PORT EVERGLADES
MASTER/VISION PLAN
2018 UPDATE

Element 3:
Plan Development and Final Plan
FINAL REPORT

Prepared by

Bermello Ajamil & Partners

February, 2020

CONTENTS

3.0 Glossary of Terms

Air Draft
The maximum height of a structure or vessel.

Apron
Area immediately adjacent to the vessel berth where lines, provisioning, gangway and other operations occur.

Anchorage
Location where a vessel may anchor. For cruise, in destinations where docks are not present to accommodate vessel operations, anchorages are used and passengers are shuttled to/from the cruise vessel to a landside location using a small boat (tender). Anchorages are generally only used in ports-of-call. For cargo, an area outside a port where a vessel anchors to await a berth assignment.

Available Passenger Cruise Days (APCD)
The formula cruise lines typically use to assess and compare cruise itineraries from a financial perspective.

Beam
The width of a vessel at its widest part.

Bed (Berth) Nights
A typical cruise industry form of capacity measurement representing the number of lower berths (a bed on a cruise vessel, with the aggregate total generally determining the vessel's nominal passenger capacity) multiplied by nights of operation in a region.

Berth
(1) An anchorage or dock space for a vessel in port.
(2) A bed, generally attached to the deck and/or bulkhead onboard a cruise vessel.

Break-Bulk
General cargo or goods such as steel rebar or pipes that must be loaded/unloaded and handled individually or in pre-determined modular quantities (i.e. pallettes). Break-bulk cargo is not handled in intermodal shipping containers or in bulk quantities as would be the case with petroleum, grain and cement, for example.

Bunker/Bunkering
Marine fuel used for propulsion. The act of delivering marine fuel to a vessel.

Cabotage Laws
Legislation and/or regulation relating to the ability of foreign-flagged vessels to transport goods and passengers between domestic ports. Cabotage Laws are often put into place to protect domestic maritime industries.

Capacity
The number of units (passengers, berths, containers, gallons, tons, etc.) that a given area or space can handle at a given time.

Cruise Brand
Term referring to individual cruise vessel operating companies (i.e. Carnival Cruise Line) to distinguish them from their corporate holding companies (i.e. Carnival Corporation).

Cruise Line
For purposes of this report, cruise line is used to describe a corporate holding company with one or more cruise brand(s) operating under its corporate umbrella (i.e. Carnival Corporation).

Cruise Terminal
Building where cruise passengers embark and/or debark in a homeport destination.

Daily Cruises
Term applied to vessel service transporting passengers and/or vehicles and/or cargo from point to point. The key difference between daily cruises and multi-day cruises is that daily cruises offer transportation services as their primary business focus, not a travel and leisure experience.

Dockage
Fees levied by a port or destination for the right to dock a vessel.

Draft
The depth of water required by a vessel to float; the measurement in feet (or meters) of the extent to which the vessel projects below the surface of the water.

Dry Bulk
Commodity cargo that is transported in unpackaged, non-standardized, non-liquid granular form, usually in large quantities (i.e. cement, bauxite, coal, etc.).

Emission Control Area (ECA)
Geographic boundaries established through treaties to provide for decreased NOx and SOx emissions in select zones such as North America and Europe.

Gross Tonnage (GT)
A measure of a vessel's enclosed volume. This term has emerged as the standard measure of communicating a vessel's size. A *mega-vessel* generally refers to a vessel of 70,000 GT or larger.

Ground Transportation Area (GTA)
Zone in which vehicles, including buses, taxis and private cars are organized and accessed as part of cruise terminal/destination embarkation and disembarkation activities.

Homeport
A marine facility and destination locality that serves as the base of operations from which a multi-day or daily cruise begins and/or terminates.

Itinerary
Sailing routes and ports visited on a given cruise. Two itinerary types are generally observed. *Open-jaw (OJ) itineraries* refer to those deployments where the cruise begins at one homeport and ends at another. *Roundtrip* (RT) or *Closed-jaw itineraries*—the more common type observed—begin and end from the same homeport.

In Bond
Cargo or baggage that transits directly to and from the port/airport and has a customs approval allowing for a single inspection.

Length Overall (LOA)
Total length of a vessel in feet (or meters), including any incidental structure that may extend this dimension.

Liquid Bulk
Free-flowing liquid cargos, such as gasoline, jet fuel, crude oil, liquefied natural gas, industrial chemicals, etc. that are typically transported in large quantities via tanker vessel and stored in tanks at or near ports for distribution/consumption.

Liquified Natural Gas (LNG)
Liquefied natural gas is natural gas that has been cooled to a liquid state (about -260 degrees Fahrenheit) for shipping and storage. This process makes it possible to transport natural gas to places pipelines do not reach and to use natural gas as a transportation fuel.

Marine Terminal
Facility, including storage yards as well as associated buildings, where cargo handling activity occurs, usually within a physically defined and secure (i.e. gated) area.

Mixed-Use Facility
Refers to a facility or complex with more than one type of real estate or operational use. Mixed-use facilities generally:

(1) are contiguous in nature
(2) are developed within a broader master plan constructed at one time or in phases
(3) provide for a symbiotic relationship to occur among all uses such that the sum of the mixed-use facility from a real estate or operational perspective is greater than its parts. Mixed-use maritime facilities often include cruise, ferry, marina, commercial, residential, recreational and other upland transportation facilities.

Multi-Day Cruises (Cruises)
Leisure-oriented voyages on deep-water, ocean-going cruise vessels of two or more nights often to a variety of destinations, or port-of-calls. Multi-day cruises are offered either by regional or international operators marketing to a variety of consumer sectors and nationalities.

Neo-Panamax
Vessels classified as Neo-Panamax are of the maximum dimensions that will fit through the newest set of locks in operation by the Panama Canal (366 m/1,200 feet long by 49 m/161 feet wide by 15.2 m/50 feet in depth).

Panamax
Vessels classified as Panamax are of the maximum dimensions that will fit through the original locks of the Panama Canal (304 m long by 33.5 m wide by 25.9 m deep). Thus a Panamax vessel will usually have dimension of close to 294 m/965 feet long by 32.3 m/106 feet wide by 12.04 m/39.5 feet in depth.

Passenger Fee (Head Tax)
Port charges assessed against each passenger aboard a cruise vessel. Generally the principal income stream to ports and destinations for accommodating cruise activities.

Peak (or Peaking)
Period of greatest intensity of use or volume. Port Everglades' peak days for cruise activity, for example, are Saturday and Sunday since those are the days that, on average, see the greatest number of cruise ship calls and/or passenger debarkations during the course of a given cruise season.

Penetration Rate
Percentage of the total potential market that is currently accessible. For example, in 2016, North America (including Canada, the United States, Mexico, the Caribbean and Central America) had a penetration rate for cruise of 2.3 percent (13.34 million cruisers/579 million total population).

Port Authority
Governmental or quasi-governmental public authority for a special-purpose district usually formed by a legislative body (or bodies) to oversee and/or operate ports and other maritime, aviation, road and/or rail transportation infrastructure.

Port-of-call (POC)
One of several destinations visited as part of a cruise itinerary. The focus of the port-of-call is on tourism activities adjacent to the cruise arrival area and the transportation of passengers to regional points of interest.

Post-Panamax
Size standard that exceeds the largest vessel dimension capable of transiting the original Panama Canal locks (304 m long by 33.5 m wide by 25.9 m in depth). Generally based on the beam and LOA of the vessel.

Private Island
Island destinations primarily located in the Caribbean and Central America that are owned and/or developed for exclusive or semi-exclusive use by a single cruise company (cruise line) and its proprietary brands.

Revenue Passenger
This generally refers to homeport passengers or in some very limited cases port-of-call passengers (e.g. Vancouver, where all passengers are charged on/off the vessel), whereby passenger counts reflect the Port's passenger wharfage or tariff rate charging policy. For homeport calls the actual number of passengers is doubled to show that the cruise operator is charged by the port for the passenger embarking/debarking the vessel at a set fee.

Ro-Ro
Maritime term for roll-on/roll-off cargo such as passenger vehicles, tractor/trailers, buses, railcars, etc. that are driven on and off a ship under their own power or using a platform vehicle, such as a truck and trailer or self-propelled modular transporter.

Super Post-Panamax
Generally refers to the largest vessels in existence today. These vessels are defined not only by their dimensions, but also their carrying capacity (i.e. 3,000+ passengers for cruise and 12,000-14,000 TEUs for container ships).

Tariff
A schedule of fees charged to port users, especially marine terminal and vessel operators to cover some or all costs associated with port operations and other fiduciary obligations (i.e. infrastructure development and maintenance).

Terminal Operator (TO)
Entity with primary responsibility for managing marine terminal/cruise terminal and related operations on a daily basis, usually under contract to a public port authority or other public or quasi-public ownership interest.

Transit Passenger
By literal definition, the status of cruise passengers during a port-of-call.

Twenty-Foot Equivalent Unit (TEU)
Unit of cargo used to describe the capacity of modular container ships and container terminals. It is based on the volume of a 20-foot-long (6.1 m) intermodal container, which is the historical standard metal container used in container shipping. The majority of containers in use today are Forty-Foot Equivalent Units (FEU); however, TEU remains the standard unit of measurement.

Use Ratio (Utilization Percentage)
The ratio of days that a berth is actually occupied to available berth days (total calls/total available berth days). For example, in a year-round market, a single berth is theoretically available for a total of 365 days. If that berth receives 52 calls (one vessel sailing weekly roundtrip itineraries year-round) then its use ratio is .142, or 14.2 percent (52/365).

All other terms and acronyms are defined within the text below.

3.1 Introduction

The 2018 Update of the Port Everglades Master/Vision Plan is intended to serve as a roadmap for the future of the Port, not just in terms of land use and infrastructure development, but in terms of market opportunities and strategic business practices. Element 3 of the 2018 Update, which combines parts of Elements 3, 4 and 5 from the 2014 plan, starts with a brief description of the planning process and presents a summary of the updated market assessments prepared for the Port's four primary business lines – cruise, liquid bulk, containerized cargo and non-containerized cargo – as part of Element 2. It then summarizes the status of the projects proposed in the 2014 plan and identifies those projects proposed in that plan that have carried over to the 2018 Update. Element 3 continues with a review of design trends for both cruise and cargo terminals, discussion of potential operational enhancements at Port Everglades and a facility needs assessment. As was done for the 2014 Update, a project decision matrix has been developed to evaluate projects proposed in the 2018 Update. This matrix was included as part of Element 4 in the 2014 plan but has been moved to Element 3 for this 2018 Update. A comprehensive description of all projects included in the Final 2018 Master/Vision Plan together with their investment costs and derived benefits is then presented. Element 3 concludes with an affordability analysis of the Port's 5-year CIP and 10- and 20-year Vision Plans. The parking analysis and estimate of future truck trips included in Element 3 of the 2014 Update is now included as part of Element 4 of the 2018 Update.

3.2 Conceptual Planning Process

The planning process for the 2018 Update involved an ongoing collaborative effort among the consultant team, the Port's senior staff, tenants, and stakeholders to achieve the Port's goal of creating a plan that facilitates growth in volume and associated revenue while maintaining a diverse portfolio of operations through a realistic 5-year Capital Improvement Program (CIP) within the 10- and 20-year Vision Plan framework. Through public meetings and other forums, this process included the Broward County Administration and sister agencies such as the Broward County Aviation Department (BCAD). State and federal agencies were also included in these public meetings and forums for comments and direction; these included the U.S. Army Corps of Engineers

(USACE), the U.S. Coast Guard, U.S. Customs and Border Protection (CBP), the Florida Department of Transportation (FDOT), the Florida Department of Environmental Protection (FDEP), the Federal Aviation Administration (FAA) and others. Existing Port tenants, prospective tenants, and other affected parties were contacted and interviewed throughout the planning process to understand their current and future operational requirements. In late April and early May, 2019, charrettes with Port tenants and others were conducted and the input and comments received by the consultant team have been incorporated into this document.

3.2.1 Common Charrette Themes

In the course of the charrettes conducted with representatives of each of the Port's business lines, several concerns common to all were identified. One of the most significant of these was internal traffic circulation. Concerns in this area generally centered around the following issues:

- Trucks carrying petroleum and other liquid bulk cargos to/from Northport having to stop on Spangler Boulevard while waiting to access terminals
- General congestion related to automobiles, buses, taxis, vans, and provisioning trucks entering or exiting the Midport cruise areas, particularly via Eller Drive and especially on weekends during multi-ship days
- Long queues of trucks carrying containers clogging access to Southport and spilling onto the I-595 eastbound approach due to the presence of a security checkpoint on McIntosh Road and lack of alternative access to Southport

In anticipation of such concerns a separate Traffic Study was commissioned by Port management in late 2018 to identify near-term opportunities to improve internal circulation within Port Everglades as well as long-term opportunities to better distribute future peak traffic associated with growth in both cruise and cargo activity. The results of this separate study are incorporated as appropriate into Element 3 and presented in full as an appendix to Element 3. Other concerns identified by Port tenants and stakeholders as the Port looks to advance its infrastructure development, relocate certain uses, and improve operational efficiencies include:

- LNG (i.e. how to bunker, if/where to store at the Port)
- Near-term taxi and bus staging to support cruise operations

- Relocation options for the tugs that currently berth in the Tracor Basin
- Ongoing construction-related impacts to both cruise and cargo operations (i.e. Berth 19 Finger Pier, McIntosh Road realignment)
- Airport adjacency issues associated with the proposed Griffin Road extension and NE 7th Avenue improvement projects
- The potential inability to position or use Ship-to-Shore (STS) cranes or even mobile harbor cranes at the berths to the far west (Berth 30W) and north (Berth 30N) of the Southport Turning Notch Extension (STNE)
- Lack of a dedicated berth or terminal facility for daily cruise (ferry) operations

Some of these matters have been addressed during the planning process but others remain ongoing and will need to be addressed separately by the Port and its user community in conjunction with individual projects as they come online or as part of future Master/Vision Plan updates.

3.2.2 Iterative Planning and Design

The B&A team used an iterative planning and design process to evaluate and refine future land use alternatives for the Port using the following four principles as a guide throughout:

- Capacity – does the plan increase capacity consistent with projected demand?
- Efficiency – does the plan improve efficiencies and/or reduce operating costs?
- Flexibility – does the plan anticipate and allow for changing conditions over time?
- Integration – does the plan integrate related uses through physical adjacency?

This iterative process involved working through many alternatives, using a collective review technique, selecting the preferred attributes of each alternative, refining the selected elements into a revised plan, and repeating the process until a preferred plan was selected with concurrence of Port management. The results from the market forecasts, capacity analyses, and needs assessments were used to balance the Port's land use options and size the terminal facilities in balance with projected growth. Element 3 and all subsequent elements of this 2018 Update evaluate and refine project opportunities and provide phasing recommendations for the 5-year Master Plan/CIP as well as the 10-year and 20-year Vision Plans.

Figures 3.2.1-3.2.2 present a summary of the Port's berth and land requirements,

respectively, by Plan milestone period for each line of business as well as select other categories of future land use.

Figure 3.2.1: Port Everglades Berth Requirements

	Berth Requirements (berths)				KPIs	Δ 2018-2038
	2018	2023	2028	2038		
Cruise (including parking)	9.0	8.0	8.0	9.0		0.0
Multi-Day	8.0	8.0	8.0	9.0		
	467,676	556,130	696,455	795,800	PAX/berth	
Daily	1.0	0.0	0.0	0.0		
	128,934	n/a	n/a	n/a	PAX/berth	
Liquid Bulk	3.0	3.0	3.0	3.0		0.0
	112,698	113,291	112,046	118,280	BPD/berth	
Containers	5.5	8.5	8.5	8.5		3.0
Southport (w/ cranes)	4.0	6.0	6.0	6.0		
	252,116	193,730	254,484	330,529	TEUs/berth	
	80,037	64,577	65,252	78,697	Moves/crane	
Southport (w/o cranes)	0.0	2.0	2.0	2.0		
	n/a	29,600	29,600	29,600	TEUs/berth	
Midport	1.5	0.5	0.5	0.5		
	66,667	200,000	200,000	200,000	TEUs/berth	
Break-bulk	0.9	0.5	0.5	0.5		-0.4
	403,396	409,514	409,514	409,514	Tons/berth	
Dry Bulk	3.6	2.5	2.5	2.5		-1.1
	416,553	680,000	680,000	680,000	Tons/berth	
Automobiles	1.0	0.5	0.5	0.5		-0.5
	107,208	53,740	60,140	72,954	CEUs/berth	
Commercial	n/a	n/a	n/a	n/a		
	n/a	n/a	n/a	n/a		
Warehousing/Logistics/Miscellaneous	n/a	n/a	n/a	n/a		
	n/a	n/a	n/a	n/a		
Vacant/Other	n/a	n/a	n/a	n/a		
	n/a	n/a	n/a	n/a		
Total	23.0	23.0	23.0	24.0		1.0

Figure 3.2.2: Port Everglades Land Requirements

	Land Requirements (acres)				KPIs	Δ 2018-2038
	2018	2023	2028	2038		
Cruise (including parking)	88.0	85.0	103.0	116.0		28.0
Multi-Day	84.0	85.0	103.0	116.0		
	44,541	52,342	54,094	61,743	PAX/acre	
Daily	4.0	0.0	0.0	0.0		
	32,234	n/a	n/a	n/a	PAX/acre	
Liquid Bulk	23.0	19.0	15.0	15.0		-8.0
	14,700	17,888	22,409	23,656	BPD/acre	
Containers	321.0	308.0	298.0	312.0		-9.0
Southport (w/ cranes)	279.0	272.0	276.0	290.0		
	3,615	4,491	5,747	7,043	TEUs/acre	
Southport (w/o cranes)						
Midport	42.0	36.0	22.0	22.0		
	2,381	2,778	4545	4545	TEUs/acre	
Break-bulk	14.0	14.0	10.0	10.0		-4.0
	25,933	14,625	20,476	20,476	Tons/acre	
Dry Bulk	16.0	16.0	16.0	16.0		0.0
	93,724	106,250	106,250	106,250	Tons/acre	
Automobiles	9.0	15.0	17.0	25.0		16.0
	3,219	1,791	1,769	1,459	CEUs/acre	
Commercial	20.0	20.0	29.0	13.0		-7.0
	n/a	n/a	n/a	n/a		
Warehousing/Logistics/Miscellaneous	46.0	75.0	75.0	67.0		21.0
	n/a	n/a	n/a	n/a		
Vacant/Other	68	34	41	32		-36.0
	n/a	n/a	n/a	n/a		
Total	605.0	586.0	604.0	606.0		1.0

3.2.3 Plan Drivers

Three planning components provided the essential precursor for the plan development process discussed in this element:

- The market assessments previously presented in Element 2 that update the forecasts for the Port's four business lines
- The status of the various projects from the 2014 Master/Vision Plan, particularly key projects such as: the STNE plus new super post-Panamax STS cranes, USACE deepening and widening and relocation of the Foreign Trade Zone area in Southport; the redevelopment of Terminal 25 in Midport; and the extension of Slip 2 and demolition of storage tanks to clear approximately 11 acres of land for future development in Northport
- Conceptual feasibility and affordability of new projects in the context of the Port's past, current and expected future financial position

Together, these components provided the foundation for the B&A team's recommendations related to future development alternatives and priority phasing.

