1.7 Berthing Analysis

Port Everglades currently operates its facilities as a landlord port; the Port constructs the facilities and leases them back to tenant operators. The majority of berths at the Port are treated as public wharves that are shared by all tenants and shipping lines. Access to berthing areas is coordinated by the Port's Operations Division/Harbor Master as necessary.

The Northport cruise and Southport container terminals provide opportunities for preferential berthing assignments that guarantee berth availability and location during contractual windows of time for given days and hours of operation, as prescribed in tenant leases. In some cases, when berthing conflicts occur during loading or unloading operations, shared berthing arrangements require reassigning vessels to a new berth or off-shore anchorage areas. Overall, this approach maximizes berth occupancy, or wharf utilization, throughout the Port.

To measure the effective berth utilization at Port Everglades, the Consultant Team calculated the gross utilization of each berth by cargo or passenger vessel operation. "Gross berth utilization" is defined as the average ratio of berth occupancy (vessel time at berth x the length occupied by the vessel) to berth availability (hours of operation x total berth length available). More simply explained, berth occupancy is the percentage of time that a vessel occupies a given berth, during the total range of available operating hours and days.

At Port Everglades, the berth areas are available for vessel activities throughout the year and, in some cases, on a 24-hour, 7-days-per-week schedule. In practice, vessels are worked around the clock as necessary to allow for faster vessel turn-around time. Most vessel calls are of short duration, however, and 1 or 2 shifts per day are all that is necessary for cargo-handling operations. In theory, the berth is available for occupancy and cargo-handling operations any day of the week at any time. This factor is used to identify the total amount of time that a berth is available for theoretical occupancy calculations; the application of time-at-berth data can then estimate the total number of annual vessel calls to arrive at a projected berthing capacity.

Port Everglades' staff provided vessel arrival and departure data for all vessel types calling at the Port from FY 2001 through FY 2005. The data included unique vessel identification numbers for all vessel calls and a berth number for each vessel berth location. The data also included vessel attributes such as vessel length over all (LOA), the total time spent at a given berth, and the amount of cargo handled by cargo and vessel types. Containerized cargo operations were reported by the number of container lifts broken down in 20- and 40-foot containers. Non-containerized cargo operations were reported in metric tons.

Using this vessel arrival and departure data, the Consultant Team conducted a berthing analysis to assess how the various berths at the Port are being utilized. FY 2005 vessel call records (October 1, 2004 through September 30, 2005) were used for this analysis. During this period, 5,894 vessel calls were reported at the Port's 37 berths. Of these calls, roughly three-quarters were attributable to cruise (PV) and container (CV) activities and 539 were related to tug (TG), yacht (YA), Navy (NV), Coast Guard (CG), and container barge services (CB, BA).

These 539 calls were excluded from the berthing occupancy analysis because these types of vessels are transitory and can be moved if cargo vessels need to occupy the berth for cargo-handling operations. Table 1.7-1 describes the remaining 5,335 calls, by vessel type, that were included in the analysis. (A comparison of the staff-provided data in this table with the Port's subsequently published Waterborne Commerce Report, reveals a slight difference of nine vessels, which does not affect the accuracy of the calculations on which the following analysis is based.)

Table 1.7-1
Fiscal Year 2005 Vessel Type Breakdown
(All Vessel Types)

Vessel Type	Vessel Type Description	Number of Annual Vessel Calls	Percent of Total Vessel
PV	Cruise Vessels	2,358	40%
PT, PB	Petroleum Vessels and Barges	752	13%
CV	Container Vessel	1,843	31%
GC	General Cargo Vessel	278	5%
BK	Break-Bulk Vessel	124	2%
Others	Tug, Yacht, Navy, Coast Guard and Non-Petroleum Barges	539	9%
Total		5,894	100%

Source: Port staff

From the vessel arrival and departure time data, the Consultant Team calculated the total time spent by each vessel at each berth facility in the Port. Vessel berth time was then multiplied by total length occupied by a vessel at a given berth to calculate berth occupancy. To account for the vessel tie-down gap, 60 feet of length were added to the vessel LOA. Berth availability numbers were calculated by multiplying available berth length by the total 8,760 hours available per berth per year (24 hours per day x 365 days per year). The berth occupancy numbers were then divided by the berth availability numbers to calculate a gross utilization percentage for each berth. The average monthly gross utilization was calculated for each berth and from that, the annual average berth utilization was calculated.

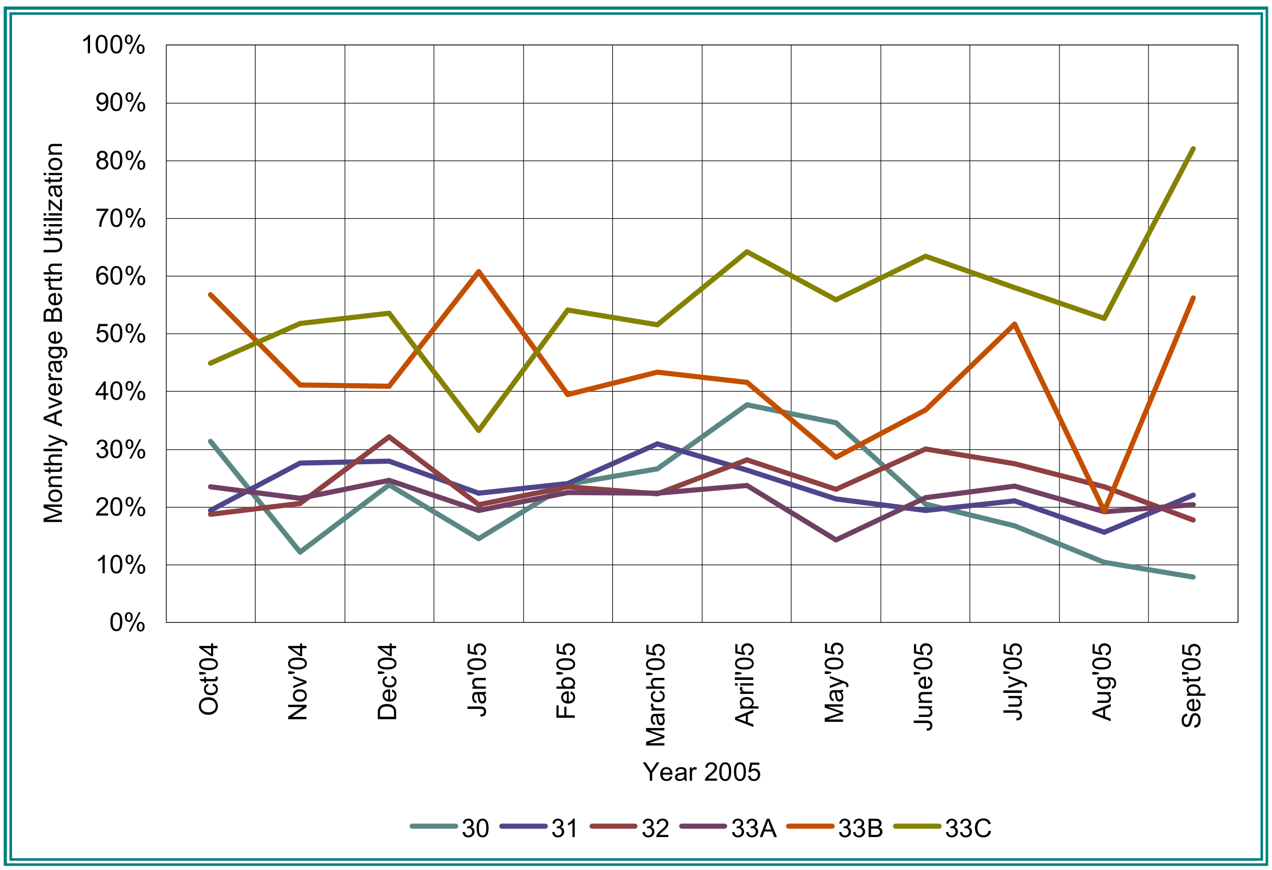
For each Port area and berth number, Tables 1.7-2 through 1.7-4 summarize the primary vessel types served, the availability of standard wharf-mounted container cranes, the available berth length, the average vessel LOA, and the annual average berth utilization. Figures 1.7-1 through 1.7-5 show the variation in the average monthly utilization for each berth and all vessel calls.

The majority of container vessel operations at the Port occur in the Southport area. The average annual utilization for standard dock-crane berth operations in Southport was in the mid-20 percent range whereas the roll/on-roll/off (RO/RO) berths -- 33B and 33C -- had a higher utilization, reaching up to 55 percent, due to the lower berth productivity achieved during operations. The RO/RO vessels occupy the berths for a longer time, as compared with standard dock-crane berth operations.

Table 1.7-2
Southport Berth Utilization Summary
(FY 2005)

Port Area	Berth Number	Primary Vessel Types Served	Equipped with Container Cranes? Y/N	Available Berth Length	Avg Vessel LOA	2005 Avg Berth Utilization
Southport	30	CV	Y	900	538	22%
	31	CV	Y	1000	566	23%
	32	CV	Y	1000	549	24%
	33A	CV	Y	800	378	21%
	33B	CV	N	400	516	43%
	33C	CV	N	400	518	55%

Figure 1.7-1
Monthly Berth Utilization for Southport Berth
(FY 2005)



The Midport area serves a mix of container, general cargo, break-bulk, and cruise vessels that use the berths, based on availability and the respective tenants' lease agreements with the Port. In FY 2005, the average annual berth utilization at Midport varied from a low of 8 percent for Berth 27 to a high of 41 percent for Berth 18. Utilization for the majority of Midport berths was less than 30 percent. Berths 16, 17, and 18 are contiguous and provide a continuous berth length of 1,647 feet. Among these three berths, Berth 18 had the highest utilization of 41 percent; Berth 17 had the lowest, with 10 percent. Utilization for Berths 19, 20, 21, and 22 varied from 22 percent to 29 percent. Berths 24, 27, and 28F achieved lower than 20 percent utilization, whereas the utilization of Berths 25, 26, and 29 exceeded 30 percent.

Table 1.7-3
Midport Berth Utilization Summary
(FY 2005)

Port Area	Berth Number	Primary Vessel Types Served	Equipped with Container Cranes? Y/N	Available Berth Length	Avg Vessel LOA	2005 Avg Berth Utilization
Midport	16	CV, GC	Y	549	366	23%
	17	CV, GC	Y	549	418	10%
	18	CV, GC, PV	Y	549	612	41%
	19	CV, GC, PV, BK	N	650	420	24%
	20	CV, GC	N	650	314	25%
	21	CV, GC, PV	N	738	583	29%
	22	PV	N	738	431	22%
	24	PV	N	685	409	13%
	25	CV, GC, PV	N	685	695	30%
	26	CV, GC, PV	N	669	701	31%
	27	CV, GC, PV	N	669	442	8%
	28F	CV, GC	N	400	275	16%
	29	CV, GC, PV, BK	N	800	532	31%

Figure 1.7-2
Monthly Berth Utilization for Midport Berths (16 - 21)
(FY 2005)

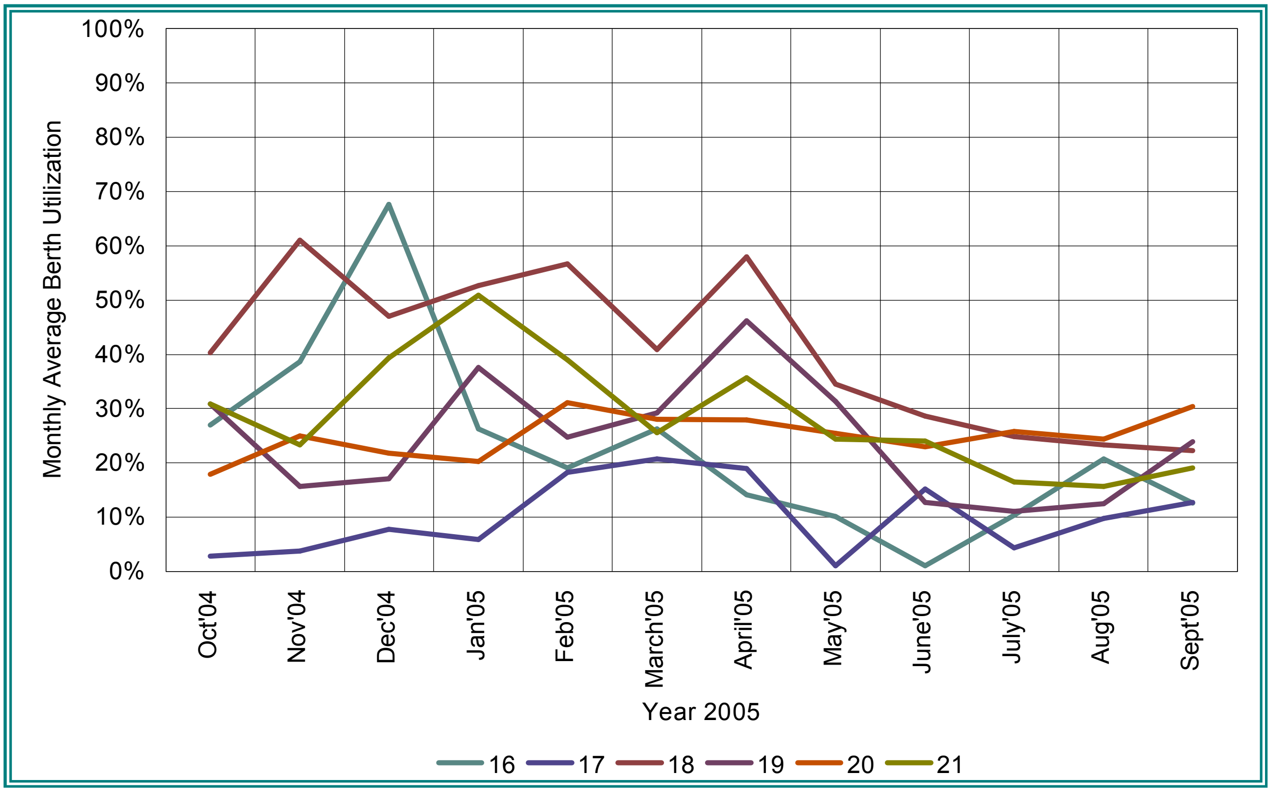
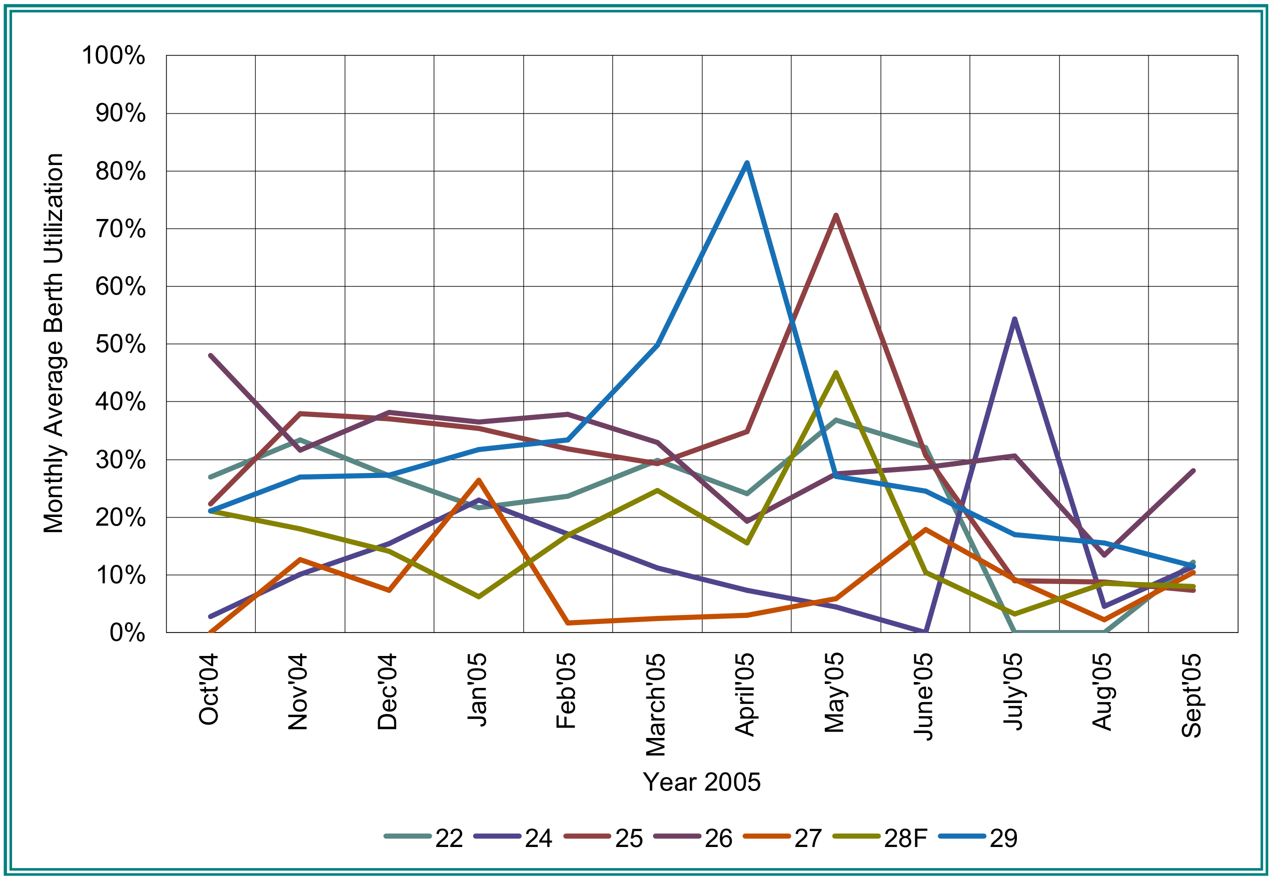


Figure 1.7-3
Berth Utilization for Midport Berths (22 - 29)
(FY 2005)



Northport berths had relatively high utilization rates for the cruise, general cargo, and petroleum vessels calling there. Berth 7 utilization was 69 percent compared with Berth 8 utilization of 3 percent. Due to the adjacent position of Berths 7 and 8 in Slip 1, Berth 7 was used for vessel operations a majority of the time and Berth 8 remained vacant when the adjacent berth was in use. Similarly, for Berths 9 and 10, utilization of up to 76 percent was achieved for Berth 9, whereas Berth 10 had a low utilization of 7 percent due to slip width restrictions. Overall, the annual average utilization rates for Berths 1, 2, 5, 13, 14, and 15 were high, varying from 45 percent to 73 percent.

Table 1.7-4
Northport Berth Utilization Summary
(FY 2005)

Port Area	Berth Number	Primary Vessel Types Served	Equipped with Container Cranes? Y/N	Available Berth Length	Avg Vessel LOA	2005 Avg Berth Utilization
Northport	1	PV	N	534	509	58%
	2	PV	N	534	748	45%
	3	CV, PB, GC, BA	N	534	241	4%
	4	CV, PV	N	900	473	28%
	5	BK, CV, GC, PB, PT	N	900	458	50%
	6	CV, GC, PV	N	380	242	6%
	7	PB, PT	N	600	435	69%
	8	PB, PT	N	600	437	3%
	9	PB, PT	N	600	499	76%
	10	PB, PT	N	600	512	7%
	11	PB	N	400	170	8%
	13	PB, PT	N	600	463	65%
	14	BK	N	600	611	52%
	15	BK, GC	N	600	525	73%

Figure 1.7-4:
Berth Utilization for Northport Berths (1 - 7)
(FY 2005)

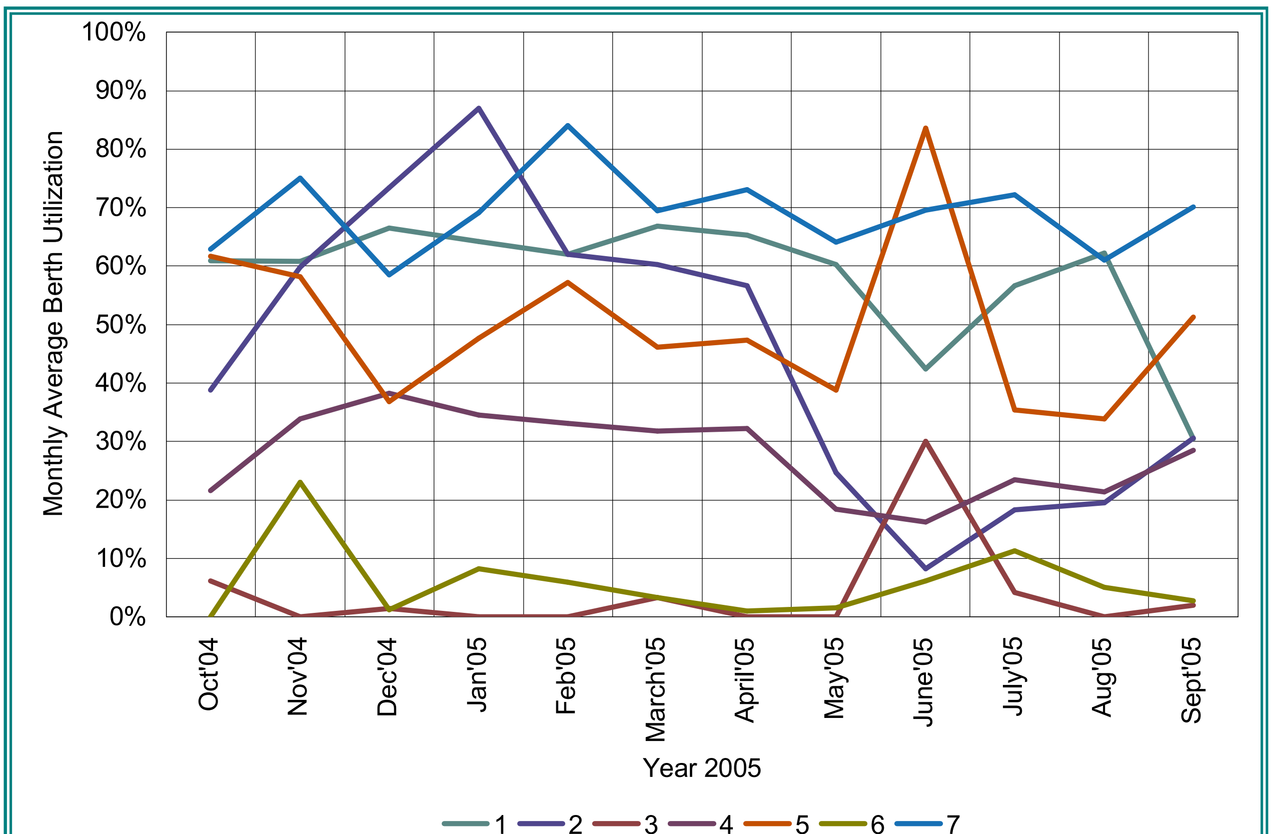
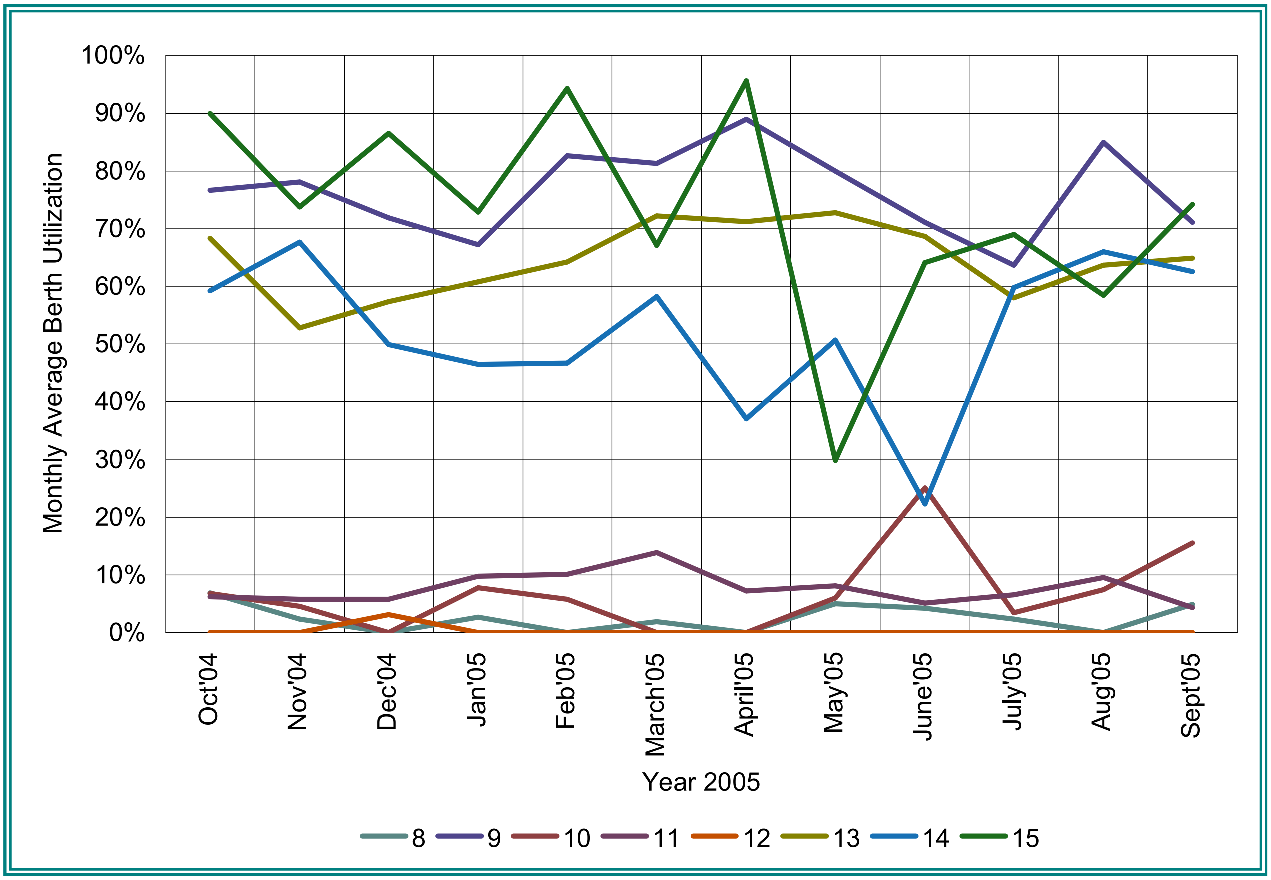


Figure 1.7-5
Berth Utilization for Northport Berths (8 - 15)
(FY 2005)



From the FY 2001 through FY 2005 vessel data, the Consultant Team also extracted information concerning the LOA changes for the major vessel types calling at the Port during that period. Figures 1.7-6 through 1.7-11 illustrate the LOA and the number of calls for each vessel type derived from these data.

Figure 1.7-6 illustrates the LOA trend for the container vessels that called at the Port from FY 2001 through FY 2005. The majority of these vessels varied in LOA from approximately 200 to 700 feet. The number of container vessels calling at the Port with LOAs ranging from 200 to 300 feet increased steadily while those with LOAs ranging from 300 to 400 feet declined by almost 50 percent over this period. There was no significant change for container vessels with LOAs ranging from 400 to 600 feet, which showed just a slight decline over the period. Container vessels ranging from 600 to 900 feet showed the most growth during the period, whereas the number of vessels with LOAs from 900 to 1,000 feet decreased. The changes in vessel LOAs are attributable both to the Port's trade with the smaller ports in the Caribbean, Central American, South American, and Mexican markets and to the emerging growth from European and Asian cargo trade lanes, with their larger ships.

Figure 1.7-6
Container Vessels - LOA vs. Number of Calls
(Fiscal Year Data)

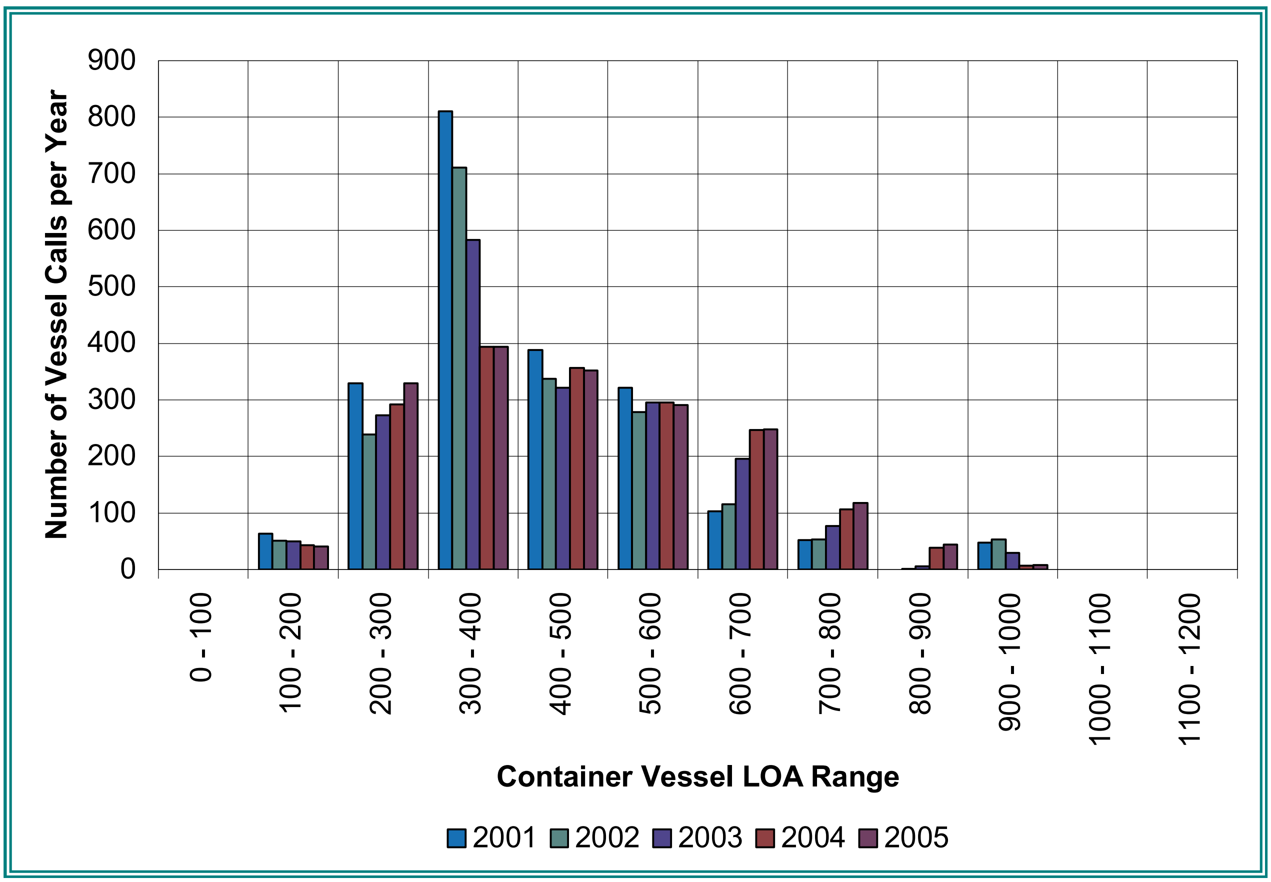


Figure 1.7-7 illustrates the LOA trend for the cruise vessels that called at the Port from FY 2001 through FY 2005. The majority of these vessels varied in LOA from 400 to 1,000 feet, with the heaviest concentration in the 400- to 600-foot range. The number of cruise vessels with LOAs ranging from 400 to 600 feet declined in FY 2005 compared with the previous year. It is unclear at this time whether this is a cyclical anomaly or an emerging downward trend as the smaller ships are being replaced with larger vessels. Cruise vessels with LOAs ranging from 600 to 700 feet have remained steady over the years while those with LOAs of 700 to 800 feet have declined since FY 2002. Cruise vessels ranging from 900 to 1,000 feet in LOA saw the most growth at the Port. In 2004, the Port had 6 calls by cruise vessels with LOAs of more than 1,100 feet. This number increased to 11 calls in FY 2005. This trend is anticipated to continue, as discussed in the cruise market assessment in Element 2.

