013 Revenue and Activity Reports*.

Figure 3.5-3
PORT REVENUE BY SOURCE
Source: Port Everglades April 2013 Revenue and Activity Reports



With Figure 3.5-3 as background, the volume of “all other” cargo types, including cement, steel and other neo-bulk or break-bulk commodities, is a small fraction of activity at the Port. The consultant team did identify the berths that work these cargos and used a similar technique as that used for Southport’s container activities to calculate berth capacity.

Figure 3.5-4 shows how the berth capacity of these cargo types compares with recent volume. The capacity of all three types of cargo is well above recent volumes, although at one point the volume of bulk cement was much higher than current capacity. Cement volume collapsed at the start of the recession in 2008 and rebounded somewhat, but is still far from its historical peak.

The Port makes berths available for each cargo type as it is in demand. Since cement and steel are not in as high demand in recent years, the number of physical berths and total berth hours to serve these products has been reduced accordingly. If need be, capacity can be shifted from other cargo types to bulk products to meet demand; for instance, a currently shared container and bulk cargo berth could be dedicated to bulk activity only when warranted.

For each type of cargo shown in Figure 3.5-4, storage capacity exceeds berth capacity by a significant margin, except for the steel break-bulk, for which the margin is narrower.

Figure 3.5-4
NON-CONTAINERIZED CARGO BERTH CAPACITY

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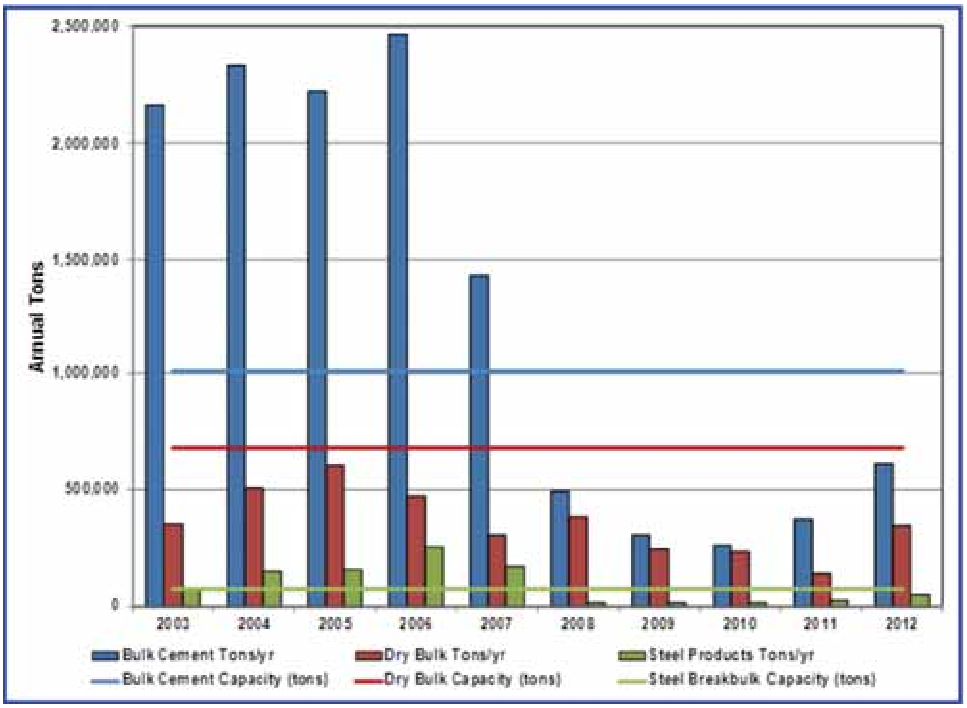


3.6 Conceptual Planning Studies

Conceptual planning studies were conducted of projects needed to serve the forecasted throughput of the four business lines: cruise, petroleum, containerized cargo, and non-containerized cargo at the 20-year planning horizon. These conceptual planning studies addressed diverse planning and development factors, including:

- Redeveloping, realigning, or adding new berths.
- Increasing berth/terminal efficiencies.
- Consistency with the USACE deepening and widening project.
- Relocating, expanding, or developing new cargo storage areas.
- Expanding cruise terminals and the ground transportation area.
- Modernizing other facilities to enhance Port operations.
- Programming underutilized Port parcels.
- Reviewing existing and proposed berth assignments.
- Previous airspace obstruction analyses.
- Transportation circulation and access needs.
- Ongoing implementation of the current 5-Year Capital Improvement Program (CIP), which includes the Port's strategic projects, such as Cruise Terminal 4, relocation of the Eisenhower Boulevard security gate, the McIntosh Road realignment, the ICTF, and the Turning Notch extension as well as FDOT's Eller Drive overpass.

3.6.1 Projects Considered for the 2014 Plan

The conceptual 2014 Plan, through the 2033 planning horizon, now comprises 37 projects, of which 11 are new projects or have been redefined from those presented in the 2009 Plan. The 37 projects being considered for the 2014 Plan are listed in Table 3.6-1, which identifies the projects by the following factors.

- Plan milestone.
- Port area.
- Project name.
- Business line.

The 11 redefined or new projects highlighted in Table 3.6-1 are located throughout the Port, as shown in Figure 3.6-1. The focus of this section is a discussion of these 11 projects and their initial programming, formulation, and eventual consideration for inclusion in the 2014 Plan. These projects were the focus of the planning team's efforts, which included planning study charrettes, stakeholder workshops, and numerous meetings with the Port's staff.

In several cases, various project alternatives were developed, which were then evaluated and discussed with the Port. These alternatives are all presented in Section 3.6.2 regardless of whether they were selected for forwarding into the 2014 Plan. It is important to an understanding of the planning process that even those alternatives that were eliminated from consideration be described and the factors that led to their elimination be included in the planning analysis.

Table 3.6-1
PROJECTS CONSIDERED FOR THE 2014 MASTER/VISION PLAN

Milestone	Area	Project (New projects are italicized and highlighted in brown)	Business Line
5-Year	Northport	Berths 1,2, and 3 New Bulkheads	Cruise
		Slip 1 New Bulkheads/Reconfiguration - Phase 1 (Berths 9 and 10) **(1)**	Petroleum
		Neo-Bulk Storage Yard **(2)**	Cargo
	Midport	Slip 2 Westward Lengthening	Cruise
		CT 25 Improvements/Expansion	Cruise
		CT 29 Improvements/Expansion	Cruise
	Southport	Westlake Mitigation	
		Super Post-Panamax Cranes (3)	Cargo
		Southport Turning Notch Extension	Cargo
		McIntosh Road Gate Lane Addition **(3)**	Cargo
		Southport Phase 9a Container Yard	Cargo
		Southport Phase 9b Container Yard **(4)**	Cargo
		Foreign Trade Zone Relocation	Cargo
		New Crane Rails (Berths 30,31, and 32)	Cargo
	Portwide	USACE Deepening and Widening Design	
		USACE Deepening and Widening Construction	
10-Year	Northport	***Slip 1 New Bulkheads (Berths 7,8,and 8A)*** **(6)**	Petroleum
		CT 4 Parking Garage	Cruise
	Midport	Berths 14 and 15 New Bulkheads	Dry Bulk
		Berths 16,17,and 18 New Bulkheads	Cruise
		Multimodal Facility - Phase 1	Cruise
		CT 18 Parking Garage	Cruise
		Tracor Basin Fill **(7)**	Cruise/Cargo
		Berths 21 and 22 New Bulkheads	Cruise
	Southport	Super Post-Panamax Cranes (2)	Cargo
		Container Yard Densification Improvements	Cargo
		Berth 33 Reconfiguration **(8)**	Cargo
20-Year	Northport	Slip 2 New Bulkheads and Widening (Berths 4, 5, and 6)	Cruise/Cargo
		Slip 3 New Bulkheads and Widening (Berths 11, 12, 13, and 13A) **(9)**	Petroleum
	Midport	Berth 19 and 20 New Bulkheads	Cruise
		Ninth Cruise Berth **(10)**	Cruise
		Multimodal Facility - Phase 2	Cruise
		Berth 23 New Bulkheads	Cruise
		Berths 24 and 25 New Bulkheads	Cruise
		Berths 26 and 27 New Bulkheads	Cruise
	Southport	***Crushed Rock (Aggregate) Facility*** **(11)**	Cargo

Figure 3.6.1
NEW AND REDEFINED PROJECTS CONSIDERED FOR 2014 MASTER/VISION PLAN

3.6.2 Project Alternatives

The following project discussions are organized by business line and by Port area. Those project alternatives that have been eliminated from consideration are noted as such as are those that have been retained for further study.

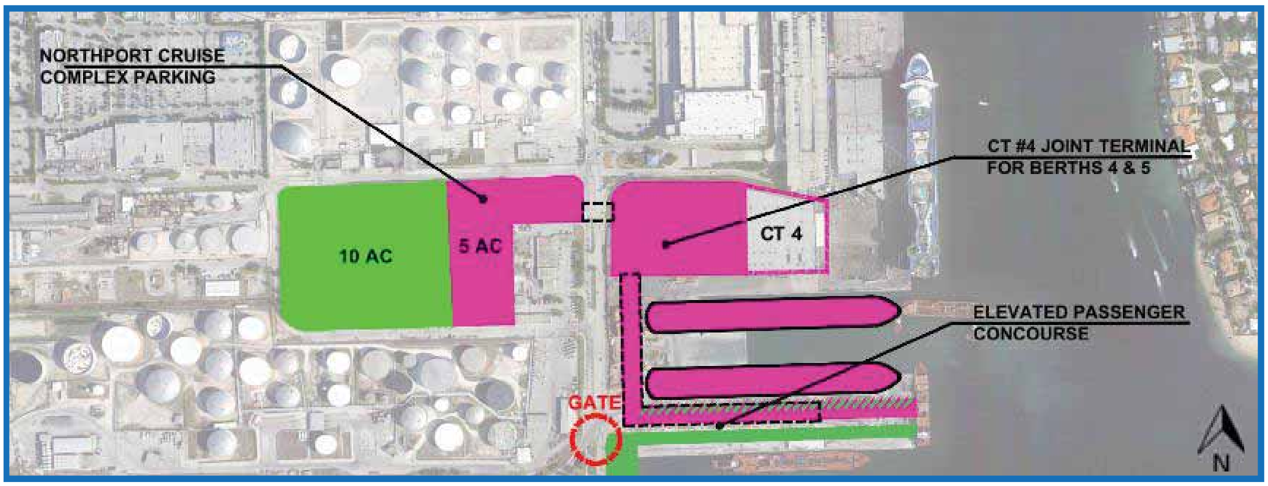
Cruise Projects. Five projects were proposed and analyzed for the cruise sector in Northport and Midport. The overriding objectives of these projects were to create a ninth cruise berth, consistent with the cruise projections through 2033, the 20-year planning horizon, and to promote the modernization and capacity expansion of the Port's existing cruise terminals. The proposed projects and their status determination are listed below:

- North Cruise Complex Expansion (Berth 5) (Northport): Not considered for further study.
- Berth 18 Extension (Midport): Not considered for further study.
- Cruise Pier 19 and Cruise Terminals 19/20 (Midport): Advancing for further study.
- Midport Cruise East Consolidation (Midport):Not considered for further study.
- Tracor Basin Fill – Cruise (Midport): Advancing for further study.