3.3 Market Assessment Summary

The detailed market assessments presented in Element 2 are summarized below for the Port's four principal business lines, namely:

- Cruise
  - Multi-day
  - Daily
- Liquid bulk
- Containerized cargo
- Non-containerized cargo
  - Dry bulk
  - Break-bulk
  - Other (yachts, used ro-ro, project cargo)
  - Automobiles

3.3.1 Cruise

Figure 3.3.1: Range of Multi-Day Cruise Revenue Passenger Projections, 2012-2038
Source: B&A

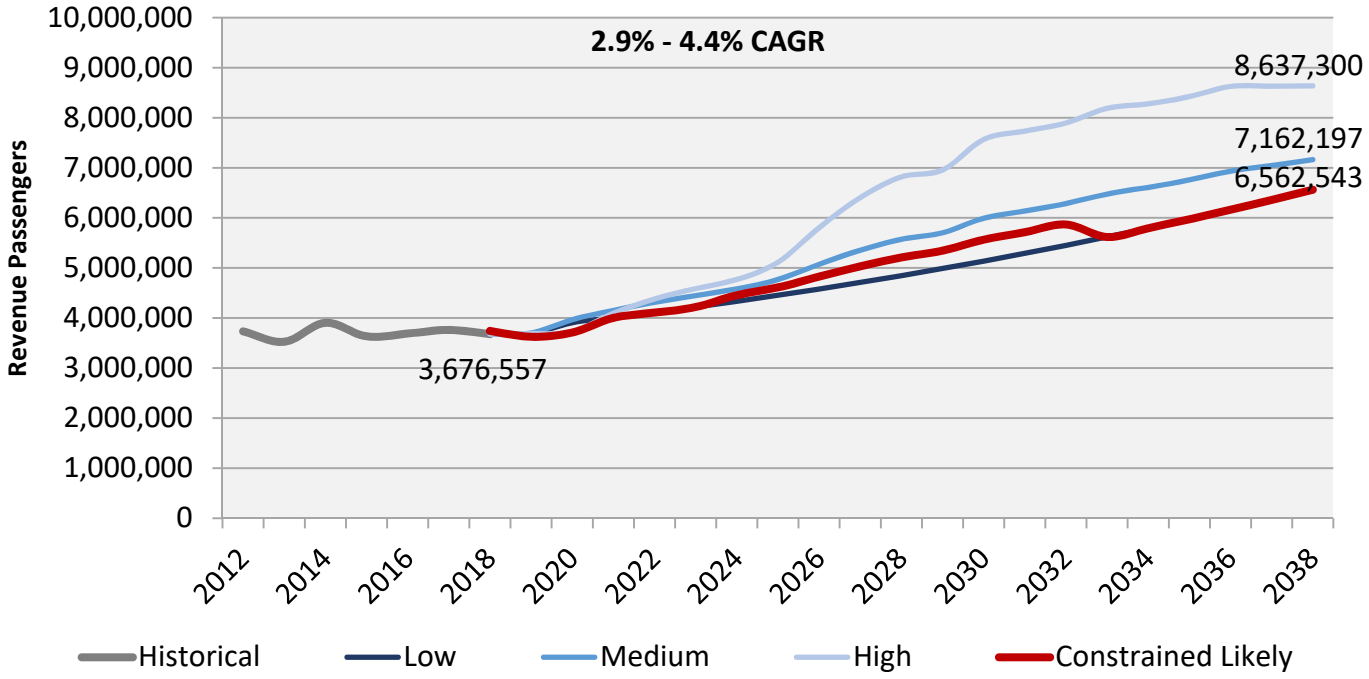


Figure 3.3.2: Range of Multi-Day Cruise Vessel Call Projections, 2012-2038
Source: B&A

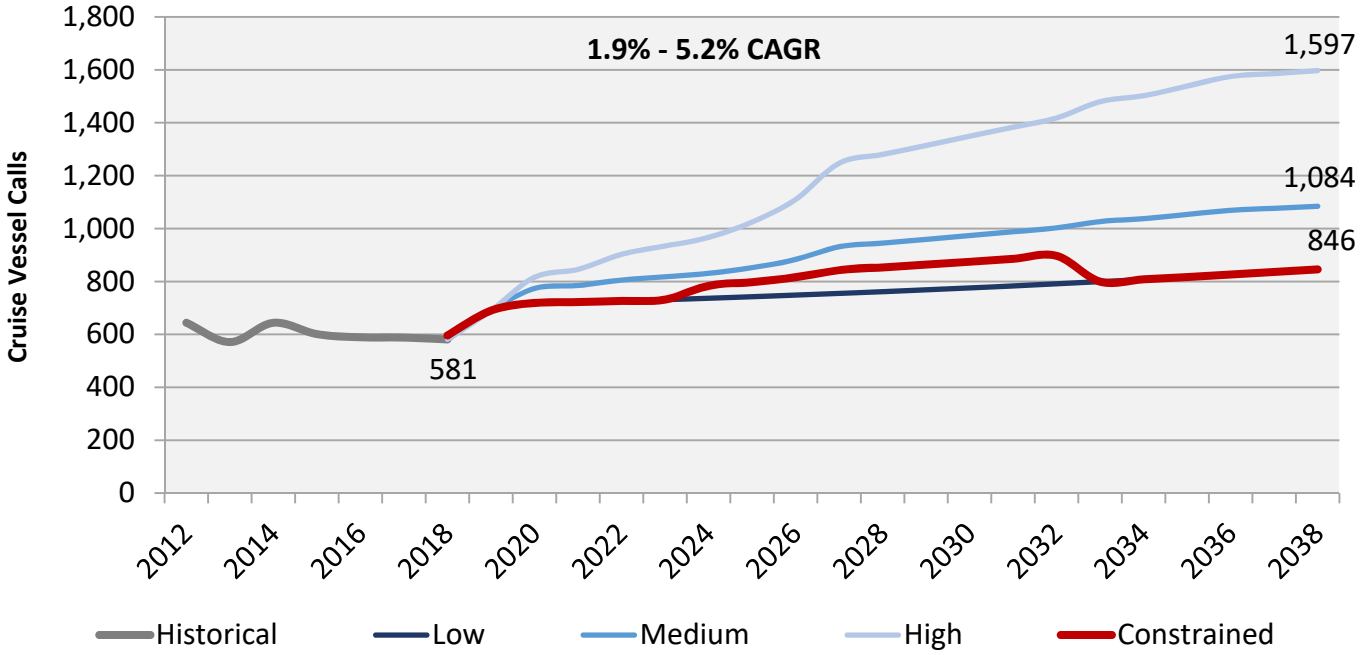
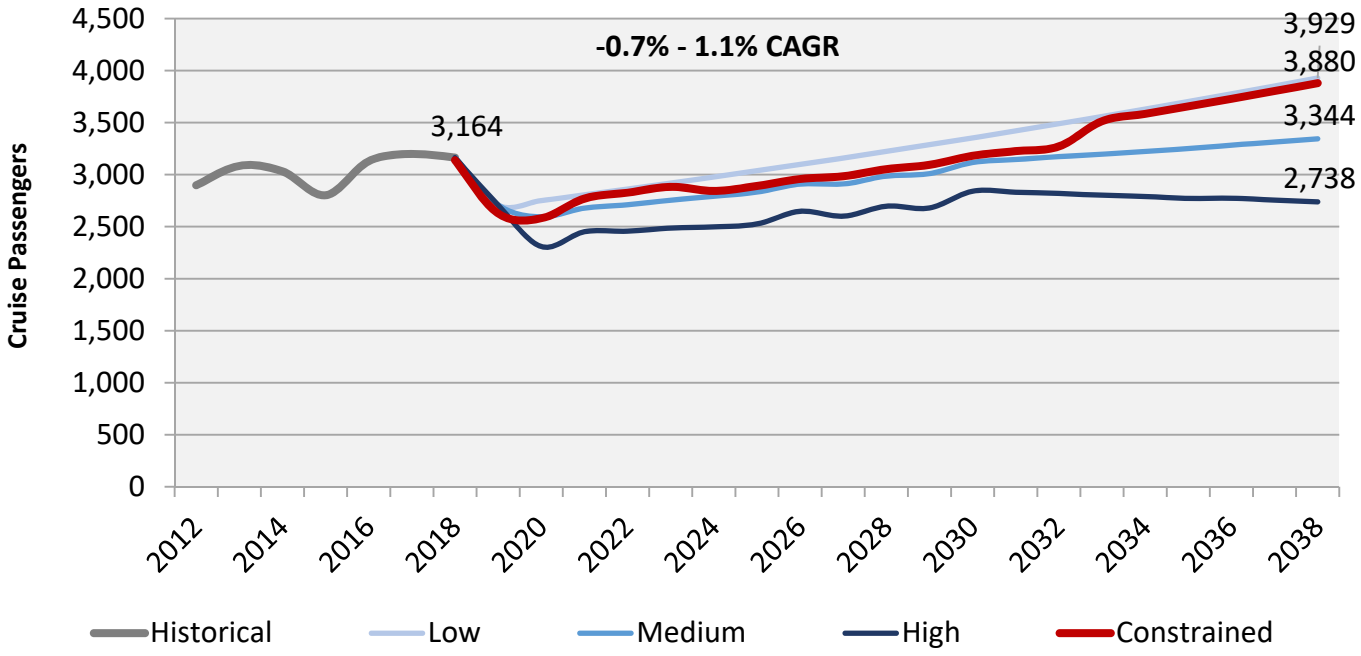


Figure 3.3.3: Range of Expected Multi-Day Cruise Passengers per Call, 2012-2038
Source: B&A



The updated multi-day cruise market projections shown in Figures 3.3.1-3.3.3 determined that up to 10 multi-day cruise berths are required to meet projected future cruise demand with a ninth multi-day cruise berth being a high mid- to long-term priority for Port Everglades in order for the Port to be able to maintain its current market position and stay competitive as a marquee homeport within South Florida serving the still expanding Caribbean cruise market. Discussions with cruise line stakeholders also revealed that major near-term improvements to the Port's existing cruise terminals and ground transportation areas are also a priority.

It must be noted that, since completion of the 2018 cruise market assessment, an additional "constrained likely" forecast – illustrated in red above – has been developed in order to reflect additional input from Port management. This constrained likely forecast serves as the basis for all financial modeling done as part of the 2018 Update.

In addition to the Port's multi-day cruise line of business, a separate 20-year market assessment was completed for daily cruise (fairy) activity as part of Element 2. This assessment is not included or referenced here because no projects related to fairy activity are included in the 2018 Update.

3.3.2 Liquid Bulk

Figure 3.3.4: Port Everglades Liquid Bulk Throughput Projections, 2012-2038
Source: Hatch

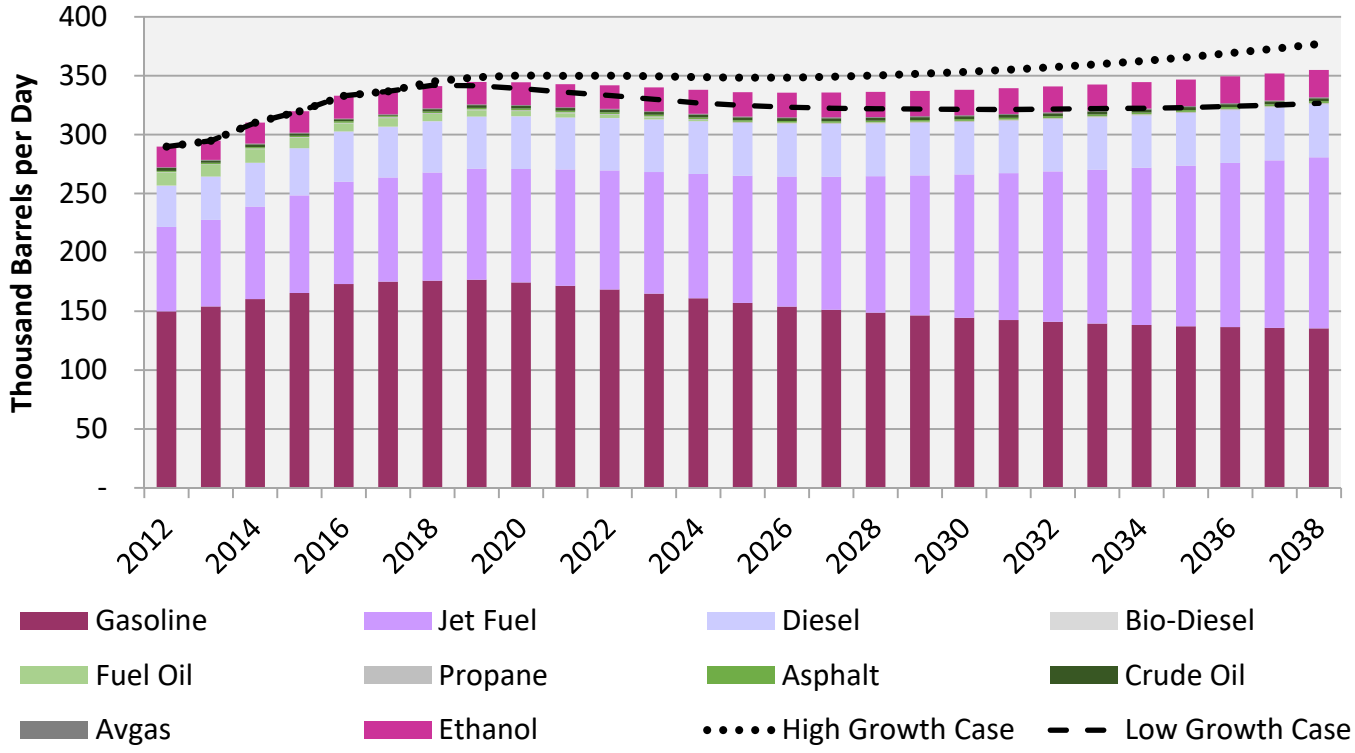


Figure 3.3.5: Tanker Vessel Calls at Port Everglades, 2012-2038
Source: Hatch

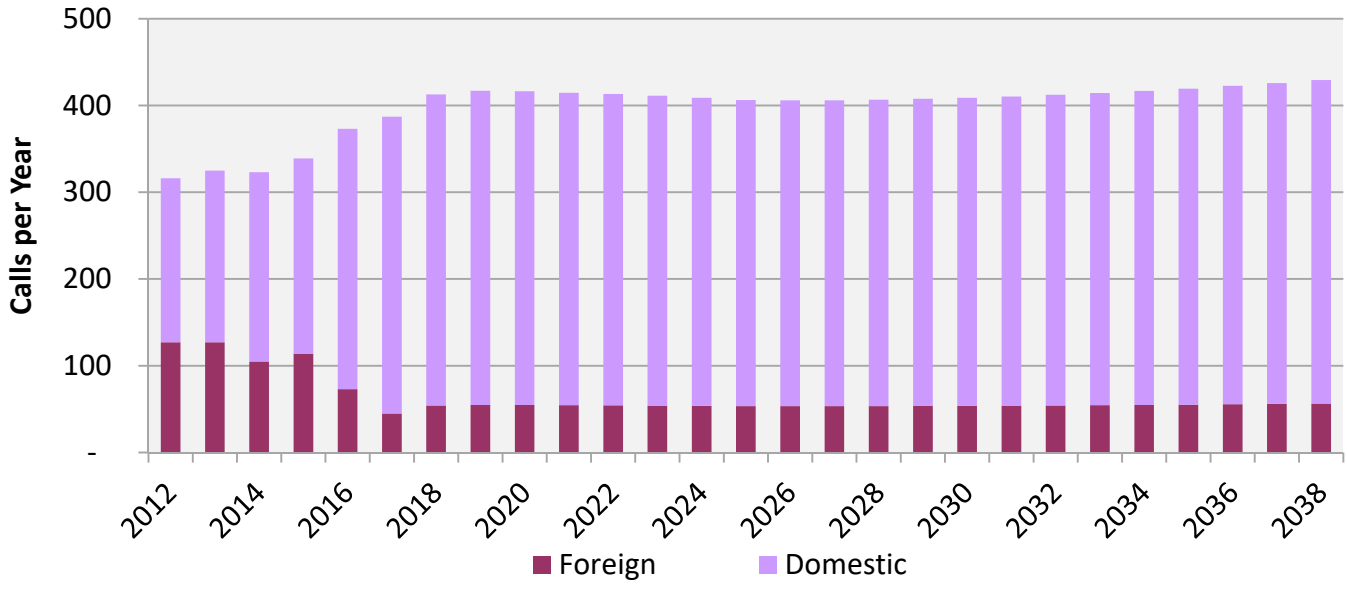
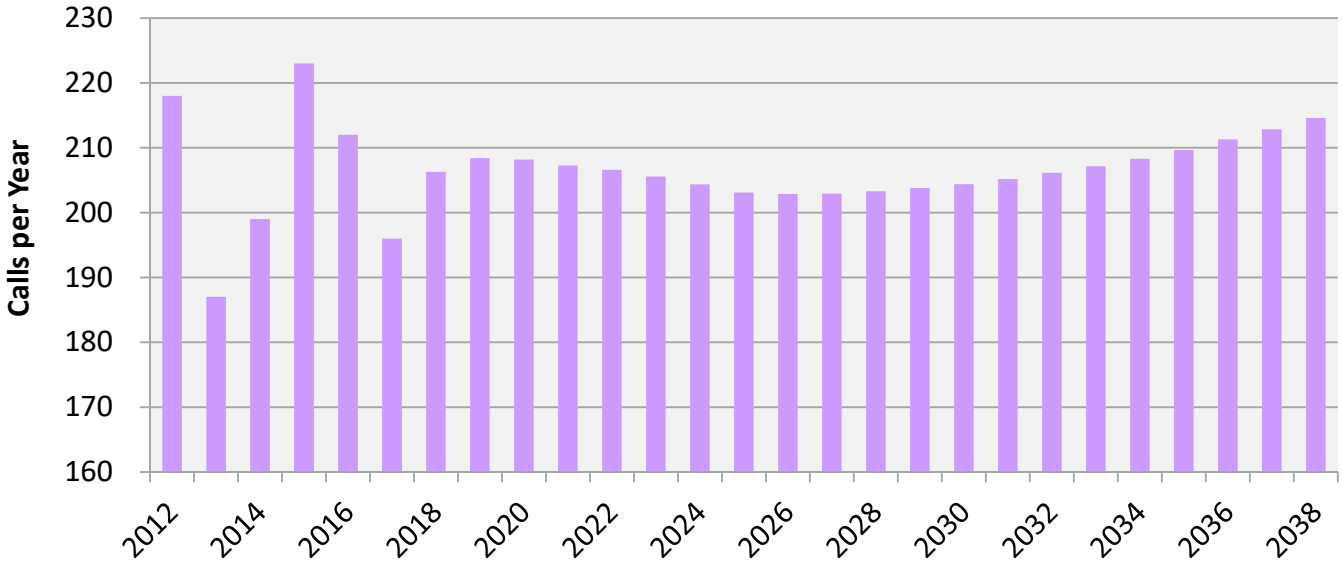


Figure 3.3.6: Barge Calls at Port Everglades, 2012-2038
Source: Hatch

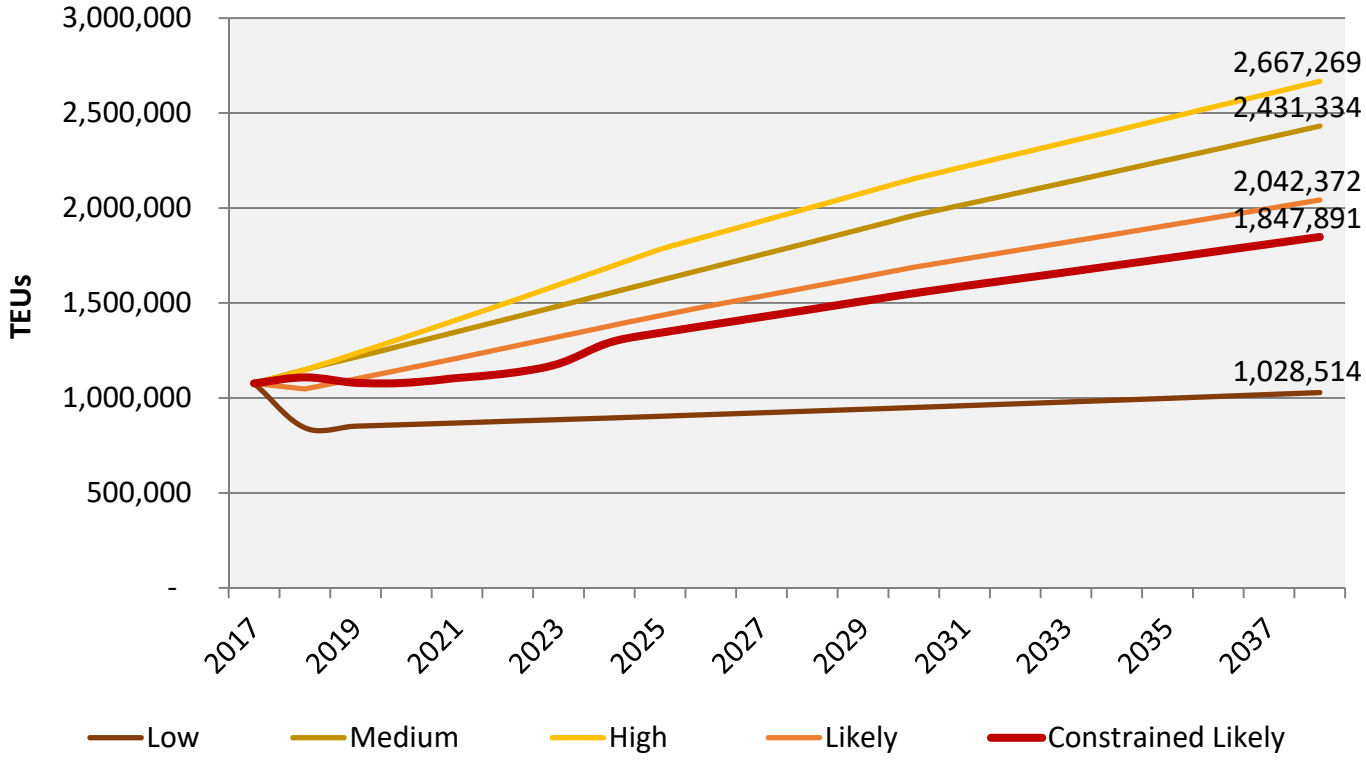


The updated liquid bulk market projections are supported by the currently planned petroleum modernization, berth expansion and bulkhead replacement program at Berths 7 through 13. This modernization program was proposed as part of the 2014 Update and no changes are recommended as part of the 2018 Update. The goal of this program is to create three Post-Panamax berths consistent with the planned USACE deepening and widening; the recommended projects include capacity enhancements, modernization and built–in redundancy to handle all expected product throughput throughout the planning horizon (i.e. 2019-2038).