Figure 1.7-7
Passenger Vessels - LOA vs. Number of Calls
(Fiscal Year Data)

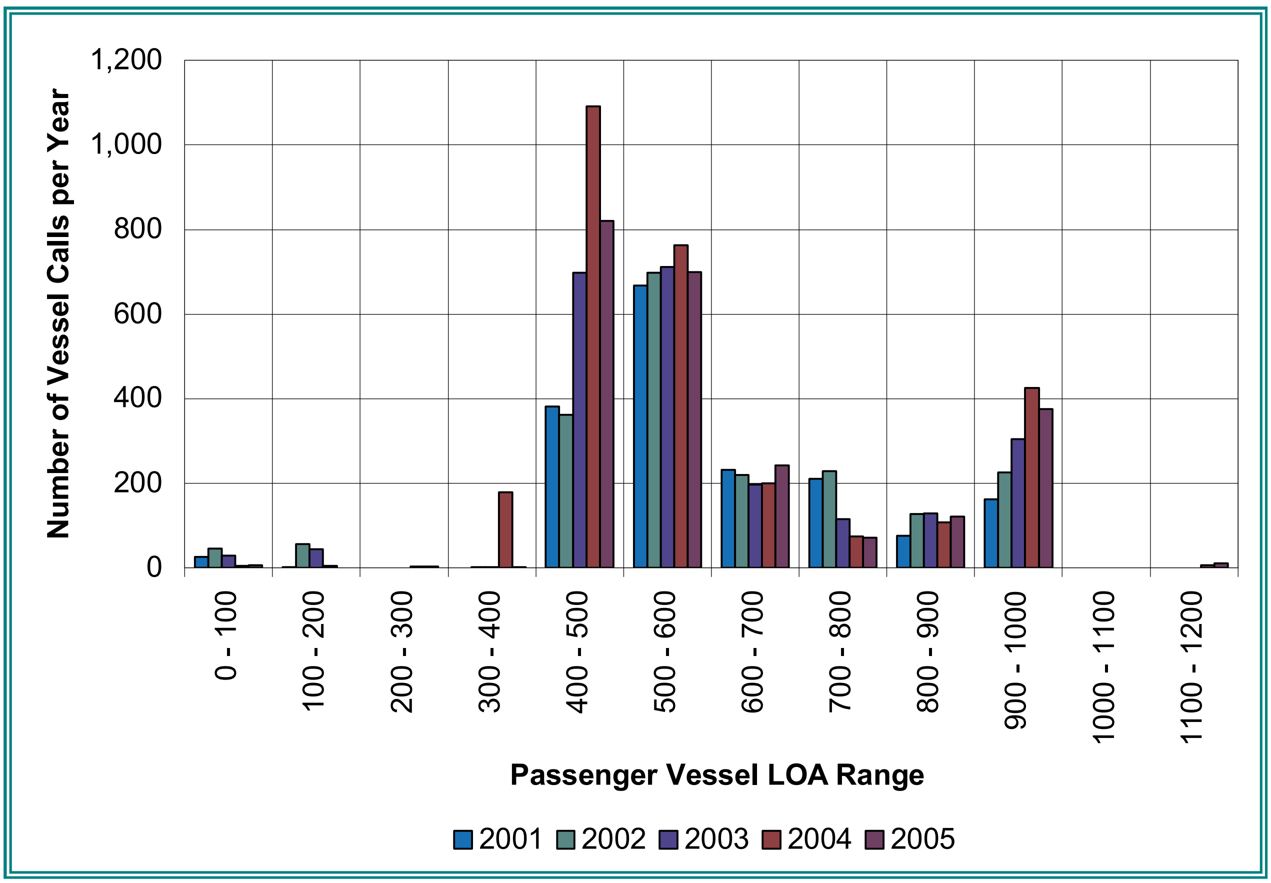


Figure 1.7-8 illustrates the LOA trend for petroleum vessels that called at the Port from FY 2001 through FY 2005. In the Port's vessel call data, petroleum vessels were coded as PB (petroleum barge) and PT (petroleum tanker). The majority of petroleum vessels vary in LOA from 400 to 700 feet. The number of petroleum vessels with LOAs ranging from 500 to 700 feet increased over the five-year period while those with LOAs ranging from 200 to 300 feet and 400 to 500 feet declined. Only seven petroleum vessel calls had LOAs of more than 800 feet during the five-year period.

Figure 1.7-8
Petroleum Vessels - LOA vs. Number of Calls
(Fiscal Year data)

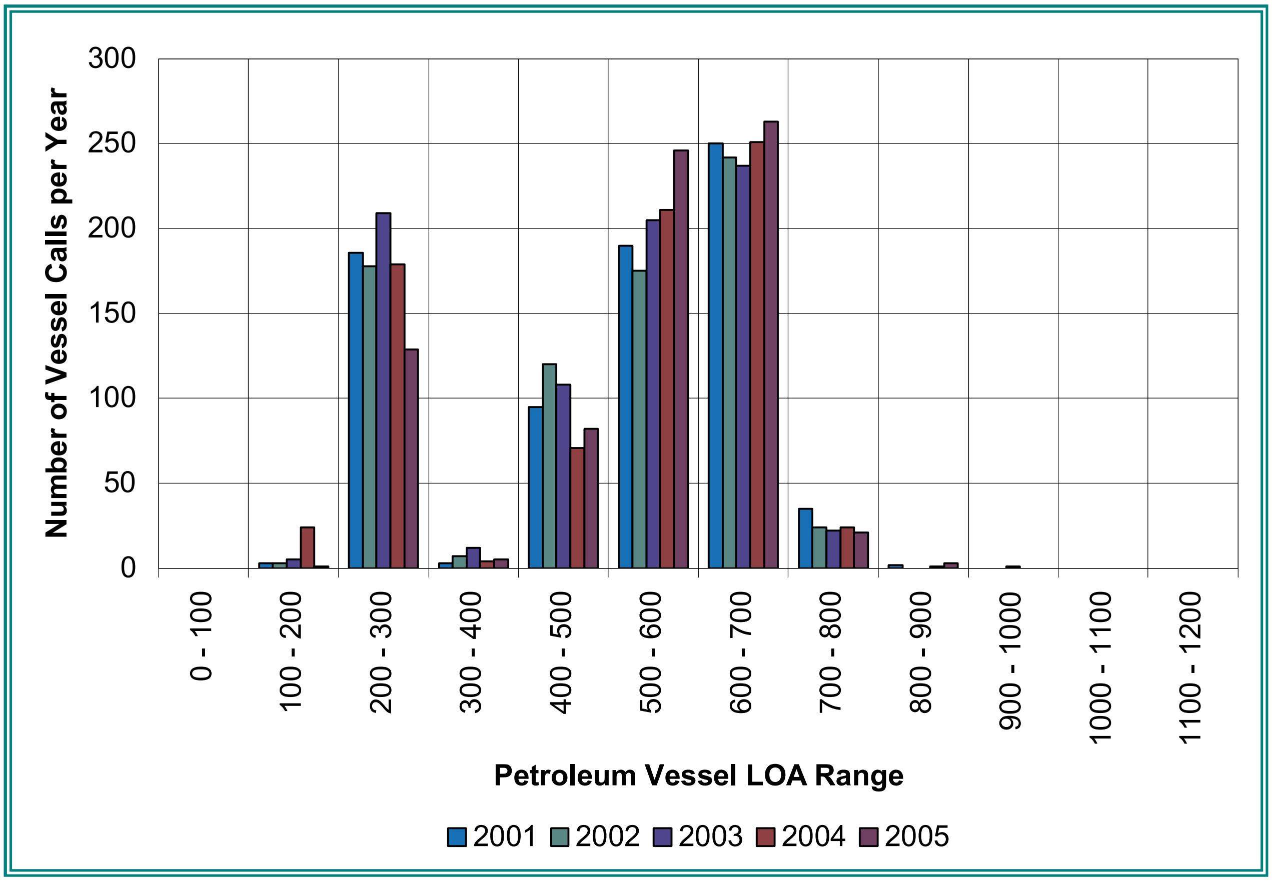


Figure 1.7-9 illustrates the LOA trend for the general cargo vessels that called at the Port from FY 2001 through FY 2005. Typical general cargo vessels carry products such as cement, bauxite, and other dry bulk cargoes. The majority of these vessels varied in LOA from 200 to 600 feet. The number of general cargo vessels with LOAs of 300 to 400 feet increased by more than 400 percent between FY 2004 and FY 2005 and the number with LOAs from 400 to 600 feet increased steadily since FY 2002. General cargo vessels with LOAs greater than 600 feet declined since FY 2002.

The declining trend observed in the smaller classes of vessels can be attributed to a general increase in vessel sizes to capture greater economies of scale from operating a larger vessel within the trade lanes. The trend of replacing smaller vessels with larger vessels is also attributable to the natural replacement of older vessels with newer vessels.

Figure 1.7-9
General Cargo Vessels - LOA vs. Number of Calls
(Fiscal Year Data)

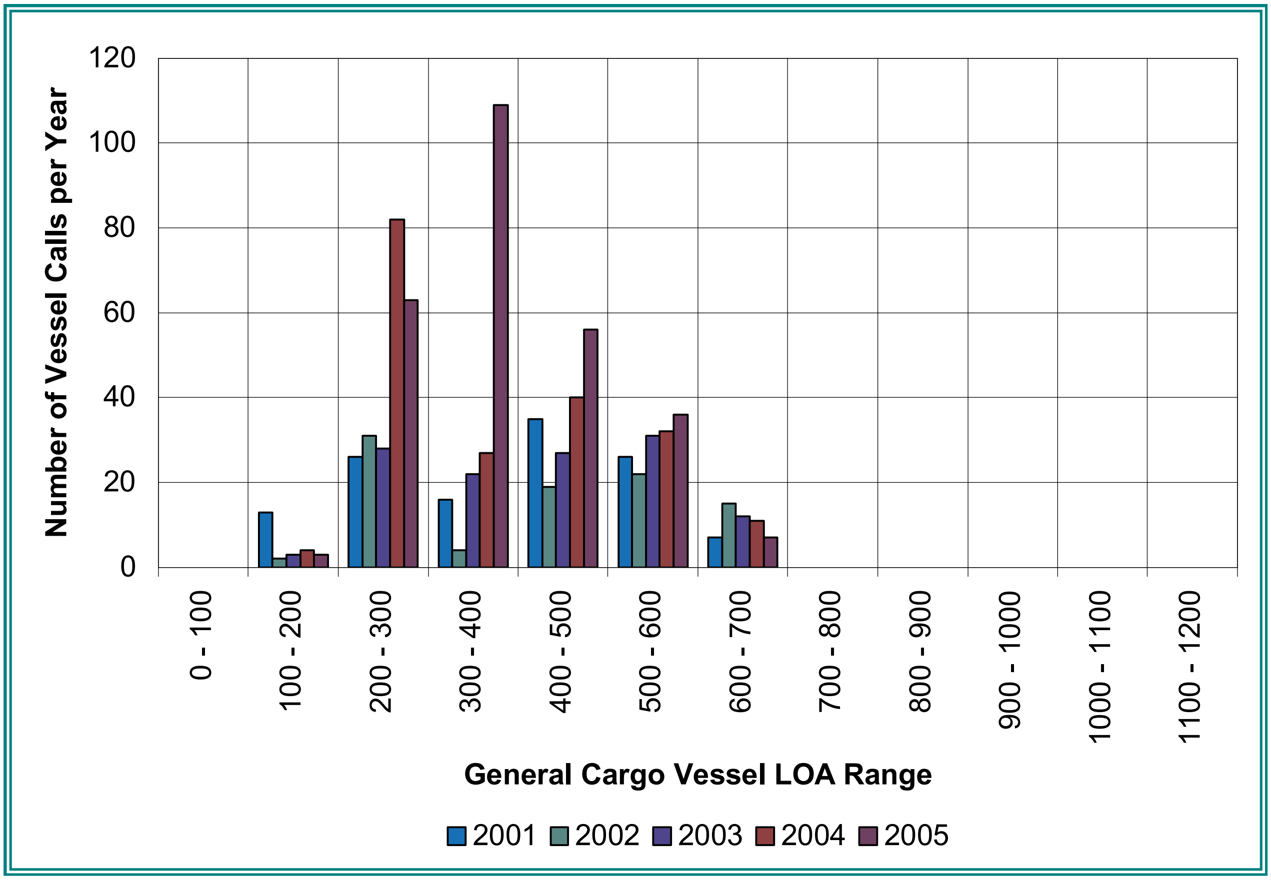
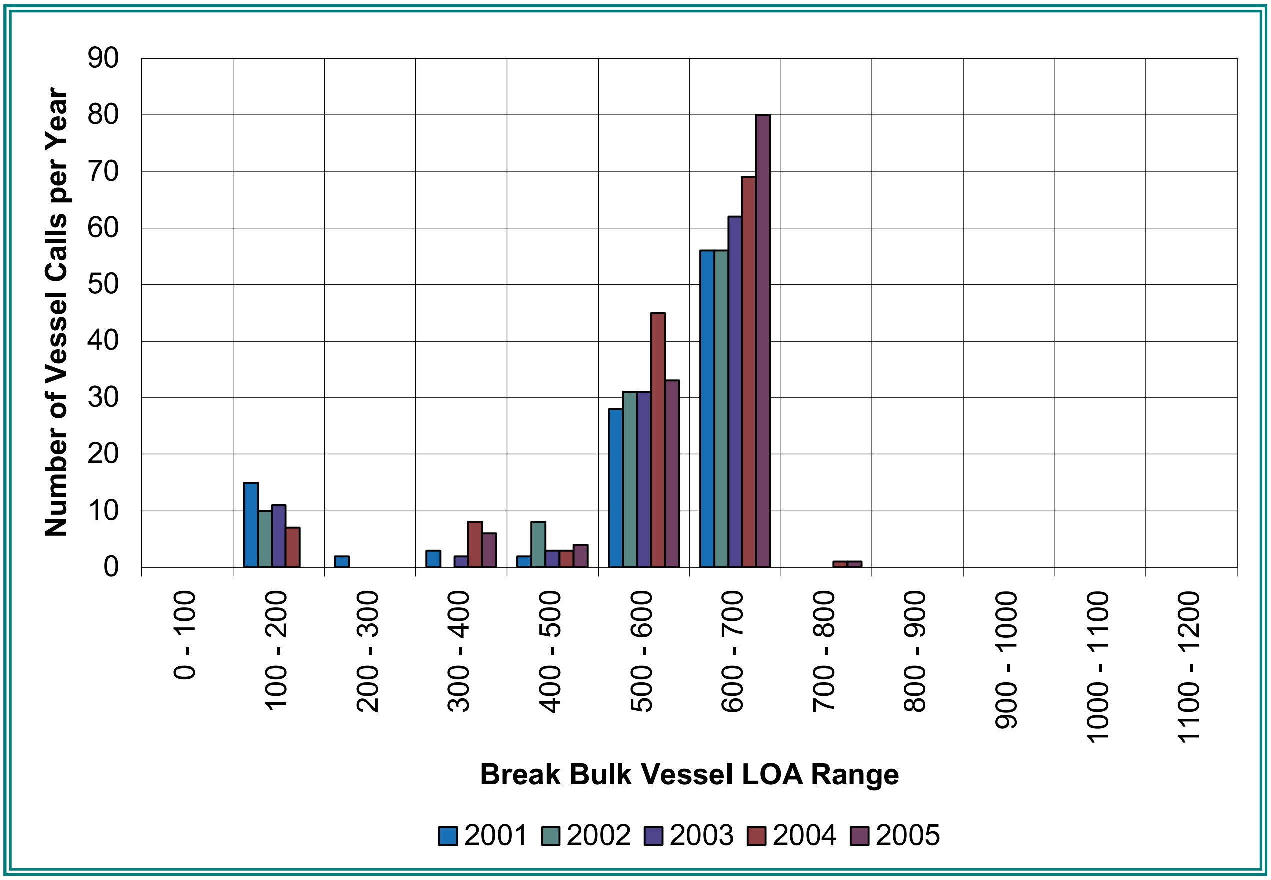


Figure 1.7-10 illustrates the vessel LOA trend for the break-bulk cargo vessels that called at the Port from FY 2001 through FY 2005. The majority of these vessels, which carry lumber, rebar, steel products, and other break bulk cargo varied in LOA from 500 to 700 feet.

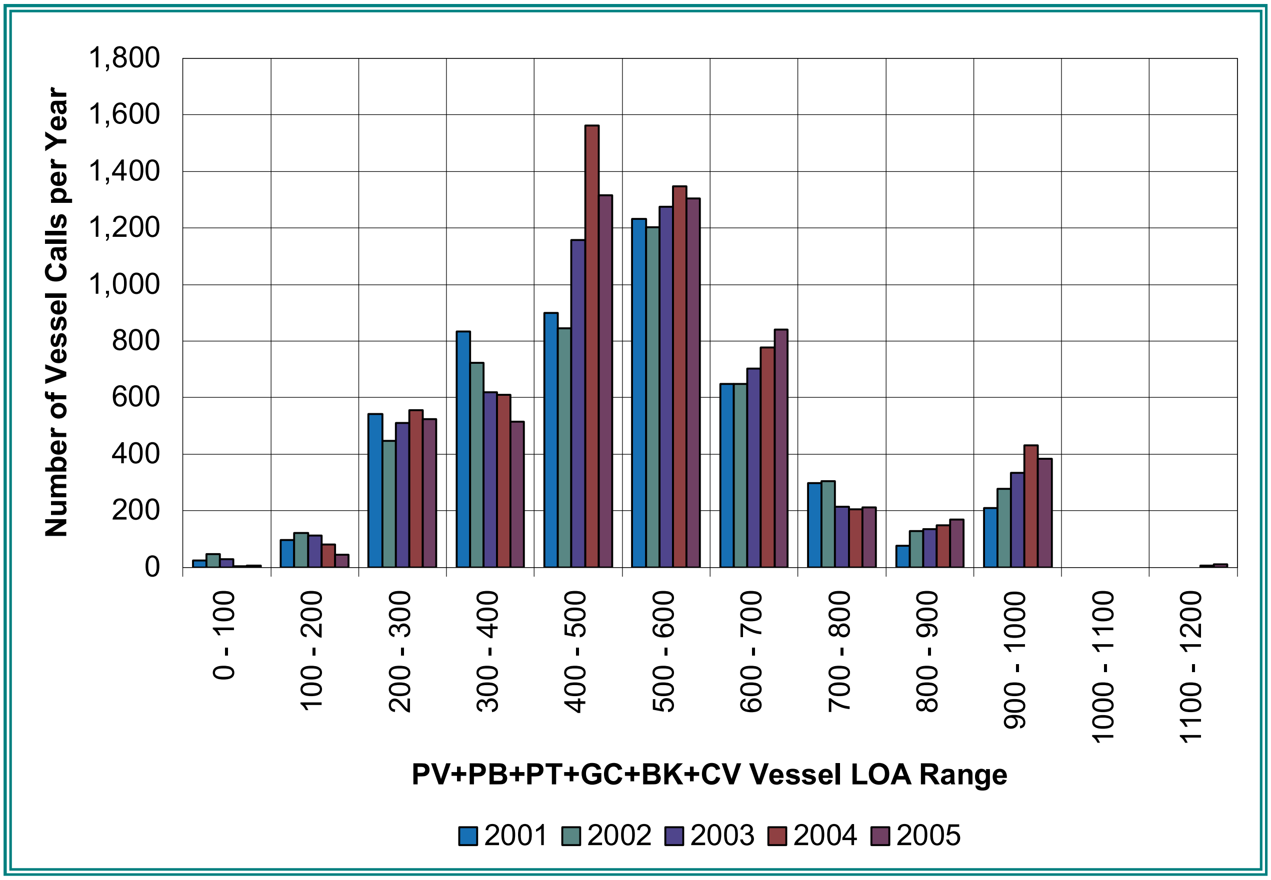
Figure 1.7-10
Break-Bulk Vessels - LOA vs. Number of Calls
(Fiscal Year Data)



All previously described vessel types that called at the Port were combined to show the overall vessel LOA trend illustrated in Figure 1.7-11. Overall, the number of vessels with LOAs of less than 400 feet declined over the period while those with LOAs between 600 and 700 feet and 800 and 1,000 feet increased.

The declining quantity of smaller class of vessels can be attributed to a general increase in vessel sizes to capture greater economies of scale from operating a larger vessel within the trade lanes. The trend of replacing smaller vessels with larger vessels is also attributable to the natural replacement of older vessels with newer vessels. The overall increase in LOA for the 400- to 1,000-foot vessels is related to reassigning larger vessels to this trade lane. The container and cruise vessels are primarily driving the LOA increase for the 800- to 1,000-foot vessels.

Figure 1.7-11
All Vessels - LOA vs. Number of Calls
(Fiscal Year Data)



1.8 Cargo Capacity Analysis

The future cargo facility needs assessment for the Port presented in this Plan was carried out in three steps.

- In Step 1, market assessments and forecast updates were conducted for all cargo types at the Port over the planning horizon. Element 2 discusses the results of these initiatives.
- In Step 2, the amount of cargo each Port facility could handle was calculated, based on existing Port operations and expected changes in future cargo-handling operations. This section discusses Step 2, the capacity analysis of Port Everglades' containerized and non-containerized cargo facilities. Section 1.8.1 below describes operations at the Port's existing cargo terminals and Section 1.8.2 describes the throughput capacity of these facilities. Petroleum facility requirements are consistent with the recommendations in the previously cited P&G report, as discussed in Element 2.
- In Step 3, the market forecast numbers were divided by the facility capacity numbers to determine future facility needs for the Port's 20-year planning horizon. Step 3 is discussed in Element 3.

1.8.1 Existing Container and Non-Container Operations

The Consultant Team interviewed management staff from container and non-container terminal operators at the Port to inquire about existing terminal operations and anticipated short- and long-term plans to enhance those operations. Similar interviews were conducted with petroleum tenants, including BP Amoco, Marathon, and TransMontaigne, to seek their input as well as with the operator of the former auto terminal. Table 1.8-1 lists the Port tenants with container, break-bulk (also called neo-bulk in the Element 2 market assessment), and dry bulk operations which the Consultant Team interviewed; the list is organized by location in the Port and by cargo type.

Table 1.8-1
List of Port's Container, Break-Bulk, and Dry Bulk Tenants Interviewed

Cargo Type	Port Area	Port Terminal Operator/Tenant
Container	Southport	Crowley
Container	Southport	Port Everglades Terminal (PET) (MSC)
Container	Southport	APM Terminals (APM) Universal Maersk
Container	Southport	Florida International Terminal (FIT)
Container	Southport	Florida Transportation Services (FTS)
Container	Midport	Hyde/H.T. Shipping
Container	Midport	Sun Terminal/King Ocean
Container	Midport	Chiquita
Container	Midport	St Johns
Container	Midport	Sawgrass Transport/SG Dole
Break-Bulk	Midport	Sherwood (subsequently departed)
Break-Bulk	Midport	St Johns Shipping
Break-Bulk	Northport	FTS
Dry Bulk	Midport	Continental Florida Materials
Dry Bulk	Midport	Rinker Materials
Dry Bulk	Northport	FTS

For each facility, the Consultant Team inquired about terminal operations and facility data for 2005, such as:

- Berth operations data, including annual lifts, ratio of container lifts to TEUs, typical vessel call size and cargo-handling capacity, typical vessel working schedule (hours/shift, shifts/day, days/week), vessel arrival patterns, type of loading crane used at the berth, loading speed of crane, quantity of cargo exchanged per call and breakdown by direction (import vs. export) and type (load vs. empty), vessel tie-up/untie time, etc.
- Yard storage operations data, including cargo dwell time by cargo type and direction, type and number of typical cargo-handling equipment used in the yard for import/export/empty containers, gross terminal area available vs. net cargo storage area available, and special cargo storage requirements such as cool/cold storage, high ceiling warehouses, silo storage, tanks, heavy lift floors, truck docks, etc.
- Gate operations data, including the number of gate hours per day and per week, entry and exit gate procedures including typical gate process time by transaction type, percentage of trouble transactions, gate traffic counts (by direction, daily, peak hour), and number of entry and exit lanes provided, etc.

Existing Container Operations. This section describes existing container operations at the Port. The information was collected and compiled from the Consultant Team's tenant interview notes and data received from the Port. Table 1.8-2 summarizes the berth throughput data for the Southport and Midport tenants who handle the majority of containers at the Port.

Table 1.8-2
Port Everglades Container Berth Operations Data
Source: FY 2005 Port Everglades Comparative Revenue Statistics

Port Area	Port Terminal Operator/Tenant	FY 2005 Throughput (Lifts)	FY 2005 Throughput (TEUs)	Lifts/TEU Ratio	FY 2005 Vessel Calls	Average Lifts per Call
Southport	Crowley	118,177	220,942	1.9	546	216
Southport	PET (MSC)	55,722	83,304	1.5	109	511
Southport	APM Terminals (Maersk)	50,681	90,234	1.8	134	378
Southport	Florida International Terminal (FIT)	39,737	66,910	1.7	187	212
Southport	Florida Transportation Services (FTS)	39,431	64,064	1.6	100	394
Midport	Hyde/H.T. Shipping	48,843	76,422	1.6	259	189
Midport	Sun Terminal/King Ocean	40,654	75,000	1.8	151	269
Midport	Chiquita	27,446	54,655	2.0	54	508
Midport	St Johns Shipping	25,014	43,905	1.8	336	74
Midport	Sawgrass/ Dole	11,013	21,758	2.0	107	103
	All of above	456,718	797,194	1.7	1,983	230

Table 1.8-3 summarizes the types of vessel-loading equipment and productivity for all container terminal operators at the Port. Currently, the Port has seven 100-gauge low-profile ship-to-shore (STS) cranes at the Southport berths and two 50-gauge gantry cranes at the Midport

berths. At Southport, Crowley conducts RO/RO operations at Berths 33B and 33C the majority of the time and periodically uses Berth 33A and a single STS crane during LO/LO operations. At Midport Berths 19, 20, and 29, container terminal operators use a combination of mobile harbor cranes, and vessel-mounted cranes, based on the type of vessel they serve and the availability of berth resources.

Table 1.8-3
Port Everglades Container Crane Data

Port Area	Port Terminal Operator/Tenant	Vessel Loading Equipment Used	Vessel Loading Crane Productivity (Lifts/hour)	Number of Cranes Used per Vessel
Southport	Crowley	RO/RO and STS Crane	22 to 25	1 to 2
Southport	PET (MSC)	STS Crane	25 to 32	1 to 2
Southport	APM (Maersk)	STS Crane	38 to 40	1 to 2
Southport	Florida International Terminal (FIT)	STS Crane	32	1 to 2
Southport	Florida Transportation Services (FTS)	STS Crane	20 to 25	1 to 2
Midport	Hyde/H.T. Shipping	Mobile Harbor Crane	14	2.0
Midport	Sun Terminal/King Ocean	STS Crane (50-gauge)	22 to 25	2.0
Midport	Chiquita	Mobile Harbor Crane/Vessel-Mounted Crane	14.0	2.0
Midport	St Johns Shipping	Vessel-Mounted Crane	24.0	1.0
Midport	Sawgrass/Dole	Vessel-Mounted Crane	28.0	1.0

Table 1.8-4 describes the average number of days (dwell time) a container stays on the terminal before it gets loaded onto a vessel or after it gets unloaded. Dwell times vary by direction (import vs. export) and type (load vs. empty). Dwell time is a key variable that affects the amount of cargo a terminal can handle annually. Lower cargo dwell times equate into higher annual cargo-handling capacity per acre. At Crowley, loaded import containers stay on the terminal an average of 6 days, whereas the dwell time for loaded export containers varies from 1 to 2 days. At the majority of the container terminals, dwell times for loaded import and export containers vary from 4 to 8 days. Empty containers generally have higher dwell times, which vary from 8 to 25 days for all terminal operators except SG/Dole, who moves its empty containers off Port to an off-site empty depot within 1 to 2 days.

Table 1.8-4
Average Container Dwell Time (Days)

Port Terminal Operator/Tenant	Import Load Containers	Export Load Containers	Import Empty Containers	Export Empty Containers
Crowley	6.0	1.5	8.0	8.0
PET (MSC)	4.3	4.3	8.0	8.0
APM (Maersk)	8.5	5.5	14.0	14.0
FIT	6.0	2.5	25.0	25.0
FTS	4.0	4.0	12.0	12.0
Hyde/H.T. Shipping	3.5	6.0	10.0	10.0
Sun Terminal/King Ocean	2.5	1.5	2.0	2.0
Chiquita	5.0	6.0	8.0	8.0
St Johns	5.0	6.0	8.0	8.0
Sawgrass/ Dole	1.5	1.5	1.5	1.5

Table 1.8-5 breaks down the containerized cargo handled by direction (import vs. export) and type (load vs. empty container). The majority of terminals handle a higher percentage of loaded import and export containers than empty import containers. FTS handles a higher percentage of empty containers, whereas APM handles a higher percentage of export empties compared to other terminals.

Table 1.8-5
Breakdown of Containers Handled by Direction and Type

Port Terminal Operator/Tenant	Import Load Fraction	Export Load Fraction	Import Empty Fraction	Export Empty Fraction
Crowley	45%	45%	5%	5%
PET (MSC)	46%	43%	4%	7%
APM (Maersk)	48%	12%	2%	38%
FIT	30%	35%	0%	35%
FTS	5%	50%	45%	0%
Hyde/H.T. Shipping	20%	50%	30%	0%
Sun Terminal/King Ocean	30%	40%	15%	15%
Chiquita	50%	35%	0%	15%
St Johns	45%	45%	5%	5%
Sawgrass/Dole	60%	15%	0%	25%

Table 1.8-6 describes the storage mode and stacking density for container operations at the Port. Wheeled operations are described by the letter "W" and top-pick or side-pick operations are described with the letter "P." Crowley, Chiquita, and St. Johns store all loaded import and export containers on wheels, whereas they stack empty containers using a top/side-pick handler. SG Dole stores all loaded import containers on wheels and stacks loaded export containers and empties in 4-wide- 3-high- or 4-wide- 4-high piles. All other terminals stack loaded import and export containers using a top-pick handler with varying stacking widths and heights. The stacking width for a top-pick pile varies from 2 wide for the APM terminal to 12 wide for Hyde. The stacking height for a top-pick pile varies from 2 to 4 high.