Descriptions and conceptual plan drawings of these projects follow.

Northport Cruise Complex Expansion at Berth 5. This project, as shown in Figure 3.6-2, proposed expanding the existing Cruise Terminal 4 to the west by adding terminal capacity at the plus 2 and 3 levels while maintaining the ground transportation areas at ground level. Consideration was given to utilizing a portion of the former molasses tank site owned by the Port for cruise terminal parking. Additionally, this terminal would be situated north of the relocated security gate on Eisenhower Boulevard, thus allowing traffic to enter the terminal without going through the security gate. The project proposed connecting the cruise terminal to Berth 5 by an elevated passenger concourse with moving sidewalks, similar to cruise terminal operating models utilized successfully at the Port of Singapore and with acceptable passenger-to-concourse distances experienced at many airports.

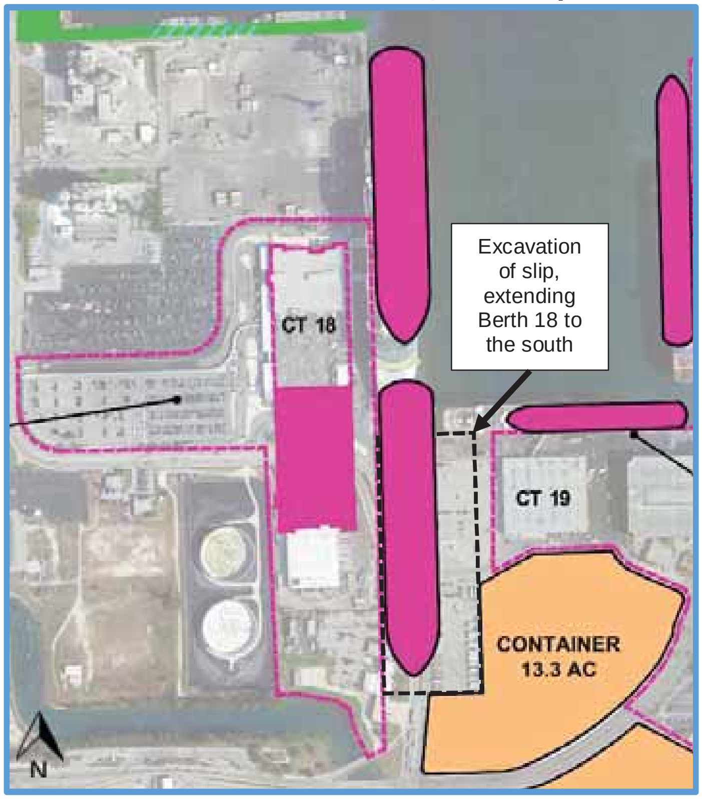
Figure 3.6-2
NORTHPORT CRUISE COMPLEX EXPANSION (BERTH 5) (NORTHPORT)



This project was not considered for further study due to its proximity to the Port's petroleum operations. Although there are no national regulations governing setback distances for petroleum operations and the public, security and safety concerns were the driving forces against this project.

Berth 18 Extension. This project proposed creating a ninth cruise berth by extending Berth 18 to the south, as illustrated in Figure 3.6-3. This extension would allow two cruise ships to berth simultaneously along the face of Berths 16, 17, 18 and the proposed extension of Berth18. The existing Cruise Terminal 18 would be expanded to the south, doubling its current footprint. The parking for the terminal would be developed west of the terminal and possibly share in the current Midport parking garage capacity. This project was envisioned to accommodate up to an Oasis-class ship, currently the largest cruise ship in the world.

Figure 3.6-3
BERTH 18 EXTENSION (MIDPORT)

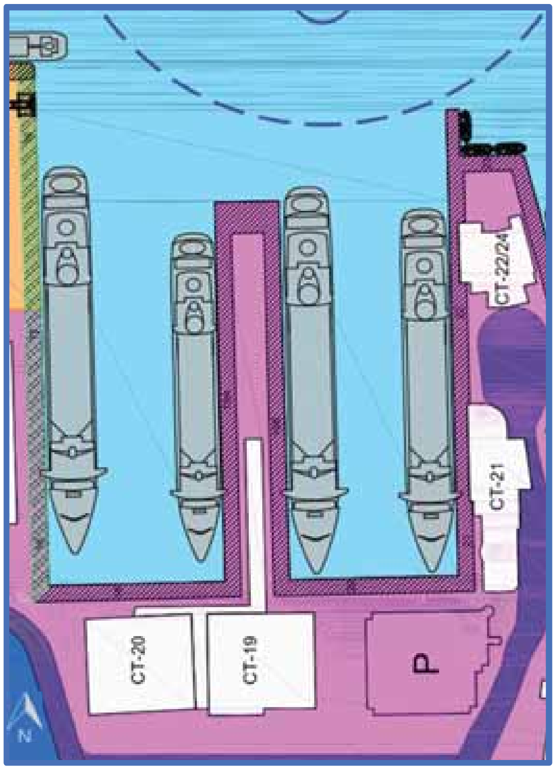


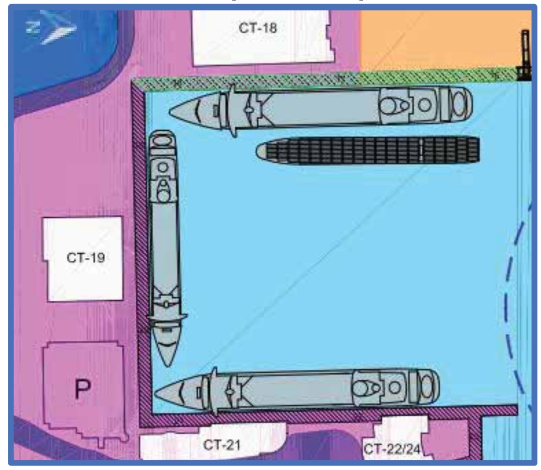
This project was not considered for further study due to required roadway and utility relocations as well as relocations of existing operations, such as the cold storage warehouse and public safety complex.

Cruise Pier 19 and Terminals 19/20. To accommodate the high unconstrained cruise forecast, this project proposed the creation of a ninth cruise berth by constructing a new pier structure extending northward from the existing Berths 19/20, as shown in Figure 3.6-4. Several alternatives were developed for this project, which included addressing the dimensions of the pier structure as well as its location within the harbor basin between Berths 16, 17, and 18 and Berths 21 and 22. The project was reviewed by the port pilots to obtain their concurrence that safe navigation practices could occur with various berth and slip spacing proposals. The existing Cruise Terminal 19 would be expanded to the west at plus levels 2 and 3, approximately doubling the current footprint of that terminal.

The ground transportation area for Cruise Terminal 20 would be at ground level under the footprint of the facility. Parking would be developed south of the terminal and initially be at grade until demand warranted a vertical parking structure to obtain additional capacity. This project was envisioned to accommodate a ship of up to 1,200 length overall (LOA) at one of the new berths. The cruise terminal would be connected to the new Berths 19 and 20 by an elevated passenger concourse with moving sidewalks, similar to cruise terminal operating models utilized successfully at the Port of Singapore and with acceptable passenger-to-concourse distances experienced at many airports.

Figure 3.6-4
CRUISE PIER 19 AND CRUISE TERMINALS 19/20 (MIDPORT)





Existing Configuration (above)

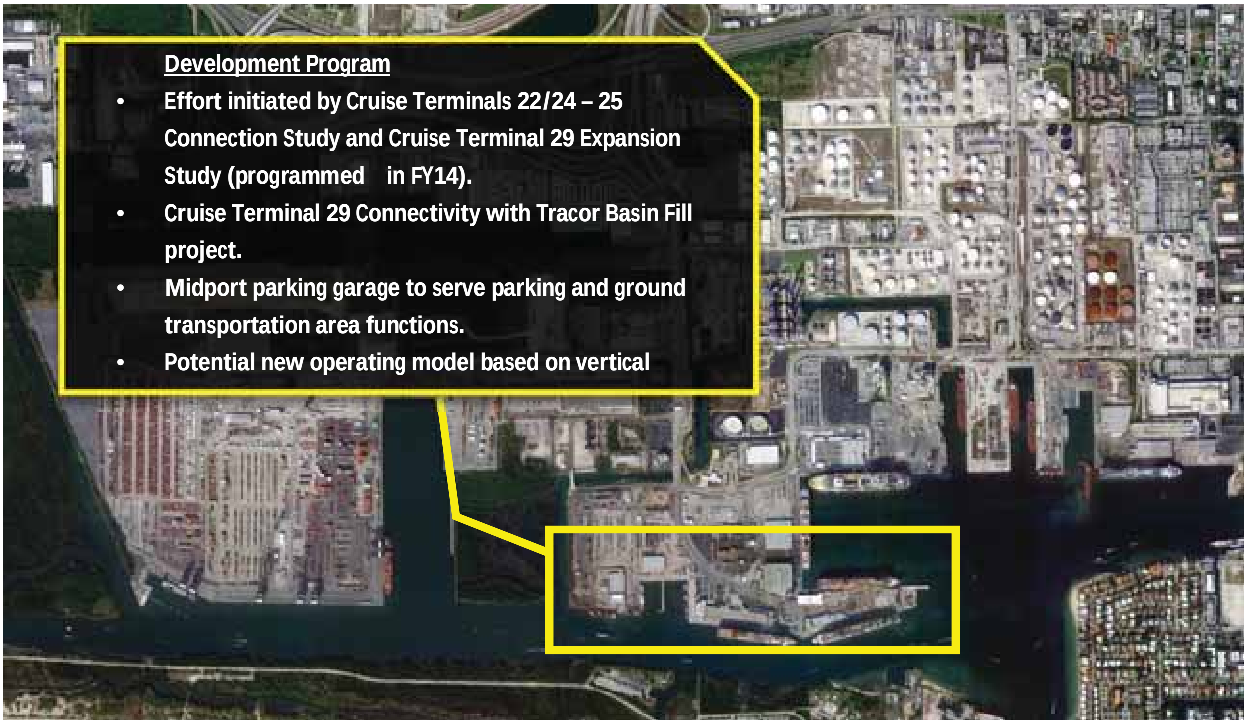
Proposed New Pier and Terminal (left)

This project was considered for further study due to its acceptance by the port pilots and its ability to provide the Port with a ninth cruise berth.