3.3.3 Containerized Cargo

As with the updated cruise forecasts, it must be noted that, since completion of the 2018 containerized cargo market assessment (Element 2), an additional "constrained likely" forecast – illustrated in red above – has been developed in order to reflect additional input from Port management. This constrained likely forecast serves as the basis for all financial modeling done as part of the 2018 Update.

Figure 3.3.7: Summary of Containerized Cargo Projections (TEUs), 2018-2038
Source: Martin Associates



The updated containerized cargo forecasts clearly demonstrate that ongoing and planned improvements at the Port, such as the STNE plus new super post-Panamax STS cranes, USACE deepening and widening and relocation of the Foreign Trade Zone area in Southport are critical to support the Port's forecasted containerized cargo market growth and competitive position.

In addition, taken together with the separately conducted Traffic Study, the updated containerized cargo projections also confirm the need for continued Southport improvements in both the near-term and outer years of the 2018 Update, particularly the upland transportation enhancement projects including the Griffin Road extension, McIntosh Road realignment and NE 7th Avenue improvement projects. These projects not only directly address the internal traffic concerns expressed by Port Everglades' stakeholders during the charrettes but also indirectly allow a substantial amount of new, contiguous container yard acreage to be developed, all of which is vital to support anticipated future volumes and reduce operational inefficiencies and operating costs associated with current yard layouts.

3.3.4 Non-Containerized Cargo

Figure 3.3.8: Projected Port Everglades Dry Bulk Imports (Tons), 2018-2038

Source: Martin Associates

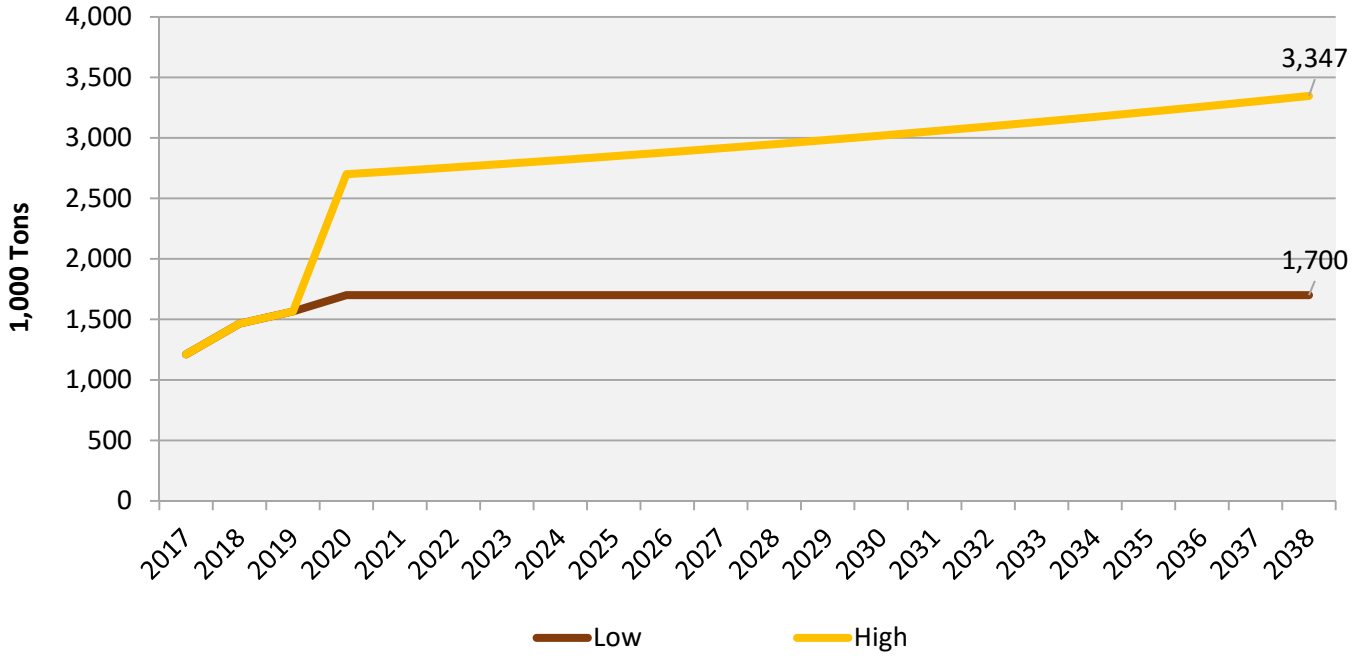


Figure 3.3.9: Summary of Break-Bulk Projections (Tons), 2018-2038

Source: Martin Associates

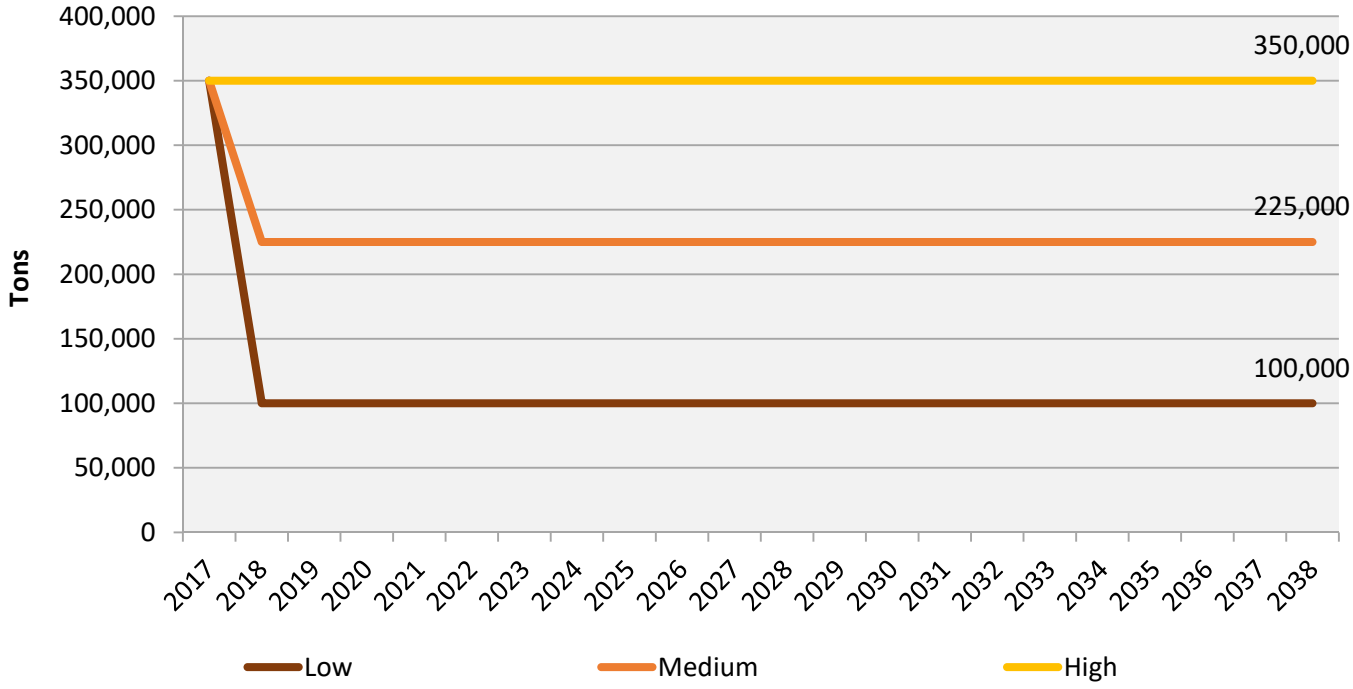


Figure 3.3.10: Other Cargo Handled at Port Everglades, 2018-2038
Source: Port Everglades

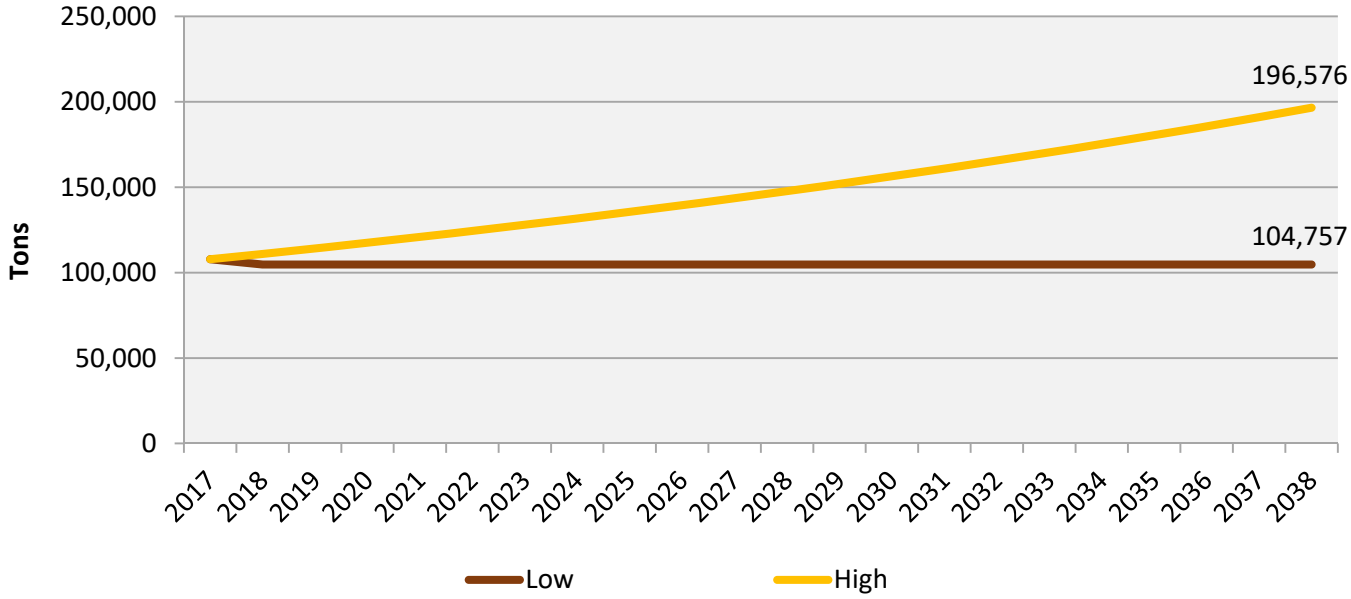
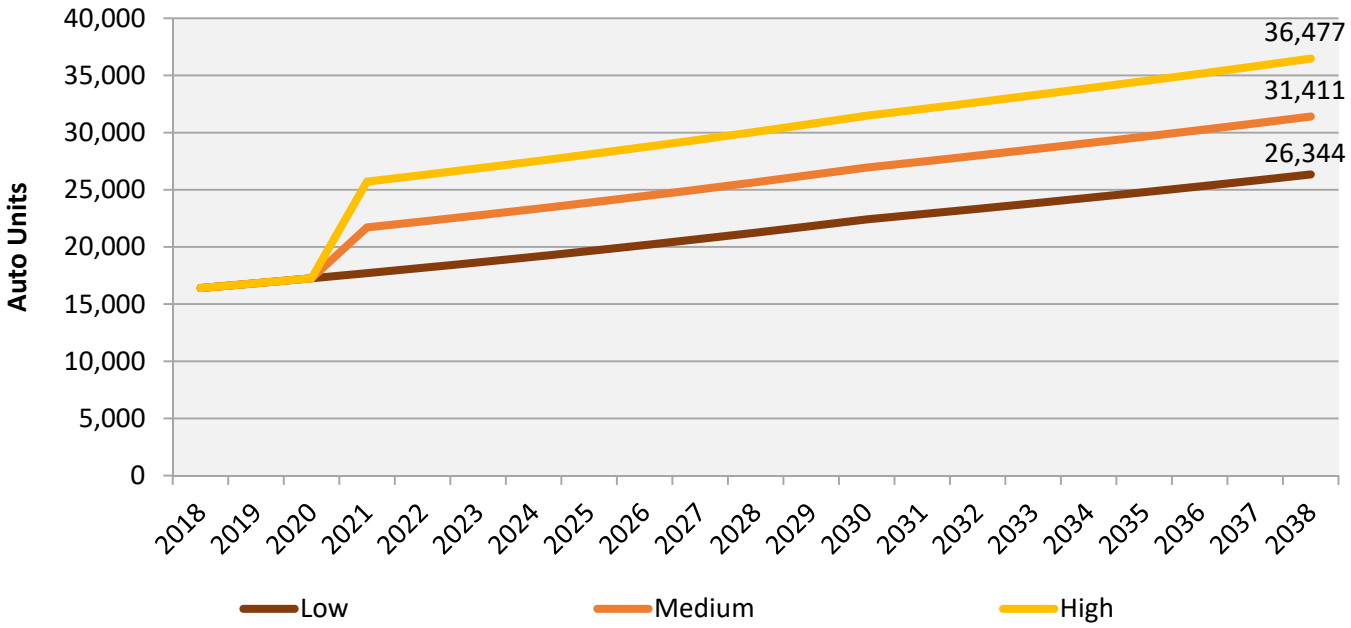


Figure 3.3.11: Summary of Automobile Projections (CEUs), 2018-2038
Source: Martin Associates



The updated non-containerized cargo projections demonstrate a mixed future for this business line. The only non-containerized product type that is expected to experience robust growth in the coming 20 years is new automobiles. As a result, additional acreage

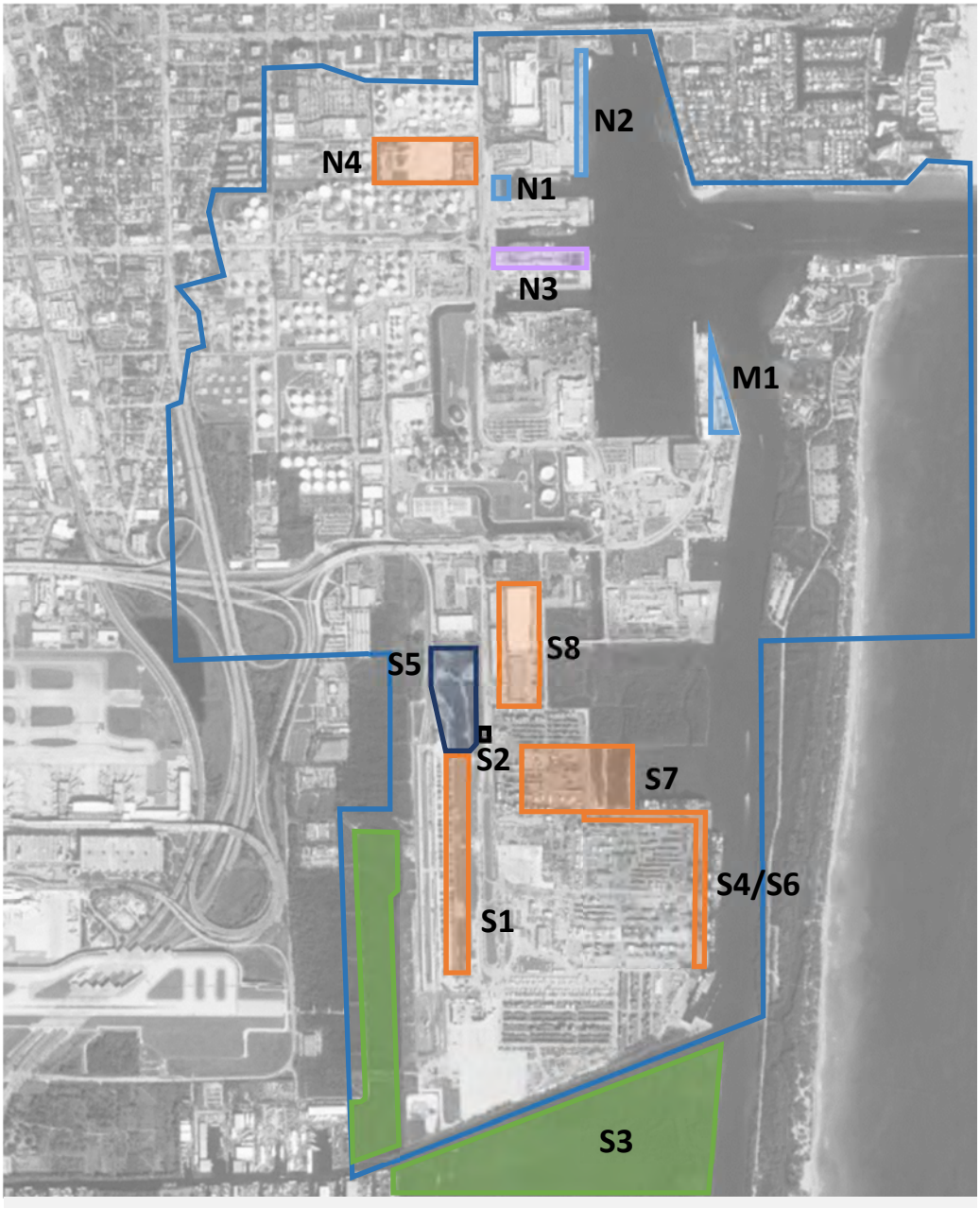
dedicated to short-term storage of new import and export automobiles is recommended in the 2018 Update to support this growth over time. Likely demand for all other product types under the non-containerized cargo umbrella, including break-bulk (i.e. steel), yachts, used ro-ro products and dry bulk commodities (i.e. cement) can generally be characterized as remaining relatively stable during the coming 20-year period, or growing slightly. In no case do projected volumes support an increase in allocated acres or berths vis-à-vis status quo conditions. Some reconfiguration of existing facilities and footprints is recommended, however as a means to increase operational efficiencies associated with berth/upland adjacencies (i.e. break-bulk, ro-ro). Dry bulk is the only non-containerized product type other than new automobiles to have potential for substantial future growth, but only under the high scenario and only on a speculative basis since such growth potential depends entirely on the assumption that additional future permits will not be granted to the Lake Belt region of South Florida to continue to produce sufficient limestone aggregate to meet the region's needs, making importation of such aggregate the most likely future solution. To accommodate such volumes of imported aggregate Port Everglades would need to make a substantial commitment to this business line both financially and in terms of custom-designed infrastructure that would allow such product to be offloaded efficiently at Port Everglades without disrupting other, existing business operations (i.e. containerized cargo). In consultation with Port management and stakeholders, it was determined that this is not a line of business that Port Everglades is interested in pursuing and no such aggregate import facility is envisioned or proposed in this 2018 Update. Together, the updated forecasts presented above have informed all decisions concerning the near-term and long-term infrastructure projects required to allow Port Everglades to meet future demand throughout the 20-year planning horizon.