Table 1.8-6
Container Storage Mode and Stack Density

Terminal Name	Crowley	PET	APM	FIT	FTS
Import load storage mode (**W**hl / **P**k / **R**tg)	W	P	P	P	P
Export load storage mode (**W**hl / **P**k / **R**tg)	W	P	P	P	P
Empty storage mode (**W**hl / **P**k / **R**tg)	P	P	P	P	P
Import load stack density (width – height)	1	4 - 3	2 - 2	2 - 3	4 - 3
Export load stack density (width – height)	1	4 - 3	2 - 2	2 - 3	4- 3
Empty stack density (width – height)	4 -3	5 - 5	10 - 4	6 - 4	12 -4
**Terminal Name **	**Hyde**	**Sun**	**Chiquita**	**St Johns**	**SG Dole**
Import load storage mode (**W**hl / **P**k / **R**tg)	P	W	W	W	W
Export load storage mode (**W**hl / **P**k / **R**tg)	P	P	W	W	P
Empty storage mode (**W**hl / **P**k / **R**tg)	P	P	P	P	P
Import load stack density (width – height)	12 - 4	1	1	1	1
Export load stack density (width – height)	12 - 4	8 - 3	1	1	4 - 3
Empty +stack density (width – height)	12 - 4	10 - 4	6 - 3	6 - 3	4 - 4

Table 1.8.7 outlines the total terminal area assigned to each tenant and the net terminal area available for cargo storage operations. The net cargo-storage area does not include the terminal area occupied by the terminal buildings, maintenance facility, gate facility and berth area; but does include the travel lanes between the storage aisles. Several tenants, including Sun Terminal, Chiquita, St Johns, and SG/Dole terminals were not familiar with their available net storage area. Where the net storage area was not known, a factor of 70 percent of the net-to-gross-area ratio was assumed for these facilities. On a bigger terminal, a higher percentage of gross area can be used for cargo storage. For example, at the smaller Hyde terminal, the net-to-gross-area ratio is 65 percent as compared with 86 percent for the larger Crowley terminal.

Table 1.8-7
Gross Terminal Area vs. Net Cargo-Storage Area

Port Terminal Operator/Tenant	Gross Terminal Area (Acres)	Net Cargo Storage Area (Acres)	Net-to-Gross-Area Ratio
Crowley	69.2	59.0	86%
PET (MSC)	39.2	33.0	85%
APM (Maersk)	44.5	39.0	89%
FIT	36.0	28.0	78%
FTS	20.9	16.0	70%
Hyde/H.T. Shipping	7.2	4.8	65%
Sun Terminal/King Ocean	22.8	16.1	70%
Chiquita	13.1	9.5	70%
St Johns	12.5	8.4	70%
Sawgrass/Dole	6.0	4.2	70%

In addition to the terminal areas identified in Table 1.8-7, additional support area is provided in the Port for temporary storage solutions including overflow operations, empty container storage yard, and other miscellaneous uses. This is typically accomplished with temporary grid assignments on an as needed basis.

Existing Non–Container Operations. This section describes the existing operations at the Port's non-containerized cargo-handling facilities. This category includes break-bulk cargo and dry bulk cargo.

Break-bulk cargo is typically palletized or bound together, as in the case of lumber or steel products (also called neo-bulk), and it is generally stored either under covered storage or in open areas near the dock. Break-bulk cargo is measured in metric tons. Table 1.8-8 describes the operational data the Consultant Team collected during interviews with the break-bulk tenants at the Port, based on the average monthly vessel calls during CY 2005 operations. The terminal area provided in the table represents the average terminal area used by the tenants to store a given cargo type. FTS uses temporary grid assignments to accommodate cargo peaks.

Table 1.8-8
Break-Bulk Cargo Existing Operations
(Average CY 2005)

Break-Bulk Existing Operations	FTS Berth 5	FTS Berth 2 or 16	Sherwood Berth 29[12]
Type of cargo	Rebar+ Coils	Plywood or Hardwood	Dimensional Lumber
Number of Berths	1	1	1
Berth length (ft)	900	600	1000
Typical vessel LOA (ft)	600	500	900
Vessel calls per year	22	6	12
Berth operating hours per day	14	20	14
Cargo handling speed (Tons/hour)	60	50	250
Avg Cargo transfer per vessel call (Tons/vessel call)	6,000	600	4,000
Storage type	Outdoor/Deck	Indoor/Stack	Outdoor/Stack
Terminal acres (Acres)	15	0.12	4
Static storage capacity available (Tons)	35,000	600	17,000
Cargo Dwell time (days)	30	30	30

Dry bulk cargo includes primarily two commodity types: cement products and aggregates. Currently the Port has two dry bulk tenants -- Continental at Berth 14 and Rinker at Berth 15 -- who handle cement products, aggregates and other concrete additives. FTS has also occasionally handled dry bulk bauxite materials at the Port on as needed basis. Cement is transferred by either pneumatic or mechanical off-loading equipment and transferred to on-site storage silos.

[12] Since this analysis was performed, Sherwood Lumber has left the Port.

Table 1.8-9 describes the key operations data collected for the dry bulk tenants at the Port for their average monthly vessel calls per month during CY 2005 operations.

Table 1.8-9
Dry Bulk Cargo Existing Operations
(Average CY 2005)

Dry Bulk Existing Operations	Continental - Berth 14	Rinker - Berth 15
Type of cargo	Cement Products	Cement Products
Number of Berths	1	1
Berth length (ft)	613	613
Typical vessel LOA (ft)	660	660
Vessel calls per year	24	36
Berth operating hours per day	20	20
Cargo handling speed (Tons/hour)	450	450
Avg Cargo transfer per vessel call (Tons/vessel call)	40,000	40,000
Storage type	Silos	Silos
Terminal acres (Acres)	5	5.0
Static storage capacity available (Tons)	44,000	65,000
Cargo Dwell time (days)	10	10

The above narrative and table do not include existing aggregate operations. Rinker is discussing the possibility of handling crushed rock aggregate products at the Port in the near future; this potential new operation is discussed separately in the future capacity analysis section.

The existing cement terminal berthing area is located at Berths 14 and 15 within Slip 3. The existing berth length is approximately 1,226 feet in length, with 613 feet at each berth and the current vessel fleets used by Rinker and Continental are 660-foot LOA vessels. If two vessels are in Port at overlapping times, the Rinker vessel will berth with the bow extending into the Midport Basin. In addition, the Rinker vessels must be shuffled to allow the Continental vessel to access or leave the western berthing position. This condition is disruptive to efficient cargo-handling operations.

1.8.2 Existing and Future Facility Capacity Analysis

The primary objective of collecting information about terminal operations and cargo-handling facilities is to determine the realistic amount of cargo a facility is able to handle under current and future operational conditions. To meet this objective at Port Everglades, the Consultant Team used a spreadsheet-based capacity analysis model to determine terminal throughput capacity, which is defined as the amount of cargo a terminal can handle under given operating parameters. For containerized cargo, the capacity is calculated in either lifts or TEUs per year. For break-bulk and dry bulk cargoes, the capacity is measured in terms of metric tons.

The total amount of cargo a terminal can handle annually depends on the capacity of four main components: stevedoring operations, yard operations, gate operations, and rail operations. The Consultant Team evaluated each of these terminal-operation components independently to identify elements limiting the overall throughput capacity of Port facilities. If one component of the facility has a much lower throughput capacity than the others, then the entire facility must operate at the capacity of that lower-functioning component.

The Consultant Team assumes that terminals will not be limited by a lack of gate capacity because gates are relatively easy and inexpensive to expand compared to berths and storage yard. To account for future in-terminal gate area needs, the Consultant Team used the ratio of the existing net cargo-storage area to the gross terminal area and applied the same ratio in calculating the future gross terminal area required. This approach assumes that the gate queue is included in the gross terminal area and would be included in the terminal for the purposes of the Master Plan. Actual detailed gate truck queuing was not included in the capacity analysis conducted during the master planning effort and should be studied further at the terminals during detailed planning of the individual facilities.

The capacity of the existing rail operations was also not an issue as currently almost no cargo moves by rail directly at the Port. The FEC operates an off-site rail facility at its Andrews Intermodal Yard as a piggyback flatcar operation (wheeled containers on flat cars). Neither Andrews Intermodal Yard operations nor terminal capacity were analyzed in this planning initiative. The Port is, however, planning to develop a near-dock intermodal container transfer facility in the Southport area to move import and export cargo.

Container Terminal Operations. At Port Everglades, cargo-handling operations at each terminal vary, based on the existing cargo throughput requirements and available berth and yard space provided by the Port. The Port operates a majority of the berths as public berths which means any berth can be assigned to any terminal operator based on the need and availability of resources. Preferential berth assignments are provided in the leases using scheduled hours of operations and days of the week. The Harbor Master's office is responsible for assigning berth slots throughout the Port.

The Port also uses temporary grid assignments to create short-duration agreements with tenants, which allows the Port to reassign available yard space to a new tenant based on the storage needs and availability of resources. These flexible lease arrangements allow the cargo-handling capacity of each berth and storage yard space to vary based on the respective user's operations.

In conducting the future capacity analysis of the existing Port facilities, the Consultant Team classified all containerized cargo operations into three main categories, based on the cargo-handling equipment used at the respective terminals and berths, as described below:

Category 1- Terminals that Use Standard Dock-Side Cranes:

- UNIV/APM Terminal.
- Port Everglades Terminal (PET) (MSC).
- HYDE Transport.
- Sun Terminal.

- Florida International Terminal (FIT).
- St. Johns Shipping.
- Florida Transportation Services (FTS).

Category 2-Terminals that Use Ship-Mounted Cranes:

- Chiquita.
- Sawgrass/Dole.

Category 3- Terminals that Use RO/RO Operations:

- Crowley (with occasional LO/LO operations at Berth 33A)
- Discovery Cruise Line (for RO/RO cargo to Bahamas)

For each operational category, the Consultant Team calculated the amount of cargo a berth and yard can handle by combining the operational characteristics of individual tenants within each category and identifying the potential advancements in terminal operation parameters under which each facility group will operate during the future 5-, 10-, and 20-year planning horizon.

Berth Capacity. Berth capacity is defined as the amount of cargo that can be handled across a given number of berths per year, without concern for any backland constraints. As with all elements of capacity, berth capacity is not a single fixed number, but a range of plausible values. Higher berth capacity means higher costs (increased equipment and labor) and lower levels of service. For example, some vessels may have to queue in anchorage areas waiting for berth space during periods of higher berth utilization. Berth capacity primarily depends on the following factors:

- Maximum practical berth utilization.
- Amount of cargo handled per vessel call.
- Dock crane productivity.
- Number of cranes assigned per vessel call.

Shipping lines expect a certain level of customer service when calling a terminal; they do not want to queue out at sea for too long waiting for a berth to become available. Conversely, shipping lines work on fairly rigid vessel schedules around the world and filling a berth on a given day of the week may prove difficult to accomplish by changing sailing patterns. Due to the variable nature of vessel arrivals (delays at berth, storms, etc.), and the market-driven need to service vessels in a timely manner, the maximum practical berth utilization is assumed to reach 50 percent at Port Everglades for all container berths.

Increases in the size of vessels calling at the Port result in less downtime between vessel calls and more productive time spent working on a vessel at berth while lifting containers. The faster a dock crane can move boxes, the faster a vessel can be turned around. Faster vessel turn-around allows for additional vessel calls, more lifts, and, therefore, a higher berth capacity.

Increasing vessel call size and dock-crane productivity can combine to increase berth capacity, but only up to a physical limit.

Over time, the Consultant Team assumed that dock-crane productivity (lifts per vessel call), and dock cranes assigned per vessel call may increase somewhat over today's situation. It is not, however, realistic to achieve more than 32 lifts per dock-crane hour, and to have more than four cranes operating at each berth for a sustained period. The cost of the cranes and acquisition schedules may also limit the ability to increase significantly the number of STS cranes available at a given berth location.

For the Category 1 terminals, Table 1.8-10 shows a series of calculations to determine unit berth capacity for the existing, 5-, 10-, and 20-year scenarios. For future cases, higher berth occupancy, increases in lifts per call, and dock-crane productivity are assumed, as highlighted in bold face. This conservative approach provides a realistic projection using the existing operational assumptions in the near-term years and slowly increases the operational productivity over time. The operational assumptions are consistent with similar port operations in the region. To achieve these enhanced productivity levels coordination between the Port, its tenants, and the shipping lines calling at the Port will be required.

Table 1.8-10
Unit Berth Capacity of a Terminal with Standard Dock-Side Cranes

	Variable	Existing	5 -Year	10 -Year	20 -Year
a	Number of berths available	1.00	1.00	1.00	1.00
b	Ship work hours per day	21.0	21.0	21.0	21.0
c	Work days per week	7	7	7	7
d	**Max overall berth occupancy**	**22%**	**30%**	**40%**	**50%**
e	Effective hrs per berth/week [a*b*c*d]	32.3	44.1	58.8	73.5
f	**Mean lifts per call - peak week**	**650**	**715**	**787**	**865**
g	**Gross dock crane productivity (lifts/hour)**	**29**	**30**	**31**	**32**
h	Mean cranes per ship	2.00	2.00	2.00	2.00
i	Mean ship work time (hr) [f/(g*h]	11.2	11.9	12.7	13.5
j	Ship tie-up & untie time (hr)	2.0	2.0	2.0	2.0
k	Mean berth occupancy time per ship (hr/call) [i+j]	13.2	13.9	14.7	15.5
l	Potential ship calls per peak week [e/k]	2.4	3.2	4.0	4.7
m	Throughput capacity during a peak week (lifts) [f*l]	1,592	2,266	3,149	4,098
n	Seasonal peak (peak/mean week)	112%	112%	112%	112%
o	Berth capacity (lifts/year) [m*52/n]	74,000	105,000	146,000	190,000
p	TEU per container	1.66	1.66	1.66	1.66
q	**Unit Berth capacity (TEU/year) [o*p]**	**123,000**	**174,000**	**242,000**	**315,000**

Over time, it is anticipated that a combination of larger vessels, additional vessel calls, and larger average lifts per call will account for most of the additional increased berth occupancy. Additional measures will be necessary to attract off-peak, mid-week vessel calls from the

Caribbean and South American markets to use the berths during the non-peak periods of the week. Possible economic incentives, such as reduced berthing/dockage fees during non-peak periods may help to induce these operational changes.

For the Category 2 terminals, Table 1.8-11 shows a series of calculations to determine unit berth capacity for the existing, 5-, 10-, and 20-year scenarios. For future cases, higher berth occupancy and an increase in lifts per vessel call are assumed, as highlighted in bold face. No improvement in ship-mounted crane productivity is assumed.

Table 1.8-11
Unit Berth Capacity of a Terminal with Ship-Mounted Cranes

	Variable	Existing	5 -Year	10 -Year	20 -Year
a	Number of berths available	1.00	1.00	1.00	1.00
b	Ship work hours per day	21.0	21.0	21.0	21.0
c	Work days per week	7	7	7	7
d	**Max overall berth occupancy**	**22%**	**30%**	**40%**	**50%**
e	Effective hrs per berth/week [a*b*c*d]	32.3	44.1	58.8	73.5
f	**Mean lifts per call - peak week**	**240**	**300**	**375**	**469**
g	**Gross dock crane productivity (lifts/hour)**	**14**	**14**	**14**	**14**
h	Mean cranes per ship	2.00	2.00	2.00	2.00
I	Mean ship work time (hr) [f/(g*h]	8.6	10.7	13.4	16.7
j	Ship tie-up & untie time (hr)	2.0	2.0	2.0	2.0
k	Mean berth occupancy time per ship (hr/call) [I]	10.6	12.7	15.4	18.7
l	Potential ship calls per peak week [e/k]	3.1	3.5	3.8	3.9
m	Throughput capacity during a peak week (lifts) [f*l]	748	1,041	1,432	1,838
n	Seasonal peak (peak/mean week)	112%	112%	112%	112%
o	Berth capacity (lifts/year) [m*52/n]	35,000	48,000	67,000	85,000
p	TEU per container	2.0	2.0	2.0	2.0
q	**Unit Berth capacity (TEU/year) [o*p]**	**70,000**	**95,000**	**133,000**	**169,000**

For the Category 3 terminals, Table 1.8-12 shows a series of calculations to determine unit berth capacity, for the existing, 5-, 10-, and 20-year scenarios. Crowley currently operates at around 55 percent berth occupancy at its RO/RO pier with a RO/RO ramp productivity of 24 moves per hour. For future cases, maximum berth occupancy of up to 60 percent is considered and no increase in RO/RO ramp productivity is assumed.

The ramp productivity is assumed to be fixed due to the use of a single ramp on the current vessel fleet Crowley operates. Productivity enhancements could possibly entail the use of multi-tiered barges or vessels that would allow deployment of multiple decks simultaneously, similar to the Trailer Bridge operations in Jacksonville. This option was discarded, however, because a completely different vessel fleet would be required to take advantage of this technology.

Table 1.8-12
Unit Berth Capacity of a Terminal with RO/RO Operations

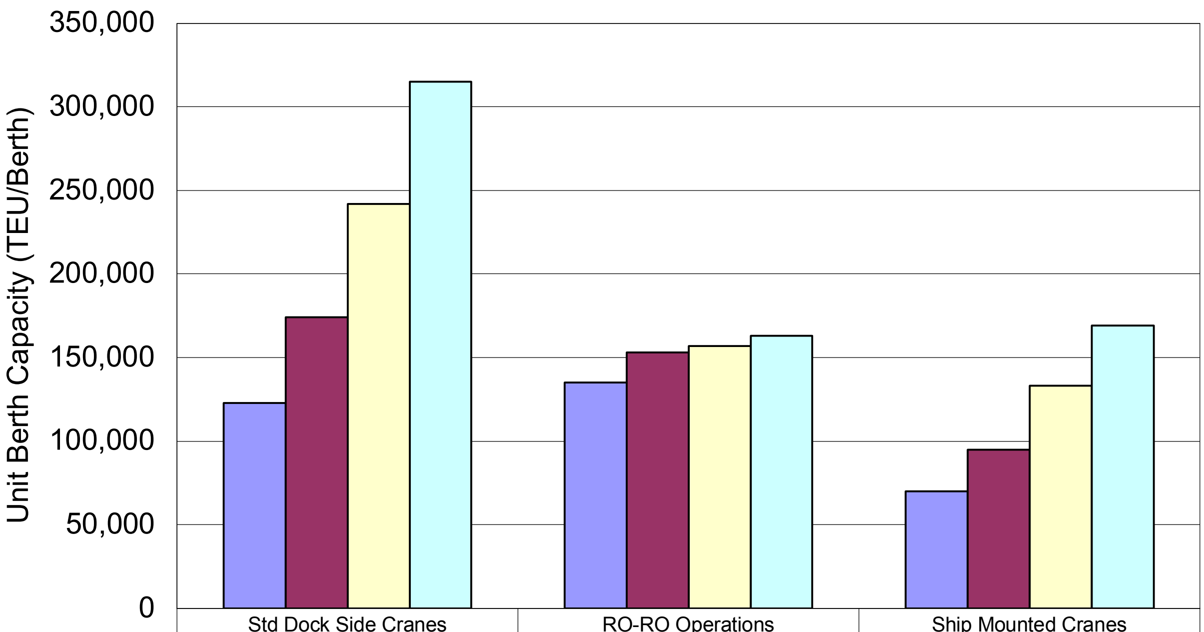
	Variable	Existing	5 -Year	10 -Year	20 -Year
a	Number of berths available	1.00	1.00	1.00	1.00
b	Ship work hours per day	21.0	21.0	21.0	21.0
c	Work days per week	7	7	7	7
d	**Max overall berth occupancy**	**55%**	**60%**	**60%**	**60%**
e	Effective hrs per berth/week [a*b*c*d]	80.9	88.2	88.2	88.2
f	**Mean lifts per call - peak week**	**216**	**271**	**338**	**423**
g	Gross RO/RO ramp productivity (moves/hour)	24	24	24	24
h	Number of RO/RO ramps	1.00	1.00	1.00	1.00
I	Mean ship work time (hr) [f/(g*h]	9.2	11.5	14.4	18.0
j	Ship tie-up & untie time (hr)	2.0	2.0	2.0	2.0
k	Mean berth occupancy time per ship (hr/call) [I]	11.2	13.5	16.4	20.0
l	Potential ship calls per peak week [e/k]	7.2	6.5	5.4	4.4
m	Throughput capacity during a peak week (moves) [f*l]	1,561	1,766	1,820	1,865
n	Seasonal peak (peak/mean week)	112%	112%	112%	112%
o	Berth capacity (moves/year) [m*52/n]	72,000	82,000	84,000	87,000
p	TEU per container	1.9	1.9	1.9	1.9
q	**Unit Berth capacity (TEU/year) [o*p]**	**135,000**	**153,000**	**157,000**	**163,000**

Table 1.8-13 and Figure 1.8-1 summarize the unit berth capacity for all three categories of container operations at Port Everglades for existing and future operations. The RO/RO berths have a higher unit berth capacity for the existing operations compared to terminals with standard dockside cranes; this is the result of the higher berth utilization and length of time required to load/unload a vessel. For future years, the unit berth capacity for terminals with standard dockside cranes increases relatively faster compared to other categories because of the increase in berth utilization. These projected capacity measures are used to establish future throughput limits.

Table 1.8-13
Container Operations - Unit Berth Capacity Summary

Year	Standard Dock Side Cranes	RO/RO Operations	Ship-Mounted Cranes
Existing	123,000	135,000	70,000
5 - Year	174,000	153,000	95,000
10 - Year	242,000	157,000	133,000
20 - Year	315,000	163,000	169,000

Figure 1.8-1
Container Operations - Unit Berth Capacity



	Std Dock Side Cranes	RO-RO Operations	Ship Mounted Cranes
Existing	123,000	135,000	70,000
5 - Year	174,000	153,000	95,000
10 - Year	242,000	157,000	133,000
20 - Year	315,000	163,000	169,000

Yard Capacity.Yard capacity is defined as the amount of cargo that can be handled in the cargo-storage yard under given yard-operating parameters. Yard capacity primarily depends on the following factors:

- Type of cargo-storage operations.
- Cargo storage-dwell times and inventory peaking factors.
- Stacking height and width.

In North America, the general trend is to operate in the lowest density mode possible to minimize the labor cost associated with sorting and stacking activities. As market demand increases, operators will shift to modes that densify storage capacity in the container yard, rather than turn away business if the terminal storage area cannot be expanded.

The most effective way to increase storage density is to switch from a wheeled operation to a grounded (stacked) operation. Most U.S. operators, including Crowley and banana carriers, choose to handle as many containers on wheels as possible because no labor costs for gate service are incurred in a wheeled operation. Community truckers also favor wheeled operations because they typically receive faster service than with a grounded operation. Wheeled operations, however, take up a large amount of yard space compared to grounded operations. Currently at Port Everglades, a majority of the existing container terminal operators use a top-pick handler to move loaded containers and a side-pick handler to move empties. The existing grounded operations use a fairly low-density stacking pattern to limit sorting operations and contain labor costs.

As terminal throughput increases, many of the existing Southport container terminal tenants have expressed interest in upgrading their terminal operations to use rubber tire gantry (RTG) cranes to handle loaded import and export containers and further densify container storage patterns in the yard. RTGs are more effective at sorting and selecting individual containers from dense storage piles. Terminal operators will continue to use top-pick or side-pick handlers for empty containers because empties of the same size are generic, do not typically require random selection patterns, and can be stored in high-density piles sorted by shipping line.

Cargo-storage dwell time is another factor that impacts yard capacity. Decreases in cargo dwell time mean that containers move off the terminal faster, allowing a faster rate of flow through the terminal, increased turnover of static storage, and a higher overall container yard capacity. Ports and terminal operators can reduce container dwell time through demurrage (fees charged for containers that exceed a given dwell time) to discourage excessive dwell time practices. The peaking factor, defined as peak/mean inventory ratio, reflects the fluctuations in inventory due to simultaneous ship loading and unloading plus gate operations. A seasonal peaking factor can also be used to reflect changes in cargo flows during peak operating periods. The container yard needs the capacity to handle the peak inventory of each type of container listed.

Based on discussions with the Port's senior staff, the Consultant Team assumed no change in the container dwell times or inventory peaking factor for the planning period. Additional increases in yard capacity may be realized through reducing average dwell times in the container operations. Specific examples include reducing the import load dwell times closer to the industry norm of 2 to 4 days and empty dwell times to 4 to 6 days. The empty dwell times appear to have some room for improvement, as well as the RO/RO import load dwell times. Possible modifications to the Port's demurrage and tariff can be used to improve the average dwell times. A review of allowable free-time storage provisions should also be investigated with other ports in the surrounding region to further address long-term storage of containers on the terminals.

Table 1.8-14 describes cargo-storage dwell times and inventory peaking factors by cargo type for each category of terminal operations.

Table 1.8- 14
Container Dwell Times and Inventory Peaking Factors

	Standard Dock Side Cranes	RO/RO Operations	Ship-Mounted Cranes
Import local load dwell time (days)	4.3	6.0	1.5
Export local load dwell time (days)	4.3	1.5	1.5
Import empty dwell time (days)	8.0	8.0	1.5
Import storage factor (peak / mean)	125%	125%	125%
Export storage factor (peak / mean)	115%	115%	115%
Empty storage factor (peak / mean)	110%	110%	110%

Taller container stack heights require increased labor for sorting and, therefore, cost more to operate. Terminal operators will increase stack heights and operate denser terminals as market demand drives their economics, but they can do this only up to a physical limit. The use of 1-over-5 RTGs (machines capable of moving one container over a 5-high container stack) is not the absolute limit, but a sensible practical limit based on current practice worldwide. Based on the terminal interviews, the Consultant Team assumed that terminals will use 1-over-5 RTGs for future yard operations. The actual maximum stacking height will be a fraction of the theoretical, machine-rated maximum due to terminal operator needs. The operator's needs vary by container-move type. For example, loaded import containers destined for gate trucks require more random access, due to the unscheduled nature of truck arrivals, than block-stored loaded export containers destined for the vessel. On average, inbound loaded import containers will be stacked lower than loaded export containers to account for the random nature of the truck arrival patterns.

Table 1.8-15 outlines the Consultant Team's assumptions, based on tenant interviews, for the type of current and future cargo storage operations and maximum practical future mean stacking height for the various types of container moves. None of these values are hard limits and could potentially be improved in the long-term.

Table 1.8-15
Cargo Storage Operations Type and Stacking Height Assumptions

	Existing	5–Year	10-Year	20-Year
	Standard Dock-Side Cranes			
Import load storage mode (**W**hl / **P**k / **R**tg)	P	R	R	R
Export load storage mode (**W**hl / **P**k / **R**tg)	P	R	R	R
Empty storage mode (**W**hl / **P**k / **R**tg)	P	P	P	P
Mean Import load height (mean stack height)	2.50	2.50	3.00	3.50
Mean Export load height (mean stack height)	2.50	3.00	3.50	4.00
Mean Empty height (mean stack height)	3.00	4.00	5.00	5.00
	RO/RO Operations			
Import load storage mode (**W**hl / **P**k / **R**tg)	W	W	W	W
Export load storage mode (**W**hl / **P**k / **R**tg)	W	W	W	W
Empty storage mode (**W**hl / **P**k / **R**tg)	P	P	P	P
Mean Import load height (mean stack height)	1.00	1.00	1.00	1.00
Mean Export load height (mean stack height)	1.00	1.00	1.00	1.00
Mean Empty height (mean stack height)	3.00	4.00	5.00	5.00
	Ship-Mounted Cranes			
Import load storage mode (**W**hl / **P**k / **R**tg)	W	W	W	W
Export load storage mode (**W**hl / **P**k / **R**tg)	P	P	P	P
Empty storage mode (**W**hl / **P**k / **R**tg)	P	P	P	P
Mean Import load height (mean stack height)	1.00	1.00	1.00	1.00
Mean Export load height (mean stack height)	3.00	3.00	4.00	4.00
Mean Empty height (mean stack height)	3.00	3.00	4.00	4.00

The Consultant Team used the data in Tables 1.8-14 and 1.8-15 to develop the peak inventory requirements at berth capacity for all three categories of container terminals at the Port. The data were then used to develop the conceptual plans for the Port and verify that the site had sufficient container yard capacity and terminal area to balance with the available berth capacity.

Table 1.8-16 shows an example calculation of the twenty-foot ground slots (TGS) required to handle peak-week import containers at an overall throughput of one million TEUs.

Table 1.8-16
Peak Import TGS Required at One Million TEUs

a	Throughput (TEU)	1,000,000
b	Peak/mean week	120%
c	Peak week TEU (a/52*b)	23,077
d	Import fraction	40%
e	Peak week import TEU (c*d)	9231
f	Mean dwell time (days)	3
g	Mean import inventory, peak week (TEU) (e*f/7)	3956
h	Inventory peak factor	140%
i	Peak import inventory, peak week (TEU) (g*h)	5538
j	Mean stacking height	3.00
k	Peak TGS required for imports (i/j)	1846

For each category of terminal operations, the Consultant Team calculated the total TGS required to handle import, export, and empty containers to balance with the projected berth throughput. In a container terminal, different storage layouts yield different slot densities, defined as the number of TGS per acre of net container yard.

Table 1.8-17 outlines the typical average slot density assumptions for different storage modes, using standard yard layouts and aisle spacing. The low-density top-pick operations currently employed at Port Everglades actually yield a lower net storage density per acre than a typical wheeled cargo terminal due to the limited stack widths and heights. The private truck operators in South Florida own and maintain their chassis. The low-density stacking patterns are employed to avoid storage of chassis on the terminal. As the base of the storage pile increases in width and height, the storage density advantage will go to the top-pick operations and drive operating costs higher to account for higher stacking equipment use and sorting operations.

Table 1.8- 17
Slot Density Assumptions

Storage Mode	TGS per Acre
Wheeled	50
Top pick or Side pick (2 to 3 wide)	40
Top pick or Side pick (6 to 8 wide)	90
RTG	113

The Consultant Team calculated the net container yard area required for each cargo type by dividing the TGS -- calculated as shown in Table 1.8-16 -- by the slot density values. The net container yard area was converted to gross terminal area required by applying the net-to-gross container yard area ratio discussed earlier. The net-to-gross container yard ratio was assumed to be 85 percent for the STS crane/stacked, top-pick terminals and 75 percent for the RO/RO and Banana wheeled terminals. The net terminal area consists of the container storage yard and drive aisles. Gross terminal acreage also includes the gate complex, administrative offices, maintenance facilities, privately owned vehicle parking, and other support areas of the terminal. As a terminal increases in overall area, the net-to-gross ratio typically improves.

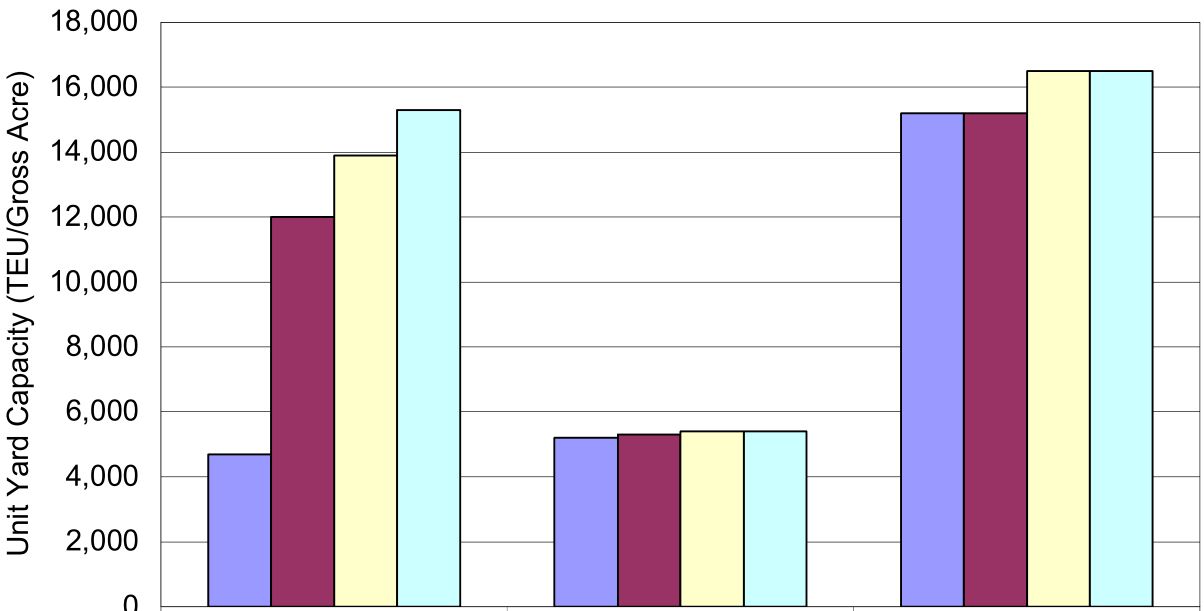
Unit berth throughput (TEU/berth) estimates were divided by gross terminal area required to calculate the unit container yard capacity, which is expressed as annual terminal throughput per gross terminal acre (TEU/acre).