Midport Cruise East Consolidation. Commonly referred to as the "lollipop" area of Midport, this project area includes Cruise Terminals 21, 22/24, 25, 26, and 29 as well as the Midport parking garage (see Figure 3.6-5). The overall project concept is to consolidate the respective ground transportation areas into the ground level of the Midport parking garage and assess and consider a new operating model through vertical separation of vehicular traffic circulation and passenger functions. From the waterside, this project extends from Berth 21 to Berth 29, with the intent of maximizing the utilization of these berths and, as allowable, increase the size of the cruise ships that these berths can handle.

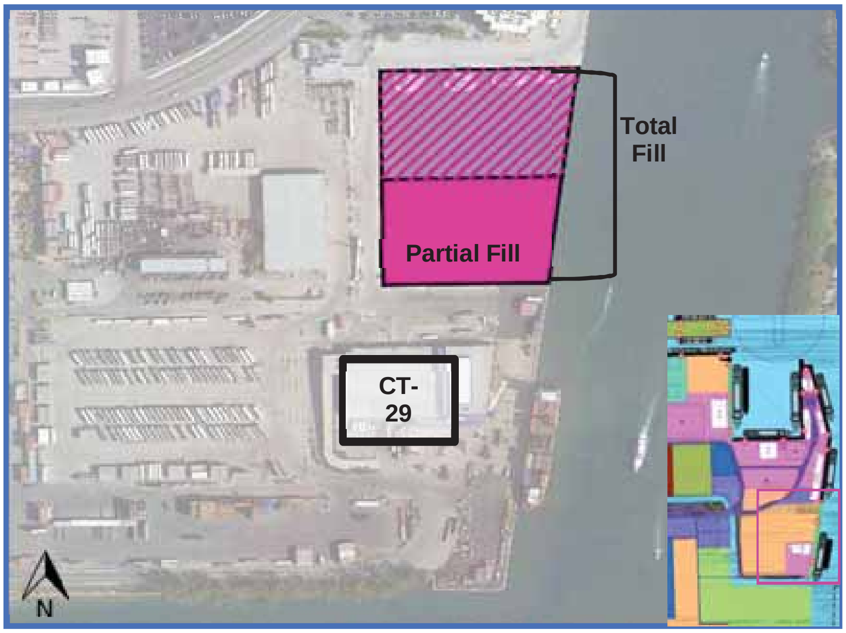
This project was not considered for further study as an "independent project"; however, the overall operating concept proposed may be considered part of other existing cruise sector projects that are located in the Midport area. These projects include the Cruise Terminal 25 and Cruise Terminal 29 Improvements/Expansion programmed currently in the 5-Year Plan and the proposed Tracor Basin Fill project that is discussed below.

Figure 3.6-5
MIDPORT CRUISE EAST CONSOLIDATION (MIDPORT)



Tracor Basin Fill. This project initially considered a partial or a total fill of the Tracor Basin (see Figure 3.6-6). Through the analysis, the total fill was determined to be the preferred alternative. This project benefits the cruise activity at Berth 29, which is supported by Cruise Terminal 29. The filling of the Tracor Basin, which creates approximately 6 acres of new land and extends Berth 29 northward, will increase the efficiency of cruise ship provisioning and baggage-handling. It will also allow the berth and cruise terminal to be more directly connected to the above-mentioned “lollipop” area of Midport, thus increasing the terminal’s potential use of the Midport parking facilities. The USACE harbor deepening and widening will allow for increased vessel traffic on the Intracoastal Waterway and also allow larger vessels to utilize Berth 29, as well as Berths 25, 26, and 27.

Figure 3.6-6
TRACOR BASIN FILL – CRUISE (MIDPORT)



This project was considered for further study due to its operational benefits. The Cruise Terminal 29 footprint and operating concepts are addressed in the Cruise Terminal 29 Improvements/Expansion project, which is programmed currently in the 5-Year Plan.

Petroleum Projects. One project was considered for the petroleum sector in Northport. The overriding objective of this project was to create three redundant Post-Panamax berths for the petroleum sector in Northport for the 20-year horizon and also promote the modernization and capacity enhancement of petroleum operations.

This project is proposed to be completed in three phases, as shown previously in Table 3.6-1:

- Slip 1 New Bulkheads and Reconfiguration – Phase 1 (Berths 9 and 10)
- Slip 1 New Bulkheads (Berths 7, 8, and 8A)
- Slip 3 New Bulkheads and Widening (Berths 11, 12, 13, and 13A)

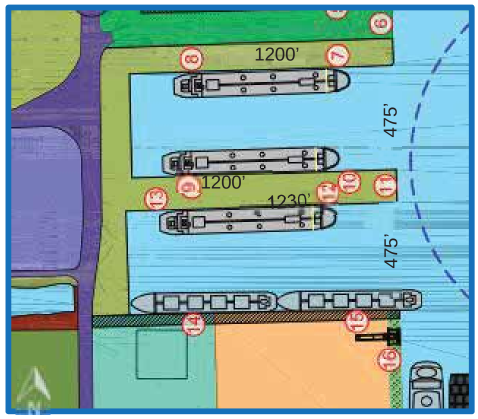
The initial petroleum redevelopment concept maintained the dimensions established in the 2009 plan:

- Slip 1 Northward Expansion by 50 feet.
- Slip 1 Southward Expansion by 125 feet.
- Slip 3 Northward Expansion by 300 feet.

After additional analysis, however, the project was revised to accommodate more efficient landside and waterside operations and to be consistent with the USACE deepening and widening.

The project provides three redundant berths with like operating factors that will allow the petroleum sector to meet projected demand (see Figure 3.6-7). The new project design removes the notch to Slip 3 envisioned in 2009 and provides for a full cutback of the slip to alleviate berth constraints due to what has been called the cement vessel shuffle at Berths 14 and 15, where the innermost ship cannot enter or exit the slip if the outermost ship is present, requiring the vessel to move.

Figure 3.6-7
PETROLEUM SLIP EXPANSION (NORTHPORT)

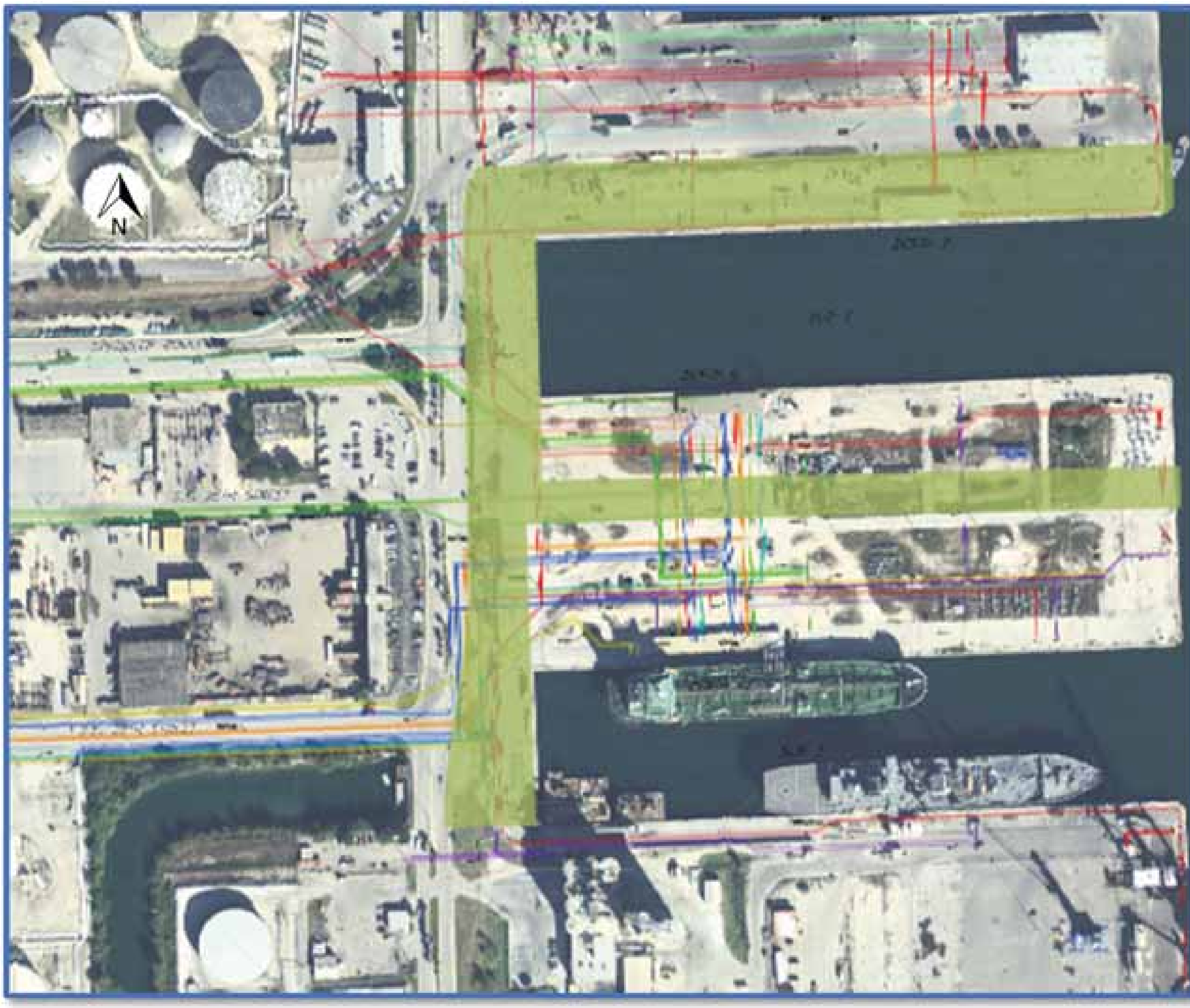


Two issues identified in the 2009 plan design were addressed in this revised design:

- First, the entrance channel range lights, which are utilized by the Port Everglades pilots for vessels entering and exiting the channel, are currently positioned along the existing bulkhead of Berths 7 and 8. During the planning process for the 2009 Plan, the pilots were concerned that moving the Berths 7 and 8 bulkheads to the north by 50 feet would interfere with the visibility of these range lights and would limit channel safety. Consequently, the 2009 Plan suggested that, during the preliminary engineering and design of these Slip 1 bulkheads, a detailed study be prepared to address this concern and maintain a clear line of sight for these range lights. The solution to this issue identified in the 2014 Plan, after discussion with the port pilots, is to maintain the current bulkhead position of Berths 7 and 8 and expand Slip 1 further to the south to accomplish the desired slip width without obstructing the visibility of the range lights.
- Second, the Pier 1 width was deemed insufficient at 75 feet for piping and general operations and thus the pier width was extended to 150 feet. The final slip dimensions of Slips 1 and 3 are 475 feet, as recommended in the 2009 Plan.

The project, over its three phases, envisions that the Port's share of the costs will be limited to the marine structures, environmental, pier excavation, dredging and removal of piping. Improvements and reinstallation of piping and unloading infrastructure will be the responsibility of the private sector (see Figure 3.6-7a, which shows the multiple pipelines for the respective operators). The order-of-magnitude scope of those improvements the private sector would need to make as a result of the Port's identified improvements were addressed conceptually during the master planning process; this definition of private sector project responsibility was vetted with the Northport petroleum operators during that process.