3.4 Status of Projects in the 2014 Master/Vision Plan

To summarize what was presented in Element 1 (Section 1.5), Figure 3.4.1 (Figure 3.4.2 for Project P1) shows the locations of the projects in the 2014 5-year Master Plan. Table 3.4.1 summarizes the status of these projects. The subsequent Tables 3.4.2 and 3.4.3 list the projects in the 2014 10- and 20-year Vision Plans. While these projects have had no change in status given their previously recommended

implementation time frames, several of them have been revisited as part of the 2018 Update process and are therefore included below. Those projects included in the 2018 Update are discussed in greater detail in Section 3.9 of this element.

Figure 3.4.1: Port Everglades Projects (2015-2019) as Proposed in 2014 Update
Source: B&A



*Note: Project **P1** is detailed in Figure 3.4.2.*

Figure 3.4.2: USACE Harbor Deepening and Widening (Project P1) Map
Source: USACE/Port Everglades

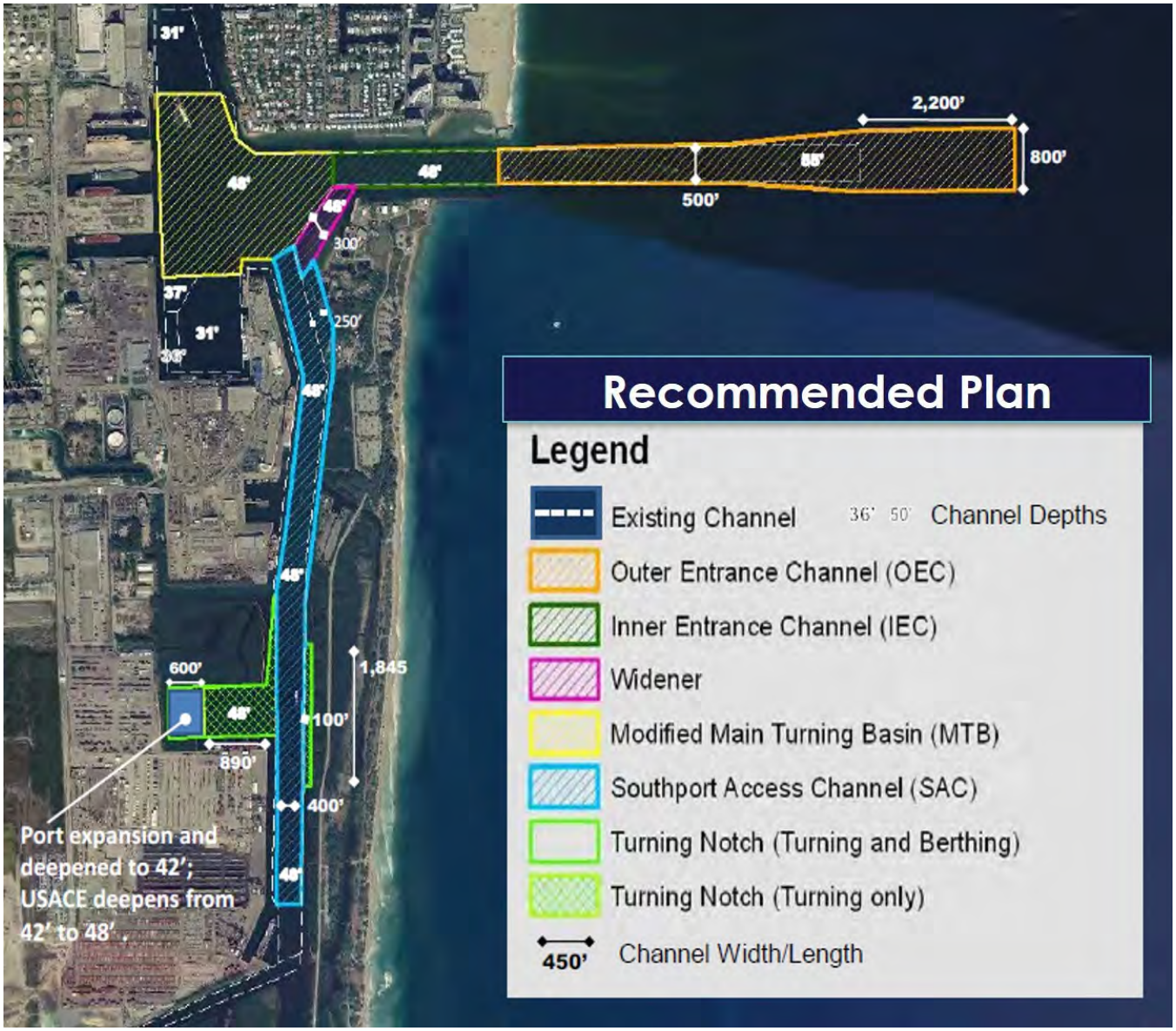


Table 3.4.1: Port Everglades 5-Year Projects as Proposed in 2014 Update
Source: 2014 Port Everglades Master/Vision Plan

Port Area	Project ID	Project Name	Status
Northport	N1	Slip 2 Westward Lengthening	Completed (FY2017)
	N2	Berths 1, 2 and 3 New Bulkheads	Pending (FY2025)
	N3	Slip 1 New Bulkheads and Reconfiguration - Phase 1 (Berths 9/10)	Underway (FY2025)
	N4	Break-Bulk Storage Yard	Pending (FY2026)
Midport	M1	T25 Improvements/Expansion	Completed (FY2019)
Southport	S1	Southport Phase 9b Container Yard	Completed (FY2018)
	S2	Southport McIntosh Road Gate Lane Addition	Underway (FY2020)
	S3	Westlake Mitigation (Southport Turning Notch Extension)	Underway (FY2020)
	S4	Super Post-Panamax Cranes (3)	Ordered (FY2020)
	S5	Foreign-Trade Zone (FTZ) Relocation	Underway (FY2020)
	S6	New Crane Rails (Berths 30,31, and 32)	Underway (FY2020)
	S7	Southport Turning Notch Extension	Underway (FY2023)
	S8	Southport Phase 9a Container Yard	In Design (FY2022)
Portwide	P1	USACE Deepening and Widening Design	PED Underway (FY2023+)

Table 3.4.2: Port Everglades 10-Year Projects as Proposed in 2014 Update
Source: 2014 Port Everglades Master/Vision Plan

Port Area	Project	2018
Northport	Berths 1, 2 and 3 New Bulkheads	Included
	Cruise Terminal 4 Parking Garage	Advanced to 5-year CIP
Midport	Berths 16, 17 and 18 New Bulkheads	Included
	Multimodal Facility – Phase 1	Not Included*
Southport	Turning Notch Extension – Contract 2	Included
	Crushed Rock Facility	Not Included**
	Foreign-Trade Zone + USCBP Relocation	Included
	Super Post-Panamax Cranes (2)	Advanced to 5-year CIP (+1)
	Container Yard Improvements	Modified
Portwide	USACE Deepening and Widening	Included

** The multimodal facility concept has been modified in the 2018 Update, with the previously envisioned Phase 1 being replaced by a new shared parking structure adjacent to a redeveloped T29/T26 cruise node. See Section 3.9.*

*** The crushed rock facility included in the 2014 Plan has been removed entirely from the 2018 Update due to the need to prioritize cruise and containerized cargo infrastructure improvements in Midport and Southport, respectively.*

Table 3.4.3: Port Everglades 20-Year Projects as Proposed in 2014 Update
Source: 2014 Port Everglades Master/Vision Plan

Port Area	Project	2018
Northport	Slip 2 New Bulkheads and Widening	Not Included*
	Slip 1 New Bulkheads and Reconfiguration – Phase 2	Included
	Slip 3 New Bulkheads and Widening	Included
	Berths 14 and 15 New Bulkheads	Included
Midport	Berths 19 and 20 New Bulkheads	Included
	Berths 21 and 22 New Bulkheads	Included
	Berth 23 New Bulkhead	Included
	Berths 24 and 25 New Bulkheads	Included
	Multimodal Facility – Phase 2	Modified
Southport	Super Post-Panamax Cranes (2)	Advanced to 5-year CIP
	Demolition of Ro-Ro Berths + Lengthening of Berth 33	Not Included**
Portwide	N/A	N/A

** Challenges associated with the width of Slip 2 were determined to be insufficiently urgent to merit the expense of widening the Slip since break-bulk and/or dry bulk operations taking place at Berth 5 within Slip 2 can accommodated around Berth 4 cruise vessels activity.*

*** The Berth 33 alignment project has not been included in the 2018 Update due to the fact that the incremental gains in land area and operational efficiency were deemed too insignificant to warrant the nearly $150 million estimated expense of the project. See Section 3.9.*

3.5 Terminal Design Trends

3.5.1 Cruise Terminal Trends

There are approximately 120 new cruise vessels scheduled for delivery between 2020 and 2027. The average passenger capacity of these vessels is 2,113; however, 30 of these newbuilds have a capacity over 4,000 passengers and 21 of them exceed 5,000 passengers. The majority of these ultra-large vessels are being built by cruise lines that currently call Port Everglades, namely Carnival Cruise Line, Princess Cruises and Royal Caribbean International (RCI). This trend toward larger average cruise vessels, particularly in Port Everglades' core service region – the Caribbean – is discussed at length in the Element 2 cruise market assessment and not replicated here, but larger average vessels is one of the most important trends impacting current as well as future cruise terminal trends. Port Everglades is the third busiest cruise homeport in the world. As such, it should strive to have cruise facilities that not only meet today's best-in-class industry standards but set the bar for what constitutes best-in-class. To do this the Port's cruise terminals must be designed to allow for flexibility in terms of cruise line operations, passenger loads and other variables while emphasizing efficiency and guest/user convenience. Increasingly, new cruise terminals should be highly functional facilities that are designed to allow performance targets to be achieved through a coordinated level of operations by limiting passenger queueing times and minimizing the overall amount of time required to complete the key embarkation and disembarkation processes. Efficiency of operations and passenger throughput rates become even more important as average vessel sizes increase and as average and peak passenger volumes at the Port continue to grow. As a general rule, the cruise vessel and brand it represents should be the experience with the terminal serving as the platform to initiate and complete this experience. As such, convenience and passenger comfort are the defining considerations. Terminal design should also work to minimize or reduce labor costs.

Homeport Facility Components

Cruise homeport facilities, such as those as Port Everglades, generally consist of the following components and should be designed with the following questions/considerations in mind:

- Ground Transportation Area (GTA)
    - What is the best configuration to meet the needs of the homeport options at

peak volume?

- Terminals
  - What is the optimal passenger flow from/to GTA and vessel?
  - What are the KPI's the design will be based upon (overall time in facility, queuing and waiting times)?
  - How much will technology define the design?
  - Check-in, Security, CBP, Waiting and ancillary areas (restrooms, office, storage, secondary uses) interior areas need to be defined based upon a combination of user needs, performance standards, and design standards
  - Interior circulation (embarkation, disembarkation and back-of-house operations) must be defined to manage the hardware and manpower assets in the most efficient manner
- Passenger boarding bridges/gangways
  - Type, number, range of service, etc.
- Baggage claim
  - Define the laydown space and circulation pattern based upon the design load
- CBP unit (primary and secondary inspection, offices)
  - Based on current CTDS, annex and peak throughput calculations
- Operations
  - Storing routing, inspection area for vessel servicing
  - Security – including truck clearance, baggage, passengers, terminal, surroundings
  - Baggage scanning/movement – embarkation and disembarkation
  - Office, restroom, storage, etc. – to be defined by stakeholder needs and site requirements such as secondary uses, etc.
- Secondary use issues
  - Facility ingress and egress (multiple) for event space needs
  - Access to the apron – safety and security on the water side and a potential positive attribute for secondary uses
  - Storage – dependent upon event types (long-term, short-term, etc.)
  - Warming kitchen(s) – adequate space to provide required capacity
  - Space use (multiple event space) – access to water, balcony, high ceilings, lighting, ambience, etc.

Key Design Issues

User convenience and satisfaction should be the key drivers in the cruise terminal design process. While certain "bells and whistles" or next-level amenities (including functional as well as aesthetic amenities) may be desirable on the part of cruise lines as a means to reinforce their branding and the overall passenger experience within the terminal, the core design should focus on efficiency and be intuitive while allowing for maximum flexibility and easy maintenance. The future can be anticipated, but never predicted, so flexibility and design that addresses short-term issues within a long-term strategy are vital as this will minimize or avoid future costs associated with unexpected market or operating changes and also allow the Port to adapt to new opportunities more dynamically. Key considerations that influence facility design concepts include:

- Segregation of passengers/traffic
- Segregation of transportation modes
    - Buses/tour vehicles
    - Private vehicles/staff
    - For-hire vehicles
- The latest security
    - Entry/exit, pier, GTA
    - Check of passengers, bags, provisioning (if required)
    - Provide for operational flexibility
        - All facility security cordon
        - Partial facility security cordon
        - Berth security cordon
- Improvements in functionality
    - Reduce queuing
    - Linkages of passenger metering processes – slow to fast
    - Integrate facility into the waterfront
- Secondary uses
    - Commercial
    - Other

Typically, today's cruise homeport facilities provide for two levels of operations in order to allow for simultaneous embarkation and disembarkation. Multiple (two) passenger boarding bridges (gangways) are also typically used for each vessel call to allow for safe

and efficient movement of passengers on and off the vessel. Design elements should be as flexible as possible in order to accommodate multiple vessel types and sizes as well as different operations. Flexibility is also important in order to allow for potential future reconfiguration of the facility based on changing operational preferences as well as changes in security practices and/or protocols over time. The following cruise terminal trends are among the most salient in terms of positioning Port Everglades to handle projected future cruise traffic while achieving best-in-class operational efficiency, convenience and passenger comfort:

- Multi-level terminals
- Key performance indicators (KPIs)
- Type, number and service range of passenger boarding bridges (gangways)
- Parking and ground transportation areas (GTA)
- Baggage handling
- Customs and Border Protection (CBP)/Security
- Alternative/secondary use

Each of these trends is discussed below.

Multi-level Terminal Design

Multi-level cruise terminals – which primarily comprise a ground floor and upper floor but often include additional levels as well – have become the industry standard for several reasons. First and foremost, the height provided by multiple levels allows for the maximum amount of flexibility when it comes to positioning gangways to access the preferred decks of most of today's cruise vessels while ensuring safe and manageable vertical grades for passengers. One recent trend that underscores this is the emerging preference by some cruise lines for embarkation to occur directly onto the promenade deck of the vessel. This not only requires a substantial vertical service range for passenger boarding bridges but also requires a higher point of terminal connection to ensure acceptable gangway grades. Separate terminal levels also facilitate segregation of passenger embarkation and disembarkation flows, thereby ensuring separation of passengers while also allowing for overlap of two-way operations. Multi-level terminals may also minimize the distance a passenger must travel between the GTA and the vessel during embarkation and between the vessel and GTA during disembarkation. Each of these factors contributes to operational efficiency, enhances the cruise passenger

experience and increases the overall level of service provided. An additional benefit of multi-level cruise terminals is a substantial reduction in the structural footprint of the terminal itself since the overall square area of the terminal can typically be distributed relatively evenly between the two primary levels thereby reducing the footprint by 40% or more vs. a single-level facility. This is strategically very advantageous for ports like Port Everglades that have extremely limited berth-adjacent land on which to accommodate cruise activity. Figure 3.5.1 presents an example of a best-in-class multi-level terminal: Port Everglades' own Terminal 25 (T25).

Figure 3.5.1: Example Multi-Level Terminal Program – Port Everglades T25
Source: B&A

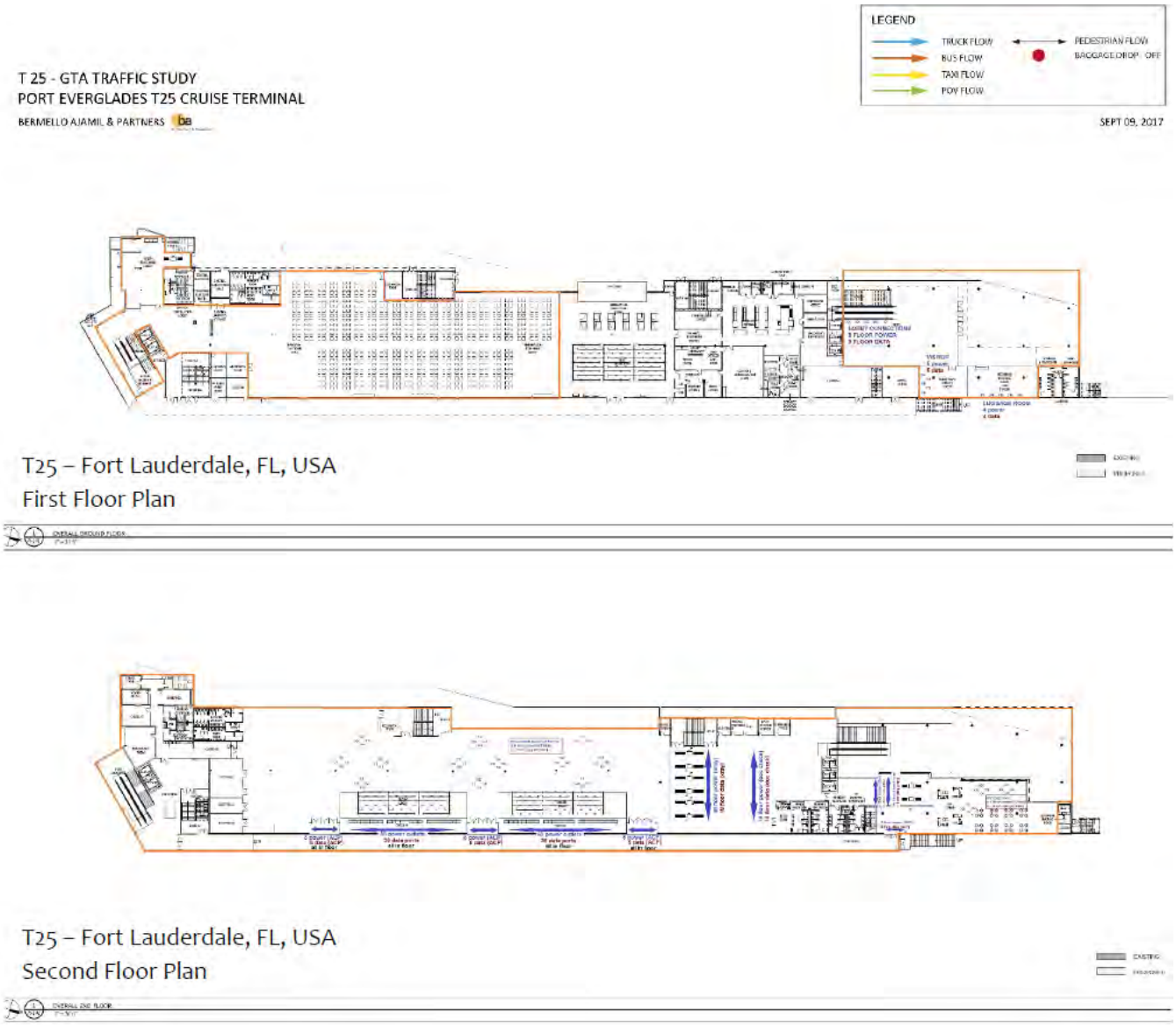


Table 3.5.1 illustrates the primary elements of a standard U.S. homeport terminal program in terms of gross floor area (GFA) by function and by target service level. As shown, service level ratings of "A", "B" and "C", respectively, have been assumed using a 5,400 passenger vessel for simulation purposes. There is a degree of flexibility (+/-) for many program elements within these guidelines, but as a rule of thumb they effectively capture the space required to meet the target service level for the target vessel capacity. Given the very large total square areas involved, the advantage of distributing the program elements across multiple levels becomes clear. One trend that has emerged in recent years with the introduction of more technology and faster embarkation processing times is a reduction in space requirements for both check-in and passenger waiting areas. This trend has shifted the required distribution of space even more to the ground floor, meaning upper level(s) may be able to be reduced in size if site and other program conditions allow.