Table 1.8-18 and Figure 1.8-2 summarize the unit container yard capacity for each container terminal category. The unit container yard capacity for dock-side crane/top pick stacked operations is initially lower than for RO/RO/wheeled operations due to the lower slot density of existing 2- to 3-wide top-pick operations as compared with the wheeled RO/RO operations. In future scenarios, the dock-side crane/top pick stacked operations terminals achieve a much higher container yard density due to the higher slot density resulting from wider stack layouts and future RTG operations. The wheeled banana terminals continue to achieve the highest unit container yard capacity overall due to the exceptionally low average dwell times of 1 to 2 days associated with use of off-site CFS/ripening centers. This existing practice is assumed to continue in future years.

Table 1.8-18
Container Operations - Unit Yard Capacity Summary (TEU/Acre)

Year	Standard Dock Side Cranes	RO/RO Operations	Ship-Mounted Cranes
Existing	4,700	5,200	15,200
5 - Year	12,000	5,300	15,200
10 - Year	13,900	5,400	16,500
20 - Year	15,300	5,400	16,500

Figure 1.8-2
Container Operations - Unit Yard Capacity



	Std Dock Side Cranes	RO-RO Operations	Ship Mounted Cranes
Existing	4,700	5,200	15,200
5 - Year	12,000	5,300	15,200
10 - Year	13,900	5,400	16,500
20 - Year	15,300	5,400	16,500

<u>Non-Container Terminals</u>. Tables 1.8-19 through 1.8-22 describe the detailed capacity calculations for the break-bulk and dry bulk cargo terminals at the Port. The non-container terminal models combine the assessment of the berth and yard capacity functions into a single spreadsheet model. The cargo capacity estimates are provided for steel rebar products, lumber, cement products, and the proposed crushed rock aggregate import facility for the 5-, 10-, and 20-year planning intervals. The projected cargo throughput is achieved by developing an estimate of the future terminal operating capacity to arrive at an average throughput per acre under enhanced operating measures, based on tenant interviews and the review of empirical data from the Port.

Berth capacity or wharf throughput is a factor of the wharf operating hours, annual vessel calls, average cargo handled per call, berth occupancy, and other wharf-operating factors. For the purposes of estimating the wharf throughput, the typical cargo handled per vessel call was applied to the anticipated vessel calls. Where the tenant could identify potential changes to the vessel rotations or amount of cargo handled per call, adjustments were incorporated. For most of the operators, little change to the vessel call patterns was anticipated.

Storage yard capacity is a factor of static storage capacity and average dwell time. Average dwell time is the typical amount of time that cargo remains on the terminal waiting to be retrieved for inland delivery or placed upon a vessel for export. The primary function of dwell time is to determine the average number of times the static capacity of the terminal can be used over a course of the year, or turned over for additional storage. As the average dwell increases, the number of times that a terminal is available for cargo storage decreases. Mathematically, this can be summarized using the following formula:

Static Storage Turns per Year = 365 days per year / Average Dwell Time

An average dwell time of 30 days would be the equivalent of turning the static storage capacity of a terminal property over approximately 12.16 times per year. For reference, Table 1.8-19 summarizes typical average dwell times and the corresponding static storage turnover.

Table 1.8-19
Average Dwell Time Impacts on Storage Turnover

Average Dwell Time (days)	Annual Theoretical Static Storage Turn Over
10	36.50
15	24.33
30	12.16
45	8.11
60	6.08
90	4.05
120	3.04

As shown in Table 1.8-20, the limiting capacity of the FTS steel terminal operations is the berth operations. This is partially limited artificially by the 48 vessel calls per year or an average of four calls per month. The berth and storage yard could accommodate additional vessel calls. Under the existing operational assumptions and vessel patterns in practice today, the terminal is berth-constrained at approximately 288,000 annual tons of steel cargo. Put another way, the terminal throughput could be enhanced through additional vessel calls arranged by FTS, or by adding a new operator with enhanced cargo turnover and reduced dwell times.

Table 1.8-20
Break-Bulk Cargo (Steel) - Unit Throughput Capacity

	Break-Bulk - Steel Products	FTS- Berth 5
a	Type of cargo	Rebar + Coils
b	Vessel calls per year	48
c	Berth operating hours per day	14
d	Cargo handling speed (Tons/hour)	60
e	Cargo transfer per vessel call (Tons/vessel call)	6,000
f	**Annual existing berth throughput (Tons) (b*e)**	**288,000**
g	Terminal acres (Acres)	15
h	Storage type	Outdoor/Decked
i	Total static storage capacity (Tons)	35,000
j	Dwell time (days)	30
k	**Annual existing yard throughput capacity (i*j)**	**425,600**
l	**Unit Throughput Capacity (Tons/Acre) (k/g)**	**28,389**

Similar to the FTS steel terminal operations discussed previously, the combined lumber terminals are berth-constrained due to limited vessel call patterns. Significant increases in terminal efficiencies could be gained by combining berthing operations with other cargo types, or attracting additional break bulk carriers. The existing lumber terminals are berth-constrained at approximately 90,000 tons per year, as shown in Table 1.8-21.

Since the initial tenant interviews, the lease with Sherwood Lumber has expired and will not be renewed. Sherwood Lumber has indicated to the Port staff that they intend to continue discharging cargo at Port Everglades with direct transfer to inland storage areas. They would like to continue to use the Port's general cargo berths for importing lumber, as necessary.

Table 1.8-21
Break-Bulk Cargo (Lumber) - Unit Throughput Capacity

	Break-Bulk - Lumber Products	FTS Berth 2 or 16	Sherwood Berth 29	Total Lumber
a	Type of cargo	Plywood or Hardwoods	Dimensional Lumber	Lumber
b	Vessel calls per year	12	18	30
c	Berth operating hours per day	20	14	20
d	Cargo handling speed (Tons/hour)	50	250	250
e	Cargo transfer per vessel call (Tons/vessel call)	600	4,000	3,000
f	**Annual existing berth throughput (Tons) (b*e)**	**7,200**	**72,000**	**90,000**
g	Terminal acres (Acres)	Indoor/Stack	Outdoor/Stack	Indoor/Outdoor
h	Storage type	0.12	4.0	4.1
i	Total static storage capacity (Tons)	600	17,000	17,600
j	Dwell time (days)	30	30	30
k	**Annual existing yard throughput capacity (i*j)**	**7,300**	**206,833**	**214,133**
l	**Unit Throughput Capacity (Tons/Acre) (k/g)**	**60,833**	**51,708**	**51,974**

The existing combined cement terminals receive weekly vessel service at two berths. The weekly vessel service is fairly matched to the silo-storage capacities currently available on site. Additional silo storage capacity may be necessary to cover peak operating periods and provide a vessel buffer. The combined existing cement operations are berth-constrained at approximately 3.36 million tons per year, as shown in Table 1.8-22.

Table 1.8- 22
Dry Bulk Cargo (Cement) - Unit Throughput Capacity

	Dry Bulk - Cement Products	Continental Berth 14	Rinker Berth 15	Total Cement
a	Type of cargo	Cement	Cement	Cement
b	Vessel calls per year	36	48	84
c	Berth operating hours per day	20	20	20
d	Cargo handling speed (Tons/hour)	450	450	450
e	Cargo transfer per vessel call (Tons/vessel call)	40,000	40,000	40,000
f	**Annual existing berth throughput (Tons) (b*e)**	**1,440,000**	**1,920,000**	**3,360,000**
g	Terminal acres (Acres)	5.0	5.0	10.0
h	Storage type	Silos	Silos	Silos
i	Total static storage capacity (Tons)	44,000	65,000	109,000
j	Dwell time (days)	10	10	10
k	**Annual existing yard throughput capacity (i*j)**	**1,606,000**	**2,372,500**	**3,978,500**
l	**Unit Throughput Capacity (Tons/Acre) (k/g)**	**321,200**	**474,500**	**397,850**

As mentioned previously, a crushed rock aggregate import facility has been proposed at the Port to replace materials currently mined from local quarries in Miami-Dade County as well as overall dwindling quantities of this essential commodity. This facility includes a new wharf, conveyor system, storage sheds, and rail transfer facility in Southport. The assumptions used to develop the near-term and future crushed rock aggregate terminal capacity model are based on interviews with Rinker Cement and the Florida East Coast Railway. As shown in Table 1.8-23, the proposed terminal would be berth-constrained at approximately 4.32 million tons per year.

Table 1.8- 23
Dry Bulk Cargo (Aggregates) - Unit Throughput Capacity

	Dry Bulk - Aggregate Products	Rinker - Start Up	Rinker - Future
a	Type of cargo	Crushed rock/Sand	Crushed rock/Sand
b	Vessel calls per year	48	72
c	Berth operating hours per day	16	16
d	Cargo handling speed (Tons/hour)	5,000	5,000
e	Cargo transfer per vessel call (Tons/vessel call)	60,000	60,000
f	**Annual existing berth throughput (Tons) (b*e)**	**2,880,000**	**4,320,000**
g	Terminal acres (Acres)	4	6
h	Storage type	Indoor/Shed	Indoor/Shed
i	Total static storage capacity (Tons)	100,000	150,000
J	Dwell time (days)	10	10
k	**Annual existing yard throughput capacity (i*j)**	**3,650,000**	**5,475,000**
l	**Unit Throughput Capacity (Tons/Acre) (k/g)**	**912,500**	**912,500**

Table 1.8-24 and Figure 1.8-3 summarize the unit berth throughput capacity for all non-containerized cargo terminals at the Port for existing and future operations. No change in unit berth capacity occurs as no operational changes have been assumed for the future scenarios. Dry bulk – aggregate operations are assumed to start within the first 5 years and continue throughout the planning horizon.

Table 1.8-24
Non-Containerized Cargo – Berth Capacity Summary

Year	Dry Bulk - Cement (MT/Berth)	Dry Bulk - Aggregates (MT/Berth)	Break Bulk - Lumber (MT/Berth)	Break Bulk - Steel (MT/Berth)
Existing	1,920,000	-	90,000	288,000
5 – Year	1,920,000	2,880,000	90,000	288,000
10 - Year	1,920,000	2,880,000	90,000	288,000
20 - Year	1,920,000	4,320,000	90,000	288,000

Figure 1.8-3
Non-Containerized Cargo - Unit Berth Capacity

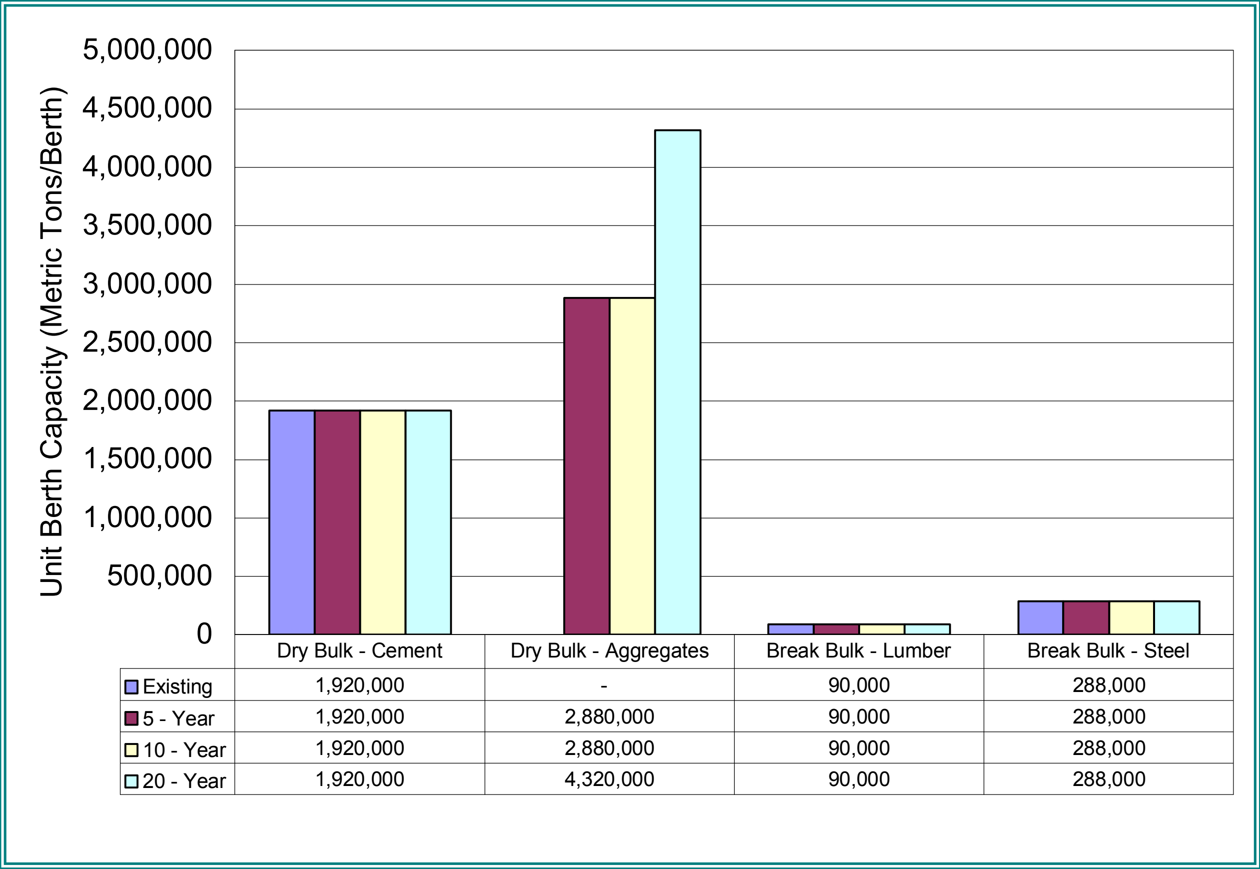
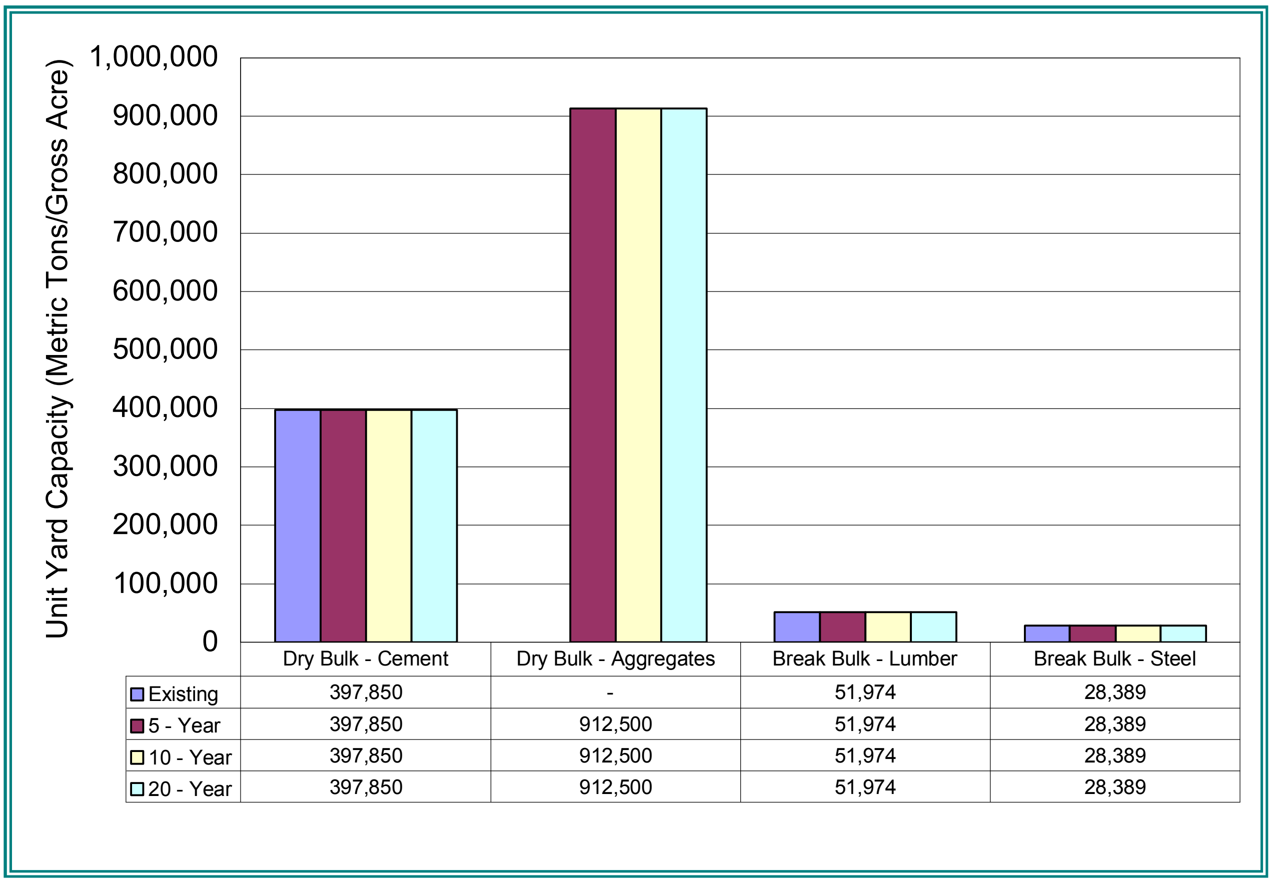


Table 1.8-25 and Figure 1.8-4 summarize the unit yard throughput capacity for all non-containerized cargo (dry bulk and break-bulk) terminals at the Port for existing and future operations. No change in the unit yard capacity occurs as no operational changes have been assumed for the future scenarios.

Table 1.8-25
Non-Containerized Cargo - Yard Capacity Summary

Year	Dry Bulk - Cement (MT/Acre)	Dry Bulk - Aggregates (MT/Acre)	Break-Bulk - Lumber (MT/Acre)	Break-Bulk - Steel (MT/Acre)
Existing	397,850	-	51,974	28,389
5 – Year	397,850	912,500	51,974	28,389
10 - Year	397,850	912,500	51,974	28,389
20 - Year	397,850	912,500	51,974	28,389

Figure 1.8-4
Non-Containerized Cargo - Unit Yard Capacity



1.9 Wharf Operations

The Consultant Team conducted a Container Wharf Operations Study in Southport to understand the tenants' wharf activities and examine the necessary cross-sectional distance between the face of the wharves and the beginning of the waterside lease boundaries beyond the back reach of the cranes. The Port operates its wharf structures as public berths with limited preferential berthing assignments. Therefore, as cargo throughput per berth increases over time, the berth and adjacent back-reach area will serve as a major circulation route between the STS container cranes and the storage yards as yard hostlers shuttle cargo between the two activity areas.

The purpose of the study is outlined below:

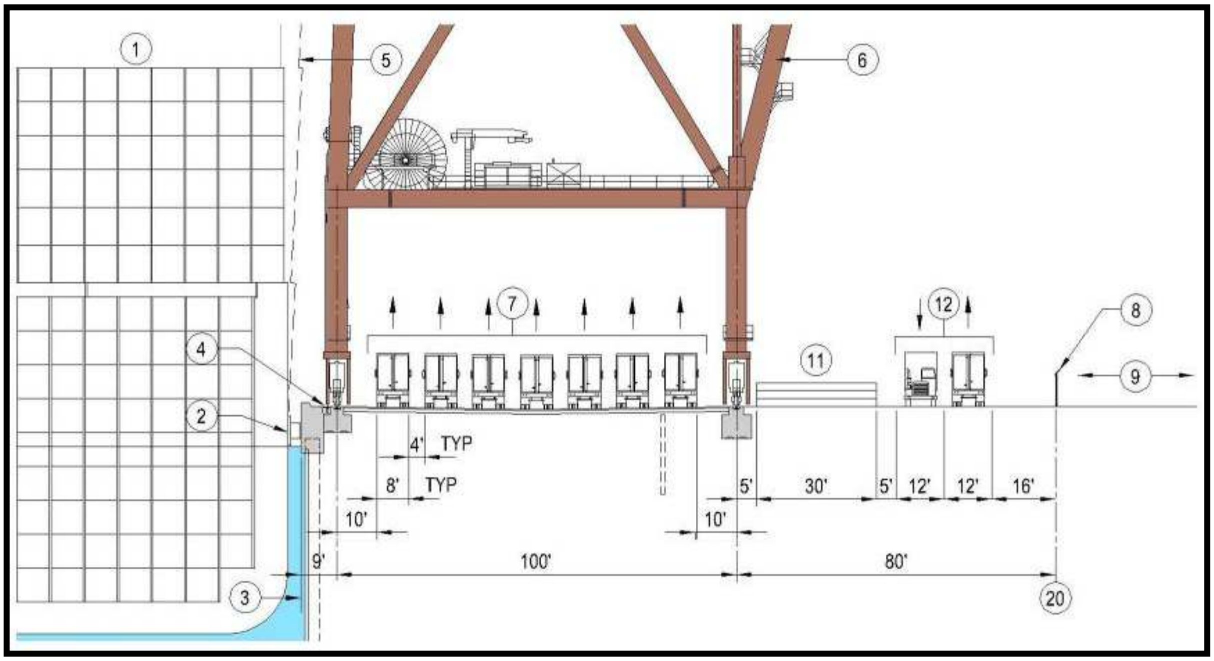
- Focus on Southport wharf operations.
- Identify the most efficient operational wharf layout.
- Identify measures to enhance worker safety.
- Identify efficient traffic patterns.
- Establish the footprint of wharf operations and terminal lease boundaries.
- Establish future wharf cross-sections and layouts.
- Establish future ship-to-shore crane requirements.

Discussions with the Port's senior staff concerning the general wharf layout for future berth alignments revealed that standard 100-gauge cranes were adequate for future terminal operations. Advanced twin-pick cranes may be considered in the future as new crane equipment is purchased. As twin-pick cranes are considered for future wharf operations, crane gauge and wharf apron widths will require additional study to maximize the potential of this new technology. The Port staff also preferred concepts that allowed for a single service lane between the wharf face and waterside crane rail for vessel access and mooring activity on future wharves where possible. For Southport, use of the existing crane rail alignments adjacent to the bullhead was preferred due to channel width restrictions and the minimal benefits associated with the significant reconstruction costs.

1.9.1 Existing Conditions (Pre-Wilma)

The existing Southport wharf layout consists of a 100-gauge gantry crane mounted perpendicular to the wharf with the waterside crane leg mounted approximately nine feet from the face of the wharf to the centerline of the crane rail. Seven load lanes are provided between the crane legs at approximately 12 feet on center, which provides an eight-foot-wide travel lane with about 4 feet between the outer edges of the travel lanes. Clerks are stationed between the load lanes for data collection and deconing activities. A 30-foot-wide hatch-cover laydown area is provided in the back reach of the crane beyond the landside crane rail. The remaining area beyond the hatch covers is used to provide two circulation lanes behind the crane for general circulation. The overall cross-section of the wharf operational area occupies approximately 189 feet from the face of the wharf to the terminal fence line that runs the entire length of the wharf. Gates are provided at random intervals to access the individual terminals. The operational wharf cross–section (Pre-Wilma) is depicted in Figure 1.9-1.

Figure 1.9-1
Wharf Operations (Pre-Wilma)



LEGEND: 1. CONTAINERS ON SHIP; 2. FACE OF FENDERING; 3. FACE OF BULKHEAD COPING; 4. WATERSIDE FACE OF GANTRY CRANE; 5. LANDSIDE FACE OF SHIP; 6. GANTRY CRANE; 7. NUMBER OF TRUCK LANES UNDER GANTRY CRANE; 8. FENCE BETWEEN WHARF AND TERMINAL YARD; 9. TERMINAL YARD; 11. HATCH COVERS; 12. TRUCK LANES; 20. WIDTH OF WHARF TO FENCE.

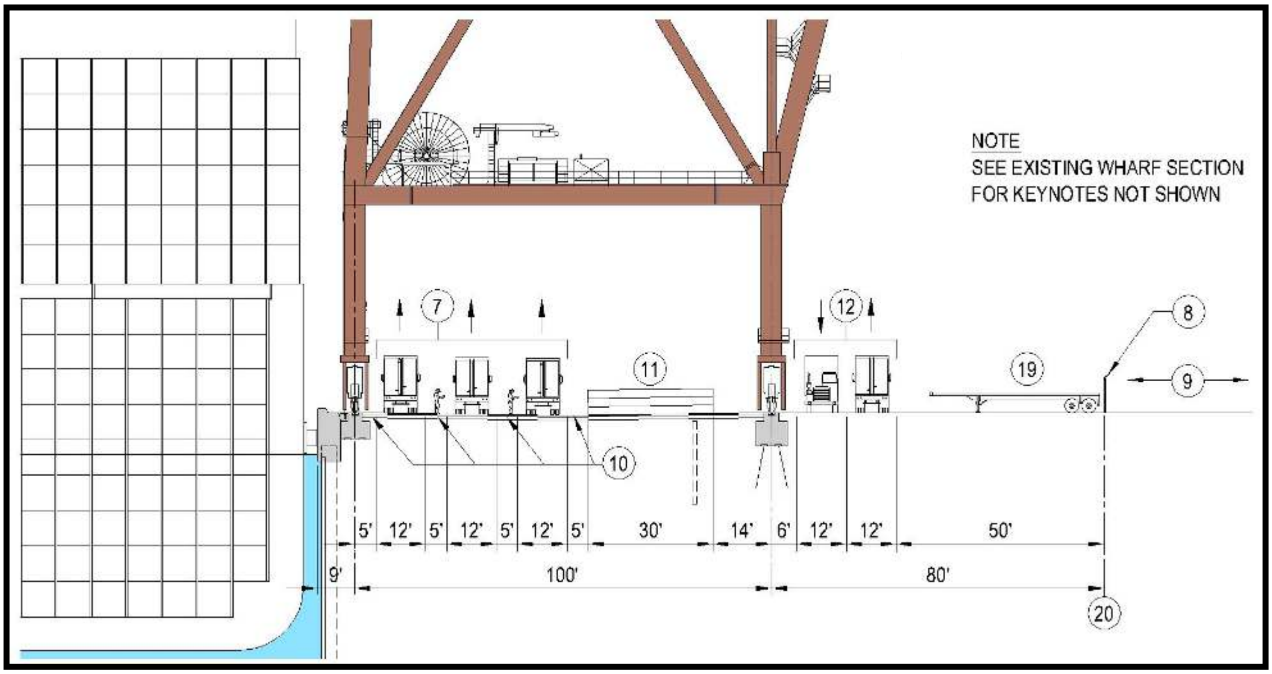
The Pre-Wilma wharf layout provides a fairly compact wharf footprint and minimizes impacts on the adjacent container terminals. The load lane area is, however, fairly tight for future traffic conditions and places the trucks too close together. Placing clerks and deconing operations in the load lanes further complicates the working areas of the wharf. The load lanes should provide more generous lane spacing to provide an area for the trucks to drive, clear outhanging mirrors, and place a twist-lock return box between load lanes. Typical spacing for these types of operations requires five to six feet between drive aisles. Widening the drive aisles to 10 to 12 feet is also acceptable. The additional aisle and operating area between the aisles will reduce the number of load lanes between the crane rails.

A second area of concern is the 30-foot-wide hatch-cover laydown area. As vessels increase in size over time, the hatch covers will also increase in size. Today's moderate to larger container vessels carry hatch covers up to 52 feet in width. Additional area should be provided to accommodate the larger hatch covers in the future. This can be accommodated through a combination of relocating the truck circulation lanes beyond the back reach of the crane and relocating the terminal fence along the wharf apron and expanding the distance from the centerline of the landside crane rail to the terminal fence.

1.9.2 Existing Conditions (Post-Wilma Damage)

During Hurricane Wilma, the existing STS cranes in Southport were damaged, disabling their back-reach function. This required adjusting the operational layout under the crane. Post-Wilma, the same 189-foot-wide wharf cross-section was used with load lanes and hatch covers located between the crane rails. Due to the inoperative back-reach section, the load lanes have been reduced to three to four lanes about 15 to 17 feet on center. The area behind the landside crane rail is currently used for two circulation lanes and chassis storage along the terminal fence line. The operational wharf cross-section (Post-Wilma damage) is depicted in Figure 1.9-2.

Figure 1.9-2
Wharf Operations (Post-Wilma Damage)



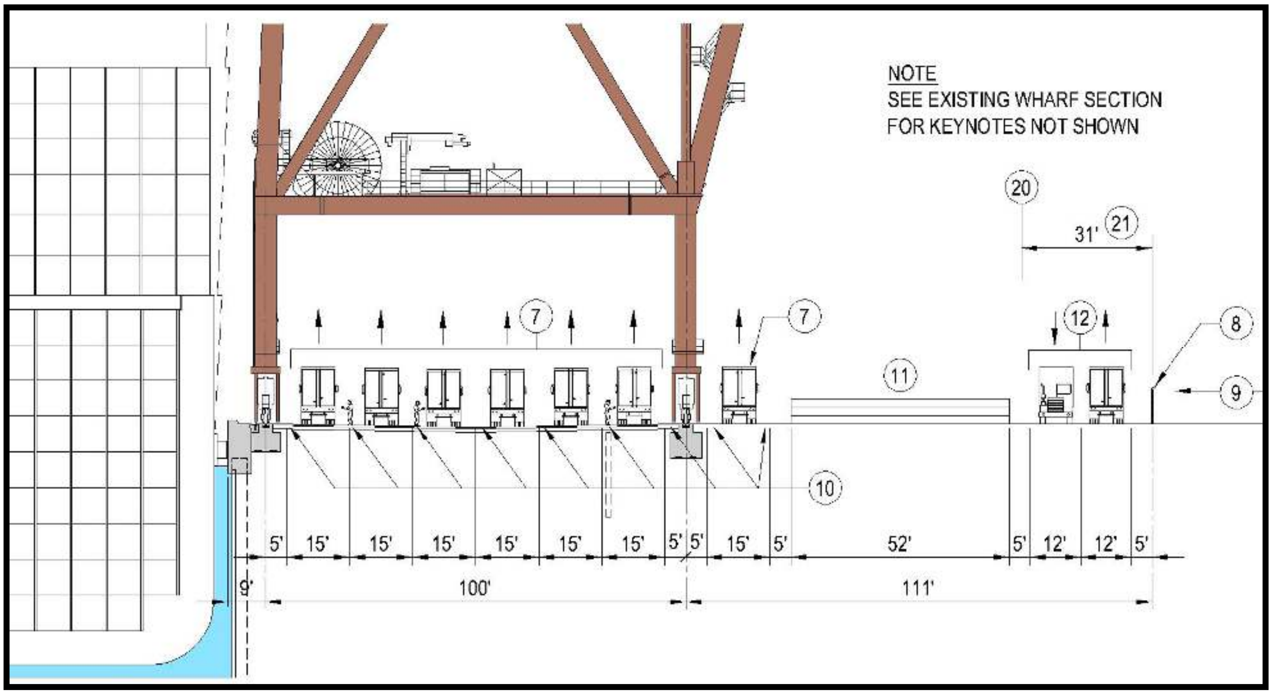
LEGEND: 7. NUMBER OF TRUCK LANES UNDER GANTRY CRANE; 8. FENCE BETWEEN WHARF AND TERMINAL YARD; 9. TERMINAL YARD; 10. WALKWAYS FOR PERSONNEL;11. HATCH COVERS; 12. TRUCK LANES; 19. CHASSIS STORAGE; 20. WIDTH OF WHARF TO FENCE.