Figure 3.6-7a
CENTRAL MANIFOLD MODERNIZATION



This project was considered for further study due to its acceptance by the petroleum sector and the port pilots and its ability to provide three redundant Post-Panamax berths consistent with the USACE deepening and widening project.

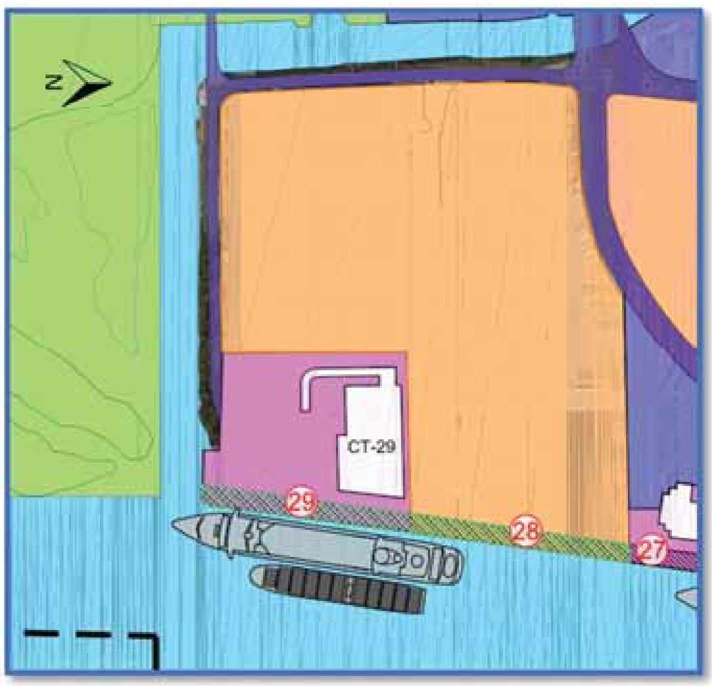
Containerized Cargo. Four projects were proposed and analyzed for the Port's containerized cargo business line in Midport and Southport. The overriding objectives of these projects were to maximize and increase the density of the Port's container operations through the 20-year horizon and also promote modernization and capacity expansion of the existing Southport container terminals, consistent with the completion of the ICTF. These proposed projects include:

- Tracor Basin Fill – Container (Midport).

- Southport Phase 9b Container Yard (Southport).
- McIntosh Road Gate Lane Addition (Southport).
- Berth 33 Reconfiguration (Southport).

Tracor Basin Fill – Container. As discussed in the above cruise section, this project considered initially a partial or a total fill of the Tracor Basin, but the consulting team determined through the course of the analysis that a total fill was the preferred alternative. In addition to its positive impact on the Port's cruise activities at Berth 29, this project also benefits its container activities (see Figure 3.6-8). Filling the Tracor Basin, which creates approximately 6 acres of new land and extends Berth 29 northward, will create a contiguous berth face from Berth 27 to Berth 29. This berth face, combined with the additional 6 acres of container yard it provides, will increase the efficiency of cargo operations in Midport and potentially support increased connectivity to the Southport container operations. The USACE deepening and widening will allow for increased vessel traffic on the Intracoastal Waterway and also allow for larger vessels to utilize Berths 27, 28, and 29.

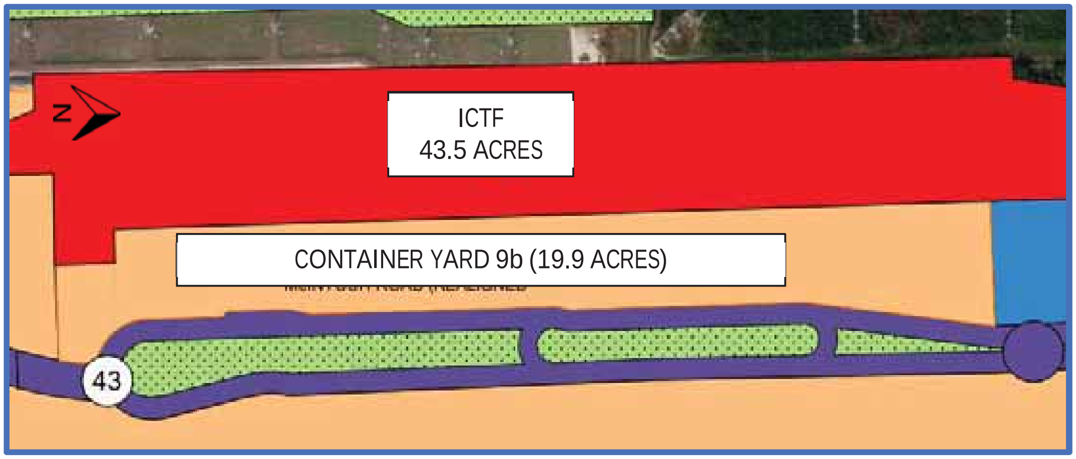
Figure 3.6-8
TRACOR BASIN FILL - CONTAINER (MIDPORT)



This project was considered for further study because of its beneficial effect on container operations at Berth 29 and the addition of approximately 6 acres to the yard footprint.

Southport Phase 9b Container Yard. This project proposes the development of a 19.9-acre parcel between the ICTF and McIntosh Road to support Southport container terminal operations (see Figure 3.6-9). It is envisioned that this parcel will be utilized for such functions as chassis storage, repositioning of container empties, long dwell-time containers, and additional container storage area on a possible grid system, particularly as the Southport turning notch is extended and container volumes increase.

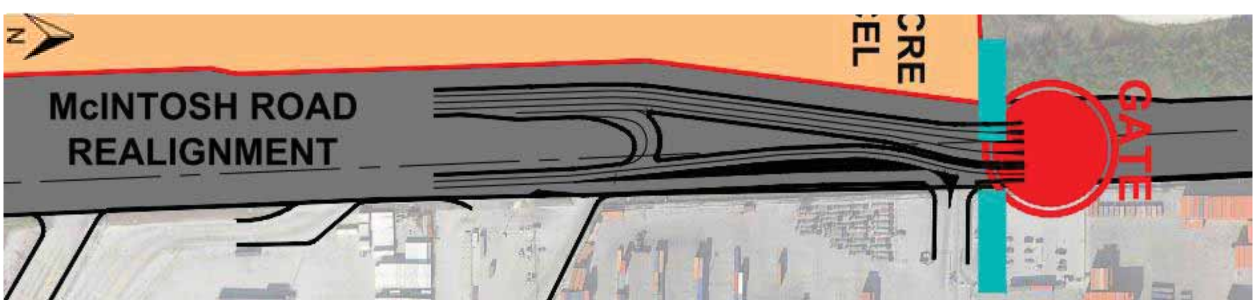
Figure 3.6-9
SOUTHPORT PHASE 9b CONTAINER YARD



This project was considered for further study because of its supporting benefits to the Southport container terminal operations and its addition of approximately 19.9 acres to the container yard footprint.

McIntosh Road Gate Lane Addition. This project was redefined from the 2009 plan, based on new operating parameters in Southport. These new operating parameters include the Foreign-Trade Zone relocation west of McIntosh Road, the McIntosh Road realignment, the turning notch extension, the ICTF development, and the Eller Drive overpass construction. The project proposes the Southport gate remain in its current location, but be expanded to the west to the greatest extent within the McIntosh Road rights-of-way (see Figure 3.6-10). The project would entail adding an outbound lane (increasing outbound lanes to 3) and shifting the inbound lanes to the west with a reservation for one additional inbound lane. The main objective of this project is to increase the efficiency of Southport gate operations and reduce wait times, both inbound and outbound, through the gate.

Figure 3.6-10
MCINTOSH ROAD GATE LANE ADDITION (SOUTHPORT)

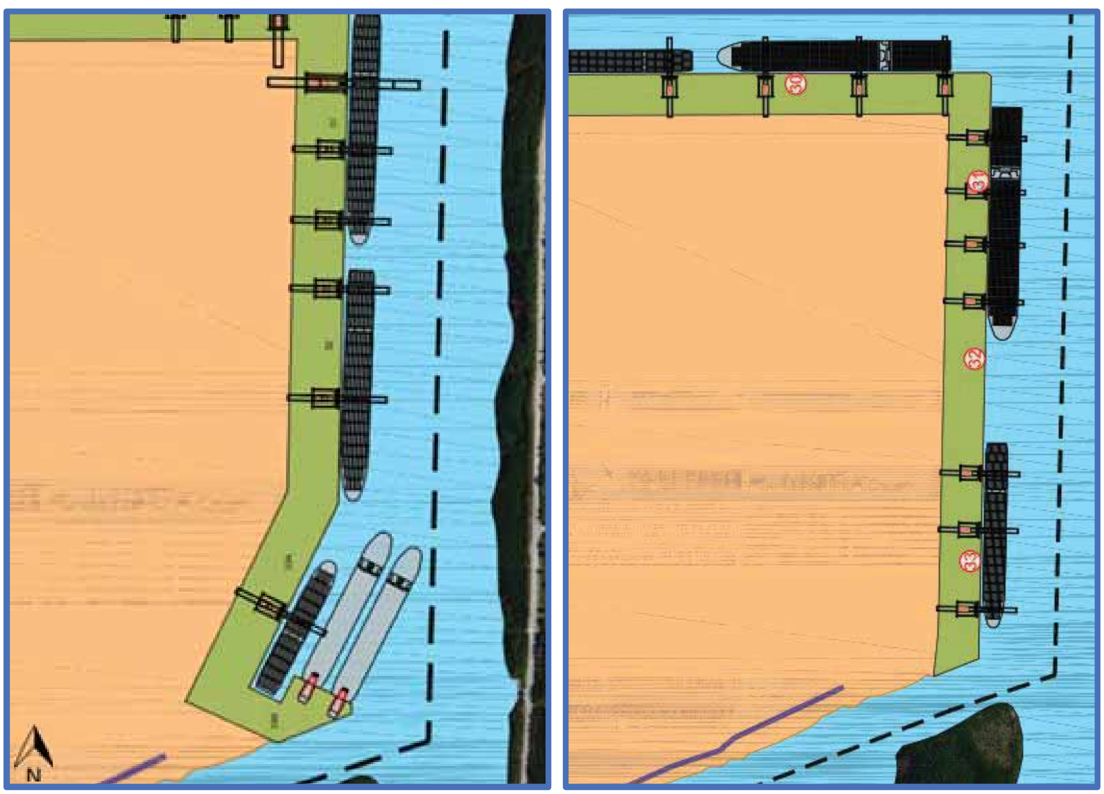


This project was considered for further study because of its benefits to Southport container operations, including increased operational efficiencies.