Table 3.5.1: Example Terminal Program/Space Requirements – 5,400 Passenger Vessel
Source: B&A

Component	Case 1 5400 pax	Case 2 5400 pax	Case 3 5400 pax
Service Level	A	B	C
Entrance Lobby	17,618	15,593	13,587
Embarkation	56,586	47,998	40,023
Disembarkation	64,676	49,013	39,412
Customs & Immigration	28,583	28,583	28,583
Security & Screening	31,772	23,715	19,849
Port Operations	1,765	1,765	1,765
	201,000	**166,666**	**143,219**
Building Mechanical Systems	5,748	5,748	5,748
Elevated Concourse	24,750	21,038	17,325
	231,498	**193,451**	**166,291**
Building Envelope, Structure, Shafts, Etc.	4,630	3,869	3,326
	236,127	**197,320**	**169,617**
Summary by floor			
Ground gloor	110,571	89,689	77,537
Second floor	88,550	75,413	63,012
Either floor	36,664	31,877	28,726
Total	**235,785**	**196,978**	**169,275**

As cruise vessels continue to increase in size and capacity over time, terminal verticality will become increasingly attractive as a means to free up additional acreage for GTA and related logistics that occur outside the terminal shell. Next level design characteristics

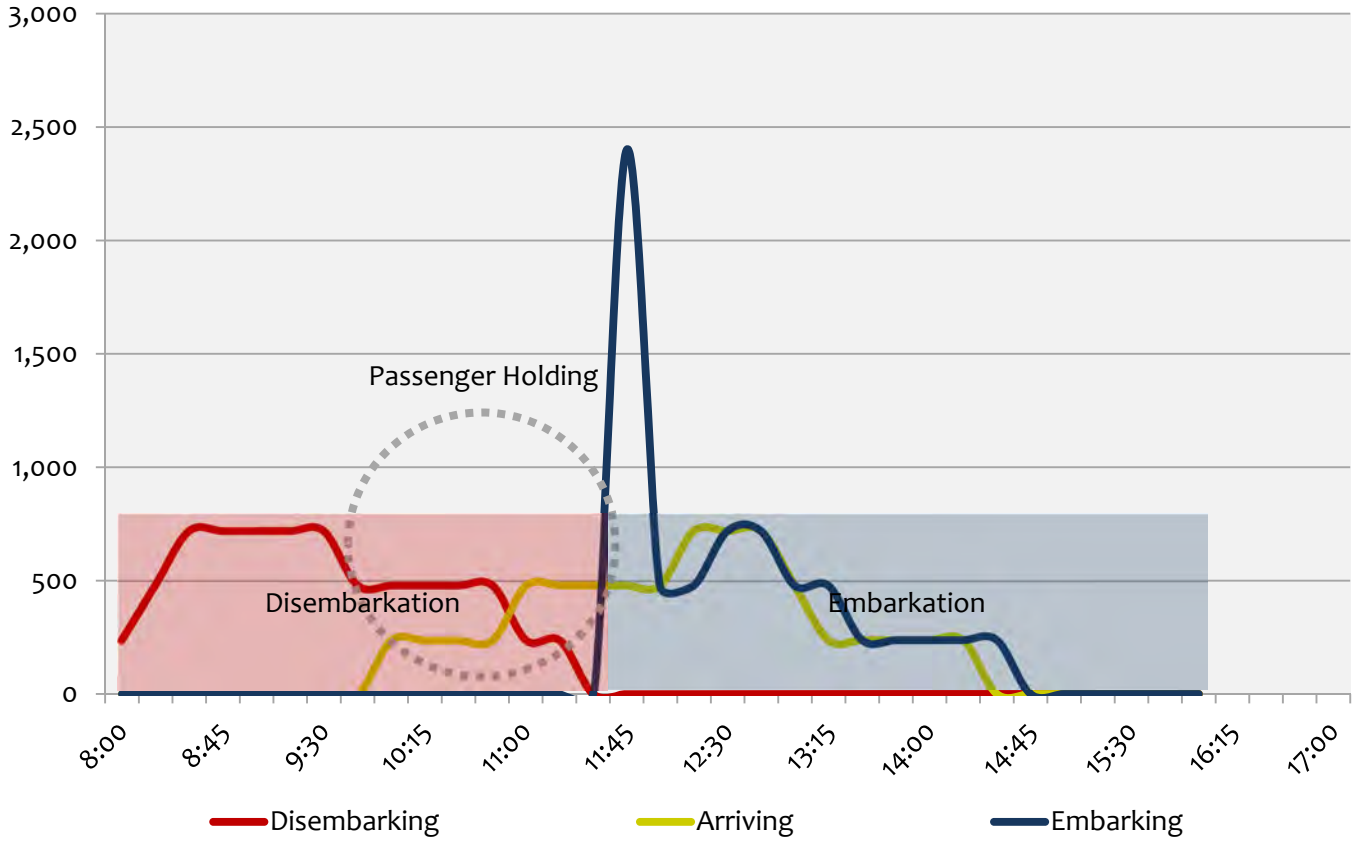
would take into account additional space for any holding scenario resulting from a late or quarantined vessel as well as redundancies for the vertical circulation elements, including elevators, escalators and stairways. Unlike airports, since cruise vessel ticket prices are inclusive of a wide array of food and beverage services, in-terminal food and beverage service is not required, common, or even desired in most cases. Other amenities and services can enhance the cruise passenger experience within the terminal, however, even if only during a relatively short (ideally 15 minutes or less) period. Such amenities include limited retail, baby changing stations in restrooms, entertainment zones for families, exhibits or galleries specific to the city or region in which the terminal is located, drinking fountains and robust audio/video (A/V) and information technology (IT) systems for both communication/information purposes and entertainment purposes. Perhaps the most important next-level amenity in today's industry is free and easy access to high-capacity, high-speed wireless internet service so that passengers can use their own handheld devices to access online information and entertainment options. All of these things help to create a terminal that is more integrated into the overall cruise experience.

Key Performance Indicators (KPIs)

Passenger flows are critical components of terminal design. Time is of the essence, meaning the speed and efficiency with which passengers can comfortably be processed through embarkation and disembarkation is an important component of the passenger experience. Similarly, maintaining a rigid time schedule is crucial to the cruise industry since in-port delays result in higher operating costs due to the need to deviate from optimal sailing speeds to make up for any time lost at the homeport. In this sense, the efficiency of a given homeport terminal is a competitive advantage. As the average capacity of cruise vessels continues to increase it will be necessary to process significantly higher passenger volumes within roughly the same amount of time, meaning cruise terminals must not only have sufficient physical space to handle a wide range of embarking and disembarking passengers, but – just as importantly – they must be designed in such a way that passenger processing can be done as efficiently as possible both during embarkation and disembarkation.

Figure 3.5.2 illustrates typical homeport passenger activity and flow distribution during a turnaround operation.

Figure 3.5.2: Typical Passenger Flow Distribution – 3,200 Passenger Vessel
Source: B&A



To mitigate the impacts of increased passenger loads resulting from larger average vessels, cruise terminals must not only allow for simultaneous embarkation and disembarkation, but also be designed in such a way that all steps included in the embarkation and disembarkation processes, respectively, can be managed within strict time limits. The following elements should be taken into account when assessing and determining the key performance indicators (KPIs) for a cruise terminal:

- Total embarkation/disembarkation time
- GTA waiting time (loading/unloading)
- Walking distances (curb to vessel)
- Baggage drop-off/pick-up time
- Security screening (queueing and processing time)
- Check-in (queueing and waiting time)
- Gangway access (time to disembark)

- Baggage delivery (time from curb to cabin)
- CBP (disembarkation; this is dependent on number of agents, use of facial recognition, flow, baggage laydown area, etc.)

Other significant KPIs include financial (cost per passenger, for example); safety/security; cleanliness; passenger satisfaction (meet and greet, friendliness, etc.); and cruise line back-of-house operations (efficiency of baggage handling, provisioning, bunkering/water/waste removal, etc.). Design is only part of the impact on KPIs, however. Outside forces influence the operations, such as multiple coaches arriving together, large groups and other surges or "mini-peaks" that can occur during the disembarkation and/or embarkation processes. KPIs should be the baseline by which performance is measured. Total time from curbside to vessel should not exceed 30 minutes.

The success of a cruise terminal in the eyes of the passenger is primarily related to the amount of time spent waiting in the terminal, specifically queuing at check-in or at circulation bottlenecks, such as security (embarkation) and CBP (disembarkation). A maximum of 30 minutes from vessel to terminal exit, or from baggage drop-off to vessel boarding, with passenger waiting times being no more than five minutes per process (security, check-in, etc.) is the lowest acceptable performance standard based upon 90 percent of passengers being processed within these durations. As the third-busiest cruise homeport in the world, Port Everglades should strive to exceed this standard whenever possible.

Table 3.5.2 provides KPI recommendations for Port Everglades' homeport operations covering the primary passenger processing, CBP and back-of-house areas for vessel calls during which 3,200 to 5,400 passengers are handled during disembarkation and an additional 3,200 to 5,400 passengers are handled during embarkation (6,400-10,800 total passengers).

Table 3.5.2: Example KPIs for Port Everglades

Source: B&A

Process	Time per PAX (seconds)	3,200 PAX	5,400 PAX	Comments
Disembarkation		**3.75 hrs**	**3.75 hrs**	
Gangway(s)	3-5	2	2	
CBP Primary (U.S.; visa; non-residents)	U.S. = 30; Other = 60	10	14	inspection stations
Baggage Claim	120-600	1	1	ground level
Exit Podium (10% to CBP secondary)	5-15	4	4	2 double podiums
CBP Secondary (30% to inspection)	5-15	2	2	1 double podium
Admissibility Waiting Area	180-7,200	9	9	seats - expandable
Secondary Baggage Inspection	720-1,200	5	5	4 tables; 1 X-ray
Embarkation		**5 hrs**	**5 hrs**	
GTA Arrival	varies			
Security Screening	10	5	7	X-ray machines
Ticketing/Check-in	120	25	50	movable desks
Baggage Screening (back of house)	varies	4-6	6-8	X-ray machines
Provisioning (back of house)	varies	16	32	trucks

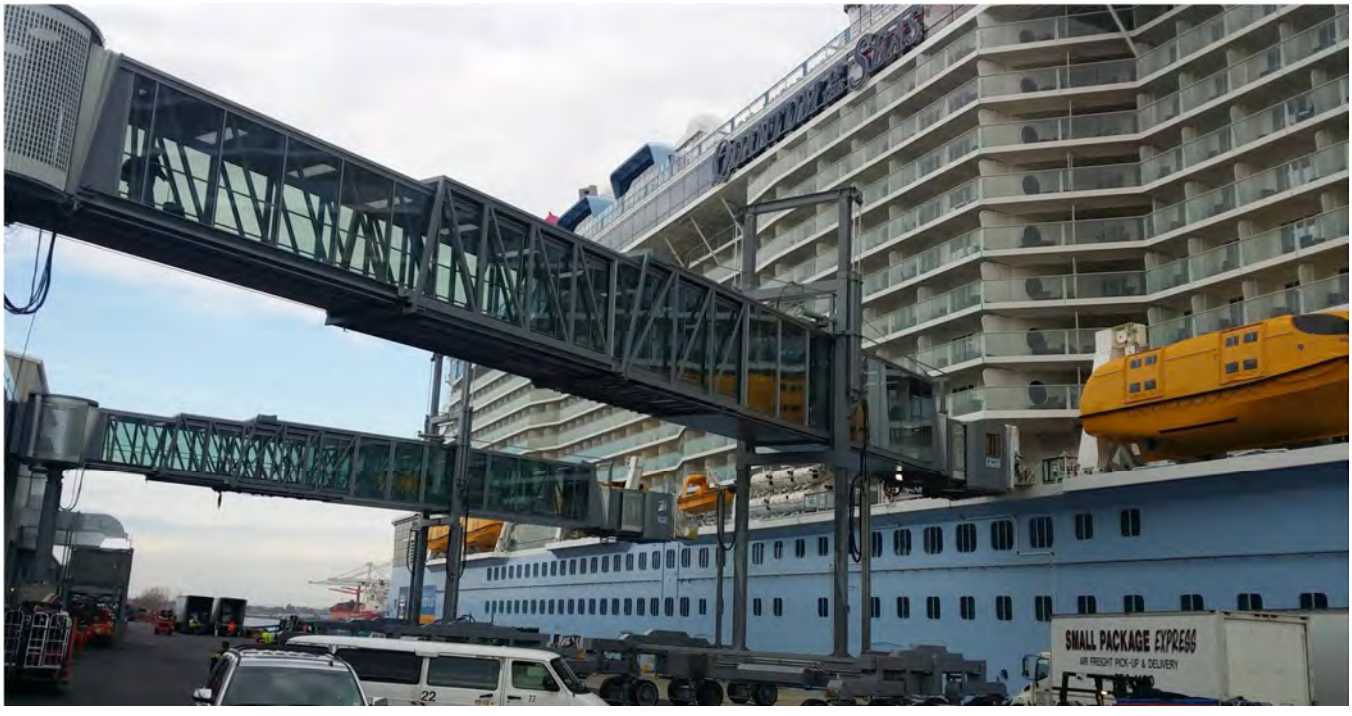
Passenger Boarding Bridges

The window of accessibility of a passenger boarding bridge (gangway) is defined by both a vertical and a horizontal dimension. The broader the window of accessibility, meaning the greater the vertical and horizontal range, the greater the number of cruise vessels in the global fleet that can be served. This effectively maximizes flexibility for today and into the future. It is not possible to know exactly which vessels will need to be served at Port Everglades beyond two or three years into the future. Terminals must therefore be sufficiently flexible to accommodate the highest possible percentage of the global fleet from a gangway service range perspective. At Port Everglades, all automated gangways are of the pivot type (See example, Figure 3.5.3) currently except for the passenger boarding bridge at Terminal 18, which has mobile elevated gangways.

The window of accessibility is also determined by the grade of the gangway since this grade, or slope, must comply with Americans with Disabilities Act (ADA) requirements. The ramp grade must not exceed 1 vertical unit for every 12 horizontal units. The window of accessibility is also impacted by the tidal range, which determines the vertical height

of the vessel's shell doors above the apron. The gangway provides the passenger connection to the ship and must be designed to allow both horizontal and vertical ship movements and be provided with specific safety equipment such as a safety net and devices warning of vessel movement. As previously mentioned, given the emerging preference by some cruise lines for embarkation to occur on the promenade deck of the vessel, flexibility in gangway service range will become even more important. Another important best practice related to gangways is to ensure sufficient available apron width and clearance under gangways to allow provisioning trucks and other service vessels dockside access to vessels. Cruise terminals at Port Everglades must therefore maximize the window of accessibility in order to service the largest range of existing and potential new vessels in the global fleet. Given that different vessel classes have different shell door locations, which also differ from port side to starboard side on the same vessel, and because different vessels vary greatly in length overall (LOA), it is vital to design service aprons such that automated gangways connecting a given terminal to a given vessel can be easily repositioned without disrupting provisioning and other activities that must occur simultaneously on the apron underneath and around each gangway.

Figure 3.5.3: Example of Large-Vessel Gangway Service Range Needs
Source: B&A



Parking and Ground Transportation Areas

A cruise passenger's first and last experience at the cruise terminal is the ground transportation area (GTA), or intermodal zone as it is sometimes called, where buses, taxis, app rides, shuttles, and private automobiles load and unload cruise passengers and baggage. For larger vessels, the capacity of the GTA must be sufficient to efficiently handle both average and peak periods of pick-up and drop-off activity. Clear, prominent and effective wayfinding and other signage within and on approach to the GTA is critical in order to minimize traffic congestion caused by confusion, indecision and/or other driver delays resulting from unclear vehicular flow patterns.

The preferred minimum GTA (not including staging, dispatch areas or pier operations (i.e., vessel provisioning/servicing)) for a typical homeport operation for a single cruise vessel of 5,000 passengers or more is roughly five acres, with approximately 2.5 acres being allocated to motorcoaches, shuttles and other high occupancy vehicle (HOV) pick-up and drop-off activity and another approximately 2.5 acres being allocated to taxis, app rides and privately occupied vehicle (POV) pick-up and drop-off activity. A minimum of 800 parking spaces is also typically recommended for a large-vessel homeport operation in South Florida given the historical and assumed future drive-in population. The specific modal requirements and configuration of a given GTA vary considerably from port to port and from terminal to terminal, depending on the overall available space and, just as importantly, on the physical and commercial context. Factors that affect GTA and must be considered when evaluating overall GTA space requirements, include:

- Single vessel operation vs. multiple vessel operation
- Shared vs. dedicated GTA
- Type of call (homeport vs. POC)
- Vessel size (passenger capacity)
- Cruise brand and itinerary type
    - Demographics
    - Length of cruise
    - Time of year (seasonal dynamics and weather)
    - Drive-in vs. fly-in market dynamics
- Modal split (motorcoaches vs. taxis vs. app rides vs. POVs)
- Site characteristics

  - Availability and cost of parking
  - Ease of approach and surrounding traffic patterns
  - Proximity to accommodations

Detailed passenger traffic data by mode was not made available to B&A specific to Port Everglades. Generally speaking, however, homeport operational needs and GTA requirements for a typical 5,000-passenger vessel are assumed to be as follows based on observed operations at other homeports:

HOVs

- Motorcoaches
  - 24-36 total per vessel
- Shuttles
  - 8-10 per vessel

Taxis/app rides

- For pick-up (disembarkation), average vehicle counts are unknown but the taxi share is declining due to increased use of app rides; this is a global trend across the industry and will likely continue indefinitely
- The best practice for app rides, as at most airports, is to designate an app ride pick-up area that is separate from the taxi and POV pick-up area; in some cases a separate area is also designated for app-ride passenger drop-off, but app ride drop-off is also often treated the same as taxi and POV drop-off since the process is effectively identical

POVs/Parking

- The relative share of POVs at Port Everglades is lower than at some other ports due to the large supply of off-port parking (see Element 4)
- Generally, POV traffic is allowed to access the curb of a given terminal to offload baggage and passengers with the vehicle then either leaving the premises or returning to the parking area
- If the Port is successful in increasing its future capture rate of drive-and-park passenger traffic then additional POV trips should be expected; while this may add to curbside congestion, it will also result in additional revenue to the Port

Trucks

- Full-size 53-foot tractor/trailers
  - Hotel 7 per vessel (dry)
  - Provisioning 11 per vessel (reefer)
- 10 box trucks per vessel (mix of dry and reefer)
- Two 53-foot tanker trucks per vessel (oily waste removal)
  - Requires approximately 2.5 hours total
- Each tractor/trailer typically has double-stacked pallets averaging 30 pallets per trailer = 540 total pallets per vessel
- Box trucks = 600 pallets (minimum) per vessel
- Vessel offloads (excluding garbage) = 50 pallets
- Heavy garbage = ~12 containers
- Total provisioning time varies by vessel, depending on vessel design factors such as provisioning hatch size and loading capacity

Baggage Handling

The baggage-handling area is typically the largest single component of a cruise terminal program and it must be on the ground floor in most cases. As a rule of thumb, one square meter (10 square feet) per passenger is the minimum space required. Circulation elements are then added to this basic area requirement, which can result in a total baggage laydown area of 65,000 square feet or more per terminal, thus occupying the majority of the ground floor of most terminals, with CBP absorbing most of the remaining ground floor area.

Increasingly, in land-constrained contexts where large vessels must be accommodated on a limited physical footprint, additional levels (i.e. a third floor) may be introduced to reduce the ground floor and overall building footprint. In such contexts carousel-style baggage conveyers and/or vertical sorting systems can be used and may be preferred, despite their higher cost vs. a standard single ground floor baggage laydown area. As elsewhere in the cruise industry, technology is also being introduced into the baggage handling process via the introduction of “smart” baggage tagging such as occurs at the Port’s T25 cruise terminal. This involves tagging bags with precision geo-locating devices that reduce the amount of time it takes the average passenger to locate their baggage and exit the terminal.

A next-level approach to baggage handling is baggage valet, or concierge service, which allows a passenger to separate from their baggage immediately upon arrival (disembarkation) so that they can enjoy greater Fort Lauderdale without the need to carry their baggage with them. This is a particularly attractive option for fly-in cruise passengers who may exit the cruise terminal as early as nine o'clock in the morning but not have a flight out of the area until the late afternoon or evening. Such a service would almost certainly increase the already significant economic impact of cruise passengers for Broward County by giving them an additional opportunity to enjoy the destination prior to returning home. This same valet service could also be used for embarking same-day fly-in passengers who arrive early in the morning at Fort-Lauderdale-Hollywood International Airport and would like to explore the destination for a few hours prior to boarding the vessel.

Ultimately, the design of a given terminal, including the approach to baggage handling facilities and technology, is the product of multiple considerations, not the least of which being the budget for the facility, so not all terminals are likely to adopt the same approach.