The Post-Wilma wharf layout is a temporary situation while the crane repair is determined. Future layouts will not follow this example. Some wharf traffic congestion-related issues can arise when a high number of vessels are being worked on or multiple cranes are operating in proximity to one another. This situation needs to be resolved to accommodate future throughput levels and return standard operating efficiencies to Southport. The limited space under the crane has helped create wider load lanes and additional area for clerk and de-coning operations.

1.9.3 Alternative Layout A – Hatch Covers in Backreach

Alternative A assumes that the same layout for the crane rails would be used as in the existing 100-gauge system. Six load lanes at 15 feet on center would be placed between the crane legs, with an optional seventh load lane located beyond the landside crane leg, beneath the backreach of the crane. A 52-foot-wide hatch-cover laydown is placed beyond the last load lane. The existing cranes appear adequate to accommodate this configuration. Two circulation lanes are provided and the terminal fence line has been moved inland to provide an overall cross-section for the wharf operational area of approximately 220 feet from the face of the wharf to the terminal fence line. This wharf layout allows clear turning moves between the load lanes and circulation lanes at the back of the wharf area. The operational wharf cross section for Alternative A is shown in Figure 1.9-3.

Figure 1.9-3
Wharf Operations (Alternative A)

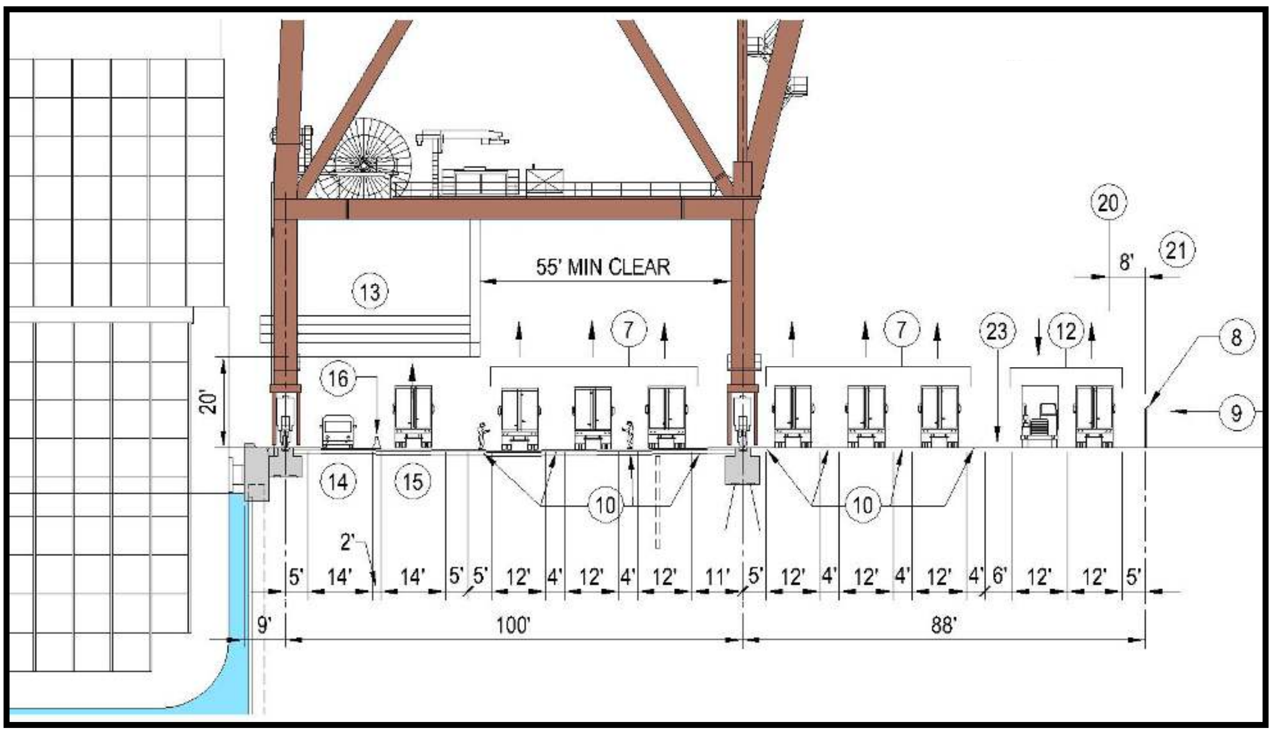


Legend: 7. Number of truck lanes under gantry crane; 8. Fence between wharf and terminal yard; 9. Terminal yard; 10. Walkways for personnel;11. Hatch covers; 12.Truck lanes; 20. Width of wharf to fence; 21. Dimension between hatch cover storage and fence.

1.9.4 Alternative Layout B – Elevated Hatch Cover Frame Inside Crane Legs

Alternative B provides an elevated platform to hold hatch covers to free the back-reach area for load-lane activity. This alternative also provides for a 14-foot vessel service lane and an additional wharf circulation lane along the waterside edge of the wharf. Six load lanes are provided at 16 feet on center. Deconing and clerk operations would occur on the ground between the load lanes. Two wharf circulation lanes are provided along the rear edge of the wharf apron, beyond the landside crane rail. The overall wharf cross-section is approximately 197 feet. The operational wharf cross–section for Alternative B is shown in Figure 1.9-4.

Figure 1.9-4
Wharf Operations (Alternative B)



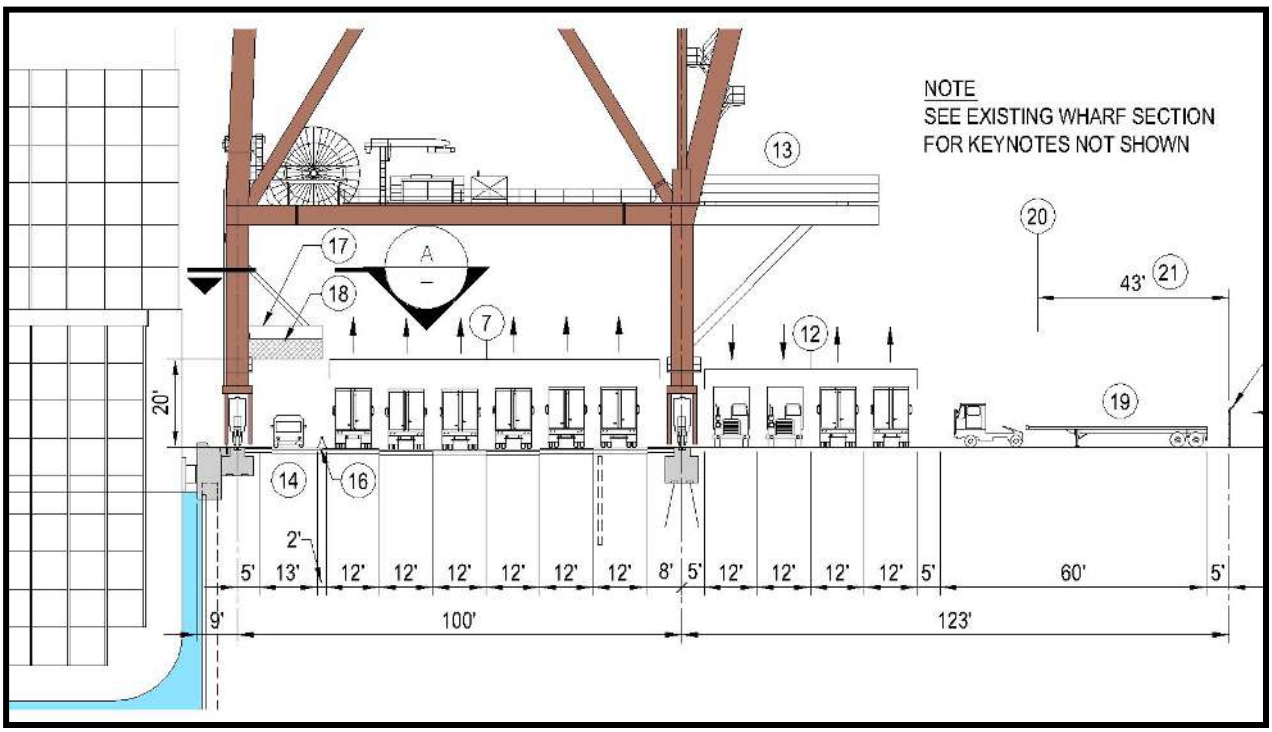
Legend: 7. Number of truck lanes under gantry crane; 8. Fence between wharf and terminal yard; 9. Terminal yard; 10. Walkways for personnel; 12.Truck lanes; 13. Hatch cover rack; 14. Vehicle lane; 15. Truck lane; 20. Width of wharf to fence; 21. Dimension between hatch cover storage and fence; 23. Truck clearance.

1.9.5 Alternative Layout C – Elevated Hatch Cover Frame / Deconing Platform

Alternative C places the hatch covers and deconing activities on elevated structural platforms attached to the crane legs. These platforms have begun to appear at some of the higher density container operations around the world to free up the area under the cranes for loading and circulation activities. To further enhance worker safety, optical character recognition (OCR) technology could be used for clerk duties with a remote viewing station off the wharf.

This alternative places six load lanes at 12 feet on center (no workers in the load lanes) and a vessel access road between the crane legs. Four circulation roads and a chassis/bomb cart storage area are provided between the landside crane rail and the relocated terminal fence line. The overall width of this wharf cross-section is approximately 232 feet. This is the largest wharf footprint of all of the alternatives. The operational wharf cross section Alternative C is provided in Figure 1.9-5.

Figure 1.9-5
Wharf Operations (Alternative C)



Legend: 7. Number of truck lanes under gantry crane; 13. Hatch cover rack; 14. Vehicle lane; 16. Barrier; 17. Hatch covers; 18. Hatch cover rack; 19. Chassis storage; 20. Width of wharf to fence; 21. Dimension between hatch cover storage and fence.

1.9.6 Wharf Operations Study – Summary

Alternative A was selected as the preferred future wharf layout to provide safer load lanes and adequate circulation patterns on the wharf. Provisions for future OCR technologies on the cranes should be studied further during design. The alternatives that use elevated platforms for the hatch covers and deconing platforms maximize the wharf operations area at the cranes; however, the technology and cost of the application are unknown, especially as they relate to retrofitting the existing low-profile cranes in Southport. Additional points to consider for the future wharf layouts include:

- Future efficient wharf operations will require a larger footprint.
- Potential relocation of the wharf/terminal lease boundaries could occur.
- Future vessels will require larger hatch cover laydown areas.
- Increased vessel lifts/call will require efficient circulation patterns.
- OCR technology and deconing platforms enhance worker safety.
  - Future wharf operations should be considered when retrofitting or ordering new crane equipment.
  - Future wharf operations (load lanes, circulation, and bomb cart storage) should be reevaluated.

1.10 On-Port Traffic Circulation and Parking

1.10.1. Traffic Circulation

The traffic analysis for the *Port Everglades Master Plan* consists of assembling existing data and evaluating roadway/traffic circulation for the existing, 5-, 10-, and 20-year traffic projections. The traffic analysis evaluates arterials and intersections within the study limits to analyze the traffic operations in Northport, Midport, and Southport. The analysis includes the following arterials:

- Eisenhower Boulevard, south of SE 17th Street.
- Eisenhower Boulevard, south of SR 84 (Spangler Boulevard).
- Eller Drive, east of SE 14th Avenue.
- SR 84 (Spangler Boulevard), east of SR 5 (U.S. 1).
- McIntosh Road, south of Eller Drive.

The study limits are the roadways within the Port's jurisdictional area and within the Port's secured area, the boundaries of which are established by the Port's security gates. Since it is envisioned that the Broward County Convention Center will be "carved out" of the Port's secured area, future traffic to and from the Convention Center is not included in the Plan.

Existing Conditions. Previous traffic studies prepared in the area, including pertinent information from the previous *Port Everglades Master Plan – 2001* and the *Broward County Intermodal Center (IMC) and People Mover Study* were reviewed. Documents that contain current and projected traffic data information, which indicate existing and future levels of congestion on the study area's roadway facilities, are also included as resource documentation.

The raw daily volume counts and turning movement counts, as shown on the traffic figures below, were obtained from the above sources.

Daily Volume Counts. Raw daily volume counts were obtained for the following locations:

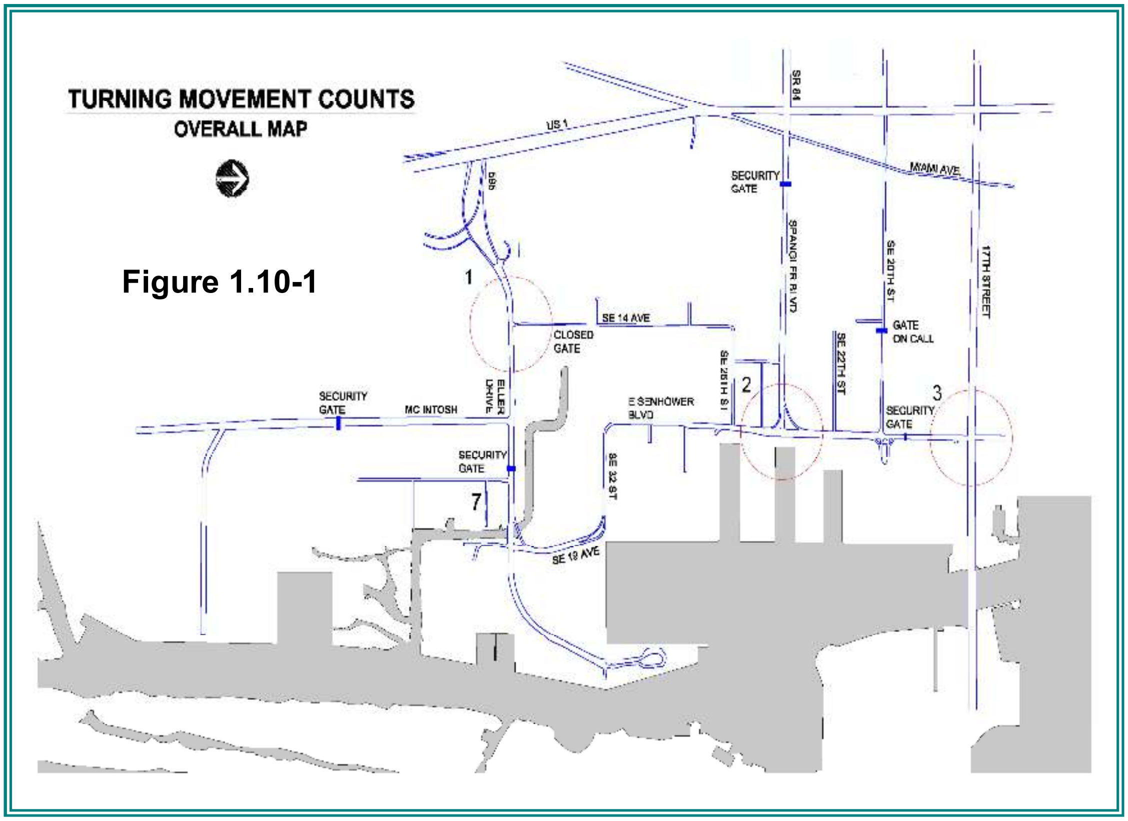
- Eisenhower Boulevard, south of SE 17th Street.
- Eisenhower Boulevard, south of SR 84 (Spangler Boulevard).
- Eller Drive, east of SE 14th Avenue.
- SR 84 (Spangler Boulevard), east of SR 5 (U.S. 1).
- McIntosh Road, south of Eller Drive.

Turning Movement Counts. Raw turning movement counts were obtained for the following intersections:

- SR 84 (Spangler Boulevard) at Eisenhower Boulevard.
- SE 14th Avenue at SE 28th Street.

- SR 84 (Spangler Boulevard) at Port Everglades security gate
- Eller Drive at SE 19th Avenue
- Eller Drive at Port Everglades security gate

Figures 1.10-1 through 1.10-9 identify the existing conditions from the available data.