Berth 33 Reconfiguration. The 2009 plan called for extending Berth 33A into the Dania Cutoff Canal, maintaining the knuckle between Berths 32 and 33. During this 2014 planning process, a conceptual study determined the reconfiguration of Berth 33, inclusive of a southward extension, would support more efficient container operations in Southport. This project includes the demolition of Berths 33B and 33C and filling east of the current Berth 33A to create a continuous linear berth from Berths 31 to 33 of approximately 2,850 linear feet (see Figure 3.6-11). The proposed fill creates 2.3 acres of land which is a net gain to the Southport container terminal.

In addition to gaining 2.3 acres for container operations, overall, this project will create greater operating flexibility and cost saving by eliminating the need to articulate the trucks on the new Post-Panamax gantry cranes and increasing the flexibility to berth up to four vessels at Berths 31 through 33, compared to the three vessels envisioned under the 2009 Plan.

Figure 3.6-11
BERTH 33 RECONFIGURATION (SOUTHPORT)



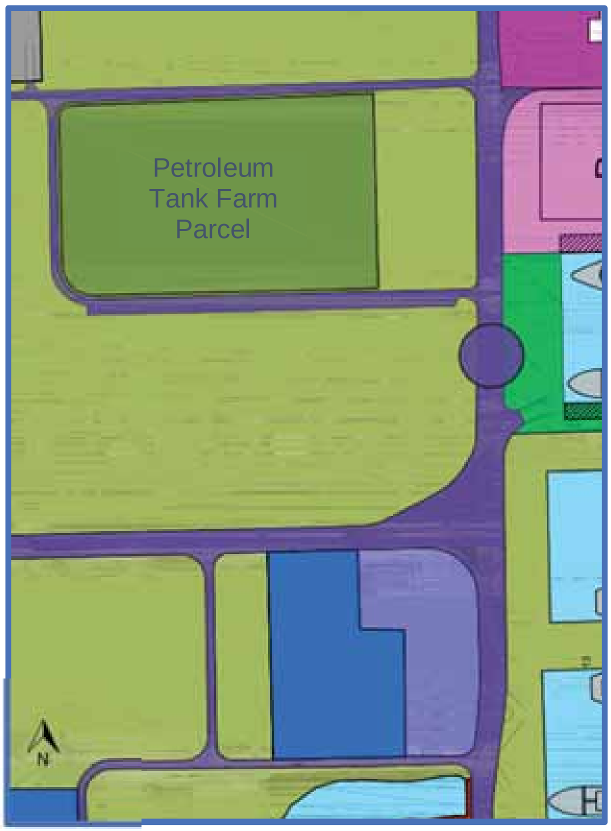
This project was considered for further study due to its benefits to container operations in Southport and increased efficiency of marine operations at Berths 31, 32 and 33.

Non-Containerized Cargo. Two projects were proposed and analyzed for the Port's non-containerized cargo business line in Midport and Southport. The objective of these projects is to accommodate the relocation of cargo uses programmed in the 2009 plan. These proposed projects included:

- Neo-bulk storage yard (Northport).
- Crushed rock (aggregate) facility (Southport).

Neo-Bulk Storage Yard. Neo-bulk operators are losing space at Berth 5. To compensate for this loss, two potential sites were identified to relocate neo-bulk cargo operations so as to continue accommodating them. These sites include either the former molasses tank site (approximately 13 acres) owned by the Port or a portion of the FP&L site (approximately 10 acres) west of McIntosh Road (see Figure 3.6-12). The molasses site, if utilized, would use primarily Berth 5 for cargo loading and unloading, whereas the FP&L site would use primarily Berths 14 and 15 for these operations.

Figure 3.6-12
NEO-BULK STORAGE YARD (NORTHPORT)

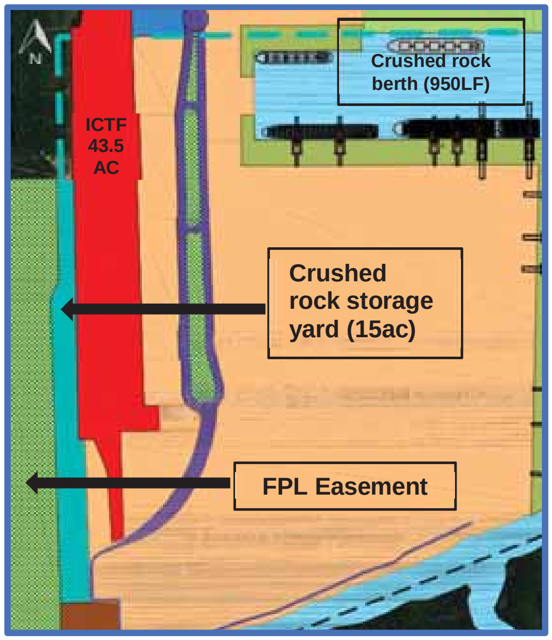


This project was considered for further study due to the need to relocate neo-bulk operations from their current location at the west end of Slip 2 because of new uses at their current location.

Crushed Rock (Aggregate) Facility. This project was redefined from the 2009 Plan, based on an adjustment to the ICTF alignment. The storage area is now proposed for acreage west of the ICTF, using a 19-acre parcel between the ICTF and FP&L easement (see Figure

3.6-13). Other elements of the project, including the use of a turning notch berth and the transfer of crushed rock via a conveyor system from berth to storage area, are consistent with the project concept in the 2009 Plan.

Figure 3.6-13
CRUSHED ROCK FACILITY (SOUTHPORT)



This project was considered for further study due to its benefits to long-term crushed rock operations.

3.7 Conceptual 2014 Master/Vision Plan

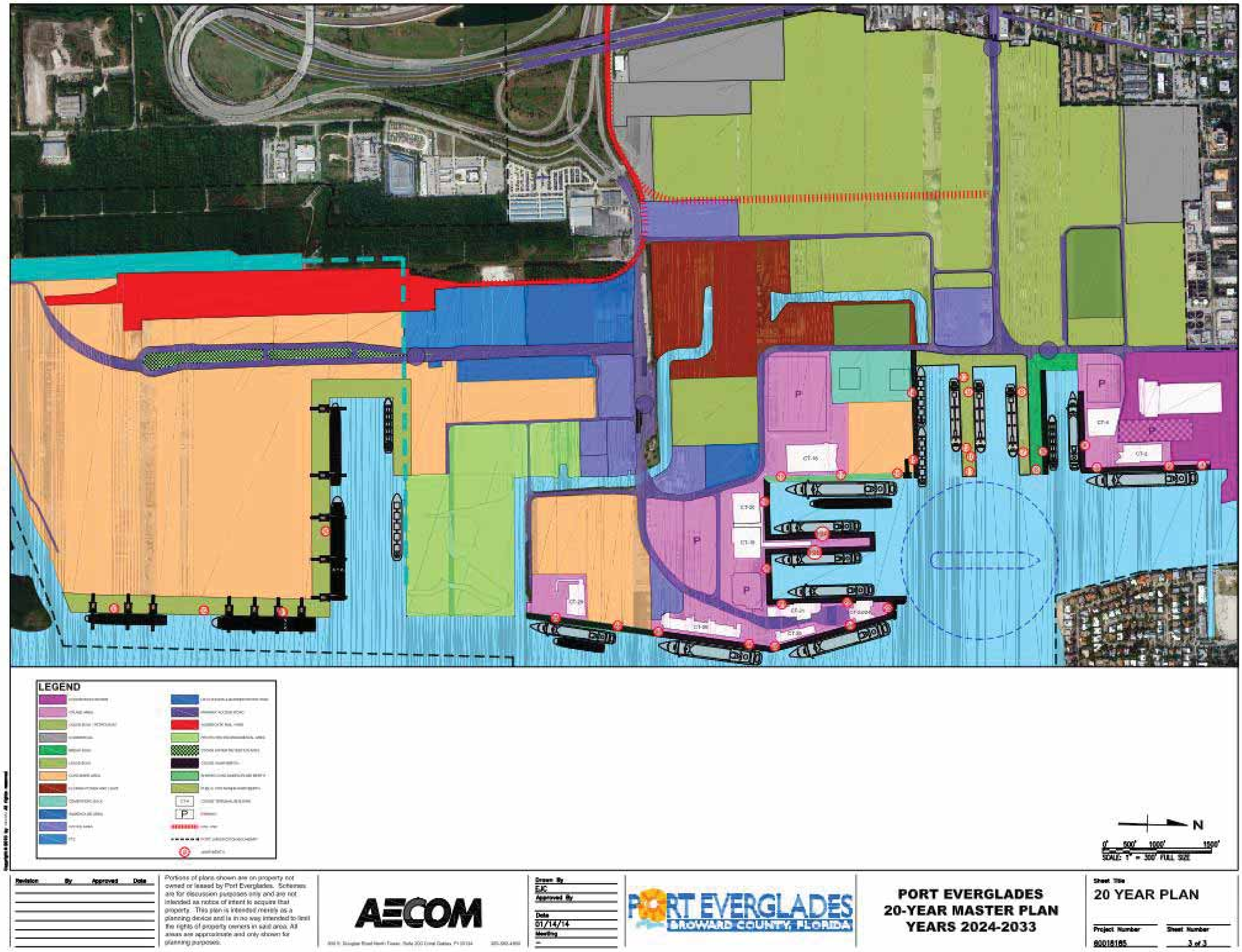
The culmination of the planning studies discussed in this element is the development of a conceptual 2014 Master/Vision Plan for further evaluation and definition. Table 3.7-1 lists the new and redefined projects considered for further study because of their supporting benefits to the Port.

Table 3.7-1
NEW AND REDEFINED PROJECTS SELECTED FOR FURTHER STUDY

Project
Slip 1 New Bulkheads and Reconfiguration - Phase 1 (Berths 9 and 10)
Neo-Bulk Storage Yard
McIntosh Road Gate Lane Addition
Southport Phase 9b Container Yard
Slip 1 New Bulkheads (Berths 7, 8, and 8A)
Tracor Basin Fill
Berth 33 Reconfiguration
Slip 3 New Bulkheads and Widening (Berths 11, 12, 13, and 13A)
Cruise Pier 19 and Cruise Terminals 19/20
Crushed Rock (Aggregate) Facility

The conceptual 20-Year Vision Plan, shown in Figure 3.7-1, illustrates the infrastructure improvements throughout the Port to be achieved by the planning horizon of 2033, assuming that all the projects undergoing further study will be included in the Plan. The final plan, resulting from the additional study of these new and redefined projects and including those projects brought forward from the 2009 plan, is presented in Element 5.

Figure 3.7-1
CONCEPTUAL 20-YEAR VISION PLAN



3.8 Parking

3.8.1 Current Parking Capacity and Demand

As discussed in Element 1 (Section 1.8), to address its cruise parking needs, the Port has two structured parking facilities: one at Northport and one at Midport; and two surface parking lots in Midport: one west of Cruise Terminal 18 and one west of Cruise Terminal 19. The parking capacity and peak utilization of each of these facilities in FY 2013 are summarized in Table 3.8-1, which updates the data provided in Element 1. Detailed utilization charts by month are provided in Appendix D.