CBP/Security

All Port Everglades cruise terminals are required to incorporate space for U.S. CBP and Immigration personnel. This is due to the fact that all foreign-flag cruise vessels, which constitute 100 percent of the fleet homeporting at Port Everglades, must visit a foreign port as part of their itinerary in order to be compliant with U.S. cabotage laws (i.e. the Passenger Vessel Services Act of 1886). CBP processing areas are located at the end of the passenger disembarkation route. After disembarking the vessel, passengers are directed to the baggage laydown area where they retrieve their luggage. With their luggage and personal belongings in their possession they then proceed to CBP. CBP facilities include a primary and a secondary inspection area.

In the past, all cruise passengers were required to undergo some level of screening/processing by CBP officers at Port Everglades prior to leaving the terminal to ensure that contraband, agricultural materials and other disallowed or otherwise suspect goods and/or people are not allowed to enter the country. Recently, several new terminals, including T2, T18, T25 and T26 at the Port, have been developed with facial recognition technology in place to pre-screen passengers upon arrival. All passengers

pass through a corridor where facial scanning occurs; for the majority of passengers, this facial recognition scan results in a “green light” that allows them to bypass the primary CBP area altogether and simply exit the terminal after claiming their baggage. Only those passengers that do not “pass” facial recognition require additional CBP processing. This technology has dramatically shortened the post-cruise disembarkation process for most passengers in terminals where it has been deployed. While this is a very positive outcome, it also results in more intense post-baggage disembarkation peaking since a higher percentage of passengers are now exiting the terminal in a more compressed time period. Future terminal designs that incorporate facial recognition will need to account for this process change in their space and flow planning to ensure there are adequate interior or at minimum weather-protected post-baggage disembarkation holding areas located adjacent to GTAs so that passengers are not forced out of the terminal, onto the street and/or into the elements prior to their ground transportation being available.

For terminals that do not include facial recognition, all passengers must still be processed by CBP officers. Most passengers are screened at the primary inspection station and then cleared to exit the terminal. Some passengers are also required to pay duty on items acquired during their cruise. The overall process is similar to what occurs at U.S. international airports upon arrival. The secondary inspection facility is set apart and enclosed in a secured zone. If there is a question about a passenger’s belongings or a passenger him/herself, then that passenger is directed to the secondary inspection area where a more detailed screening is conducted. The area consists of screening tables, interview rooms, a holding room, and several staff offices as well as the duty collection office. The duty collection cashier is positioned so as to allow passengers to pay duty from the general queuing area without having to enter the secondary inspection area. Other support facilities include a computer room, rest rooms for passengers and staff, a staff break room, and an agriculture inspection lab. An observation office is positioned to permit an officer to view all activities in the passenger queuing area. The total space will vary depending on the size of the terminal and other factors, but it is generally determined by the Cruise Terminal Design Standards (CTDS), which are themselves determined centrally by CBP and generally applicable to all new cruise terminals built within the U.S. The CTDS and associated annexes are updated approximately every five years, with the most recent update (the 2018 CTDS) being released in the spring of 2019.

As with previous CTDS, the 2018 CTDS and its annexes provide for numerous process and

spacing allocation changes compared to the previous standard, most of which require more rather than less physical space than prior CTDS. These changes normally take effect when a facility is designed or renovated and there is no reason to believe that Port Everglades will be exempted from this for the planned renovations at T21, T29 and T26 and the new T19/20 terminal complex.

Apart from CBP, other landside and waterside security protocols exist and remain a high priority. The primary maritime security units under the U.S. Department of Homeland Security are the U.S. Coast Guard, Immigration and Customs Enforcement, and CBP. Seaports are outside the jurisdiction of the Transportation Security Administration. Additionally, a local security force used strictly for the port or a component of the local police force, such as the Broward County Sheriff's Office at Port Everglades, are typically also present.

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

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

Alternative/Secondary Terminal Use

Many ports within the U.S. and around the world allow their cruise terminals to be used as venues for various types of special events. By virtue of their size and waterfront locations, cruise terminals offer premium event and meeting space and for some ports these secondary uses serve as a substantial source of additional non-cruise revenue. Options for secondary uses include conventions, meetings, exhibitions, weddings, fundraising events, dinners, food and beverage festivals and other corporate, non-profit and private functions.

Port Everglades has traditionally only allowed secondary use of its eight cruise terminals for a limited and very specific number of events, such as public meetings associated with

the Master/Vision Plan update process. Going forward, this policy should be reviewed and B&A recommends that a market study be conducted to determine whether or not there is sufficient potential demand for secondary uses at the Port's cruise terminals to merit a shift in policy. If such a market study were to determine that there is a market for regular on-Port events then additional amenities could be considered for inclusion in future terminal renovations, including movable walls to help with space scaling, adjustable lighting controls to provide customizable ambiences for different uses (cruise, exhibition, dinner, auction, etc.) and enhanced kitchen facilities.

A summary of the key trends currently impacting cruise terminal design is presented below.

- Technology
  - Mobile check-in (embarkation)
  - Facial recognition (disembarkation)
  - "Smart" baggage tagging (precision geo-locating)
- Industry preferences
  - Larger vessels
  - Embarkation shift to promenade deck
  - Faster check-in and smaller waiting areas
  - Weather-protected post-baggage disembarkation areas
  - Updated CBP standards and requirements (2018)
- Consumer preferences
  - Higher % of early walk-off (self-assist) passengers
  - Higher % of app ride use
- Emerging practices at some other ports
  - Baggage conveyors and vertical sorting
  - Baggage valet service

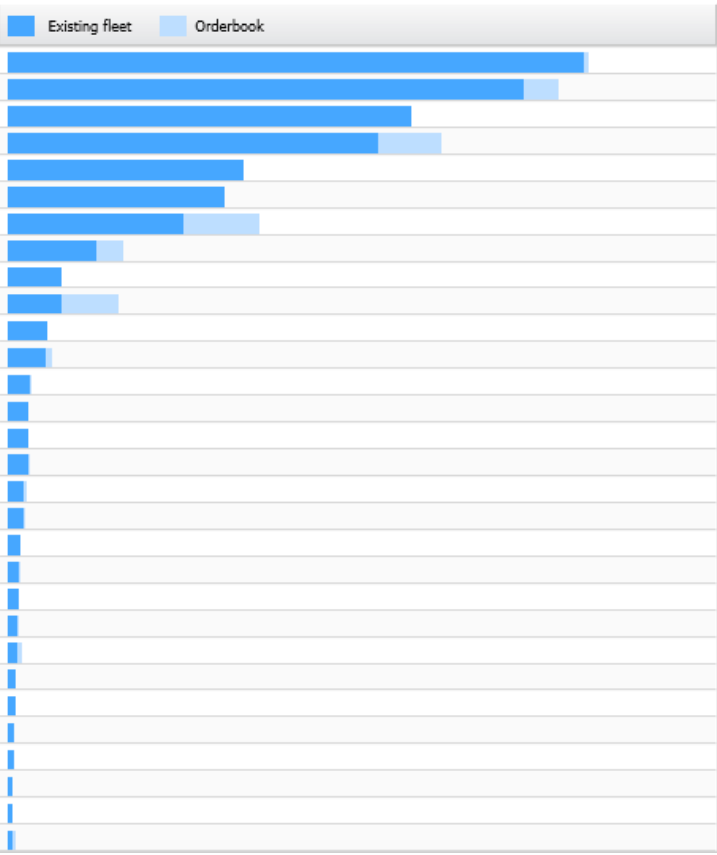
3.3.2 Container Terminal Trends

The ocean transportation of international containers is handled by shipping lines primarily owned and operated by international corporations based in Europe and Asia. Figure 3.5.4 presents the top 30 container lines by total capacity (i.e. active fleet plus orderbook) as of January 1, 2019.

Figure 3.5.4: Top 30 Container Lines by Total Capacity – January 1, 2020

Source: Alphaliner

Rank	Operator	Teu	Share
1	APM-Maersk	4,192,742	17.8%
2	Mediterranean Shg Co	3,757,451	15.9%
3	COSCO Group	2,938,030	12.4%
4	CMA CGM Group	2,695,863	11.4%
5	Hapag-Lloyd	1,716,932	7.3%
6	ONE (Ocean Network Express)	1,581,368	6.7%
7	Evergreen Line	1,276,568	5.4%
8	Yang Ming Marine Transport Corp.	646,630	2.7%
9	PIL (Pacific Int. Line)	393,498	1.7%
10	Hyundai M.M.	388,526	1.6%
11	Zim	291,036	1.2%
12	Wan Hai Lines	274,036	1.2%
13	Zhonggu Logistics Corp.	161,068	0.7%
14	IRISL Group	152,419	0.6%
15	KMTC	146,734	0.6%
16	Antong Holdings (QASC)	146,152	0.6%
17	SITC	117,812	0.5%
18	X-Press Feeders Group	116,404	0.5%
19	UniFeeder	85,067	0.4%
20	TS Lines	79,673	0.3%
21	SM Line Corp.	73,882	0.3%
22	Arkas Line / EMES	64,517	0.3%
23	Sinokor	64,192	0.3%
24	Sinotrans	59,339	0.3%
25	RCL (Regional Container L.)	54,058	0.2%
26	Salam Pacific Indonesia Lines	52,121	0.2%
27	Matson	45,634	0.2%
28	Emirates Shipping Line	42,672	0.2%
29	Grimaldi (Napoli)	41,756	0.2%
30	Swire Shipping	40,815	0.2%



Since the 2014 Master/Vision Plan was adopted, two major global trends have largely already played out.

The first of these – a shift to larger average vessels in most east-west trade lanes and even some north-south lanes – has been occurring for more than a decade but was accelerated in terms of relevance to Port Everglades with the official opening of the Panama Canal's new set of locks to commercial traffic in 2016. Since then, there has been a clear cascading of larger vessels into both the Transatlantic and Transpacific trade lanes, with some cascading also occurring in the inter-Americas trade lane. Table 3.5.3 highlights the increase in average vessel size that has occurred since 2016; a trend which continues today. As shown, Port Everglades is the only major container port in the South Atlantic region not to see an increase in average vessel capacity. This is due in part to the trade lanes that Port Everglades's customers serve; however, it is also due in part to the

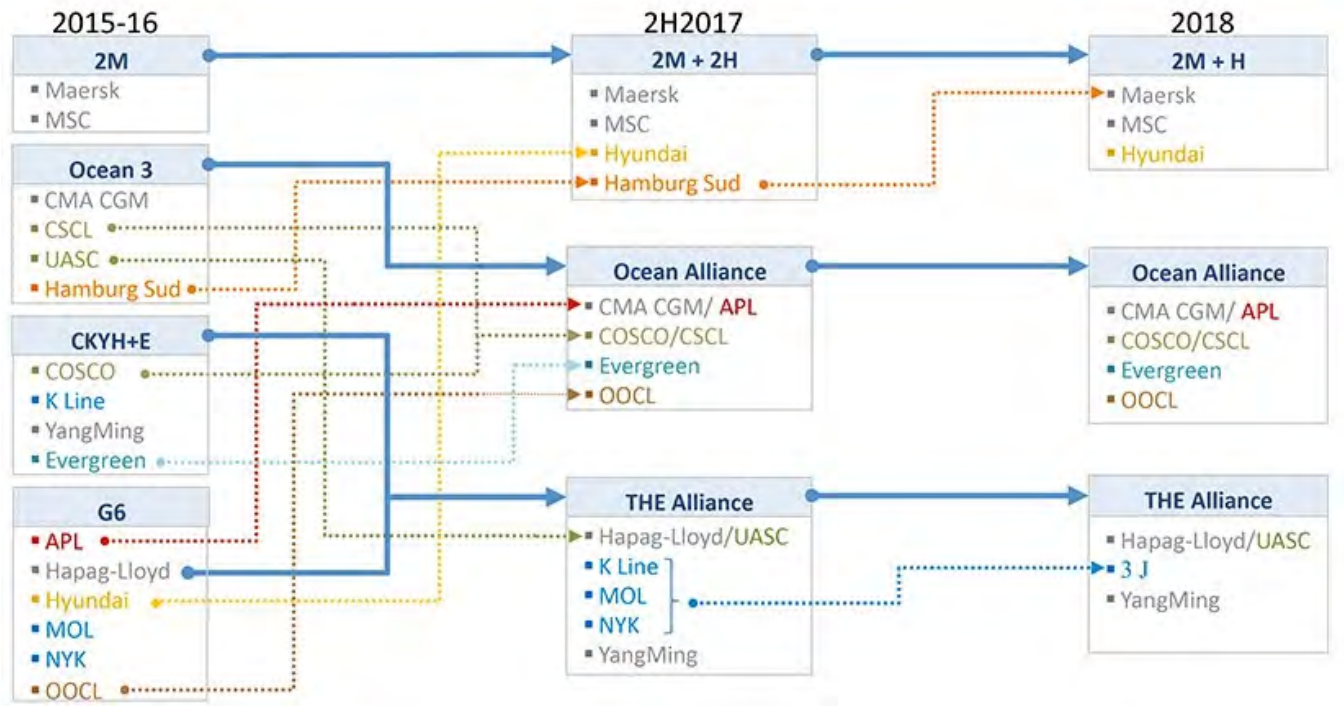
fact that post-Panamax vessels (i.e. vessels with capacities in excess of approximately 4,500 TEUs) cannot be serviced efficiently at Port Everglades due to both navigational and equipment constraints. See Element 2 and Section 3.6 below for additional discussion of these constraints).

Table 3.5.3: Average Size (TEUs) of Vessels Deployed through Panama Canal - Select South Atlantic Ports
Source: PIERS; Martin Associates

PORT	AVERAGE SIZE OF CONTAINER SHIP 2012 (TEUs)	AVERAGE SIZE OF CONTAINER SHIP 2017 (TEUs)
Port of Charleston	4,885	8,401
Port of Savannah	5,106	8,366
Port*MIAMI*	4,650	6,974
JAXPORT	5,002	6,566
Port Tampa Bay	2,448	4,748
Port Everglades	4,235	4,189

The second major trend to occur in recent years within the global container shipping industry is a massive amount of ocean carrier consolidation triggered by mergers, acquisitions and at least one high-profile bankruptcy (Hanjin). This consolidation has occurred at the corporate level but also – and perhaps more importantly – at the consortium/alliance level. Figure 3.5.5 below illustrates the extent and pace of consolidation that has occurred since the 2014 Plan was adopted.

Figure 3.5.5: Container Liner Industry Consolidation (2015-2018)
Source: pacificatrucks.com



The practical impact to Port Everglades of the trends reflected in Figures 3.5.4 and 3.5.5 is that more decision-making and greater market share is now concentrated in fewer hands, meaning container lines have more leverage in nearly all aspects of the industry – including port selection – than ever before. What follows is a discussion of these and other trends related to container terminal operations.

Larger Vessels

An ocean carrier's costs are determined in part by the size of vessel operated. Larger vessels are generally deployed on longer, higher-volume trade routes due to the efficiency and cost-effectiveness of carrying more containers per sailing. As vessel sizes have increased over time, and continue to do so today, vessel operators in many cases have elected to call fewer ports in a given port range. This allows shipping lines to minimize the costs and delays of coming into and out of multiple ports and to avoid excessive delays to the cargos/containers that would be discharged at the final port in the rotation, thereby increasing the value of that port within the range. An important consequence of this service structure has been that a particular port's success may be

linked to other ports through common vessel services, and competitive position may depend on where ports line up in the vessel service patterns. For example, being the first port-of-call in a port range is important for increasing a port's share of potential discretionary import cargo because the cargo can get off the vessel and be distributed by rail or truck, in some cases by the time the vessel reaches the second port of call. Conversely, export volumes may be increased for a port located near the port range's final port of call since this will minimize the outbound transit time to the end customer (i.e. the beneficial cargo owner or freight forwarder).

To date, Port Everglades has not benefitted from the shift to larger vessels due to both infrastructure and operational impediments that limit its attractiveness for calls by post-Panamax vessels operating in the east-west trade lanes.

Increased All-Water Service Options

As previously expected, with the opening of the new, expanded Panama Canal locks, ports up and down the U.S. East Coast have seen an increase in all-water services from Asia. Perhaps less expected is the fact that the number of services originating in Asia but being routed to the U.S. via the Suez Canal rather than the Panama Canal has also increased in recent years. The end result is that there are now multiple weekly services calling a wide variety of U.S. East Coast (and Gulf Coast) ports. The larger vessels that can now be deployed via either canal has improved the economics of all-water service significantly and put mini land bridge (i.e. intermodal rail service from/to the U.S. West Coast) in a less competitive position than in the past.

LNG

Fuel consumption accounts for a large share of the total cost (up to half) of a container vessel's voyage. Fuels such as LNG have the potential to reduce fuel-related vessel operating costs by about 30 percent while also boosting the vessel operator's environmental bonafides by reducing each vessel's total emissions and overall carbon footprint. A comprehensive assessment of the potential operational impacts to Port Everglades of the trend toward LNG as a primary fuel source for cruise vessels is presented in Element 2. For the containerized cargo industry, a similar shift would result in similar infrastructure and operational requirements. Given that Crowley Maritime is among the pioneers in the use of LNG for container vessels, it is more a question of when Port Everglades needs to be prepared to offer LNG as a bunkering alternative for its cargo

customers rather than if it will need to.

Terminal Densification

With container throughput increasing and available land becoming scarce, ports and terminal operators are converting to container-stacking equipment that can increase the storage density on the terminal. A terminal's stacking density can be increased by shifting from a conventional mode of storage to high-density storage, such as top-picks, rubber-tired gantry cranes (RTG), rail- mounted gantry cranes (RMG), and automated stacking cranes (ASC). The choice of container-handling equipment normally depends on several criteria, including required storage capacity versus available land, required container accessibility, labor skills and costs, terminal shape and configuration, and pavement limitations (load capacity). Using stacking equipment such as top- picks, RTGs, and/or RMGs, the terminals can stack the containers higher and increase the static storage capacity; however, as the storage density increases, more sorting and rehandling are required to service the gate and vessel traffic, so the highest-density option is not necessarily the optimal situation from a cost or even efficiency perspective.

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

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

A more extreme example of densification is terminal automation. A number of marine terminals around the world have shifted towards automation in container-handling equipment. APMT's terminal in Portsmouth, Virginia, was the first operational terminal

in the U.S. with ASCs in the yard. ASCs are unmanned container-handling equipment that require sophisticated integration with the terminal operating system (TOS) to work automatically. Long Beach Container Terminal (LBCT) at the Port of Long Beach in Long Beach, California is s more recent example of a fully automated terminal. In both cases, the absence of human beings allows cranes and other equipment to be operated at higher speeds and during longer, uninterrupted periods of time. Terminal automation is very capital-intensive however, and is typically only adopted in large-scale environments that have higher than average labor costs since the actual productivity advantages may be minimal when compared to the cost of implementation. Port Everglades is looking at automation as one of many potential solutions to current and anticipated future terminal congestion.