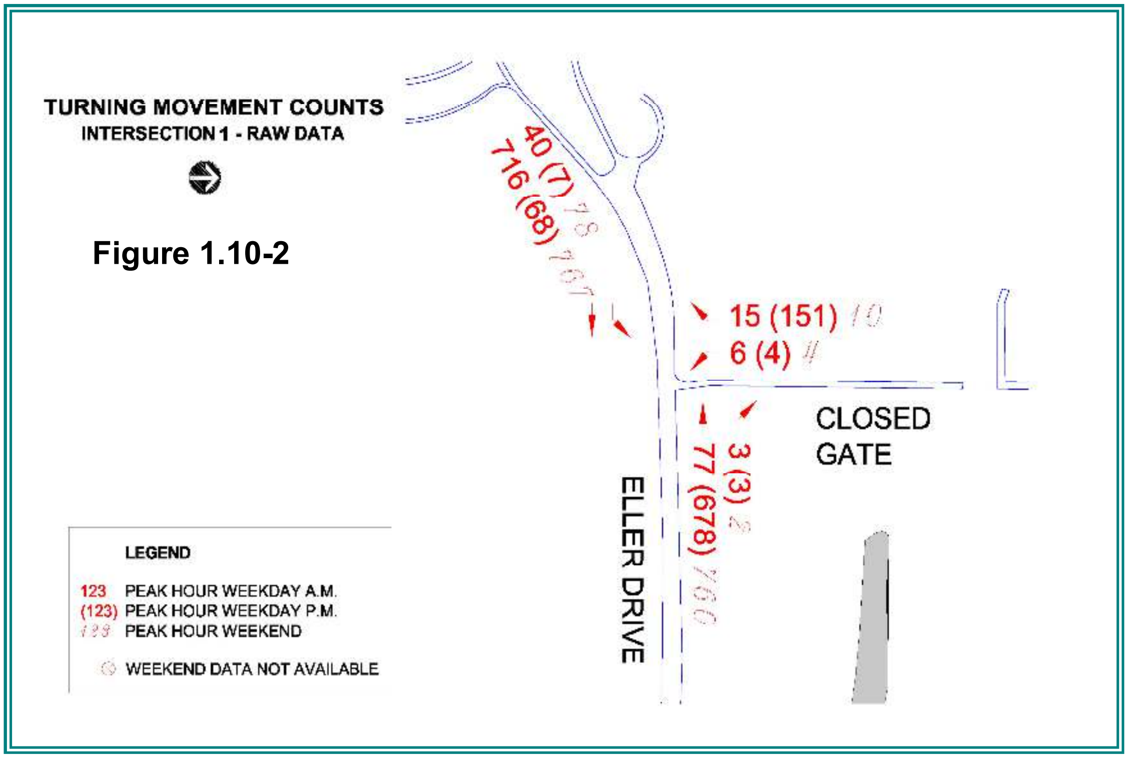


Figure 1.10-2

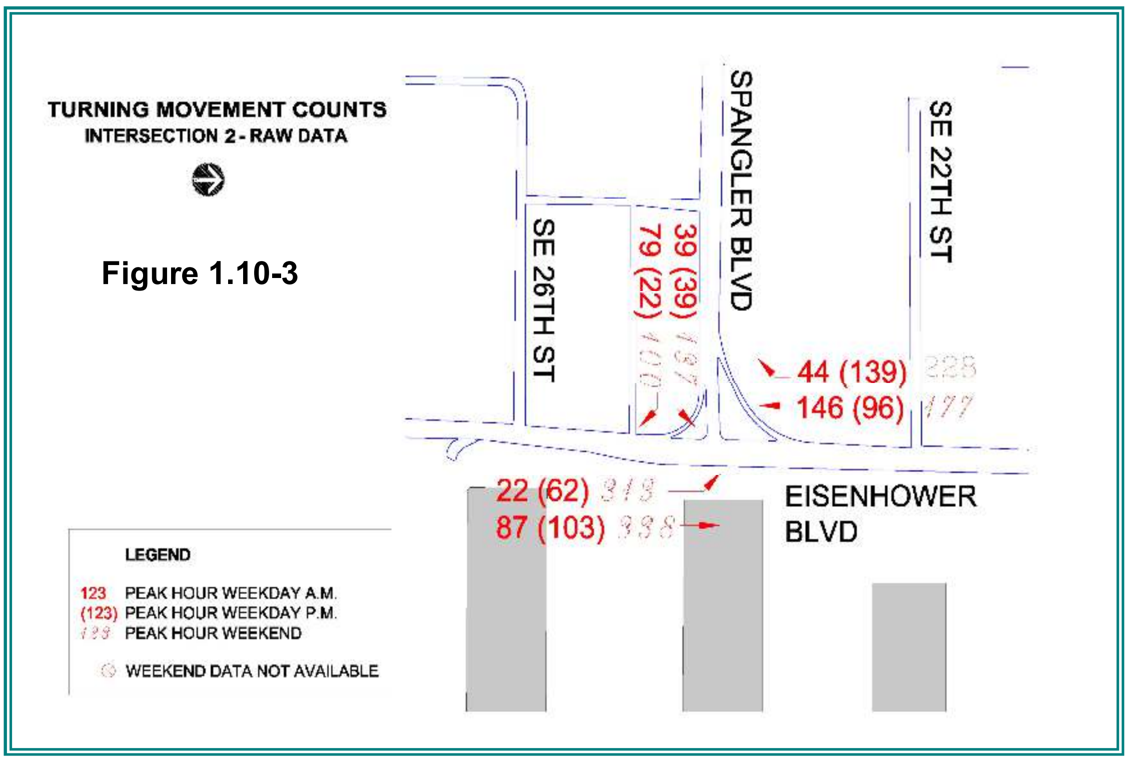


Figure 1.10-3

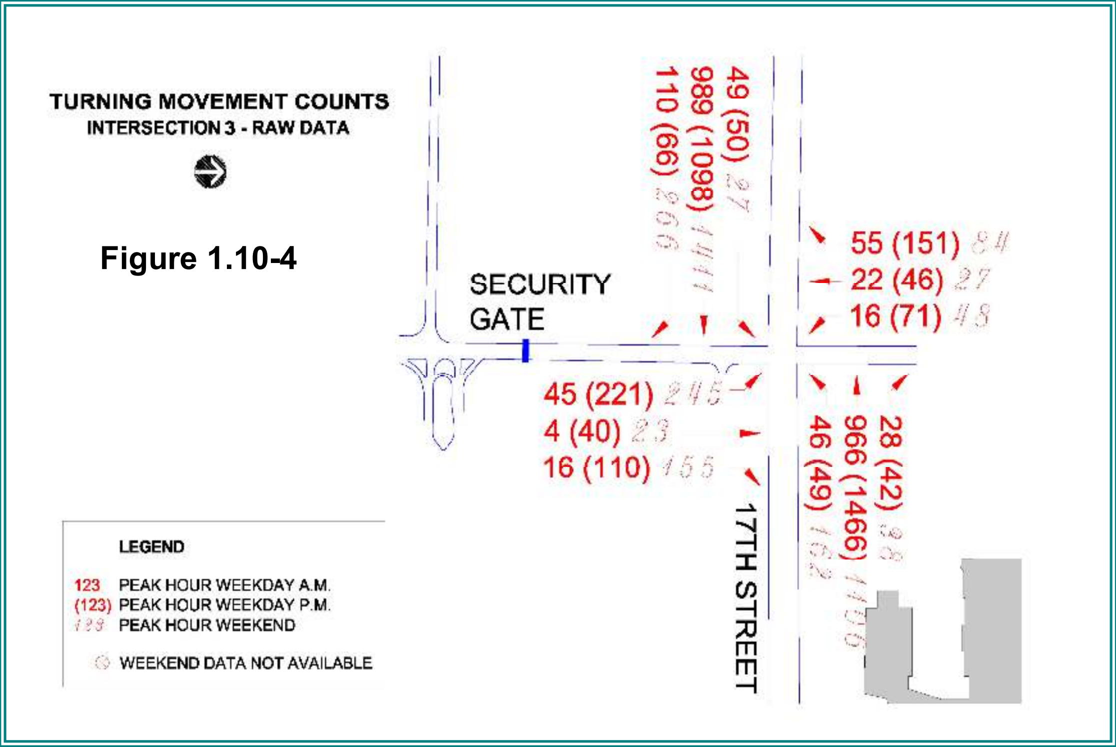


Figure 1.10-4

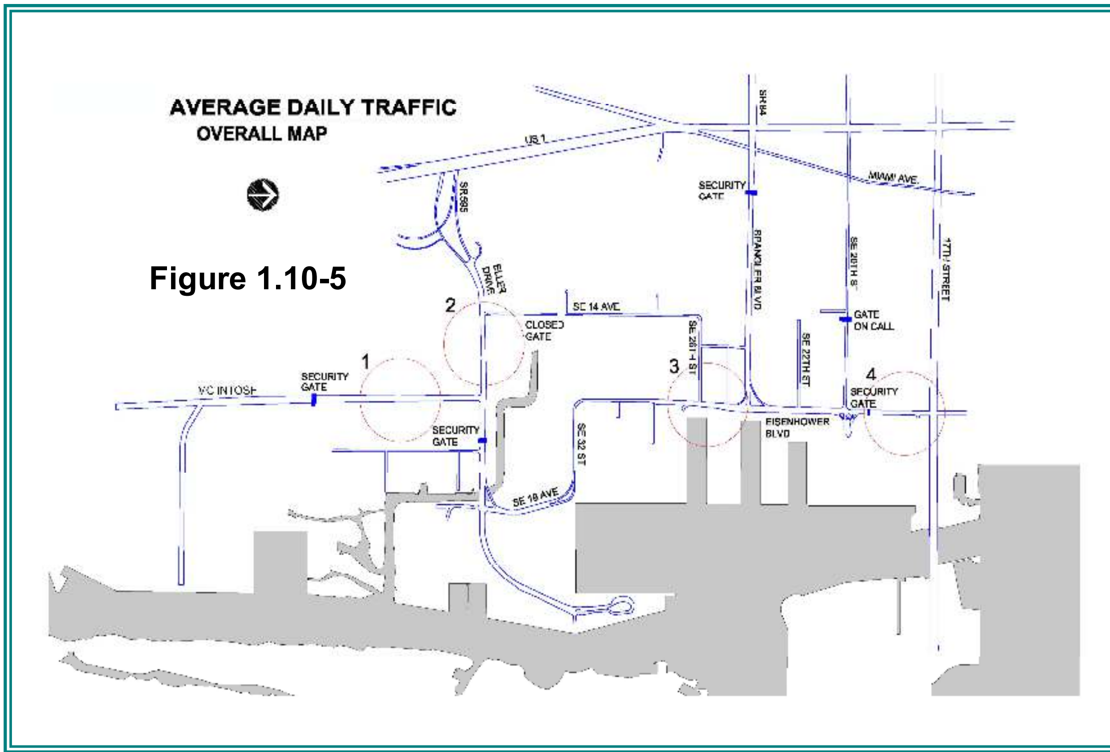


Figure 1.10-5

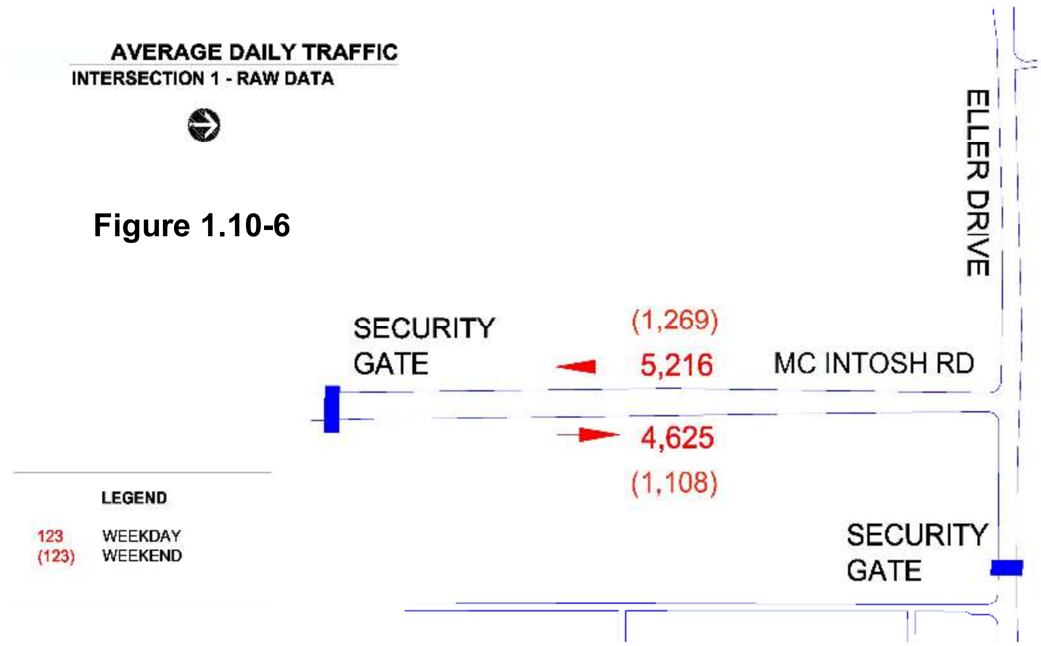


Figure 1.10-6

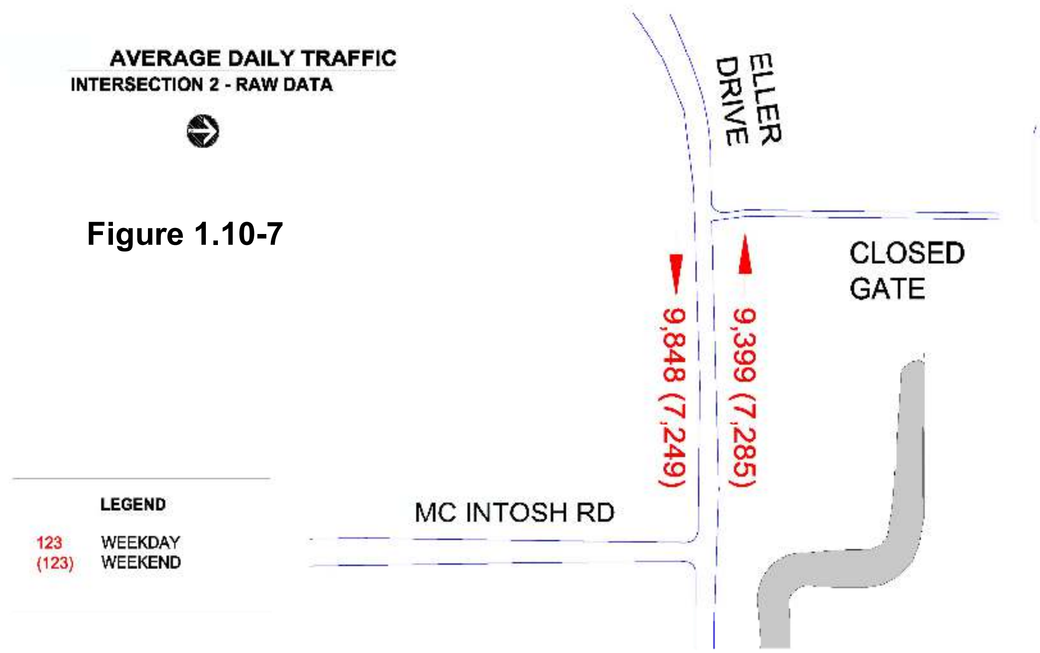


Figure 1.10-7

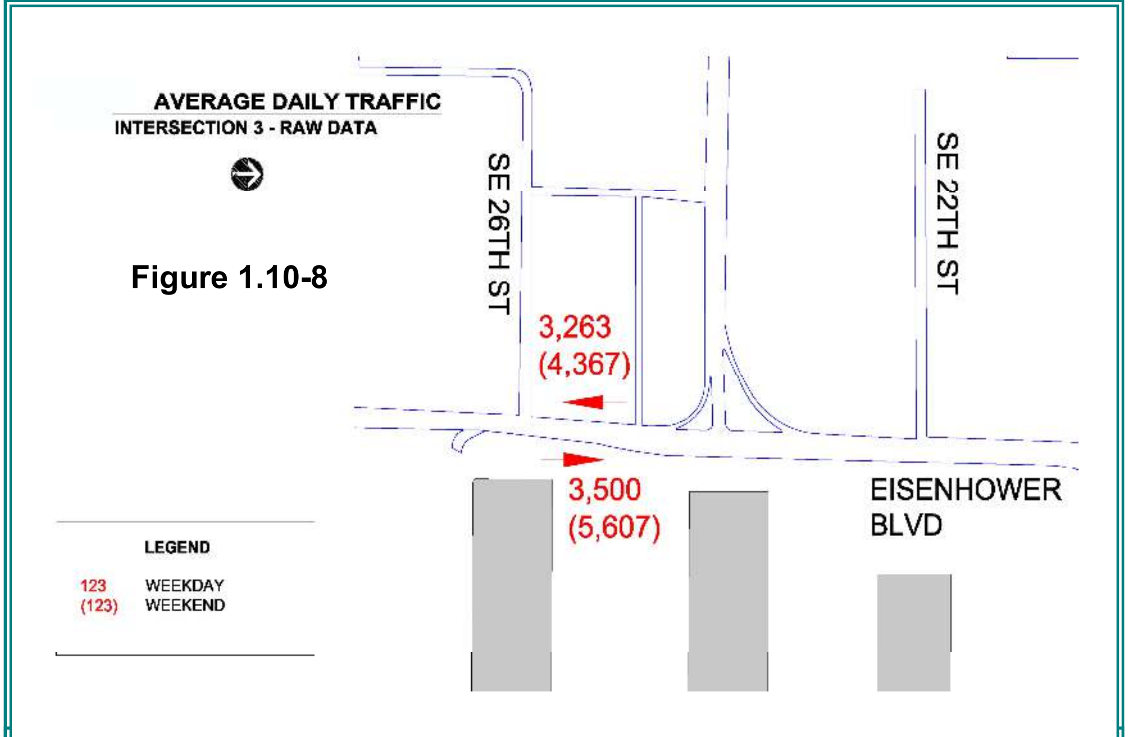


Figure 1.10-8

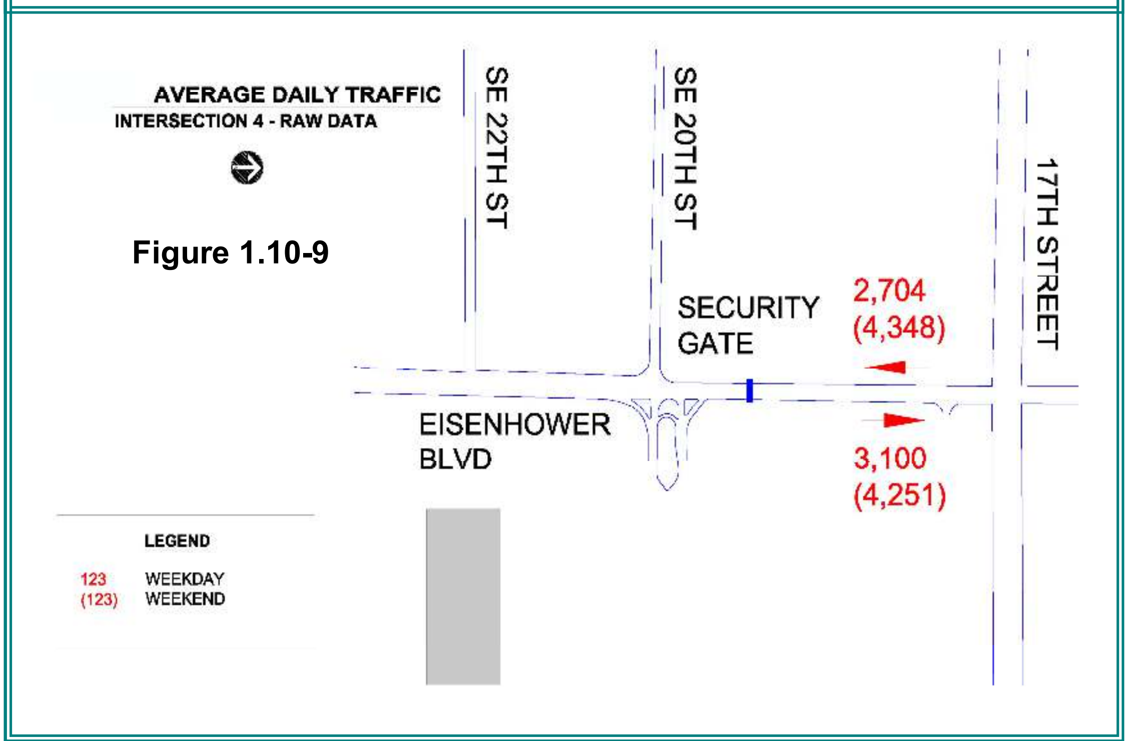


Figure 1.10-9

1.10.2 Existing Parking Conditions

The Port, at the close of 2006, had two structured parking facilities: one at Northport and one at Midport.

Northport Parking Facility. The Northport structured parking facility, which has a capacity of 2,350 spaces, serves the Broward County Convention Center and Cruise Terminals 1, 2, and 4. Cruise Terminal 1 is used for day cruises; Cruise Terminals 2 and 4 are used for multi-day cruises. It is envisioned that the Convention Center will be "carved out" from the Port's secured area, leaving the parking facility in public space. The existing parking structure will be used primarily by Convention Center visitors and staff after a new parking structure, west of Cruise Terminal 4, is operational. It is also envisioned that the planned expansion of the Convention Center with hotel facilities will require the demolition of Cruise Terminal 1.

The Port has designed a new structured parking facility to be located directly west of Cruise Terminal 4. This proposed facility, with approximately 1,680 spaces, is anticipated to serve Cruise Terminals 2 and 4. It will be accessed only by vehicles that have passed through the Port's security gates.

Midport Parking Facility. The Midport structured parking facility serves the Midport cruise facilities, including Cruise Terminals 18, 19, 21, 22/24, 25, and 26 and the Port offices within the parking facility. These terminals are all used for multi-day cruises. The Midport parking facility has a capacity of 1,950 spaces. The Port has programmed the addition of approximately 400 on-grade parking spaces in the area west of Cruise Terminal 19 and 600 at-grade parking spaces west of Cruise Terminal 18. This proposed addition will provide parking for Cruise Terminal 18, which is within walking distance for the cruise passengers. The proximity of this on-grade parking to Cruise Terminal 18 will eliminate the operational cost of shuttling cruise passengers to and from this terminal.

Table 1.10.1 summarizes the parameters at the Midport and Northport parking facilities, including the average and high number of spaces used during the peak months at the respective locations. The future parking requirements of the Port over the 20-year planning horizon, based on these parameters and the market forecasts presented in Element 2, are discussed in Element 3.

Table 1.10-1
2006 Parking Parameters

Parameter	Parking Facility		Total Spaces
	Midport	**Northport**	
Parking Capacity	1,950 spaces	2,350 spaces	4,300
Peak Month Overnight	December 2006	March 2006	
Average Peak Month Overnight	1,578 spaces	831 spaces	2,409
High Peak Month Overnight	1,878 spaces	1,243 spaces	3,121

1.11 Intermodal Transportation Network

The highway network, freight and passenger railroad systems, international airports, waterways and intelligent transportation systems affecting Port Everglades are discussed in this section. Each of these modes is essential to the Port's intermodal connectivity and its role as a hub on the Florida's Strategic Intermodal System (SIS). The section concludes with an overview of the regional planning that is intrinsic to the efficient movement of goods and people throughout the South Florida MSA.

1.11.1 The Strategic Intermodal System in Broward County

As authorized by the Florida Legislature in 2003, and described in Section 341.0532, Florida Statutes, Florida's SIS includes eight major transportation corridors. These major corridors comprise internal corridors such as highways, freight and passenger rail, and waterways; hubs such as seaports, airports, and other transportation terminals; and connectors between the hubs and the internal corridors. Collectively they define "a system of transportation infrastructure that collectively provides for the efficient movement of significant volumes of intrastate, interstate, and international commerce by seamlessly linking multiple modes of transport."

The corridor of most relevance to Port Everglades extends from the Georgia border to Miami, over the I-95 spine. This Atlantic Commerce Corridor received federal designation as High Priority Corridor 49 in the SAFETEA-LU Bill passed by Congress in 2005. This designation acknowledged the importance of Florida's I-95 corridor to regional, state, and national commerce.

Facilities within the Atlantic Commerce Corridor in Broward County include I-95, I-595, I-75, Florida's Turnpike, SR 869 (the Sawgrass Expressway), and US 27; the FEC rail and its freight rail terminal, CSX, and the South Florida Rail Corridor (SFRC); the Intracoastal Waterway and shipping lanes; the Port and FLL.

The vital trade and transport role of the Atlantic Commerce Corridor in South Florida was defined in an assessment prepared in 2003.[13] This study looked at the diverse components of the South Florida transportation system, particularly the intermodal needs of the seaports and the preferred alternatives for improved seaport-rail connections.

[13] *Intermodal Connectivity in the Atlantic Commerce Corridor, An Assessment of Seaport, Rail, and Other Regional Mobility Opportunities*. Prepared under the auspices of the Port of Palm Beach and FDOT with the support of the Port of Miami, Port Everglades, the FEC, the Florida Seaport Transportation and Economic Development Council and the Florida Ports Financing Commission. Prepared by CH2MHill in association with J.D. Sanchez Consulting, Inc., November 2003

1.11.2 Highway Network

The north-south transportation spine of the Atlantic Commerce Corridor, and Broward County's most heavily traveled roadway, is I-95, a component of the Florida Intrastate Highway System and the National Highway System, carrying people and goods between Maine and Florida. Most vehicles accessing Port Everglades from the north or the south travel over this highway and its east-west direct connection to the Port, I-595.

Much of I-95 in the region is at gridlock status during a "rush hour" that is growing into an all-day affair. Currently traffic on I-95 comprises nearly 300,000 vehicles per day in South Florida, almost 22,000 of which are trucks. This traffic will certainly increase as new residents and businesses move into the region and cross-county commuting accelerates (see Figure 1.11-1). The portions of I-95 in the heavily traveled urban areas are operating at level-of-service (LOS) "F."[14] The southern two-thirds of I-95 has been widened to its ultimate form, and programmed and pending projects in Palm Beach County will take the highway to its maximum configuration in that area as well.

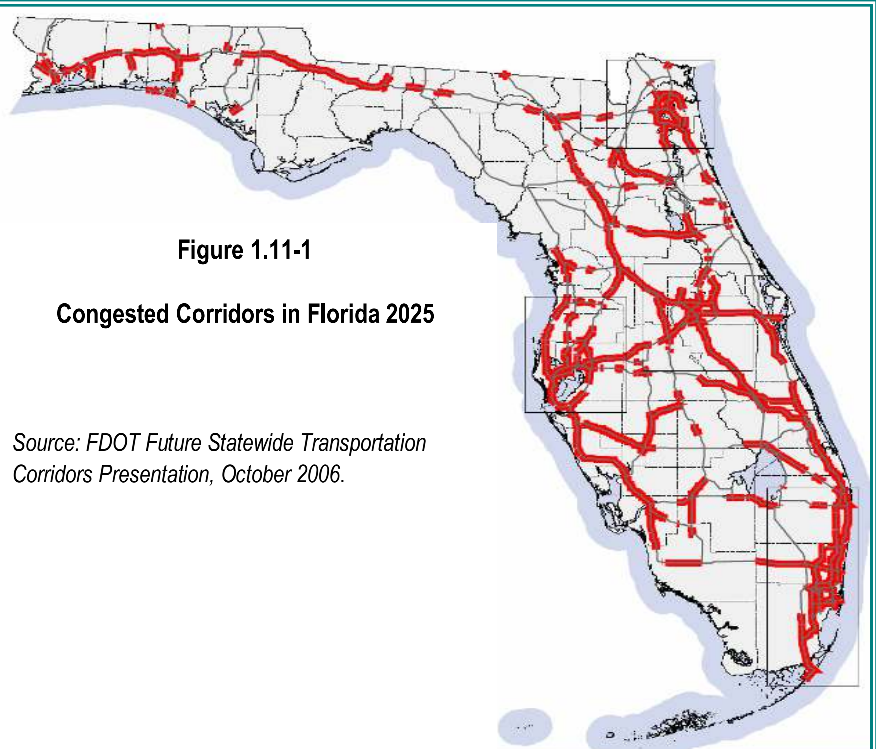


Figure 1.11-1

Congested Corridors in Florida 2025

Source: FDOT Future Statewide Transportation Corridors Presentation, October 2006.

The only significant north-south facility that complements I-95 is Florida's Turnpike, which parallels it several miles to the west. The Turnpike generally traverses residential suburban districts and, with a toll averaging 10 to 12 cents per mile for trucks and 5 cents per mile for cars, has typically played a relatively small role in regional commerce, though it supports commuting and general regional access. Recently, however, as I-95 has become more and more congested throughout the day, reports are that more trucks are using the Turnpike for their longer distance journeys.

[14] This determination is based on the measure of a highway's operating conditions, where LOS "A" describes free-flow vehicular movements, LOS "E" means that vehicles are occupying the maximum capacity of a roadway, and LOS "F" means gridlock.

Other major interstate, state, and local roads – including I-595, SR 84, U.S. 1, and I-75 -- connect with or approach I-95. U.S. 27, which extends on the diagonal from SR 826 (the Palmetto Expressway) in Miami-Dade to and beyond Lake Okeechobee in Palm Beach County, is also used by commercial interests. Nevertheless, conditions on I-95 have the predominant effect on operations at the region's major transportation hubs in each of the three counties.

Freight Planning in Broward County. Intermodal freight planning in Broward County addresses many of access factors relevant to the efficient movement of goods and people between Port Everglades and various origins and destinations:

- Connections between facilities, such as the Seaport and the Airport.
- Roads and railroads providing access to intermodal facilities, especially to the Seaport and the Airport.
- Links between intermodal facilities and major highway and rail corridors, such as between the Seaport/Airport and I-95.
- Intermodal transfer facilities.
- Mode crossing, such as highway-rail grade crossings.

Like most metropolitan areas, Broward County is dependent upon trucks for the movement of the majority of its freight. As noted in the latest update of the county's *Long-Range Transportation Plan* (LRTP) through 2030, trucks account for 65 percent of all freight shipments in Broward County by weight, with 4 percent moving by rail, 31 percent moving by water, and less than 1 percent moving by air. In addition, trucks are even more important in the transport of high-value, low weight commodities, such as electronics and other consumer goods.[15] The LRTP is currently being updated.

Recognizing the critical impacts that freight transportation has not only on the movement of goods and people, but also on the County's economic competitiveness, environment, and overall quality of life, the Broward County Metropolitan Planning Organization (MPO) has fostered several initiatives to develop and implement a planning program for freight transportation. The most recent of these, which was being conducted at the same time as Phase II of this Plan, is an *Urban Freight and Intermodal Mobility Study* that will have a special focus on Port-related freight. The Consultant Team and Port staff continue to coordinate Plan development with the MPO

[15] Kittelson & Associates, Inc., Broward County MPO, *2030 Long Range Transportation Plan* Update March 2005.

High numbers of truck crashes, at-grade rail crossings, and drawbridges negatively impact the flow of freight moving into, out of, and through Broward County. Operational strategies designed to improve the flow of vehicles on the highway system during peak hours -- such as the use of high-occupancy vehicle (HOV) lanes on I-95 and restricting trucks to the right lanes of I-95 -- may benefit passenger travel in the region, but appear to hinder the safety and efficiency of truck flows.

FDOT is also conducting several studies that are of particular relevance to efficient transportation access to Port Everglades. These include the *I-595 Master Plan Study* and the *South Florida East Coast Corridor Transit Analysis Study*. The first of these studies is summarized below; the second follows the discussion of the FEC later in this section.

I-595 Master Plan. FDOT initiated a Master Plan Study in 1994 to develop realistic improvements for I-595 and to address the future mobility needs of the corridor (see Figure 1.11-2). As part of a three-tier Master Planning process, numerous alternatives were evaluated and presented to the Broward County MPO and Federal Highway Administration (FHWA), both of which approved an I-595 Locally Preferred Alternative (LPA).

Subsequently, in the spring of 2004, FDOT initiated a I-595 PD&E Study, the boundaries of which extended from the I-75/Sawgrass Expressway interchange to east of I-95. This 13-mile corridor includes a parallel frontage road system provided by SR 84. Major system connections include I-95, SR 7 (US 441), Florida's Turnpike, and the I-75/Sawgrass Expressway interchanges.

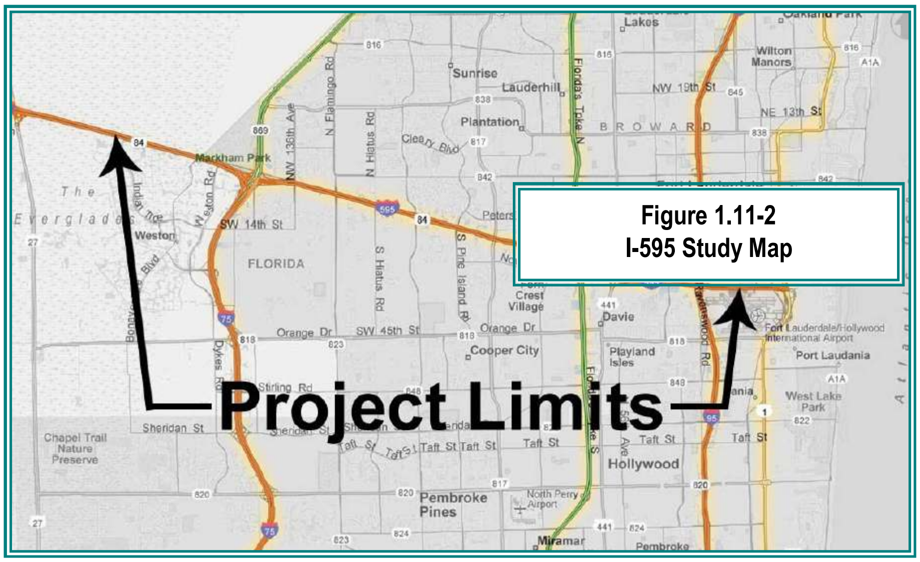


Figure 1.11-2
I-595 Study Map

On June 29, 2006, the FHWA granted Location Design Concept Acceptance for $1 billion in proposed improvements to I-595. This approval allows FDOT DIstrict 4 and Florida's Turnpike Enterprise to advance 15 projects into design, right-of-way, and ultimately construction. The LPA to this key SIS Corridor that is critical to Port access includes the following elements:

- Transit System: Plans are to extend transit from I-75/Sawgrass Mills to the Airport, Tri-Rail, and Downtown locations. The *Central Broward East-West Transit Alternatives Analysis* is defining an alignment and technology within the I-595 right-of-way. The transit study results will be integrated into I-595 PD&E Study to develop the roadway access requirements for transit stations.

- Reversible Lanes. A new physically separated, two-lane reversible roadway will be located in the median of I-595 from west of Nob Hill Road to east of SR 7 to facilitate long-distance trips.
- State Road 84 Connection: This connection, east of Davie Road, will be part of a collector/distributor system to provide access to and from I-95, SR 7, Florida's Turnpike, Davie Road, and State Road 84.
- Widened and Braided Ramps. Nine on and off ramps will be widened to two lanes, plus braided ramps at five locations to minimize weaving conflicts.
- Intelligent Transportation Systems (ITS). Improvements will include service patrols, installation of variable message signs, loop detectors, closed circuit television, ramp improvements, and the implementation of an Intelligent Corridor System.

The most extensive improvements are proposed for the I-595 corridor between SW 136th Avenue and the I-95 interchange.

1.11.3 Railroads: Freight and Passenger Systems. Two rail corridors exist in South Florida. The first is the rail freight corridor owned and operated by the FEC. The second is the shared freight/passenger SFRC -- the former 81-mile CSX Transportation Inc. (CSXT) right-of-way between approximately Miami International Airport and West Palm Beach – purchased by FDOT in 1988. The CSXT railroad has operating rights over this corridor and Amtrak and Tri-Rail operate their passenger services on it.[16]

FEC Railway. The FEC is the transportation division of Florida East Coast Industries, which provides both rail and truck drayage services. This railroad operates between Jacksonville and Miami, over a distance of 351 miles. Paralleling the Atlantic coast the length of the state, the FEC right-of-way provides the most direct rail route between Jacksonville and South Florida and serves Florida's most densely populated markets (see Figure 1-11.3). From Jacksonville, the FEC provides connecting rail service with two Class I railroads: the Norfolk Southern (NS) and the CSXT. It is the sole rail service provider to Port Everglades as well as to the other two South Florida ports.

The FEC moves freight to and from South Florida and within the state through its Bowden Yard rail center in Jacksonville. In addition to its short-line rail service linking South Florida with the NS and the CSXT in Jacksonville, the FEC provides connecting branch line service between

[16] In August 2006, the Governor of Florida announced an agreement in principle between FDOT) and CSXT that provides for transfer of operational control of the SFRC to the state. The agreement in principle will give FDOT and the South Florida Regional Transportation Authority control of maintenance and dispatch of passenger and freight trains along the 81 miles of Tri-Rail corridor between West Palm Beach and Miami, while also opening the possibility of commuter rail in Central Florida.

Fort Pierce (Mile Post 242 on the FEC line) and South Bay on the South Central Florida Express (SCFE) rail line. This branch line service is operated under a trackage lease arrangement with the SCFE, which has a reciprocal Car Haulage Agreement between Fort Pierce and Jacksonville on the FEC system.

Bowden Yard is the northernmost rail service point on the FEC system and includes a switching yard and the FEC's Jacksonville intermodal transfer facility, located at the north end of the yard. Intermodal trains are initiated and terminated at this location and all of FEC's interline rail service passes through it:

- The NS interchanges all interline traffic at Bowden Yard for run-through[17] service between Jacksonville and Miami under a Car Haulage Agreement.
- The CSXT and FEC maintain an Interline Service Agreement, wherein CSXT makes deliveries and pickups at the Bowden Yard, and FEC reciprocates with deliveries and pickups at CSXT's yard.

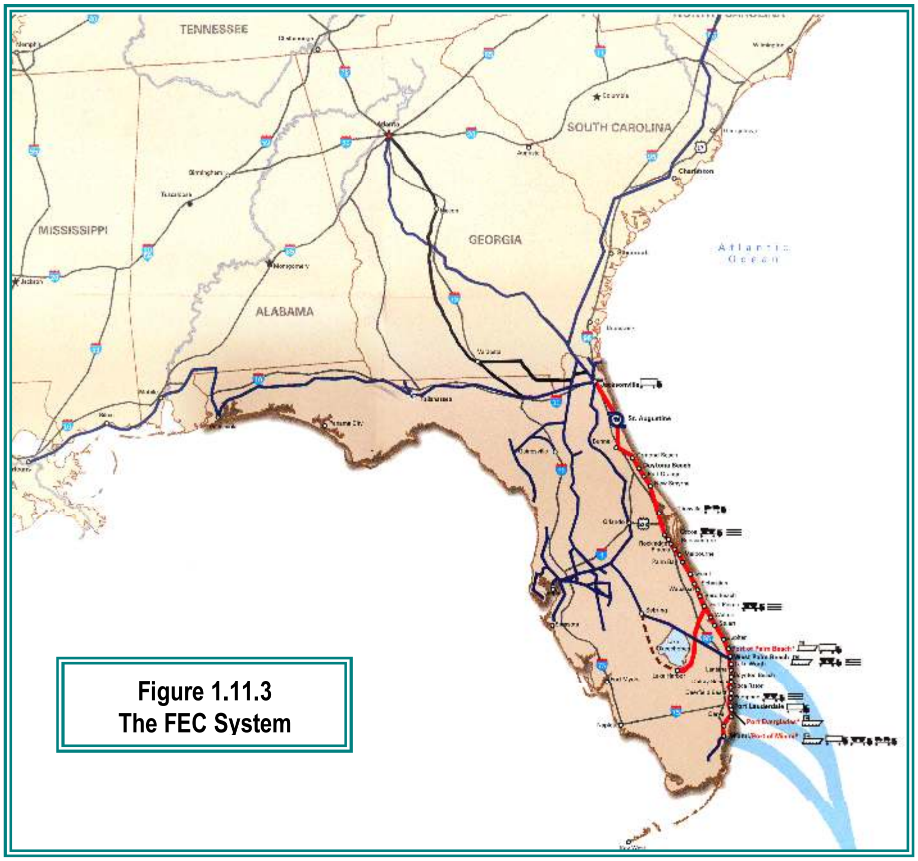


Figure 1.11.3
The FEC System

The FEC has maintained ownership of the rail right-of-way, which includes a 100-foot minimum width the entire length of their mainline system. More recently, segments of double track have been added to increase rail capacity and keep pace with rail traffic growth. As traffic grows, additional double track will be required.

Consolidated intermodal trains operate daily between Jacksonville and the South Florida points carrying domestic and international traffic. The FEC maintains intermodal facilities in its Hialeah yard in western Miami-Dade County and at its Andrew Avenue facility in Broward County, in proximity to Port Everglades. Both of these facilities are on the SIS, as is the entire length of the rail line.

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[17] "Run-through means traffic is moved as delivered and is not switched or reloaded.

Approximately 700 road/rail grade crossings occur between Miami and Jacksonville on the FEC mainline. Of these grade crossings, 210 lie between the FEC's Hialeah facility and the Port of Palm Beach.

Principal commodities carried by the FEC's rail transportation segment include automotive vehicles, crushed stone, cement, trailers-on-flatcars, containers-on-flatcars, and basic consumer goods. Truck drayage in support of intermodal service is provided by affiliates in Atlanta, Jacksonville, and Miami.

South Florida East Coast Corridor Study. FDOT initiated a study (SFECC) to consider the feasibility of providing passenger transit service from the Town of Jupiter in Palm Beach County through Broward County and on to Flagler Street in the City of Miami Central Business District (see Figure 1.11-4). The evaluation, currently at the end of the Tier 1 phase, is considering both

Figure 1.11-4 South Florida East Coast Corridor Study Map

freight and transit capacities necessary to meet the growing needs of this densely populated and highly congested corridor through 2030.

The SFRC includes existing Tri-Rail service that may be complemented and enhanced by new service/connections to employment and residential centers. At the same time, the three South Florida seaports, including Port Everglades, are focusing on the SFECC for new intermodal freight capacity, since opportunities for highway expansion are limited and roadway congestion is projected to increase. Any alternative selected must, therefore, reflect a balance between the movement of freight and people on the FEC line and be coordinated with the Port's planned ICTF development and the County's proposed IMC and People Mover between the Seaport and the Airport.

Tier 1 has resulted in the identification of an initial set of transit alternatives and selection of a set of independent corridor sections. To date, the following potential alignments have been identified:

- FEC Railway/Dixie Highway.
- U.S.1/Federal Highway/Biscayne Boulevard.
- I-95.
- Others (waterway, utility corridors, canal right-of-way, etc.).

Potential technologies being considered include:

- Commuter/regional rail.
- Heavy rail (e.g. Metrorail).
- Light rail.
- Bus rapid transit.
- Regional bus.

The objective is now to gain a Record of Decision from the Federal Transit Administration for each section. The study will then move forward into a more detailed Tier 2 analysis which will result in the identification and selection of one or more LPAs within the corridor. Multiple alternatives are likely, considering the range of the study area, the existing commuter rail service, the disparity in land use densities, potentials for rationalizing freight movement, and the need to integrate and balance passenger and freight needs.

CSX Transportation. CSXT -- the largest rail network in the eastern United States -- is the core business unit of CSX Corporation. CSXT provides rail freight transportation over a network of more than 23,000 route miles in 23 states, the District of Columbia and two Canadian provinces (see Figure 1.11-5). From its headquarters in Jacksonville, CSXT maintains an extensive rail network within Florida, which reaches from Jacksonville to Homestead, in south Miami-Dade County. This rail network extends south from Jacksonville through Orlando to Tampa. From a point east of Tampa, the CSXT rail line traverses southeastward across the state and into Palm Beach County. Starting in Palm Beach, the CSXT line parallels the FEC right-of-way south through Fort Lauderdale to its terminus in Opa-locka (known as the CSX Hialeah yard).

Despite the proximity of the CSXT rail line to the FEC line, the CSXT has no rail access rights into the ports themselves. Also, there is no freight intermodal interchange point between the FEC and CSXT south of Jacksonville. The two railroads do have the capability for the direct interchange of carload and aggregate traffic in West Palm Beach and Miami; but existing track structures are not adequate for the interchange of intermodal flatcars.

Between Palm Beach and Miami, CSXT and Tri-Rail services operate within the same rail right-of-way, that is, on the SFRC owned by FDOT. CSXT maintains freight service operating rights over this segment to continue serving customers within the Palm Beach, Broward, and Miami-Dade markets. The SFRC, which parallels I-95 for most of its length, carries Tri-Rail commuter trains, Amtrak passenger trains, and CSXT freight trains.