Table 3.8-1
EXISTING PARKING CAPACITY WITH PEAK UTILIZATION PARAMETERS
FY 2013
Source: Port Everglades data.

Parameter	Parking Facility			
	Midport			Northport
	Garage	T-18 Surface Lot	T-19 Surface Lot	Garage
Parking Capacity: (5,320 Spaces)	1,966	600	404	2,350*
Peak Month Total Demand	35,508 (December)	13,687 (June)	6,084 (December)	17,757 (March)
Peak Month Average Daily Demand	1,145 (December)	456 (June)	196 (December)	573 (March)
Highest Daily Demand	1,472 (December)	672 (February)	398 (December)	726 (November)

*While the Northport garage is often identified as having 2,500 parking spaces, 2,350 is the number of spaces used in analytical calculations because of the way the garage is striped for parking.

Figure 3.8-1 illustrates the total monthly parking demand by facility in FY 2013. As this figure shows, during the peak cruise season, from November through March/April, the Midport garage has the highest utilization, whereas in October, May, June, and July, the T-18 surface lot takes over that role. Utilization of the Northport garage peaks in March, as shown in Table 3.8-1. By the end of the fiscal year in September, all of the facilities are at their lowest utilization, reaching zero parking in some cases.

The subsequent two tables, Tables 3.8-2 and 3.8-3, round out the picture by showing the highest daily parking demand and the average daily parking demand by month at the respective facilities.

Figure 3.8-1
MONTHLY PARKING DEMAND
FY 2013
Source: Port Everglades data.

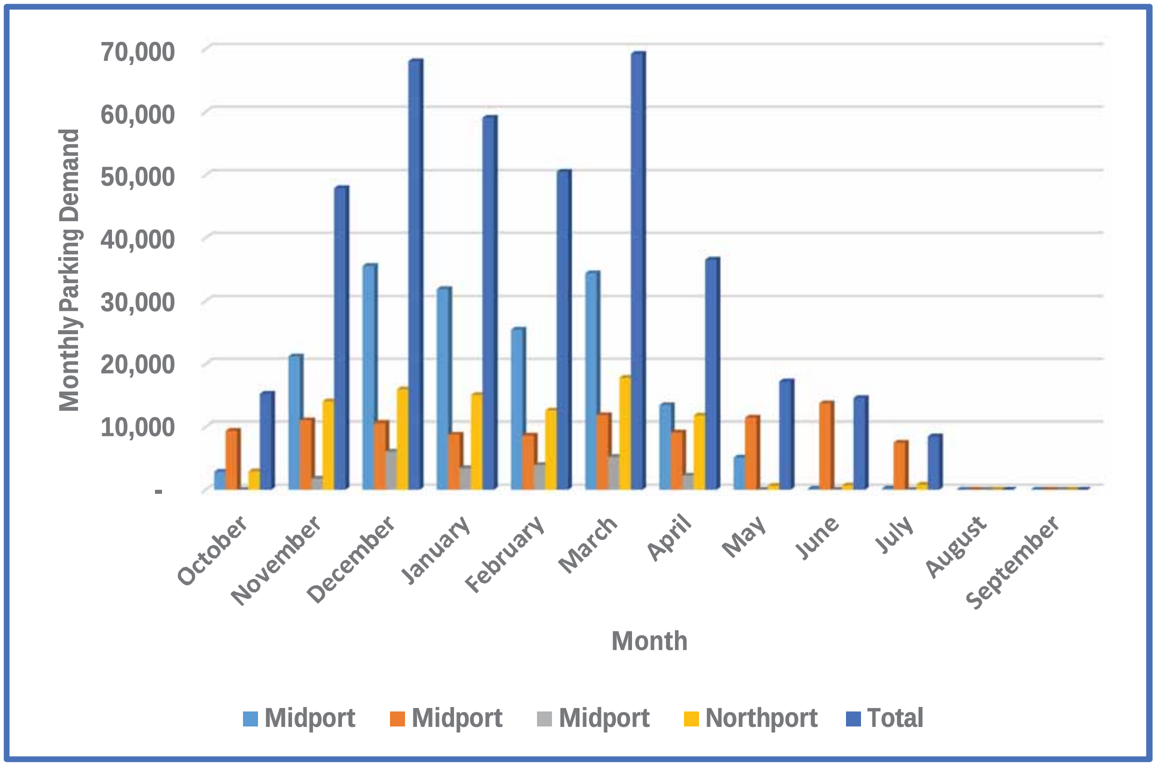


Table 3.8-2
HIGHEST DAILY PARKING DEMAND BY MONTH
FY 2013
Source: Port Everglades data.

	Midport			Northport	Total
	Garage	T-18	T-19	Garage	
October	189	325	-	207	721
November	1,130	605	148	**726**	2,009
December	**1,472**	428	259	710	**2,869**
January	1,323	319	136	624	2,402
February	1,168	**672**	**398**	543	2,781
March	1,405	434	238	717	2,794
April	1,142	347	161	672	2,322
May	205	415	-	92	712
June	185	554	-	35	774
July	460	423	-	47	930
August	-	-	-	-	-
September	-	-	-	-	-
Peak Utilization	**75%**	**112%**	**99%**	**31%**	**54%**

Table 3.8-3
AVERAGE DAILY PARKING DEMAND BY MONTH
October 2012-December 2013
Source: Port Everglades data.

	Midport			Northport	Total
	Garage	T-18	T-19	Garage	
October	93	303	-	95	491
November	705	366	59	467	967
December	1,145	341	196	513	2,195
January	1,030	283	123	484	1,920
February	909	308	140	448	1,805
March	1,111	380	169	573	2,233
April	447	304	75	391	1,217
May	171	368	-	20	559
June	166	456	-	23	645
July	218	242	-	26	486
August	-	-	-	-	-
September	-	-	-	-	-
Yearly average utilization	**25%**	**47%**	**16%**	**11%**	**20%**

Northport. As shown in Table 3.8-1, the Northport garage has 2,350 spaces available. The FY 2013 data confirm increased parking demand at this garage during the peak November-to-April season, reaching a high of 726 in November. While sharing this garage with the Convention Center, the Port is able to accommodate scheduled passengers in this garage on any given day. Overall, monthly usage of this facility was 31 percent of the available capacity, including during the peak cruise season. On a yearly basis, the facility averaged about 11 percent utilization.

Midport. The Midport garage, with 1,966 spaces, was also more heavily utilized during the peak season of November through April. During these six months, the peak demand stayed above 1,100 parking spaces, reaching 75 percent of capacity. On a yearly basis, the facility averaged about 25 percent utilization.

The surface parking lot west of Cruise Terminal 18, T-18, has 600 spaces. This facility, somewhat different than the others, experienced fairly consistent usage throughout FY 2013, even exceeding 100 percent utilization on occasion in November and February. On a yearly basis, the facility averaged 47 percent utilization.

The surface lot west of Cruise Terminal 19, T-19, has 404 spaces. During FY 2013, these spaces never reached more than 64 percent utilization between November and April except for February, when the lot was almost at capacity for a few days. On a yearly basis, the facility averaged 16 percent utilization.

Together, the Midport facilities, including the garage and the two surface lots, account for approximately 75 percent of the peak demand. The Northport garage accounts for approximately 25 percent, as shown in Table 3.8-4.

Table 3.8-4
SHARE OF FY 2013 PEAK MONTH PARKING DEMAND AT NORTHPORT AND MIDPORT*
Source: Port Everglades data.

	Midport					Northport		Peak Parking Space Demand
	Garage	T-18	T-19	Total	Percent of Peak	Garage	Percent of Peak	
December	1,472	428	259	2,159	75%	710	25%	2,869

*Based on data in Table 3.8-2.

3.8.2 Future Capacity Requirements

The Port's future parking needs are assumed to be a direct function of the growth of the cruise passenger population as well as the increasing capacity of the ships calling at the Port, although, as discussed below, other variables such as the percentage of passengers who fly to the area for their cruises versus those who drive, less costly off-port parking options, and even the length of cruises, can influences this demand. The cruise lines serving Port Everglades require near-dock parking facilities to provide acceptable proximity to and from the cruise terminals for their cruise passengers and avoid the operational cost of shuttles.

Future Parking Demand Estimates. Table 3.8-5 shows the forecasts of revenue cruise passenger growth prepared to estimate the future cruise passenger population at Port Everglades over the planning milestones through 2033 as presented in Element 2. For this analysis of future parking demand, the constrained high projection for cruise passenger growth has been used.

Table 3.8-5
SUMMARY OF PROJECTED REVENUE CRUISE PASSENGER GROWTH
Source: Cambridge Systematics, Inc.

	Overall Increase	Annual Increase	FY 2019	FY 2023	FY 2028	FY 2033
Constrained						
Low	35%	1.5%	4.3 M	4.5 M	4.6 M	4.8 M
Medium	58%	2.3%	4.8 M	5.3 M	5.4 M	5.6 M
High	69%	2.7%	5.0 M	5.6 M	5.8 M	6.0 M
Unconstrained						
High (9 Multi-Day)	86%	3.2%	4.8 M	6.0 M	6.4 M	6.6 M

The cruise passenger populations, including both multi-day and single-day passengers, estimated for the milestone years under the constrained high scenario are as follows:

2019	2023	2028	2033
5,025,892	5,575,797	5,800,666	6,013,955

The multiplier used to estimate the Port's parking needs over the planning horizon is the ratio of the estimated cruise passenger volumes in the future milestone years to the cruise passenger volume in the base year of 2013, which was 3,600,636. The resulting multipliers are as follows:

2019	2023	2028	2033
1.39	1.54	1.61	1.67

As shown in Table 3.8-4, in FY 2013, the FY 2013 peak month parking demand for the Northport and Midport garages, and the T-18 and T-19 surface lots, was approximately 2,900 parking spaces (2,869). Based on this estimated 2,900 peak of occupied parking spaces and the above multipliers, the following are the total peak parking spaces estimated to be needed in the respective milestone years:

2019	2023	2028	2033
4,031	4,466	4,669	4,843

Planned New Parking Facilities. The 2009 Master/Vision Plan included new parking facilities in the 5-year, 10-year, and 20-year time frames: a 1,680-space garage at Cruise Terminal 4 in Northport and a 1,600-space garage at Cruise Terminal 18 plus a 4,000-space multimodal facility to be built in two phases of 2,000 spaces each in Midport. Table 3.8-6 shows how this new construction, when carried into the 2014 Master/Vision Plan through 2033, would increase the Port's parking capacity in Northport and Midport. This analysis reflects the following assumptions:

- The parking currently available in the Northport garage may be lost or demolished when the garage is turned over to the Convention Center. At present, it is not known whether these spaces would be lost in whole or in part, and what the timing of the turnover is; for the purpose of this analysis, it is assumed that all those spaces would be lost at some time in the future, presumably in the 10-year time frame.
- The construction of the multimodal facility will supplant the 404 spaces now available in the T-19 surface parking lot.