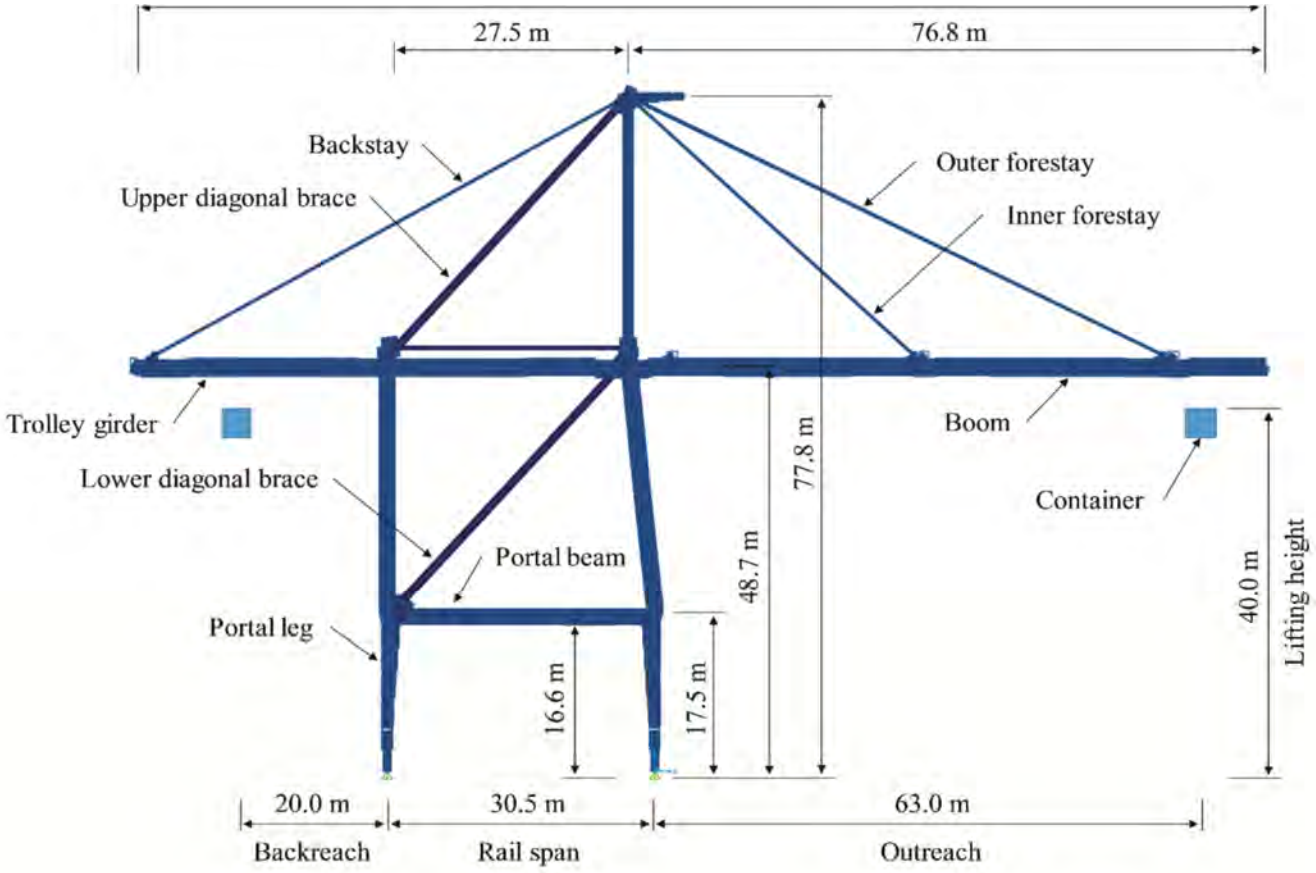
One very interesting form of automation that has taken hold in several ports is remote-controlled ship-to-shore (STS) cranes. Two terminals at Maasvlakte II in Rotterdam, for example, have chosen to operate their STS cranes remotely from a central control room. This solution actually improves crane performance by reducing cycle times while also removing the physical risks to the operator of being on the terminal.

Ship-to-Shore (STS) Cranes

STS cranes are the standard equipment used at modern container ports to transfer containers between a vessel and the pier. In order to keep pace with growth in container vessels themselves, STS cranes have evolved and grown in size and capability over time to meet the dimensional and productivity needs of the industry. The smallest type of crane still in use at North American ports are referred to as Panamax. A Panamax crane can fully load and unload containers from a Panamax-class container vessel (i.e. a vessel capable of passing through the Panama Canal locks prior to the construction of the new set of locks. Dimensions for such vessels are up to 190 feet (57.91 m) in air draft with sufficient beam to accommodate up to 13 containers across. Panamax cranes follow this same general specification. The next general step-up in dimension and capability for STS cranes is known as a post-Panamax crane. A post-Panamax crane can load and unload containers from a container vessel that is too large to pass through the original Panama Canal locks, for example an 8,000 TEU vessel that can stow 18 containers across. The current industry standard for STS cranes is known as a super post-Panamax (SPP) crane. SPP STS cranes can generally work a vessel that stows 22 containers across. Figure 3.5.6 presents an example SPP STS crane.

Figure 3.5.5: Example SPP STS Crane Design

Source: mdpi.com



Most modern STS cranes are cable of lifting two TEUs simultaneously under a telescopic spreader, giving them a minimum lifting capacity of 65 tons. Some new cranes have a 120-ton lifting capacity, enabling them to lift up to four TEUs or two 40-foot containers (FEUs) simultaneously. Cranes capable of lifting six TEUs (or three FEUs) during a single "pick" have also been designed, but are not commonly used. A typical post-Panamax STS crane weighs between 800 and 900 tons, while newer SPP STS cranes can weigh between 1,600 and 2,000 tons, depending on various structural/design components. The largest SPP STS cranes currently in use have an outreach of up to 25 container rows.

As discussed in Section 3.6, the Port currently has seven low-profile Panamax STS cranes in Southport but will put six additional SPP STS cranes into service by 2023, bring the total number of STS cranes in Southport to 13. Given the Port's proximity to Fort Lauderdale-Hollywood International Airport, these new cranes are custom-designed low-

profile cranes with numerous non-standard features. However, they still meet the general needs of the industry in terms of reach (i.e. 22 containers across) and lift capacity. See Figure 3.9.5.

Electrification of Container-Handling Equipment

Apart from STS cranes, which have largely already been electrified at most ports given their limited rail-based lateral range of motion and large power needs, container-handling equipment at terminals has traditionally been and in many cases still is powered primarily by diesel engines. This not only contributes to local port-related air emissions, but also can have a negative impact on operating costs, depending on the cost of diesel fuel relative to electricity available from the grid. Many ports have already moved away from some types of diesel-powered yard equipment in favor of electrified alternatives. Electric RTGs, for example, are commonplace at many ports in North America. Electric RTGs run on electric power directly from the power grid while working in a stack and use diesel power for moving between stacks and maintenance areas. This reduces diesel consumption and associated emissions by as much as 95 percent. U.S. West Coast ports have used mostly electric RTGs for several years and the Georgia Ports Authority is in the process of converting their diesel-powered RTGs to electric by 2022. Since only one terminal at Port Everglades currently uses RTGs at all, conversion is not the principal issue. However, as pressure to densify Port terminals in order to increase capacity continues to mount, the Port and its operators have the opportunity to start with electric RTGs initially, thereby avoiding the need to convert this equipment down the line. Prior to the use of RTGs being widespread across the Port's container terminals, it may be possible to partner with terminal operators at the Port to introduce alternative fuel (LNG, hybrid-electric, etc.) versions of existing equipment types, including top-picks, reach stackers and yard hostlers.

Empty Container Depots

Empty container depots work similarly to chassis pools. Containers are owned by the ocean carriers and the terminal operator acts as a fleet manager. Empty container depots are located outside terminal gates and sometimes even off-port. Their essential purpose is to reduce truck trips to and from a given terminal that are strictly associated with the pick-up and/or return of an empty container. This decreases the number of gate transactions at a given terminal and reduces overall truck traffic. As a landlord port, Port Everglades does not control how the respective terminal operators deploy their empty

containers. Nevertheless, since land within the Port's jurisdictional area is extremely limited and highly valuable, B&A believes that terminal operators would find it to their advantage to use their facilities for more productive purposes than empty container storage should an alternative depot area be made available.

Terminal Operating System (TOS) Integration

The TOS is the primary instrument of record-keeping, planning, control and monitoring for the modern marine terminal. It allows the centralized computer system to automatically decide equipment assignments in the yard and container placement in the stack, which reduces operational overhead and increases efficiency. The main function of a TOS is to manage containers, equipment assignment, inventory control, billing (finance), and labor within the terminal. Connecting the terminal-operating and gate-operating systems, along with the OCR system using the electronic data interchange (EDI), brings all terminal operations under a single framework. Integration between these three systems significantly improves terminal productivity and decreases the gate transaction time required to service trucks. An integrated TOS will also be required to implement new operating practices at the Port's terminals to reduce truck traffic and associated congestion. One such opportunity, which is also a trend at many container terminals, is the use of an appointment system to better manage gate traffic and pre-gate queueing.

Near-Port Cold Storage/Transloading

In 2017, approximately 45,920 TEUs of containerized grapes and berries originating in Chile and other areas of South America moved into the U.S. via the Delaware River ports of Wilmington, Philadelphia, and Gloucester City and were subsequently trucked to South Florida for distribution and final consumption. As documented in Element 2, Federal regulations designed to protect the nation's citrus industry have long barred certain imports from entering ports in Southern U.S. states due to the risk of invasive pests that could thrive and damage the citrus industries in these warmer southern climates. Until very recently, only ports north of the 39th parallel could receive products subject to the "cold treatment" requirements mandated for these pests. A pilot program was initiated in October 2013 to allow Port Everglades and Port*Miami* to import blueberries and grapes from Peru and Uruguay.

The ability to relax or repeal additional regulations that apply to similar products in this trade lane is an important opportunity to increase future Port Everglades container volume and grow market share. Port Everglades is already a leader in this niche, and the 2014 construction of the near-dock FEC ICTF provides a real opportunity to extend the port's hinterland specific to perishables, not merely further into the I-4 corridor, but beyond the State line. By definition, perishables have a limited shelf life and lose value every day that they are not in markets or otherwise available for purchase by consumers. The potential for Port Everglades to increase speed-to-market for perishable products by transloading them on-port (or near-port) into either refrigerated 53 foot domestic trailers or refrigerated railcars, so that they reach their final point of consumption more quickly, adds real value for shippers.

There is a clear trend for both dry and especially cold-storage capacity to be developed near container ports that handle high volumes of certain types of products as a means to increase transloading capabilities since this allows for less-costly inland movement, increases distribution options, adds flexibility and avoids the need to reposition ISO containers back to ports. FEC's scheduled rail service from Port Everglades to Jacksonville, with CSX and NS connections continuing from there to points throughout the Eastern U.S., could allow shippers of perishables to access key markets in the South Atlantic and beyond more quickly and at lower costs than accessing these same markets via northern ports (i.e. Wilmington) and then trucking the product south.

In addition, there is a growing interest in the synergies between air cargo perishables, particularly seafood, and cold storage facilities within the port's hinterland. In most cases, the demand for cold storage/temperature controlled warehouses is specific to facilities that can provide transload/cross dock operations, where the imported perishable cargo moving via container is stripped at the port, then transferred to domestic truck or rail for distribution. Similarly, perishables for export, such as meat and fish, are reloaded from over the road truck or rail into marine containers at the temperature controlled/refrigerated warehouse. The ability of Port Everglades to grow this market represents a real, near-term opportunity, and is underscored by the demand for on-Port or near-Port temperature-controlled space by private sector developers.

3.6 Operational Enhancement Opportunities

In order to continue to grow in step with the broader market and tap into the substantial economic growth occurring across the Pacific Rim (among other regions), Port Everglades must identify competitive logistics channels and remove constraints to growth. This includes ensuring that Port infrastructure can adequately and efficiently handle the vessel types and sizes that are expected to be deployed in the major trade lanes, relevant to the South Atlantic port range during the coming 20 years. It also means that Port Everglades must actively engage in addressing the numerous challenges that its terminal operators face. Beyond these measures, Port Everglades must assess ways to serve both its core and extended hinterland markets more cost-effectively than competing ports, such as Port of Savannah, JAXPORT and Port*Miami*.

3.6.1 Southport

The Southport area of Port Everglades handles the vast majority of containerized cargo activity at Port Everglades currently and is expected to handle nearly all containerized cargo activity once all projects in the 10- and 20-year Vision Plans are completed. Interviews with the Port's container terminal operators conducted as part of Element 2 of the 2018 Update revealed a common thread of issues, primarily berth and STS crane capacity/availability constraints, as well as traffic congestion within and surrounding the Southport facilities. There is also a general sentiment among Port Everglades' container terminal operators that these issues must be addressed – not only in order for the containerized cargo business to grow at Port Everglades, but also to prevent carriers from leaving Port Everglades for other Florida and South Atlantic ports.

The primary operational enhancement opportunities related to containerized cargo operations in Port Everglades' Southport area are summarized as follows:

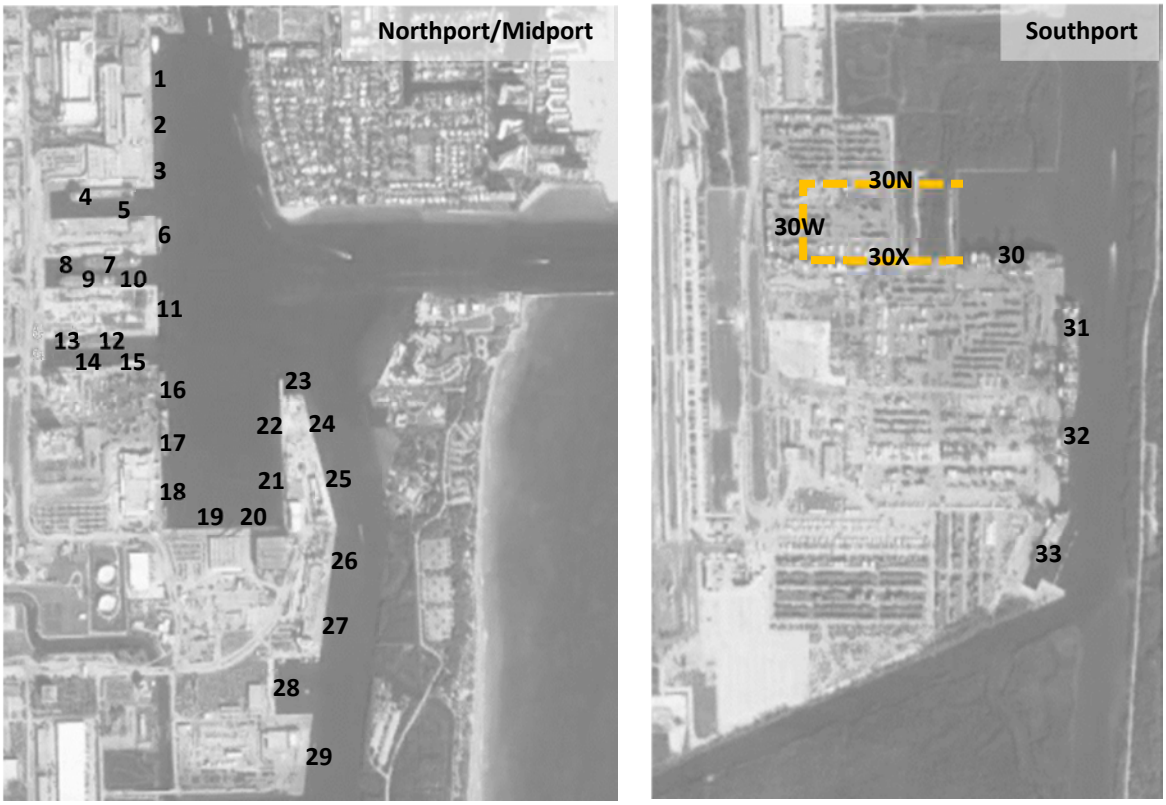
- Berth (and crane) availability
- Crane size and capacity
- Terminal operating practices
- Navigational constraints (i.e. channel depth and width restrictions, especially the need to accommodate access by neo-Panamax container vessels to Southport while post-Panamax cruise vessels are at T25, T26 and/or T29)
- Traffic congestion in and around the Port, especially on McIntosh Road

Berth Availability

Berth availability and proximity to relevant container yard (CY) areas was identified as one of the major constraints preventing higher throughput at Port Everglades. See Figure 3.6.1 below for a map of existing Port Everglades berths. This is identical to Figure 3.7.1.

Figure 3.6.1: Map of Port Everglades Berths

Source: B&A



Currently, berths are assigned by the Port's harbormaster but with each terminal operator in Southport having some claim to preferential berthing. As a result, some vessels are shifted from the berth to anchorage in the middle of a call to allow for another vessel to berth, consistent with preferential berth claims. This severely disrupts the production of the vessel load/discharge operations, increases costs as the vessel incurs shifting charges such as pilotage, towing and line handling, and causes disruptions in schedule integrity for the vessel operator. As thoroughly discussed in Element 2, Port Everglades currently has three different categories of labor related to containerized cargo operations (i.e. ILA, Teamsters, nonunion). This diversity of labor options has allowed the Port to service multiple niche container lines that it would not otherwise be able to service but it also

creates unique jurisdictional challenges on the Southport waterfront. Certain terminals have indicated that other terminal operators spend an excessive amount of time at berth waiting for "live gate moves," thus increasing berth dwell times and negatively impacting crane and berth productivity as well as overall terminal throughput rates. In some cases, vessels are required to leave a specific berth, be replaced by a one gang for ship-to-shore operations, and then return to the berth after that vessel operation is completed. In other situations, a specific vessel may be involved in a vessel sharing agreement (VSA) with another container line. In this instance, when the VSA is between a nonunion and union-served carrier (either ILA or Teamsters), a union gang will unload/load the containers for the carrier affiliated with union labor. Then they will remain at the same berth on standby while a nonunion gang is deployed to the vessel to complete its loading/unloading. This is inefficient and costly due to the amount of downtime involved for different labor groups. During cruise season, the berth situation is exacerbated, particularly for the smaller container lines operating in Midport, but also for Southport container operators who may need to schedule vessel calls around cruise operations at cruise terminals 29, 26 and/or 25, depending on the beam of the cruise vessels at those terminals and whether or not a given container vessel can safely "pass" the vessel to access or exit Southport. Cruise operations exacerbate many of the issues noted above, and have a particular impact on the smaller container operations in the Midport area of Port Everglades. The sharing of berths between cruise and cargo at Midport was cited as a hindrance to growing the smaller island services, as the cost of moving vessels off a berth to accommodate cruise operations (and the further assignment of berths farther from the container yards) adds significant costs to Port Everglades operations. Several carriers expressed the potential to deploy services elsewhere if berthing, crane and traffic circulation issues are not remedied in the near-term.

The 2018 Update includes two projects that will immediately enhance Southport container operations upon completion by addressing several of the issues outlined above. The first of these projects is the STNE, which will add up to five additional berths in Southport, thereby increasing the Port's ability to consistently assign preferential berths to the corresponding terminal operator and avoid conflicts that result in repositioning vessels mid-call away from berths. Already underway, this project is set to be completed in 2023. The second project that will greatly enhance Southport operations is the USACE deepening and widening project. This project, which is currently slated for completion in

2026, will not only allow larger vessels to call Southport, thereby better meeting the needs of the global container industry, but also allow container vessels to access and exit Southport while cruise vessels are berthed at terminals 29, 26 and/or 25. Both of these are huge competitive factors for Port Everglades so resolving them represents a major advancement in terms of operational efficiency and productivity. While no similar projects are proposed for Midport, it is envisioned that sufficient new land will be made available and sufficient operational enhancements made by both the Port and its terminal operators that nearly all future containerized cargo operations can and will be handled in Southport.

Cranes

Another major challenge at all Port Everglades container berths is crane density/availability. Crane and berth capacity are typically mentioned in tandem because both are required to service containerized cargo vessels, excepting smaller vessels that serve the Caribbean islands using ship-mounted cranes. The Port Everglades terminal operators interviewed as part of Element 2 indicated the need for additional STS cranes per berth, in order to turn vessels more efficiently which reduces vessel dwell time and effectively increases overall berth capacity. The limited height of the existing cranes in Southport due to the need to comply with the air space constraints imposed by the FAA (as a result of proximity to Fort Lauderdale-Hollywood International Airport flight paths) is a known issue and limits the reach of the cranes to one over six containers on deck. The outreach of the current cranes is also limited to 16 containers across. These restrictions have limited Port Everglades' ability to handle larger vessels in its existing trade lanes, and have effectively removed Port Everglades from consideration for direct calls in the Asia trade lane, where vessel size is growing at an increasing rate (i.e. up to 14,000 TEUs). Larger vessels require larger STS cranes, and more than two cranes per berth, in order to turn the vessel efficiently and guarantee service integrity.

The 5-year Master Plan component of the 2018 Update includes a total of six new low-profile super post-Panamax STS cranes, all of which will be able to reach one over eight containers on deck and 22 containers across. Three of these cranes (2020) will be placed on Berth 31 with the other three serving Berth 30 (2023). The addition of these cranes will hugely benefit Southport container operations not only by virtue of increasing crane density but also by virtue of giving the Port two "big ship" berths (i.e. berths that can theoretically service neo-Panamax vessels with carrying capacities up to 14,000 TEUs).