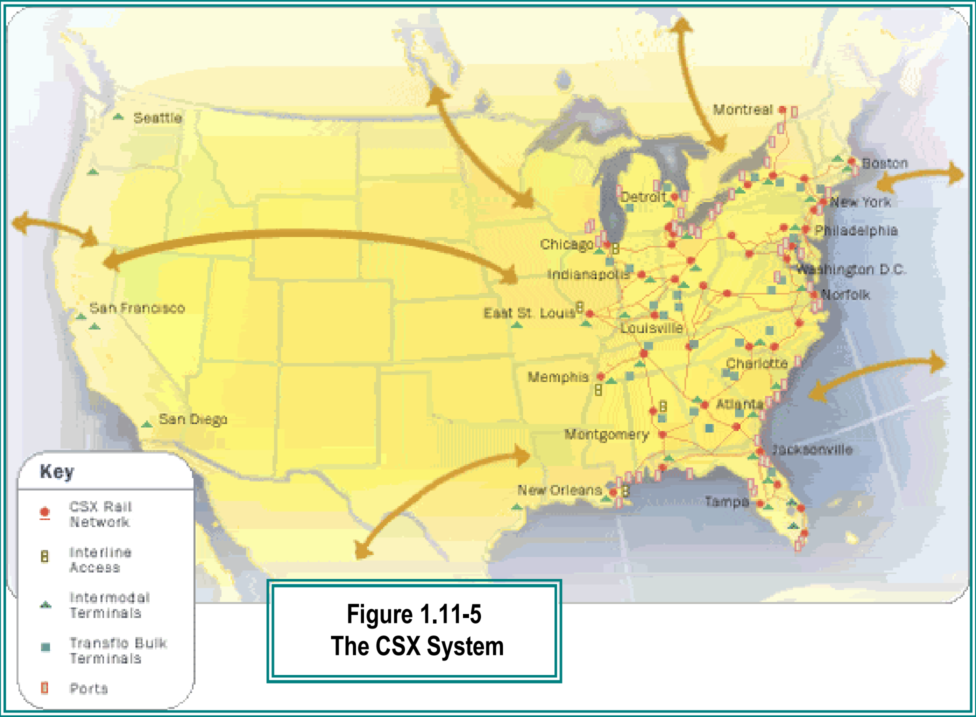

Figure 1.11-5
The CSX System

The portion of the SFRC right-of-way that CSXT uses between West Palm Beach and Miami has many fewer grade crossings than the parallel FEC line between the same two points. Grade crossings on the SFRC number approximately 75 compared with 210 on the FEC.

The CSXT rail system includes a westerly extension through Tallahassee and into Mobile and New Orleans, where it connects with other western rail carriers. It also extends in a northwesterly direction from the state line through Atlanta to Chicago and northward along the I-95 highway, with service to markets as far north as New York and New England.

The CSXT carries primarily bulk commodities, such as aggregates for the construction industry elsewhere in the state as well as carloads of consumer goods beyond state borders using the portions of its track to the north and west of Lake Okeechobee.

As part of an initiative to improve freight service and bring commuter rail to Central Florida, where the I-4 corridor is experiencing growing congestion, FDOT and CSXT are collaborating to improve infrastructure and expand capacity on two existing rail lines, one of which will be used to establish commuter rail service through a multi-county stretch in the region. The planned initiative includes:

Projects on the CSXT rail line between Baldwin to Plant City, referred to as the "S" line.

- Five road overpasses on the “S” line.
- Improvements on other CSXT rail lines around the state.
- Access roads to a new integrated logistics center that CSXT is planning in Winter Haven.

Like the SFECC effort in South Florida to balance freight and passenger needs, this Central Florida plan is looking at serving the needs of both commuters and freight shippers. The planned integrated logistics center is of particular interest to Port Everglades in terms of how it will affect the movement of goods through the state. The first phase is expected to be operational in 2009.

Norfolk Southern Railway Company. A third carrier, NS, operates rail service in Florida, but does not own right-of-way farther south than Jacksonville (see Figure 1.11-6). As noted earlier, NS provides direct service to South Florida under its Car Haulage Agreement with the FEC. Jacksonville is the NS's primary market service area in Florida and their rail service interchange point with the FEC. All NS rail interchange service into and out of Florida is classified through their Atlanta rail hub. From this hub, NS connects to their eastern United States rail network and assembles rail traffic for westward movement and connection to western Class I rail carriers.

Figure 1.11-6
The Norfolk Southern System Corridor

Amtrak. Amtrak is the long-distance passenger rail operator in South Florida. Long-term plans for Amtrak service expansion in the region have been impacted by funding constraints.

1.11.4 Airports

South Florida is the location of the most concentrated aviation activity in the state. In addition to Broward County's FLL, Palm Beach International and Miami International Airports provide scheduled air carrier service in the region. Because of the significant number of passengers who come from all regions of the U.S. and countries around the globe to cruise from Port Everglades as well as the Port of Miami-Dade, Seaport-Airport synergies are essential to the continued success of these operations.

Supporting the region's air carrier airports is a strong system of general aviation airports that provide facilities for business, recreational, flight training, and other types of aviation activities.

The three major international airports, all of which are hubs on the SIS, connect the region with domestic and international markets. The events of 9/11 and more recent terrorism and health concerns have affected passenger traffic worldwide and fuel and security costs have escalated; but the airports have recovered their pre-9/11 vitality. The degree to which these airports were affected by these events is a factor of their respective mixes of international and domestic passengers and cargo.

Fort Lauderdale-Hollywood International Airport. Once a small regional airport, FLL has become one of the nation's fastest growing airports in domestic boardings. With its preponderance of domestic passengers, it was also one of the quickest to recover from the events of 9/11. Less than 10 percent of its traffic is international; consequently, the airport was less affected by the worldwide decline in air travel than its heavily international counterpart in Miami-Dade County was.

In FY 05/06, as shown in Table 1.11-1, FLL enplaned more than 10.7 million passengers, and shipped almost 165,000 tons of air cargo. Approximately 35 domestic and

Table 1.11-1

FLL
Passenger, Cargo, and Aircraft Operations
2000 and 2006

Airport Statistics	2000	2006	Percent Change 2000-2006
Enplaned Passengers Total	7,638,142	10,680,736	39.8%
Cargo Total	277,172	165,186	-40.4%
Aircraft Operations Total	184,874	230,787	24.8%

Source: 2006 Annual Statistical Report, Broward County Aviation foreign-flag airlines serve FLL, offering non-stop service to more than 55 U.S. cities, Canada, the Bahamas, and the Caribbean. In terms of passengers, in 2005, FLL ranked 24th in the U.S. and 49th worldwide.

FLL Master Plan. Enplanements at FLL are expected to more than double, from 7.6 million in 2000, to 16.6 million by the year 2020 according to the FAA. To serve the more than 60,000 passengers arriving and departing the airport each day, the Broward County Aviation Department is preparing a major 2020 expansion plan. The 2020 plan focuses on the terminal area, but also includes a runway extension and air cargo development on the west side of the airport. FLL considers the runway extension its only opportunity to expand airfield capacity to accommodate growing air transportation needs. The potential impacts of FLL's master plan on the Port's planning initiative are discussed further in Element 3.

Continuing the previous expansion program that doubled the size of the terminal complex, added over 30 new gates and 10,000 parking spaces, and built a multi-level consolidated rental car facility, the 2020 plan further expands the terminal complex to more than 70 gates, increases parking to 19,000 spaces and improves airport roadways, including a new entrance. In addition to the proposed runway lengthening to 9,000 feet to accommodate air carrier aircraft, the 2020 Plan includes a new air cargo and maintenance center on the west side of the airport and preservation of right-of-way, between FLL and Port Everglades for the proposed People Mover.

1.11.5 Transit Systems

While transit is not typically a factor in port operations, the expansion of transit systems in Broward County and throughout the region has a role to play in reducing congestion on the major access roads to Port Everglades. As mentioned previously, in May 1988, the state of Florida, through FDOT, purchased the CSXT railroad (the former Seaboard Air Line railroad, built in the 1920s) corridor between West Palm Beach and Miami. This corridor, the SFRC, parallels I-95, with abutting rights-of-way in many areas. It extends from West Palm Beach, south approximately 76 miles to the vicinity of the 7th Avenue passenger station in downtown Miami. FDOT's purchase also included approximately five miles of the Homestead line in Miami-Dade County. The primary purpose of this purchase was to retain this strategic corridor for future transportation uses. CSXT and Amtrak retained rights to operate common carrier freight services and long-distance intercity passenger service, respectively.

Tri-Rail. Tri-Rail -- the commuter rail service linking the three South Florida counties over the SFRC -- began operations in 1989 between West Palm Beach and Miami over 66 miles of the 76-mile main line. Originally started as a traffic mitigation program during the lengthy reconstruction of I-95 in the region, Tri-Rail today, under the jurisdiction of the South Florida Regional Transportation Authority (SFRTA), carried more than 3 million passengers in 2006, 21.2 percent more passengers than in 2005. Since the system was double-tracked, and trains added, growth has exceeded 30 percent. The Tri-Rail system serves as a connecting link with the local transit services in South Florida, including Broward County Transit (BCT)

Broward County Transit. BCT provides a countywide network of fixed route bus service with several transit centers across the county providing connections between routes. BCT also oversees a special transportation service offering mobility to the transportation-disadvantaged. The agency has prepared a 10-year transit improvement plan which includes bus rapid transit service in several corridors.

1.11.7. Inland Waterways (Short-Sea Shipping)

An evolving alternative to moving freight by road or rail is the concept of short-sea shipping, the coastwise movement of containers or trailers which offers shippers, truckers and intermodal marketing companies the opportunity to shift intermodal cargo to the waterborne mode. This concept is being pursued at both the national and the state levels, and has the support of several Florida seaports. The state's lengthy coastline – with SIS Atlantic and Gulf waterways -- offers particular opportunities to utilize the concept effectively once specific policy issues have been resolved and the appropriate infrastructure built.

> Domestic Short-Sea Shipping*: Freight operations using the nation's coastal waters, lakes, and rivers to transport goods in containers or on trailers between U.S. ports as an alternative to road or rail transport.*

A 2003 study in Florida, sponsored by FDOT's seaport office, looked at opportunities for increased cargo transport on the state's commercial intracoastal and navigable waterway system.[18] The study concluded that scheduled coastal shipping is currently limited to only a few carriers, but operations in open water that could be characterized as "short-sea" operations, are conducted more regularly. The latter occur particularly in the domestic trade between Florida (the Port of Jacksonville) and Puerto Rico.

Constraints to the use of the inland waterways, such as the Atlantic Intracoastal Waterway that serves the three South Florida seaports, involve both infrastructure limitations and the appropriateness of specific cargoes. Generally speaking, water depths are not adequate in portions of the waterways and dedicated terminals that complement landside truck or rail operations are lacking. Also, only cargoes that are not time-sensitive, present a "critical mass," and can be regularly scheduled are suitable for this mode of transport. As an example, operations currently being conducted at South Florida ports are primarily for the transport of fuel. Also operating is a container barge service, which includes ports in the Northeast, Mid-Atlantic, and Southeast as well as Freeport in the Bahamas.

In its efforts to make better use of the nation's inland and coastal waterways to relieve highway congestion, the U.S. Maritime Administration (MARAD), launched a Short-Sea Shipping Initiative several years ago. This initiative included the Short Sea Shipping Cooperative

[18]Wilbur Smith Associates, CH2MHILL, and others, *Florida Intracoastal and Inland Waterway Study*, May 2003.

Program (SCOOP) of 60 public and private participants – including truck companies, shippers, railroads, terminal operators, port authorities, government entities, shipyards, equipment owners, environmentalists, labor, and others -- charged with investigating short-sea shipping alternatives to ease congestion and the strains on the nation's highways.

Subsequently, MARAD awarded a contract to analyze four case studies for market-viable short-sea shipping corridors, including origin/destination pairs. Port Canaveral was a participant in this study and is now working to develop an operational and economic model for successful, market-driven short-sea shipping.

The questions involved in determining whether the market is ready for short-sea shipping include:

- Can it provide cost-effective and timely alternatives to congested land routes and manage the increasing volumes of freight expected in the future, particularly the freight whose delivery is not time-sensitive?
- Can it offer shippers a cost-effective, reliable alternative to land transport to move their products to market?
- Can trucking companies be induced to use it as an alternative to highway congestion, driver shortages and rising fuel prices?

With the unprecedented volume of cargo coming out of China into the U.S., short-sea shipping is currently more prevalent on the West Coast, particularly the Northwest; but examples exist in the Florida market, including the longer distance roll-on/roll-off service Trailer Bridge provides between Jacksonville and San Juan. Columbia Coastal Transport and Crowley Maritime Corporation also provide a variety of services on the East Coast as well as elsewhere in the markets they serve. As all-water services bring more cargo through the East Coast ports, including Florida, short-sea shipping may become more interesting to truckers and others charged with moving goods across the congested road and rail networks on this side of the continent.

In early February 2007, short-sea shipping received new impetus from MARAD and the U.S. Congress. To give the initiative more visibility, MARAD renamed the concept as "America's Marine Highway, defining it as "an initiative encompassing commercial waterborne transportation which does not transit an ocean. It is an alternative form of commercial transportation that utilizes inland, coastal waterways and our Great Lakes to move commercial freight from one destination to another." Presumably, new legislation will be presented to Congress to support the initiative.

1.11-8. Intelligent Transportation Systems

In its efforts to alleviate highway congestion and promote more efficient traffic flows, FDOT is partnering with other states, as part of the I-95 Corridor Coalition, to develop innovative ITS solutions to their mutual traffic concerns. South Florida's seaports, which have benefited from the on-port and off-port ITS improvements implemented in recent years, are actively collaborating in this exchange of information technology to achieve faster, better, and cheaper freight movements.

ITS applications for seaports include closed circuit television monitoring, security command centers, fences and lighting, electronic gates, computerized access systems, Portal VACIS and STAR gamma ray units to detect stolen vehicles and heavy equipment, and the latest in RFID technology. They also include operational procedures ranging from staged provisioning of ships to new inspection methods to detect explosives and other agents.

From the highway perspective, reversible flow lanes designed to add capacity in the peak direction during peak travel times are planned for I-95 and use of the latest technology is proposed for several major projects to ease traffic congestion.

Broward County has implemented many ITS projects that facilitate travel across the roadways essential to the mobility of Port Everglades' users. In addition to traffic management and traveler information systems, such projects include the dynamic message signs that are in place along the I-595 corridor and the I-95 corridor near interchanges that share a common arterial linkage with Florida's Turnpike in the county; other signs are planned near east-west arterials that cross the Intracoastal Waterway and along adjacent north/south arterials (i.e., SR 5, SR A1A) within Broward County.

Cognizant of the importance of clear signage to maintain efficient vehicular circulation throughout its facilities, the Port has developed a comprehensive signage program for portwide implementation.

1.11.9 Regional Transportation Planning in the South Florida MSA.

As noted previously, the urbanized areas encompassing parts of Miami-Dade, Broward, and Palm Beach Counties were merged into one MSA in June 2003. Because of the size and complexity of this MSA, the three MPOs in the region retained their individual designation; but must develop and implement a coordinated planning process to achieve:

- A regional long-range transportation plan covering the combined metropolitan planning area and serving as the basis for each MPO's Transportation Improvement Program.
- A coordinated project prioritization and selection process.
- A regional public involvement process and a coordinated air quality planning process.

To date, the three MPOs in South Florida have formed a Regional Planning Committee comprising representatives from:

- Miami-Dade MPO.
- Broward County MPO.

- Palm Beach County MPO.
- FDOT District 4.
- FDOT District 6.
- SFRTA.
- BCT and the other two transit operators in the region, Miami-Dade Transit (MDT) and Palm Beach Transit (Palm Tran).

That Committee has defined corridors of regional significance, including:

- Interstate and expressways (urban or rural principal arterials operating as interstate and expressway facilities).
- Major regional arterials (urban or rural principal arterials that cross county lines).
- Minor regional arterials (urban or rural principal arterials with two or more connections to the interstate and expressways facilities).

The Committee has also developed the following Regional 2030 Long-range Transportation goals:

- Improve regional transportation systems and travel.
- Support regional economic vitality.
- Enhance regional social benefits.
- Mitigate regional environmental impacts.
- Integrate regional transportation with land use and development considerations.
- Optimize sound regional investment strategies.
- Provide for a safer and more secure transportation system for residents, businesses, and visitors.

Given the cross-county intermodal connectivity required for Port Everglades to move goods and people efficiently and cost effectively, this regional planning initiative is constructive and the Committee's goals are consistent with the Port's Mission and this Plan update.

Other plans and studies that are relevant to this Plan include:

- Broward County Comprehensive Plan.
- Broward County MPO 2030 LRTP.
- Comprehensive Plans of the Cities of Fort Lauderdale, Hollywood, and Dania Beach.
- Florida Transportation Plan.
- Florida Strategic Intermodal System Plan.
- Florida's Intelligent Transportation System Strategic Plan.
- I-595 Master Plan.

- FLL Master Plan.
- FLL/Port Everglades Multimodal Connector Major Investment Study.
- Broward County Signal System Master Plan.
- Urban Freight and Mobility Study.

1.11.10 Intermodal Connectivity between Port and Regional Warehousing/Distribution Facilities

South Florida, particularly Miami-Dade and Broward Counties, is home to a large number of warehousing, distribution, and other trade-related enterprises. As a group, the transportation, warehousing, manufacturing, and wholesale trade sectors account for almost 400,000 jobs in the three counties.[19] In Broward County, employment in these sectors represents 17.0 percent of the workforce; in Miami-Dade County, it represents 20.6 percent of the work force, or more than one in five jobs; and in Palm Beach County, 14.5 percent.

Warehousing and distribution centers are concentrated in several areas of the region, with perhaps the heaviest concentration in the Airport West area of Miami-Dade County. Regionwide, concentrations include:

Miami-Dade

- West of Miami International Airport, south of Okeechobee Road (U.S. 27), and between the Palmetto Expressway and the Homestead Extension of Florida's Turnpike.
- Along NW 37th Avenue.
- To the west of Opa-locka Airport.

Broward

- To the west of FLL.
- South of I-595 in Davie.
- In an area of Weston.
- Along I-95 near Sample Road.
- 10th Street at the Sawgrass Expressway.

Palm Beach

- Along I-95 at Yamato Road.
- North of Palm Beach International Airport.
- Along the I-95 corridor from 45th Street to North Lake.
- In the two railroad corridors.

Access to these areas involves the use of the local street network as well as the major highways. Thus, the connectors between these centers and the state system need to be included in any effort to expedite the movement of goods within the region.

A recent article in *Miami Today*[20] described just how important this connectivity is to the trade community:

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[19] U.S. Census Bureau, 2000.
[20] *Miami Today*, Week of Thursday February 22, 2007.

"Miami-Dade County's warehouse market is flush with foreign companies looking to distribute products from here, weighing proximity to Latin America and attractive shipping options over tight warehouse space and rising rental rates…[They] see our area as the ideal location to tap both the Eastern United States and Latin American and Caribbean markets…"[But, as one shipper stated], it is often more convenient to send …trucks to Port Everglades in Broward County."

The business connections between the warehousing and distribution facilities in one county and the seaport in another is what contributes to the regional synergies in South Florida and the dynamism of its trade and maritime community. This dynamism is, however, directly dependent on the intermodal transportation network.

1.12 Environmental Conditions

This section addresses the environmental conditions and planning considerations associated with the ongoing operations and the future development of Port Everglades. Specific areas addressed include dredged material disposal areas, wetlands, endangered species, wildlife habitat, estuarine systems, coral reef structure, stormwater management, former waste disposal sites, proposed maintenance and construction dredging programs, and the Port's Green Port Program.

1.12.1 Habitat and Species Overview

Port Everglades, through its Entrance Channel, serves as the primary access to the Atlantic Ocean for marine interests in Broward County, including commercial carriers and recreational boaters (see Figure 12.1-1). The Port was established in 1928 when a permanent inlet was created between Lake Mabel and the ocean. Prior to the opening of the channel, Lake Mabel was a local freshwater lake system, which exhibited fresh water vegetation dominated by maiden cane, saw grass, arrowhead, and pickerel weed.

Figure 12.1-1
Aerial Map of Port and Inlet
Source: SWC, 2007

The creation of Port Everglades' ocean inlet, together with the completion of the Intracoastal Waterway to Miami in 1912, completely transformed this fresh water habitat to its current brackish/marine wetland environment. Today, the dominant plant species in and around the Port include salt-tolerant plants such as red, white, and black mangroves. These wetland plants serve as important habitat for marine life such as mollusks, crustaceans, fish and their juvenile offspring, various marine organisms including nourishing algae, and numerous resident and migrating bird species.

Because of the natural habitat values they provide, mangroves are a protected wetland resource in Broward County. The ACOE, the Florida Department of Environmental Protection (FDEP), the South Florida Water Management District (SFWMD), and the Broward County Environmental Protection Department (EPD) regulate any dredging and filling activity within mangrove habitats. It is the purpose and intent of these agencies to ensure there will be no net loss in the function and value of existing wetland habitats. Therefore, any adverse impacts to existing mangroves are regulated by avoidance as the first priority, minimization as the second priority, and mitigation as the third priority.

The waters surrounding Port Everglades also provide habitat for a variety of seagrasses, including *Halophila johnsonni* (Johnson's grass), *Halophila decipiens* (Paddle grass), and *Halodule wrightii* (Cuban shoal grass). In 1998, *H. johnsonni* was listed as an endangered marine plant. Adverse impacts to seagrasses are regulated in the same manner as mangroves and other coastal wetland plants by federal, state and county environmental protection agencies.

The Outer Entrance Channel, an area leading into Port Everglades from the Atlantic Ocean, acts as a habitat for coral species such as *Siderastrea siderea* and *Stephanocoenia intersepta*. The outer reef exhibits live growth, with turf algae being the most dominant, followed by macro-algae, sponges, octocorals, scleractinians, zonathids, and tunicates. The system exhibits only less than 1 percent coral growth. This marine habitat is also regulated by federal, state, and county environmental protection agencies.

In addition to the plant and animal life described above, the waters surrounding Port Everglades also serve as habitat for the West Indian manatee, a federally endangered species. The "Manatee Season" extends from November 15 through March 31 and marks the primary migratory period for manatees from northern winter waters to the warmer waters along Florida's southern coast as a results of sustained cold fronts. The Florida Manatee Sanctuary Act of 1978 established the entire state of Florida as a "refuge and sanctuary for the manatees" and allowed for the enforcement of boat speed regulations in manatee-designated protection zones. The West Indian manatee is protected federally by both the Marine Mammal Protection Act of 1972 and the Endangered Species Act of 1973. Port Everglades is one of about two dozen manatee wintering sites designated as a manatee protection zone.

Port Everglades has established a number of policies and procedures to help increase awareness of and further protect the West Indian manatee; these include:

- **Florida Manatee Sanctuary Act** – Port Everglades was instrumental in having the commercial exemption clause removed from the Act. As a result, speed restrictions within designated protection areas now apply equally to all watercraft.

- **Manatee Signage** – The Port has worked with the Florida Inland Navigation District to increase the number of manatee warning signs in and around the Port.

- **Manatee Nursery Area** – The former "EPA Slip" located within the FPL Discharge Canal was designated as a Manatee Nursery Area and is restricted to boaters and to the general public.

- **Manatee Studies** – The Port has helped fund studies on manatee migration and feeding habits within Sanctuary Areas. Data obtained from these studies have helped in the enhancement and creation of manatee habitats and in the continuing efforts to protect manatees.

- **Manatee Protection Plan for Dredging** – The Port was an active participant in establishing a Manatee Protection Plan, which is utilized during all dredging projects. Whenever possible, dredging projects are scheduled outside of the winter manatee season and in those cases where that is not possible, the contractor is required to implement a system where trained staff maintain an intensive manatee watch during the limits of the project. Since this program was initiated, no reported deaths or injuries to manatees have occurred during a Port Everglades dredging project.

- **Manatee Protection Plan for Blasting** – A Manatee Protection Plan similar to the plan for dredging activities will also apply to any future blasting project.

- **Manatee Lagoon Improvement** – The Port obtained the necessary permits to deepen a shallow lagoon located within the existing mangrove estuary south of Berth 29. This area now offers refuge and protection for manatees during the complete range of the tidal cycle.

- **Lagoon Protection at John U. Lloyd State Recreation Area** – The mitigation program for the Port's Turning Notch included the following additions and improvements at John U. Lloyd State Recreation Area:

  - Installation of floating boat barriers at a manatee lagoon to prevent boats from entering the area.
  - Construction of an award-winning environmental educational facility.
  - Removal of exotic plant species.
  - Planting of 6,500 native upland plants to beautify the landscape.

- Creation of 23 acres of wetlands, involving planting of 160,000 red mangroves.
- Construction of 7,300 lineal feet of rip-rap.
- Creation of access channels into mitigation areas for fish migration to the mud flats for foraging.
- Construction of an observation boardwalk which allows the public to observe wetland habitats.

As an example of Port Everglades' initiatives in sustainable development and in the protection of surrounding recreational and commercial use areas, the Port has started to implement a comprehensive environmental policy known as the "Green Port Program," a commitment to comply with all local, state, and federal regulations, as discussed below. The goal of the program is to protect environmentally sensitive resources. Reflecting its continual endeavor to improve operations, the Port will annually review the environmental objectives and targets through documentation and implementation of the Program and advise Port employees and Port tenants of their progress through internal/external communication procedures.

1.12.2 ACOE Feasibility Study and Environmental Impact Statement

The ACOE, in conjunction with Port Everglades, is conducting studies for the widening and deepening of the Port's harbor and channels. The expanded waterways will allow a *Susan Maersk*- class cargo vessel to pass safely when a *Voyager of the Sea*-class cruise ship is at berth. Additional improvements to the inner/outer Entrance Channel, Main Turning Basin, South Extension of the Main Turning Basin, the Turning Notch, and the Dania Cut-off Canal are also being evaluated for environmental impacts. The Feasibility Study/ Environmental Impact Study will evaluate different alternatives to meet program objectives and will address the environmental impacts and costs associated with each alternative. The ultimate objective of the study will be to obtain federal funding for the project and to obtain the required environmental permits to deepen and widen the Port's channels.

The study's objectives are as follows:

- Deepen the north turning basin to accommodate *Voyager of the Sea*-class vessels.
- Deepen the main turning basin to accommodate larger and deeper-draft petroleum vessels.
- Deepen the south extension of the main turning basin to accommodate Panamax vessels.
- Expand the turning notch to accommodate post-Panamax vessels.
- Deepen and widen the Southport channel to accommodate *Susan Maersk*-class vessels.

- Deepen and widen the Dania Cut-off Canal to accommodate Bellatrix vessels.

- Provide for a new turning facility at the Dania Cut-Off Canal and Intracoastal Waterway to position vessels entering and exiting the Canal.

The ACOE has held a series of coordination meetings with the regulatory agencies and other affected parties to solicit input and provide incremental updates on the progress of the study. The ACOE originally identified four non-structural alternatives and sixteen structural alternatives for meeting the study objectives, which were evaluated for environmental impacts as well as costs. A no-action plan was also considered throughout the process. The ACOE has had a number of additional meetings with resource agencies to formulate and screen design alternatives, and continuous progress is being made toward completion of the study.

In addition to reviewing project alternatives, the ACOE is also evaluating disposal options for the dredged material. The project is expected to generate in excess of 7 million cubic yards of dredged material. Currently, the ACOE is considering Airport and/or offshore disposal options. The Broward County Aviation Department is performing an engineering study to evaluate an approximately 64-acre site west of the Port as a possible disposal area for the dredged material that would be associated with extension of the south runway at FLL.

1.12.3 West Lake Park

Port Everglades, in partnership with FLL, will fund the design, permitting, and construction of a comprehensive environmental restoration and enhancement project at West Lake Park, located directly south of the Port, to provide up-front compensation for wetland impacts resulting from the improvements to Airport and Seaport facilities. The project includes:

- Installation of culvert connections to increase flushing of an approximately 1,500-acre mangrove forest.

- Installation of tidal flushing channels.

- Construction of a riprap/crib structure for shoreline stabilization along approximately three miles of shoreline adjacent to the mangrove edge along the Intracoastal Waterway and for approximately 1.5 miles along the Dania Cut-off Canal.

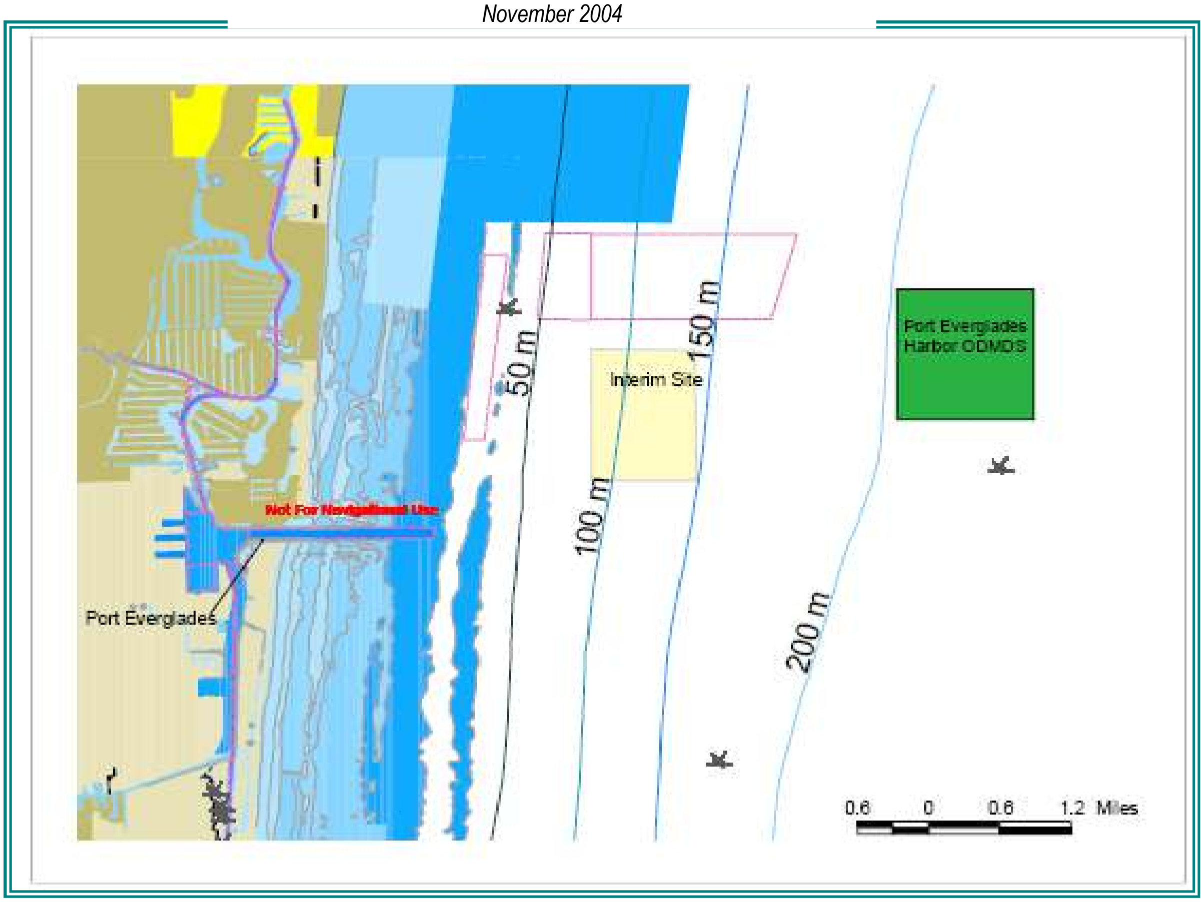
- Scrape down and/or removal of exotic vegetation from approximately 63 acres of upland soil to create mangrove, mudflat, tidal flats and pools, seagrass, and maritime hammock habitat, along with exotic removal in smaller areas throughout the park.

The project will result in the creation of 24.2 acres of mangrove habitat, 7.0 acres of mud flats/tidal pools, 8.6 acres of tidal channels, 8.0 acres of seagrass habitat, 13.4 acres of marine hammock, 1.9 acres of structural habitat (riprap/crib structure), and 2.0 acres of supplemental structural restoration (along the Dania Cut-off Canal). Permits for this ambitious environmental restoration project have been issued by the SFWMD (Permit No. 06-04-16-P issued April 14, 2004), and the ACOE (Permit No. SAJ-2002-00072(IP-LAO) issued March 2, 2006).