The construction of a new parking garage, with 1,600 parking spaces at Cruise Terminal 18, originally scheduled for 2018, but deferred to the 10-year time frame, and that of a 1,680-space second garage at Cruise Terminal 4, also proposed in the 10-year time frame, as well as the two-phase multimodal facility, would add 7,280 parking spaces to the Port's inventory, for a total of 9,846 spaces.

Table 3.8-6
SUMMARY OF EXISTING AND PLANNED NORTHPORT AND MIDPORT PARKING FACILITIES

Facility	Existing Spaces	New Spaces	Total spaces	Timing in 2009 Plan	Timing in Conceptual 2014 Plan
Northport					
Northport Garage*	2,350		(2,350)		
Cruise Terminal 4 Garage		1,680	1,680	In 10-Year Plan	In 10-Year Plan
Northport Total	**2,350**	**1,680**	**1,680**		
Midport					
Midport Garage	1,966		1,966		
T-18 Surface Lot	600		600		
T-19 Surface Lot**	404		(404)		
Cruise Terminal 18 Garage		1,600	1,600	In 5-Year Plan but deferred to 2018	In 10-Year Plan
Multimodal Facility Phase 1***		2,000	2000	In 10-Year Plan	In 10-Year Plan
Multimodal Facility Phase 2***		2,000	2000	In 20-Year Plan	In 20-Year Plan
Midport Total	**2,970**	**5,600**	**8,166**		
Portwide Total	**5,320**	**7,280**	**9,846**		

*Assumes the existing Northport garage would be turned over for the exclusive use of the Convention Center and these spaces would be lost.
**With the Phase I construction of the multimodal facility, the T-19 surface lot spaces would be lost.
***The decision on implementing Pier 19 and the new Cruise Terminal 19/20 would affect if, how, and when the multimodal facility would be constructed.

Comparison of Capacity and Demand. Table 3.8-7 compares the Port's planned parking capacity and the anticipated peak parking demand over the planning milestones for Northport and Midport, based on the percentages shown in Table 3.8-4.

Table 3.8-7
COMPARISON OF CAPACITY AND PEAK MONTH PARKING DEMAND OVER THE PLANNING MILESTONES*

	Midport				Northport				Portwide
	Existing (2013)	2019	2023	2033	Existing (2013)	2018	2023	2033	2033 Total
Capacity	2,970	2,970	6,166	8,166	2,350	2,350	1,680	1,680	9,846
Demand: Peak Month	2,159	2,869	3,350	3,632	710	964	1,116	1,211	4,843
Excess Capacity: Peak Month Demand	811	101	2,816	4,534	1,640	1,386	564	469	4,875

*Capacity is based on currently anticipated time frames of construction, as shown in Table 3.8-4.

As Table 3.8-7 shows, the addition of all the planned facilities would exceed the total anticipated high month peak parking demand at both Northport and Midport to various degrees through the 2014 Master/Vision Plan milestone of 2033.

Northport. This analysis reveals that the construction of the Northport Cruise Terminal 4 garage in the 10-year time frame (by 2023) would cover the anticipated high month peak parking demand over the planning horizon. The excess capacity in the 10- and 20-year time frames would allow for parking by shore side cruise employees (see discussion below) and other potential uses. Were all or part of the existing Northport garage to remain available for Port use, the Port would have additional parking flexibility in Northport.

Midport. In Midport, however, the analysis suggests there would be a slight capacity constraint in the 5-year time frame (2019) if no additional parking were provided; but that after that time, if all the planned parking spaces were added, there would be excessive capacity, reaching a surplus of as much as 56 percent by 2033. It is understood that some of this capacity would be used to accommodate shore-side cruise employee parking, but even so, adding the Cruise Terminal 18 garage and the phased construction of the multimodal facility would provide 2,816 more spaces than the estimated high month peak parking demand in 2023 and 4,534 more spaces than that demand by 2033.

Portwide. If all the planned parking facilities were added, the Port would have a 50 percent surplus by the 20-year milestone in 2033. This is much more than the typical 10 to 15 percent surplus allowance over peak demand.

Variables Contributing to the Port's Parking Demand. The above analysis reflects a straightforward projection of parking demand based on the forecasted constrained high growth in the Port's cruise passenger population and the actual parking demand data. Other unpredictable variables will, however, play a role in the Port's eventual parking demand.

The Proportion of "Fly-In" to "Drive-In" Passengers. As of the end of 2013, the Port and Fort Lauderdale-Hollywood International Airport (FLL) determined that 50 percent, or 1.8 million, of the 3.6 million passengers cruising from the Port travel through FLL.[16] This pattern of people who do not need to park at the Port dramatically affects the Port's parking demand, particularly for the 7-day and longer cruises during the peak cruise season, which attract many cruisers from abroad. Conversely, the shorter and daily cruises and those during the spring break and other events attract more local cruisers, and thus greater parking demand, as evidenced by the peak demand in March.

The proportion of "fly-in" to "drive-in" passengers is also affected by the changing route decisions of the airlines that serve the local area. For example, when Southwest Airlines curtailed many of its flights between FLL and other Florida cities, cruise passengers who might

[16] Of the 23 million passengers who fly in and out of FLL, an annual average of 14 percent do so for a cruise. This percentage changes over the course of the year, from the peak season to the off-peak.

have flown to and from their cruises needed to find another mode of transportation, including driving and perhaps parking at the Port.

Off-Port Parking Options. While the Port offers convenient and safe parking for its cruise passengers, other parking options exist. These include less expensive off-port parking locations as well as parking incentives offered to cruisers staying at local hotels for pre- or post-cruise packages.

Employee Parking. Shore-side personnel serving the respective cruise lines park gratis in the Northport garage and in the Midport garage and surface lots, but their vehicles are tabulated. Recent data provided by the Port showed that the maximum number of parking spaces used by shore-side employees at the Northport garage during the first five months of FY 2014 (October through February) was 325. The number of parking spaces employees used at that garage exceeded 300 only nine days during the five-month period. Similarly, at Midport, the maximum number of parking spaces used by shore-side cruise employees on a given day during the first months of FY 2014 (October through a portion of March) was 381. The number of parking spaces employees used at that garage exceeded 300 only five days during these peak months. (One of those five was an outlier of 946 spaces, but this is not considered typical.)

Whether the cruise lines will add more shore-side employees in the future to serve their larger ships is not known at this time; but a range of 300 to 400 parking spaces for these shore-side employees is a reasonable assumption and could be accommodated in the estimates shown in Table 3.8-7, especially as these employees are not confined to one parking locale.

While the number of parking spaces used by shore-side cruise employees can be determined based on Port records, other employees, such as those from the International Longshoremen's Association (ILA), may choose to park at the Northport or Midport facilities, but there are no counts for this category as their vehicles are not differentiated from any other vehicle parking in a Port garage.

Approximately 25 Port Operations and Harbormaster staff park in the Midport garage.

Cruise Length and Ship Capacity. A cruise ship's transition from a 7-day cruise to 4- and 5-day cruises, such as scheduled by the *Ruby Princess* and the *Vision of the Seas* for FY 2014 is a variable presumably generating greater parking demand as the shorter cruises attract more local residents. To provide additional insights into the parking demand from the diverse ships homeporting at Port Everglades, Port data were analyzed to see what trends could be discerned. Table 3.8-8 looks at the Port's FY 2013 parking transactions from various perspectives, including average parking demand per sailing and the percentage that demand represents of a ship's passenger capacity. For example, Royal Caribbean's *Oasis of the Seas* and *Allure of the Seas*, whose capacity is 5,400 guests each for their seven-day cruises, have an average parking demand of 168 and 177 spaces, respectively, or, as shown in the last column of the table, approximately 3 percent of the ships' capacity. The 3.1 percent shown is actually the median parking demand for all the ships included in the table.

Table 3.8-8
PERSPECTIVES ON PORT PARKING TRANSACTIONS
FY 2013
Source: Port Everglades data

.					Parking Transactions						
Ship	**Cruise Length**	**Timing**	**Ship Capacity**	**Yearly Sailings**	**Northport Garage**	**Midport Garage**	**T-18 Surface Lot**	**T-19 Surface Lot**	**Total**	**Average Demand per Sailing**	**Demand for Parking per Ship Capacity**
INFINITY	15	Oct-Apr	2,170	4		4			4	1	0.05%
STATENDAM	14	Oct-Mar	1,258	4		8			8	2	0.15%
SILVER SPIRIT	7, 10, 14	Nov-Mar	540	10	1	20			21	2.1	0.38%
SILVER WHISPER	9, 16	Nov-May	382	3	5				5	1.6	0.41%
PRINSENDAM	14, 23, 68	Nov-Mar	835	4	18	2			20	5	0.59%
ECLIPSE	14	Nov-Apr	2,850	12		522			522	37.2	1.31%
AMSTERDAM	14, 115	Dec-Jan	1,380	3	2	35			37	18.5	1.34%
LEGEND	10, 11	Nov-Jan	204	4	4	7			11	2.75	1.35%
VISION OF THE SEAS	4, 5	Oct-Mar	2,416	13	532	146		69	747	57.4	1.74%
PACIFIC	10, 28	Dec- Jan	680	2	2	22			24	12	1.76%
MAASDAM	10, 11, 14	Nov-Apr	1,266	12		324			324	27	2.13%
EQUINOX	10, 11	Dec-Apr	2,850	12		19	2	721	742	61.8	2.17%
EMERALD PRINCESS	10	Nov-Apr	3,080	16	845	413			1,258	78.6	2.55%
QUEST	14, 15	Dec	450	2		23			23	11.5	2.55%
NOORDAM	10, 11	Nov-Mar	1,972	12	108	583			691	57.6	2.90%
OASIS OF THE SEAS	7	All year	5,400	52		213	8,511		8,724	167.8	3.10%
ALLURE OF THE SEAS	7	All year	5,400	52		170	9,009		9,179	176.5	3.26%
SILHOUETTE	7	Dec-Apr	2,886	16	58	1,521			1,579	98.7	3.41%
RUBY	7	Oct-Apr	3,080	26	2,494	272			2,766	106.3	3.45%
NIEUW AMSTERDAM	7	Nov-Apr	2,106	24	70	1,717			1,787	74.4	3.53%
ISLAND PRINCESS	10, 14	Oct-Apr	1,970	10	413	316			729	72.9	3.70%
ZUIDERDAM	7, 10, 11	Oct-Mar	1,848	16	66	1,101			1,167	72.9	3.94%
GRAND PRINCESS	7	Nov-Jan	2,590	10		1,045			1,045	104.5	4.03%
WESTERDAM	7	Nov-Mar	1,848	17		1,365			1,382	81.3	4.39%
EURODAM	7	Nov-Mar	2,104	23	61	2,077			2,138	92.9	4.41%
CORAL PRINCESS	10, 14,18	Oct-Apr	1,970	8	639	77			716	89.5	4.54%
CARNIVAL FREEDOM	4, 5, 6, 8	All year	2,974	52	89	5,411	120	1,849	7,521	144.6	4.86%
CARIBBEAN PRINCESS	7	Nov-Apr	3,080	23	3,614	69			3,683	160	5.19%
LIBERTY OF THE SEAS	4, 5	Nov-Mar	4,375	32		7,994			7,994	249.8	5.70%
INDEPENDENCE OF THE SEAS	6, 8	Dec-Mar	4,328	18		2,332	63	276	2,671	148.4	7.15%

3.8.3 Proposed Parking Recommendations

Seven cruise-related projects are being considered for implementation through the 20-year planning milestone:

- Cruise Terminal 25 Improvements, Midport (5-Year Plan).
- Cruise Terminal 29 Improvements, Midport (5-Year Plan).
- Cruise Terminal 4 Parking Garage, Northport (10-Year Plan).
- Multimodal Facility – Phase 1, Midport (10-Year Plan).
- Cruise Terminal 18 Parking Garage, (10-Year Plan).
- Cruise Pier 19 and Cruise Terminals 19/20, Midport (20-Year Plan).
- Multimodal Facility – Phase 2 (20-Year Plan).

The proposed parking recommendations for this 2014 Master/Vision Plan reflect the potential impact of these projects and the anticipated peak parking demand from the high constrained cruise forecast described above.

Northport. For the Northport area, the decision when to build the Cruise Terminal 4 parking garage depends on how and when the Convention Center plans to proceed with its future expansion and construction of an adjacent hotel. The existing garage appears to be adequate for the anticipated future Northport cruise parking demand, as would the new Cruise Terminal 4 facility, when built. As stated previously, it is assumed that the existing Northport garage will be demolished wholly or in part presumably in the 10-year time frame. It is recommended, therefore, that the Port anticipate the need to build the new garage in a timely manner if it will no longer have access to adequate parking in the existing garage.

Midport. The Cruise Terminal 18 parking garage and the multimodal facility are both in the 10-Year Vision Plan. Given the identified surplus of parking capacity if both the garage and the multimodal facility are constructed, it would seem that both of these structures are not required. Of the two structures, the multimodal facility would appear to be the preferred construction choice because of its more proximate location to the preponderance of the Midport cruise terminals, the flexibility it would provide as a central location for the loading/unloading of buses, shuttles, and taxis, relieving congestion at peak times in front of the cruise terminals, and its phased construction.

Plans for this facility include an at-grade intermodal zone, or ground transportation area, with a structured parking facility above to serve all the Midport cruise terminals. When fully built, the multimodal facility would provide 4,000 additional parking spaces at Midport and is anticipated to have an elevated transport concourse with moving walkways to connect the terminals. In the 10-Year Vision Plan, only the first phase of the multimodal facility would be built, providing a structured parking facility with approximately 2,000 parking spaces, but not the elevated transport concourse and moving walkways to connect the Midport cruise terminals.

As Table 3.8-9 shows, if the Cruise Terminal 18 parking garage were not built, the Port would still have substantial capacity to meet the anticipated parking demand. If needed on an interim basis, the footprint of this multimodal facility could be developed into surface parking to service Cruise Terminals 18 and 19 as well as all the other Midport cruise terminals.

Table 3.8-9
COMPARISON OF CAPACITY AND PEAK MONTH PARKING DEMAND OVER THE PLANNING MILESTONES WITHOUT THE CRUISE TERMINAL 18 GARAGE

	Midport				Northport				Portwide
	Existing (2013)	2019	2023	2033	Existing (2013)	2018	2023	2033	2033 Total
Capacity	2,970	2,970	4,566	6,566	2,350	2,350	1,680	1,680	8,246
Demand: Peak Month	2,159	2,869	3,350	3,632	710	964	1,116	1,211	4,843
Excess Capacity: Peak Month Demand	811	101	1,216	2,934	1,640	1,386	564	469	3,403

*Capacity is based on currently anticipated time frames of construction, as shown in Table 3.8-4.

The site proposed for the Cruise Terminal 18 garage would remain as parking and/or a ground transportation area for Cruise Terminals 18 and 19. Additionally, by not constructing this parking garage, the Port retains options in the future for new cruise terminal capacity, such as an expansion to Cruise Terminal 19.

Other factors influencing the decision as to what should be built in Midport to meet the forecast parking demand is whether the Cruise Pier 19 and Cruise Terminals 19/20 project is to be included in the 2014 Master/Vision Plan and the outcome of studies related to Cruise Terminals 25 and 29. If the Cruise Pier 19 and Cruise Terminals 19/20 project is to move forward, even in the 20-year time frame, it would not be wise to build new structured facilities in its anticipated footprint. With respect to Cruise Terminals 25 and 29, their impact on the Port's parking demand is included in the constrained high forecast and thus is reflected in the estimated parking demand. The impact of the Cruise Pier 19 and Cruise Terminals 19/20 project on the Port's parking demand is not, however, included in that estimate as the project was part of the unconstrained high demand and its implementation is still under consideration.

Regardless of whether the Cruise Pier 19 and Cruise Terminals 19/20 project advances for further consideration and is included in the 20-Year Plan, is postponed to the next planning cycle for reconsideration, or is eliminated from further consideration, the most prudent option for the Port would appear to be postponing or eliminating the construction of the Cruise Terminal 18 garage, planning for interim surface parking if warranted in the footprint of the multimodal facility, and then proceeding with that facility in the 10-year time frame.

In summary, parking requirements and construction time frames need to be continually monitored prior to the commitment of capital improvement funds to reflect evolving demand patterns as new cruise ships come on line, passenger airlift and driving patterns change, off-port parking incentives increase, and shore-side cruise employee parking needs and other potential variables also change.

3.9 Rail and Truck Traffic

The increase in throughput at the Port over the 20-year planning horizon to 2033 will increase the traffic entering and leaving the Port. Several ongoing and planned projects, including the ICTF, the Eller Drive overpass, and the reconfigured McIntosh Road security gate, will, however, both accommodate the increase in throughput and mitigate the potential for increased traffic congestion.

3.9.1 Rail Usage Projections

When completed, the ICTF and the Eller Drive overpass will facilitate the use of rail to reduce traffic at the Port. By 2033, assuming single stacking and operations six days per week, an average of 3.6 container unit trains (generally, two departures and two arrivals) and 1.9 bulk unit trains handling crushed rock (one loaded departure and one empty arrival) are expected to cross Eller Drive. As an essential complement to the ICTF, the Eller Drive overpass provides a grade separation for freight rail at the main access roadway to Port Everglades and eliminates a potential blockage on Eller Drive. This project eliminates a potential on-grade rail crossing and the associated delay of truck, bus, taxi, and passenger car movements in and out of the Port. In 2033, container operations are expected to avoid more than 222,000 truck trips and bulk operations are expected to avoid an estimated 300,000 truck trips to and from the Port.

Table 3.9-1, on the next page, identifies the projected rail usage, based on projections adapted from the FEC's application for a State Investment Bank (SICB) loan. Currently, the share of rail usage is 6.1 percent. The anticipated share of rail use by 2019 is 12.2 percent; by 2033, the target is 12.4 percent.

3.9.2 Truck Trip Projections: McIntosh Road Security Gate

Table 3.9-2, on the following page, shows the annual truck traffic projected to pass through the McIntosh Road security gate. The figures shown assume the ICTF is operating at the volumes presented in Section 3.9.1 above; the ICTF projections in that section include non-maritime as well as maritime traffic. Maritime ICTF traffic reduces the number of truck trips through the gate, but non-maritime ICTF traffic does not. Non-maritime ICTF traffic actually generates trucks to and from the ICTF (to drop off and pick up freight), but this traffic has not been counted as through-the-gate traffic.

For container traffic, each container moving to or from a ship generates a truck move to or from the Port. The exception is transloaded cargo, where a container is loaded from one ship to another, without actually leaving the Port. To be conservative, no adjustment has been made for on-port transloading, so one over-the-wharf container equals one **cargo-generated truck trip**. Additionally, other truck trips will occur, to pick up or return ocean carrier property (ocean carriers typically own the containers as well as the truck chassis used to transport them) or for other purposes; these are considered **equipment-generated truck trips**. Over time, it is likely that containers and chassis will increasingly move into pooled ownership, and the number of equipment-generated truck trips will decline; however, it is difficult to predict how quickly this will occur, so no attempt has been made to estimate the number of these trips in given years.

For bulk traffic, all of the cargo moving to and from the facility is expected to move by rail, so no cargo-related truck trips would be generated.

Table 3.9-1
ANNUAL PROJECTED RAIL USAGE AT PORT EVERGLADES

	Time Frame			
	2019	**2023**	**2033**	
Containerized Cargo (High Forecast)				
TEUs by Rail	246,745	295,389	370,562	Per 2014 Plan (Includes current Port Everglades rail users, future rail users, and domestic traffic, based on projections adapted from FEC SIB Loan Application)
Containers by Rail	148,047	177,234	222,337	TEUs/1.66 conversion
Rail Cars	74,023	88,617	111,169	Assumes single stack, 2 containers per rail car
Trains/Year	740	886	1,112	Assumes unit train of 100 standard rail cars
Trains/Day	2.4	2.8	3.6	Assumes 6 days/week operation
Avoided Truck Trips/Year	148,047	177,234	222,337	Assumes one avoided trip per container.
	2019	**2023**	**2033**	
Bulk Cargo (Crushed Rock, High Forecast)				
Tons by Rail	0	2,400,000	3,000,000	2 unit trains (100 cars each)/day/5 days/week
Loaded Railcars	0	24,000	30,000	100 tons per car
Total Railcars	0	48,000	60,000	One empty move for each loaded move
Trains/Year	0	480	600	100 cars per train
Trains/Day	0	1.5	1.9	Assumes 6 days/week operation
Avoided Truck Trips/ Year	0	240,000	300,000	Assumes five trucks (20 tons capacity) for every railcar

Table 3.9-2
ESTIMATED TRUCK TRAFFIC THROUGH THE MCINTOSH ROAD SECURITY GATE
(Cargo-Generated Traffic Only)

	Time Frame			
	2019	**2023**	**2033**	
Containerized Cargo (High Forecast)				
Total TEUs	1,350,763	1,615,647	1,988,055	Per Master Plan Update
Maritime TEUs through ICTF	164,453	199,992	246,090	Per Master Plan Update (Includes current Port rail users, future Port rail users, and domestic traffic, based on projections adapted from FEC SIB Loan Application)
TEUs by Truck	1,186,220	1,415,655	1,741,965	Total TEUs less ICTF TEUs
Containers by Truck	711,732	849,393	1,045,179	TEUs/1.66 conversion
Trucks/Year	711,732	849,393	1,045,179	One truck trip per container
Trucks/Day	2,737	3,267	4,020	Assumes 5 days/week operation

Note: The number of truck trips assumes each truck entering or leaving the gate is carrying a container.