1.12.4 Planning Considerations

Dredged Material Disposal Areas – Limited areas are available to the Port for the disposal of dredged materials. With the exhaustion of possible alternative locations to place fill on land, the U.S. Environmental Protection Agency (EPA) and ACOE have suggested ocean dredged material disposal sites (ODMDS). In a meeting between regulatory agencies in November 2004, the tentative site depicted in Figure 1.12-2 was selected.

Figure 1.12-2
ACOE and EPA Map of Proposed ODMDS
November 2004



The proposed potential Port Everglades ODMDS is a 1 nautical mile by 1 nautical mile square area located 4 nautical miles off the Broward County coast, with the center of the area at 26 07.00'N Latitude and 80 01.50 W longitude. The bathymetric elevation ranges from 195 meters to 215 meters deep. The Port ODMDS has not previously been used as a disposal area

Three specific ODMDS management goals were specified by the agencies at the 2004 meeting: marine environmental protection, beneficial use of dredged material whenever possible, and documentation of disposal activity at the site. Disposal levels have been limited in the past at the nearby interim site to no more than 30,000 cubic yards annually. A proposal has been made to limit the volume of the disposal events at the ODMDS to 500,000 cubic yards per project; any amount in excess will require additional capacity studies.

The dredge material is also being considered for use in fill for the potential Airport runway expansion project as well as for Port use. The material is proposed to be carried to the disposal site by a slurry pipe running parallel with existing roads to minimize any wetland or other environmental impacts.

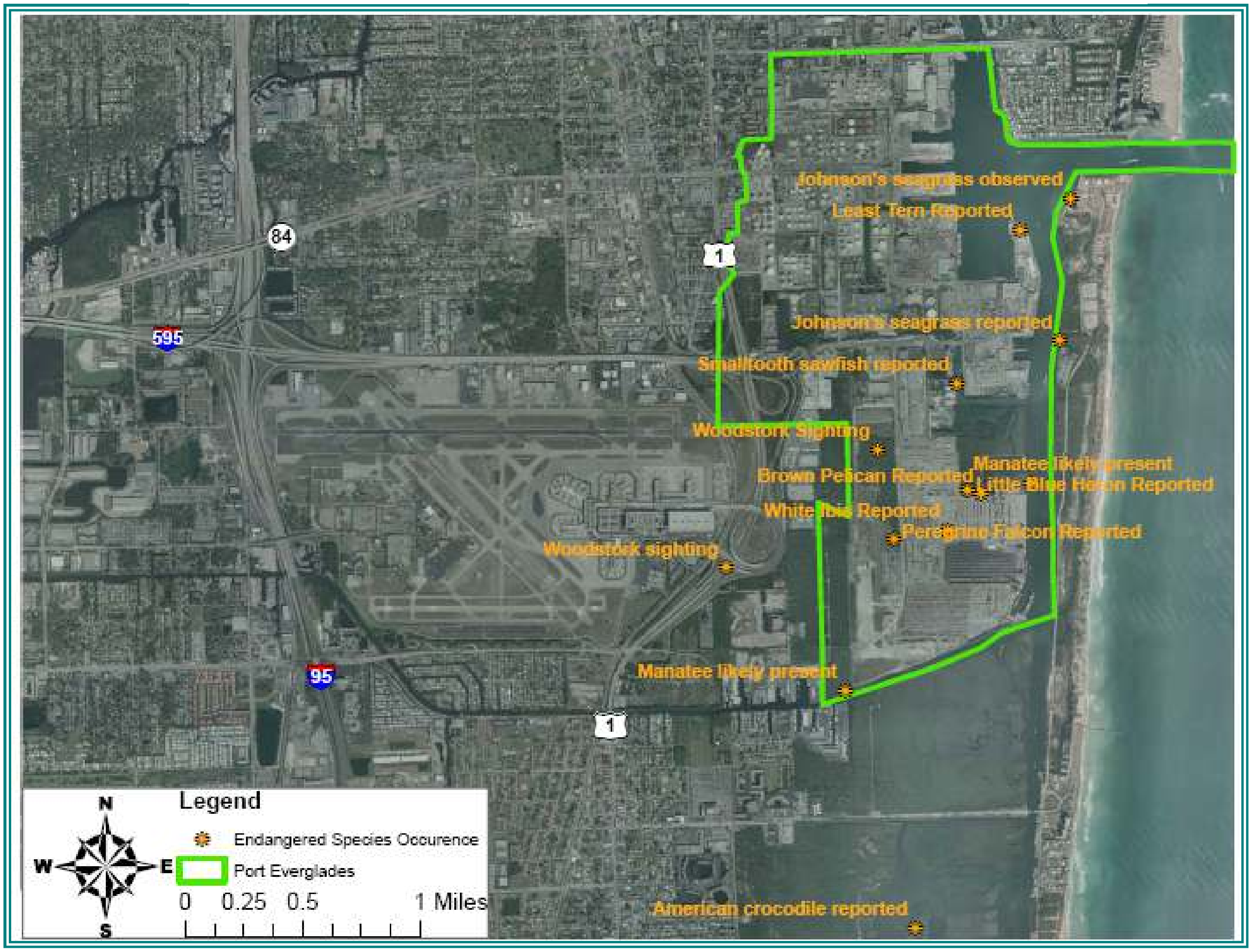
Landfill Area –This area is currently a leased parcel for cargo operations. A portion of the area is presently being used as a container storage yard and the balance of the area has been designed to serve in the same capacity. The design of these container storage yards has taken into account the potential impacts of the old landfill. This landfill was deemed inactive by the Broward County EPD and a no-further-action order was issued on the basis that no construction is to be done on the site and it would not be rezoned or redeveloped as a high population density use. The closure letter, dated October 28, 1992, indicates that ground soil contamination still existed that could not be attributed to saltwater intrusion, consisting of manganese, BOD, ammonia, and phosphorus. All monitoring wells either have been locked to prevent vandalism or have been properly abandoned.

Wetlands – As mentioned previously, mangroves are the dominant wetland plant species at Port Everglades. An approximately 50-acre mangrove stand is located to the west and north of the Southport Turning Notch. This area is encumbered by a conservation easement issued to FDEP. The Port is currently evaluating the feasibility of obtaining the required environmental permits to release 8.7

acres of the conservation easement and dredge that area to expand the turning notch and create additional dock space. One possibility is that mitigation credits from the comprehensive restoration project at West Lake Park could be applied to offset the impacts associated with the Turning Notch expansion discussed above. The Broward County EPD has indicated that opportunities to mitigate for impacts to coastal wetlands (mangroves) are very limited in Broward County. Future opportunities may, however, arise as the EPD continues to further define the County's natural resources and identify areas of need for mangroves and other coastal wetland areas.

Endangered Species - The following species of fauna listed by state or federal agencies as endangered or threatened have been reported to occur in the Port Everglades area (see Figure 1.12-3):

Figure 1.12-3
Reported Sightings and Likely Presence of Endangered or Threatened Species
Source: SWC 2007



- West Indian manatee (*Trichechus manatus*).
- *Halophila johnsonii* seagrass.
- Three species of sea turtles—Loggerhead sea turtle (*Caretta caretta*), Green sea turtle (*Chelonia mydas*) and Leatherback (*Dermochelys coriacea*).
- Wood stork (*Mycteria americana*).
- Small-toothed sawfish (*Pristis pectinata)*.
- Brown pelican (*Pelecanus occidentalis*).

- Least tern (*Sterna antillarum*).
- Peregrine falcon (*Falco perigrinus*).
- White ibis (*Eudocimus albus*).

Other species of concern that could be present in the area include the Mangrove rivulus (*Rivulus marmoratus*), American alligator (*Alligator mississippiensis*), American crocodile (*Crocodylus acutus*), Eastern indigo snake (*Drymarchon corais couperi*), Gopher tortoise (*Gopherus polyphemus*), Gopher frog (Rana capito), American oystercatcher (*Hamaetopus palliates*), Bald eagle (*Haliaetus leucocephalus*), Black skimmer (*Rhynchops niger*), Florida burrowing owl (*Athene cunicularias*), Florida sandhill crane (*Grus canadensis pratensis*), Kirtland's warbler (*Dendroica kirtlandii*), Limpkin (*Aramus guarauna*), Little blue heron (*Egretta caerulea*), Piping plover (*Charadrius melodus*), Roseate spoonbill (*Ajaia ajaja*), Snail kite (*Rostrhamus sociabilis plubeus*), Snowy egret (*Egretta thula*), Southeastern American kestrel (*Falco sparverius paulus*), and the Tricolored heron (*Egretta tricolor*). There have been no recorded sightings of these species, but several are reported in agency publications to be highly likely to occur at the Port. Table 1.12-1 provides a summary of listed species reported to occur or highly likely to occur in the Port Everglades area.

Table 1.12-1
Protected Wildlife Potentially Present in Southern Broward County around Port Everglades

Source: SWC, 2007

Species		Designated Status[A]		Reported Sightings within Port Everglades Area
Common Name	**Scientific Name**	**Federal**	**State**	
FISH				
Mangrove rivulus	*Rivulus marmoratus*	-	SSC	No
Smalltooth sawfish	*Pristis pectinata*	E	Prohibited[B]	Yes
REPTILES AND AMPHIBIANS				
American alligator	*Alligator mississippiensis*	T (S/A)	SSC	No
American crocodile	*Crocodylus acutus*	E	E	No
Eastern indigo snake	*Drymarchon corais couperi*	T	T	No
Gopher tortoise	*Gopherus polyphemus*	-	SSC[C] (to be reclassified to T)	No
Gopher frog	Rana capito	-	SSC	No

Species		Designated Status[A]		Reported Sightings within Port Everglades Area
Common Name	**Scientific Name**	**Federal**	**State**	
Loggerhead sea turtle	Caretta caretta	T	T	Yes
Green sea turtle	Chelonia mydas	E	E	Yes
Leather Back sea turtle	Dermochelys coriacea	E	E	Yes
BIRDS				
American oystercatcher	*Hamaetopus palliates*	-	SSC	No
Bald eagle	*Haliaetus leucocephalus*	T	T[C] (to be delisted)	No
Black skimmer	*Rhynchops niger*	-	SSC	No
Brown pelican	*Pelecanus occidentalis*	-	SSC	Yes
Florida burrowing owl	*Athene cunicularias*	-	SSC	No
Florida sandhill crane	*Grus canadensis pratensis*	-	T	No
Kirtland's warbler	*Dendroica kirtlandii*	E	E	No
Least tern	*Sterna antillarum*	-	T	Yes
Limpkin	*Aramus guarauna*	-	SSC	No
Little blue heron	*Egretta caerulea*	-	SSC	No
Peregrine falcon	*Falco perigrinus*	-	E (undergoing status reevaluation)	Yes
Piping plover	*Charadrius melodus*	T	T	No
Roseate spoonbill	*Ajaia ajaja*	-	SSC	No
Snail kite	*Rostrhamus sociabilis*	E	E	No

Species		Designated Status[A]		Reported Sightings within Port Everglades Area
Common Name	Scientific Name	Federal	State	
	plubeus			
Snowy egret	*Egretta thula*	-	SSC	No
Southeastern American kestrel	*Falco sparverius paulus*	-	T	No
Tricolored heron	*Egretta tricolor*	-	SSC	No
White ibis	*Eudocimus albus*	-	SSC	Yes
Wood stork	*Mycteria americana*	E	E	Yes
MAMMALS				
West Indian Manatee	*Trichechus manatus*	E	E[C] (to be reclassified to T)	Yes

Notes

A. SSC = Species of Special Concern; T = Threatened; E = Endangered; T(S/A) = listed as Similar in Appearance to a Threatened Taxon (American Crocodile); all statuses were verified July 2006 with Federal Register 50 CFR Part 17 and Florida Administrative Code Rules 68A-27.003, 68A-27.004 and 68A-27.005

B. The smalltooth sawfish is protected by Florida Administrative Code Rule 68B-44.008 as a “prohibited” species.

C. Reclassification will not occur until the FWC approves the management plan for each of these species. Management plan due dates are: gopher tortoise (June 2007), bald eagle (September 2007), and West Indian manatee (April 2007). The peregrine falcon reevaluation is ongoing.

Wildlife Habitat - The waters and lands in and around Port Everglades provide habitat for a variety of plants and animal wildlife. Numerous species of mammals, fish, and birds take refuge in the mangroves, canals, and trees that surround the Port. Impacts to these habitats are strictly regulated by federal, state, county, and local regulations. The waters to the south of the Port, including the waters bordering West Lake Park and Dania Cut-off Canal, could be considered essential fish habitat under the Magnuson-Stevens Fishery Conservation and Management Act of 2002 (67 FR 2343). These essential fish habitats supply the necessary waters and substrate to fish for spawning, breeding, feeding, and growth to maturity.

Stormwater Management. Both FDEP and the Broward County EPD have jurisdiction over all drainage and water management activities at Port Everglades. All new development on Port properties is required to provide water quality storage equal to 1 inch over the site or 2½ times the percentage of imperviousness. In addition, discharge into tidal waters is limited to the historical rate of discharge. At a minimum, roads and parking areas are maintained at the 10-year flood elevation and building floor elevations at the 100-year flood elevation.

In 2000, the Port contracted for the design of improvements to stormwater ditches in the Midport area. The proposed improvements included the cleaning of existing culverts and the widening and deepening of the existing drainage ditches north of Eller Drive and west of SE 14th Avenue. The "Stormwater Ditch Improvement" project has been completed and installation of sediment traps in the stormwater drains has commenced. Port tenants voluntarily clean and maintain the sediment traps.

1.12.5 Green Port Program

The proposed Green Port Program, which is still in the development stage, is the Port's progression to a holistic approach for managing the natural and man-made environment by integrating environmental decision-making into activities affecting Port operations, tenant utilization of Port property, Port users, and the general public. Progress is currently being made in the areas of clean air, water quality, wildlife and habitat protection, soil protection, waste reduction and elimination, recycling, use of green and recycled products, and interaction with tenants and users as well as the community at large. The proposed program is meant to be adaptable. A review team comprising Port staff, tenants, and other users will evaluate the program's progress on an annual basis and make adjustments when appropriate.

Air Quality. The Air Quality Program is the Port's commitment to reducing the amount of air emissions from Port/ tenant/other user operations. Initiatives include exchanging vehicles and other operating equipment that are highly dependant upon diesel fuel for more dependable and less polluting fuel sources, improving ground transportation and rail capabilities, implementing procedures for improving the Port's energy efficiency and performance, and actively participating in air quality legislation related to the Port industry.

The Port plans to convert diesel-fueled vehicles and equipment to less polluting Biodiesel 20 (B-20) fuel sources by 2010, with some vehicles and equipment eventually operating at Biodiesel 100 (B-100) by 2015. The Port is also purchasing electric forklifts to minimize the operation of diesel-run equipment. Alternative vehicles such as golf carts, electric dump trucks, and fuel-efficient hybrid vehicles are being used for transportation around Port grounds. To reduce emissions from queued vehicles, Port employees are now instructed to turn all vehicles off when in an idle position. In addition, more cargo will be placed onto improved rail facilities on and off Port property and will be transported during off-peak hours to reduce traffic congestion as well as air emissions caused from queued vehicles.

The Port Everglades Department retained an independent consultant, Trane of South Florida, to complete a comprehensive energy performance and facility upgrade project. The project will cost approximately $4.4 million to implement and includes replacing aging equipment with newer, energy-efficient models. Five areas have been targeted for conserving energy and reducing operating costs: lighting retrofit and control, air conditioning upgrades, more efficient chiller plants, window tinting, and a Port-wide energy management control system. The annual energy conserved from the project will result in an annual reduction in greenhouse gas emissions of 9.8 million pounds of carbon dioxide, 61,101 pounds of sulfur dioxide, and 17,091 pounds of nitrous oxide. The project is expected to be complete by the end of 2007.

The Port continues to actively participate in state and federal organizations concerned with air quality and research on alternative fuel sources. The Port participates in legislation and makes policy recommendations as a department of the Broward County government as well as a member of the American Association of Port Authorities.

Water Quality. The Port's mission in regard to water resources is to protect the quality of the waters within the surrounding Port area. Initiatives include implementation of dock inspection and spill kit programs, use of sediment traps and other Best Management Practices (BMPs), and monitoring of water quality discharges at Port maintenance facilities.

Port employees regularly patrol the docks for cleanliness before and after ship arrivals to prevent both liquid and solid substances from entering the waters. If the procedures are not followed, cleanup of the area is the responsibility of the vessel. The Port has also implemented a program where all dockside vehicles have on board a spill containment package including absorbents, absorbent booms, a dust pan, and a bag designed to collect oil and other absorbent materials in the event of a spill.

The Port uses a series of Best Management Practices (BMPs) to pre-treat and protect the quality of the water before it is discharged from the dock area, including the use of spill catchers at the fuel stations and fuel booms at the point of transfer to reduce spillage. Sediment traps are used to prevent clogging of the drainage system with debris and other materials that may prevent the efficient movement of stormwater. The Port has designed at least 25 of these types of structures to be included in its new Phase VIII construction of 36 acres of new container facilities at Southport and expects all construction by 2020 to have these devices installed.

The Port will continue to monitor water quality discharges at its three maintenance facilities. These three areas are monitored once a quarter during a rain event and are assessed annually, based on the results from each quarter.

Wildlife. The Port is committed to addressing the protection of wildlife within its property and along the waterways. This commitment includes implementation of species protection plans, adherence to special construction techniques and/or guidelines that address wildlife concerns, and participating in scientific programs associated with resource protection.

Many steps are being taken to protect the West Indian manatee during dredging projects and from routine boating traffic in the canals. The Port's dredge protection plan includes these guidelines to ensure manatee protection:

- Contractors are informed of manatee permit stipulations and life history traits prior to construction.

- A safety zone in which all work ceases upon sighting of a manatee is established approximately 300 yards from a drill or blast rig.
- Manatee observers and side scan sonar are utilized to monitor the presence of manatees within safety zones.
- Manatee warning signs are placed on all waterborne equipment.
- All water traffic proceeds at slow speed.
- Appropriate agencies are contacted in the event of injury or death to manatee individuals.

Other initiatives include year-round recording of manatee sightings on observation logs, installation of manatee grating devices on outfall pipes, installation of fenders on the sides of vessels that provide adequate space at berth to prevent wedging of manatees between the dock and hull of a vessel, restricting recreational access to the FPL Discharge Canal site, and supporting manatee research.

The Port also continues to protect the endangered sea turtle species that utilize the nearby waters and beaches. The development of a new lighting arrangement and installation of lighting shields on docks will redirect light onto the dock surface, reducing hatchling mortality by allowing turtles to orient quickly to the ocean's reflected light. The Port will also continue to participate in the Broward County Reef Tire Removal Program, a joint venture between county, state, and federal entities which will remove approximately 700,000 tires from nearby coastal waters that were originally intended to form artificial reef habitat. In addition, the Port continues to allow scientific studies to take place at the Port regarding wildlife, and limits public access to environmentally sensitive areas to prevent environmental degradation.

Soil Protection. The Port's mission is to protect the soils of the Port by strict adherence to BMPs both by its tenants and by Port construction activities. Therefore, all spills of petroleum onto and into the ground are addressed immediately so as not to contaminate the soils, the ground water underneath these soils, or the waters of the Intracoastal Waterway. The Port has been actively removing all underground storage tanks and replacing them with above-ground tanks that have double-wall protection. The Port also identifies subsurface areas that have been contaminated in the past by defective pipelines and effectively cleans the area through contamination removal. In addition, tenant leases contain many stipulations designed to protect Port property, such as requiring immediate remedial action be taken for any accidental spills or contamination of the Port environment.

Waste Reduction and Recycling. The Port continues to explore methods of reducing the amount of solid and liquid waste generated during operations by implementing a variety of recycling and waste reduction programs. Currently, the Port is recycling glass, plastic, colored and white paper, waste oil, absorbent rags, spent absorbent, batteries, tires, fluorescent tubes, print cartridges, and cardboard in the administrative building and are expanding these initiatives to other buildings and terminals. With waste reduction in mind, the Port has eliminated the use of mineral spirits. All communication is now done electronically to reduce paper waste, recyclable goods are preferably used, car stops are plastic instead of cement, and no aerosols are used on property.

1.12.6 Seagrass Mapping and Assessment

Dial Cordy and Associates Inc. (DC&A) was subcontracted in 1999 by Gulf Engineers and Consultants, Inc. (GEC) to conduct an environmental baseline and impact assessment for proposed deepening and widening of Port Everglades for the ACOE. In October 2006, the ACOE contracted DC&A to revisit Port Everglades and resurvey the seagrass to document any changes that may have occurred to seagrass communities in the preceding five to six years.

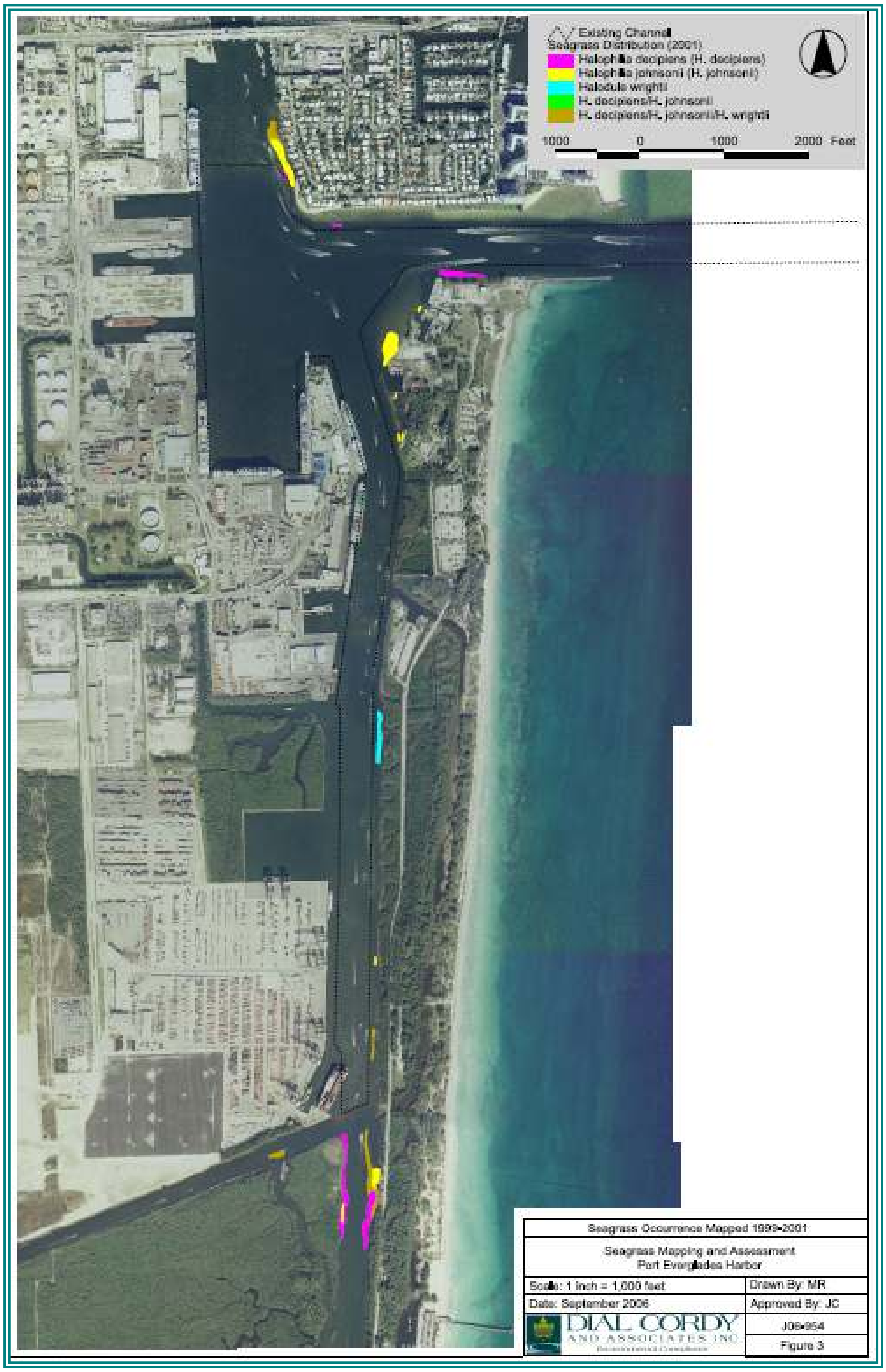
DC&A utilized geographic positioning systems (GPS) as well as self-contained underwater breathing apparatus (SCUBA) to effectively classify the quality of the seagrass beds and the quantity of coverage. DC&A concluded that seagrass coverage overall has minimally reduced from 8.71 acres to 8.44 acres, and the location and extent of species coverage has altered, as depicted in Table 1.12-2. Table 1.12-2 also shows that the species *H. johnsonii* and *H. wrightii* are being overgrown by *H. decipiens,* particularly in areas that were previously a mixture of all three species.

Most losses have occurred in the northern section of the study area and are attributed to recent storm events, specifically the hurricane seasons of 2004 and 2005. A map of the most current seagrass mapping and assessment is included as Figure 1.12-4.

Table 1.12-2
Acreage of Seagrass by Species in October 2006
Source: DC&A 2006

Bed Type	1999-2001 Acres	2006 Acres
H. decipiens	3.29	4.47
H. johnsonii	2.85	2.80
H. wrightii	0.61	0.00
Mixed H. johnsonii/H. decipiens	0.00	1.08
Mixed H. decipiens/H. johnsonii/H. wrightii	1.96	0.09
TOTALS	**8.71**	**8.44**

Figure 1.12-4
2006 Seagrass Mapping and Assessment
DC&A 2006

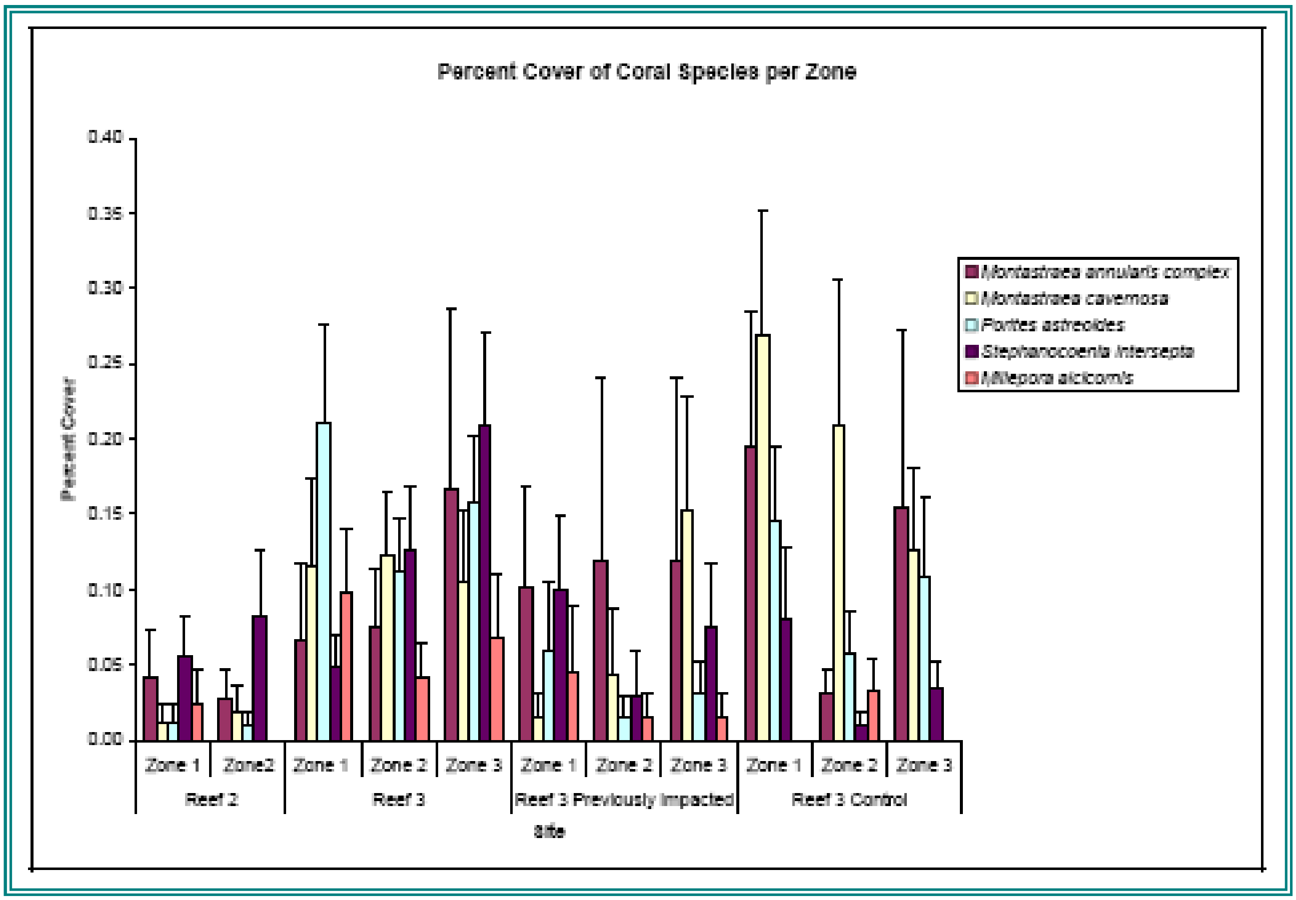


1.12.7 Coral Reef Mapping and Assessment

The ACOE contracted with DC&A to conduct reef mapping and a quantitative assessment of benthic habitats and associated benthic organisms and reef fishes at five hard-bottom sites located at the eastern end of the Port's outer entrance channel. The study sites encompassed hard-bottom habitat within, south of, and adjacent to the proposed outer entrance channel dredging area. Study areas included two general locations known to the ACOE as "Reef 2" and "Reef 3," and a control site for Reef 3. The reef structure was analyzed using remote sensing technology including GPS, LIDAR Imagery, depth sounders, and video surveys.

After determining the total percent cover of coral species per zone (see Figure 12.1-5), DC&A concluded that dredging of the reef to widen and deepen the area would reduce coral cover by 4.82 hectares (ha) in Reef 2.

Figure 12.1-5
Percent Cover of All Dominant Coral Species in All Zones
DC&A 2006



Of this amount, 56.2 percent or 2.7 ha of live coral included the following live cover organisms: scleractinians [0.36 percent], hydrocorals [0.01 percent], octocorals [0.96 percent], sponges [2.62%], zoanthids [0.01 percent], tunicates [0.08 percent], turf algae [45.19 percent], and macroalgae [6.99 percent]). Dredging of this reef area will potentially cause removal of approximately 174 square meters (m^2) scleractinian cover, 5 m^2 hydrocoral cover, 463 m^2

octocoral cover, 1,263 m^2 sponge cover, 5 m^2 zoanthid cover, 21,782 m^2 turf algae cover, and 3,369 m^2 macroalgae cover. In Reef 3, the dredging would impact 3.81 ha of the reef. Of this amount, approximately 73 percent of this area (or 2.8 ha [6.9 ac]) is made of live cover: scleractinians [0.88 percent], hydrocorals [0.07 percent], octocorals [2.47 percent], sponges [5.18 percent], zonathids [0.25 percent], tunicates [0.08 percent], turf algae [54.62 percent], and macroalgae [9.32 percent].