Upon delivery of all six new STS cranes, the Port will have at least two cranes available to service the following Southport berths:

- Berth 33A (2 Panamax)
- Berth 32 (2 Panamax)
- Berth 31 (3 super post-Panamax)
- Berth 30 (3 super post-Panamax)
- Berth 30X (3 Panamax)

The sole complication with the crane placement outlined above is that the new Berth 30X (so-named because it does not have any other official designation as of the drafting of this report) is intended to serve mostly as two separate small ship berths rather than as a single big ship berth. Following this thinking, the berth that is farthest west within the new STNE will still feature just one STS crane, even after 2023. While this berth is intended to service smaller vessels, it is still inefficient in most cases to use only one STS crane on a vessel, meaning Berth 30X will necessarily see lower productivity than other berths in Southport for similar calls due to lack of crane density/availability. At least one current Southport terminal operator has advocated strongly for purchasing a 14th STS crane within the coming five years. Given the previously mentioned FAA air space issue at this location, any additional crane placed at the far western end of the STNE would need to be similar in profile to the Port's existing Panamax cranes. The 20-year Vision Plan component of the 2018 Update does call for an additional STS crane to be purchased for placement at the far western end of Berth 30X no later than 2032.

Terminal Operations

One of the principal issue with existing operations at Port Everglades is container yard density. Densification is the process of increasing the number of containers that can be stored per gross terminal acre. When cargo throughput increases, but the terminal remains in the same configuration, boxes must be stacked on the terminal to increase storage capabilities. With the majority of the stacking layouts at the Port's container terminals being designed to suit low-density top-pick operations, significant additional densification to meet future demand is needed. This will require a change in terminal operations, including the use of different types of equipment, such as widespread or even universal implementation of RTGs. Port Everglades Terminal (PET) moved to a partial RTG operation several years ago (see Section 3.7), but additional implementation will be

required to increase the effective capacity of PET and other Southport terminals. Further engineering investigations will be needed to determine the exact type of equipment that is most suitable at Port Everglades as well as the degree and timing of implementation required and the terminal configurations that are optimal to accommodate high-density handling equipment.

Apart from densification, operating practices themselves can go a long way to enhance on-terminal efficiencies by reducing dwell times and so too increasing effective capacity. The introduction of economic measures such as incentives (or more likely fees in most cases) can help to increase the velocity of cargo through terminals and also reduce empty storage factors. The Port currently allows unlimited free time for storage of loaded and empty containers within the terminals. Most other ports within the U.S. and many international ports have adopted strict free-storage limits on all container types to promote higher throughput rates and avoid congestion. This policy-based solution, which can easily be enacted and modified via the Port's tariff, effectively incentivizes owners of containers to move them off-port as quickly as possible in order to avoid incurring monetary penalties for on-port storage. Enacting this type of tariff, when combined with other cost-sharing incentives or minimum cargo-threshold limits, can also be used as an incentive to move more cargo through the facility. Combined, these changes to operating practices can be used to enhance terminal operations and increase effective capacity. Typically, most ports use a tiered approach where empty containers can remain on site for longer periods of time (i.e. 15 days) whereas loaded containers are allowed free storage for only a week (i.e. 7 days), or in some cases less. On the U.S. West Coast, for example, free-time storage is less than 5 days. Given the Port's known land constraints now, but especially going forward, policy solutions that incent minimal dwell times for both loaded and empty containers should be prioritized. Typically, tariff changes of this magnitude require close coordination with the shipping community and terminal operators to develop an equitable, phased approach to resolving the underlying issues and encouraging higher rates of cargo turnover without unduly penalizing Port users. Any new tariff for the free-storage limits would need to be implemented portwide after an acceptable agreement has been reached with tenants. An alternative method would be to implement the free-storage limits on a tiered basis to gradually ease the practice into operation. As an example of a tiered application, the initial tariff would be fairly easy to accommodate, based on existing practices, and the time frame would be reduced over a

period of several years to achieve the more aggressive practice. This would allow for a gradual change with minimal operational disruptions.

Another operational practice that is already being implemented by one Southport terminal operator and is expected to be implemented broadly in the near term by other Southport tenants is the adoption of appointment systems. The value of appointment systems is primarily related to terminal gate congestion, which itself is a major contributor to truck traffic in and around Southport. By successfully implementing trucker appointment systems, particularly in combination with a working lunch period, Southport terminal operators would change the distribution of truck traffic over time such that peak periods associated with terminal operating hours (currently 8:00am-noon; 1:00pm-4:30pm) are smoothed out into a more even distribution pattern throughout the entire day. As of now, truck traffic is unevenly distributed during one- or even two-hour blocks of time prior to the terminal opening in the morning, during the lunch break and prior to the terminal closing at night. This pattern, which is common at other container terminals who observe similar schedules, is driven by the desire for truckers to make as many "turns" as possible in a given day, which under the current practice incentivizes them to queue outside terminal gates during non-operating hours so as to have a forward spot in the queue and so to a better chance of getting into the terminal sooner (and more often). Appointment systems that prohibit trucks without an appointment from entering a terminal but efficiently process trucks that do have an appointment within a tight appointment window will eliminate the inactive to queue and so too greatly reduce the congestion created by queueing trucks.

Navigational Constraints

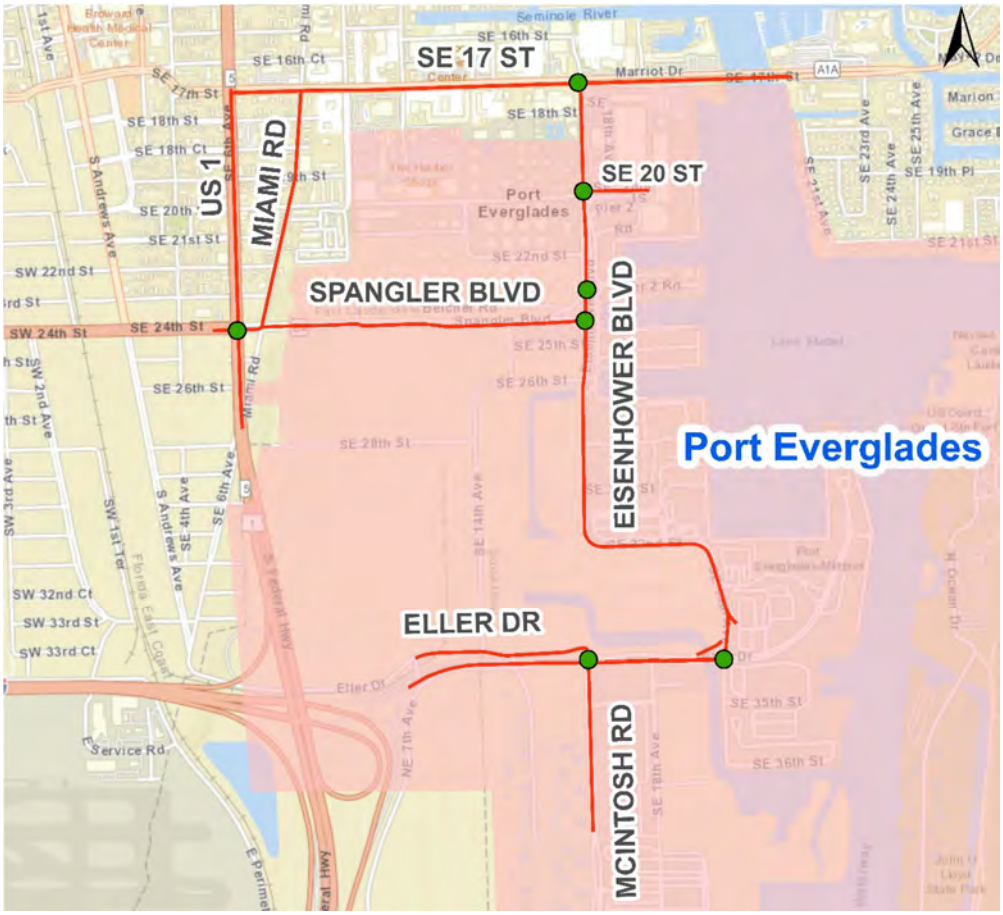
As already briefly mentioned, navigational issues at Port Everglades are prevalent. While plans for deepening and widening have been approved by the USACE, the project has yet to begin with completion still a minimum of five years away. The USACE project will alleviate the restrictive channel depth of the port, but the channel width is also a critical issue, and may prevent the deployment of larger vessels to Port Everglades by carriers involved in the Asia trade lane, particularly in the near term. On days when a larger cruise vessel is at Berths 25, 26 or 29, a post-Panamax vessel may not be able to pass the cruise vessel to access the Southport terminals, subject to the pilots' discretion. If Port Everglades hopes to compete for direct calls in trade lanes where larger post-Panamax

vessels are deployed, it is necessary to complete this project in addition to the STNE and in addition to adding the new cranes as all factors are very closely and directly related.

Traffic

As previously discussed, traffic at Port Everglades is a significant challenge during peak periods for both Midport passenger vehicles associated with cruise activity and Southport trucks associated with containerized cargo activity. Figure 3.6.2 highlights the key intersections in the Port where substantial traffic congestion occurs.

Figure 3.6.2: Major Intersections within Port Everglades
Source: CTS Engineering, Inc.



The intersections of Eller Drive at McIntosh Road and Eller Drive at SE 19 Avenue are particularly problematic. The Port's geometry and relationship with the surrounding road and highway network make some of these traffic conditions more difficult to improve than others, but cruise and cargo operations will continue to suffer unless or

until overall traffic conditions are improved. The 2018 Update includes several roadway enhancement projects that will improve overall traffic conditions within the Port. The County's Automated people Mover (APM) project is also expected to reduce cruise-related traffic. As part of the 2018 Update, B&A partnered with CTS Engineering, Inc. (CTS) to conduct a detailed traffic study both to document existing conditions and to model the impacts of the proposed Master/Vision Plan projects on future traffic conditions. The results of this study are summarized and presented in Element 4.

3.6.2 Midport

Midport currently comprises a patchwork of mixed land uses and multiple operations in a confined area. This area services all of the cargo types found at the Port, with the exception of petroleum products; it includes a mix of container, break-bulk, and cement terminals as well as significant ro-ro (i.e. new automobile import/export) activity. Midport is simultaneously home to six of the Port's eight multi-day cruise berths/terminals and three separate cruise-related parking areas, meaning there is continuous and ongoing competition both for berths and for adjacent land areas. In some cases this diversity of uses is advantageous to the Port since it results in higher berth utilization rates. In other cases, however, this mixed-use approach hinders operational efficiencies and creates conflicts. As cruise activity continues to increase at Port Everglades it will be critical for the Port to reduce the overlapping uses in Midport in order to be able to offer a more efficient space in which to concentrate growing cruise activity and operations. The principal operational enhancement opportunities in Port Everglades' Midport area are summarized as follows:

- Berth-terminal adjacency
- Conflicts between cruise and cargo operations
- Tracor basin

Berth-Terminal Adjacency and Traffic

Adjacencies between cargo berths and terminals is an issue at Port Everglades, particularly in Midport. Since berths are not associated with a specific terminal/container yard, and since the berth associated with a container yard operation can vary based on berth assignments made by the Port Everglades harbormaster, there is often a need to dray (i.e. move via truck) containers from an initial point of rest to a given container yard.

Terminal operators have reported that the cost to dray a container from one part of the Port to another (i.e. from Midport to Southport) can be as high as $300-$350/move. The competitive disadvantage imposed by this type of operation is therefore substantial. In some cases within Southport, since McIntosh Road currently has only a one-way circulation pattern, the dray requires a container to exit the McIntosh Road security checkpoint northbound only to immediately circle back around and re-enter the McIntosh Road security checkpoint southbound in order to access a different terminal within Southport. Similarly, it is often necessary to reposition a container between Midport and Southport. While this move does not require multiple security checkpoint processes, it is still costly since it constitutes an intra-port move that would not be necessary at most other ports where berths and CYs are located adjacent to each other. The overall practice of intraport drays is not only costly and inefficient, but also contributes to both Southport and Midport truck traffic by adding an additional truck trip and gate transaction simply to reposition a container from one terminal to another. Since the overall congestion that occurs on McIntosh Road is becoming a paramount issue for Southport terminal operators, minimizing or eliminating altogether these types of operational inefficiencies should be a priority. As part of the 2018 Update, B&A partnered with CTS Engineering, Inc. (CTS) to conduct a detailed traffic study of the Port and a number of interrelated transportation improvement projects have been included in both the 5-year Master Plan and the 10-year Vision Plan to address the challenges outlined above.

Conflicts between Cruise and Cargo

These mix of operations in Midport creates competing traffic patterns of trucks and passenger cars, especially during the peak cruise season. In addition to landside access issues on the roadways connecting these activities, the berthing areas are shared among the various users, with cruise vessels receiving the highest berthing priorities. Many of these conflicts are mitigated by the fact that cargo activity is heavily concentrated during the weekdays of Monday-Friday while cruise activity is more concentrated during weekend days of Saturday and Sunday. However, in the future – and already to some extent – the Port will see growth of cruise activity during the week. This growth in weekday activity will be triggered by several factors as discussed in detail in Element 2, but the result will be additional conflicts between cruise- and cargo-related traffic. The consolidation over time of most containerized cargo operations within Southport will alleviate many of these conflicts, though not all. In the 2014 Plan, the berthing practice at

Slip 3 that requires vessels at Berth 15 to relocate temporarily during vessel navigation activities at Berth 14 (i.e. the "cement shuffle") was identified as an operational enhancement opportunity. This is still the case with the 2018 Update but it is also still the case that changes to the Slip 3 configuration as proposed in both the 2014 Plan and this 2018 Update are largely expected to resolve this berthing issue.

Tracor Basin

As in the 2014 Plan, the 2018 Update proposes to fill the Tracor basin in the 10-year Vision Plan in order to create a longer contiguous berth in front of cruise terminal 29 (T29) as well as improved upland areas to support cruise-related ground transportation. While this basin is currently home to the Port's tug operators, filling it will greatly enhance the Port's ability to increase utilization of T29 since it will create a larger berth but also eliminate operational conflicts within Tracor basin users while creating sufficient land area to support the development of a new parking structure to serve a new T29/T26 cruise node (See Section 3.9) without disrupting planned Midport ro-ro operations. Several conversations have been had during the development of Element 3 related to potential alternative future locations for tug operations at the Port. No firm solution has yet been committed to by the Port, but it is clear that, while filling the Tracor basin may be a near-term inconvenience, there are several potential relocation options for the Port's tug operator partners and the Port will ensure that they have a home prior to being moved out of Tracor basin. Due to the need to temporarily relocate USCG operations to the Tracor basin to accommodate the USACE deepening and widening project, the soonest tug operators would have to relocate is likely to be 2022.

3.6.2 Northport

The principal inefficiencies within the Port's Northport area relate to liquid bulk operations within and around Slips 1 and 3 (Berths 6-13); and to a lesser extent Slip 2 (Berths 4 and 5). These inefficiencies, which relate almost entirely to the age and condition of the finger piers and width of the slips themselves, have mostly been addressed by the projects included in the 2018 Update, which have, for the most part, been carried over from the 2014 Plan. These piers were designed to service smaller liquid bulk and break-bulk vessels that called the Port in years past and are generally unsuitable for the current, let alone next generation of liquid bulk vessels. Vessels have not only gotten larger, but the amount of product transferred per vessel call has also increased,

placing constraints on both the slip widths and the land area and liquid bulk transfer infrastructure within the piers. It is not uncommon today, for example, for an adjacent berth within the same slip to be unable to be used simultaneously due to navigational constraints and general safety concerns. This is an issue for Slip 2 as well as for Slips 1 and 3. However, given the critical nature and berth-specific requirements of liquid bulk operations vs. those of break-bulk operations, challenges associated with Slip 2 are far less urgent and have not been prioritized for purposes of this Update; it is assumed that bulk operations taking place at Berth 5 can and will be accommodated around Berth 4 cruise vessels activity. Recommendations for enhancement to Northport operations that have carried over from the 2014 Update include:

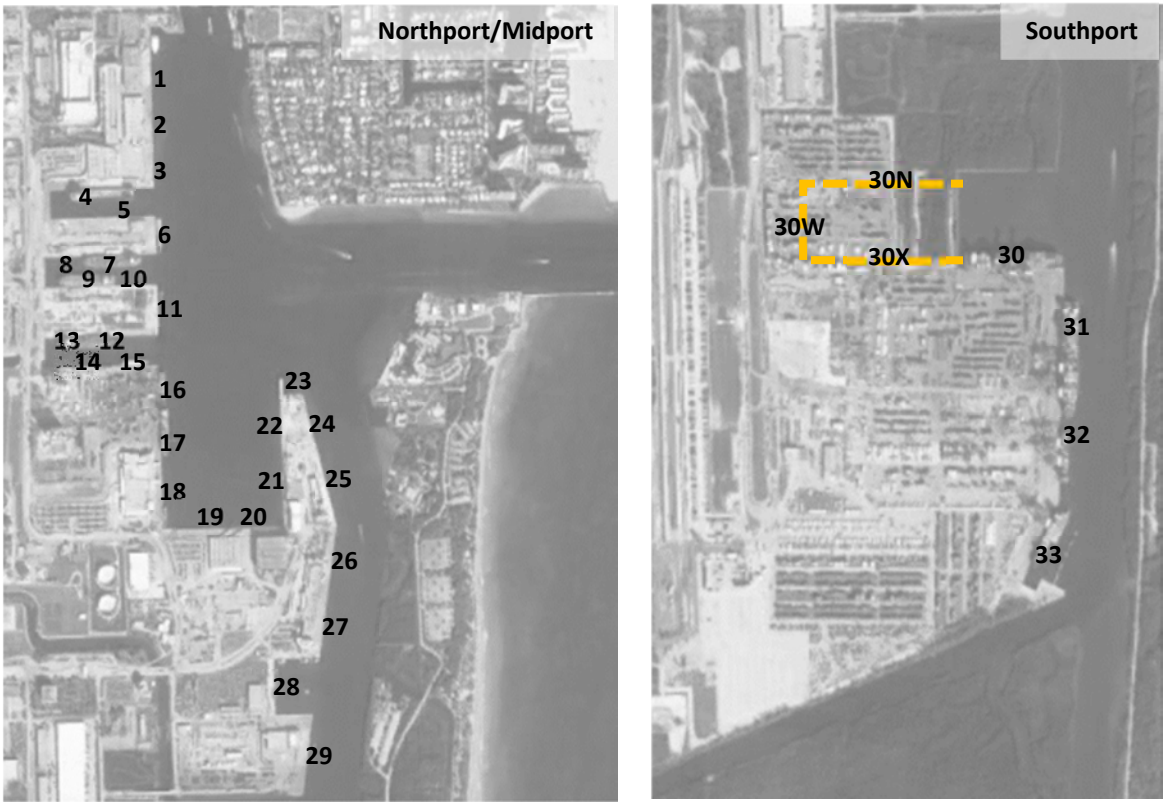
- Replacing manifolds and loading arms with larger piping
- Connecting manifolds to allow higher transfer of cargo and more efficient distribution of the flows
- Widening of Slips 1 and 3
- Repairing and/or replacing all relevant bulkheads

3.7 Facility Needs Assessment

3.7.1 Capacity Measurement and Evaluation

There are numerous accepted practices and metrics in the maritime industry for the evaluation of capacity. However, both the methods used to determine capacity and the metrics used to measure it differ substantially by line of business. For cruise, a number of key performance indicators (KPIs) are used to evaluate level of service but the most meaningful measures of basic capacity for a homeport like Port Everglades are peak berth utilization and annual revenue passengers per berth. For cargo, there are also numerous KPIs for different types of cargo operations, many of which directly impact capacity (i.e. gate processing times, crane productivity, yard dwell time). However, from an overall perspective the two most meaningful portwide measures of cargo capacity are berth capacity and yard capacity. What follows is a summary of the capacity analysis performed as part of Elements 1 and 2 of the 2018 Update. A detailed description of the methodologies used to determine capacity and the Port's overall capacity for each line of business are found in those elements and are not restated here.

Figure 3.7.1: Map of Port Everglades Berths
Source: B&A



3.7.2 Cruise Capacity

Growth of the cruise line of business at Port Everglades is envisioned to occur in a consistent seasonal pattern for regional traffic on sailings of less than eight days and much of the long-term passenger growth at Port Everglades will be a reflection of increased cruise vessel capacity. Figure 3.7.2 shows the daily call patterns for Port Everglades from 2012-2018. As with most U.S. homeports, Saturday and Sunday have consistently shown the highest amount of traffic over the period. As illustrated, more than 60 percent of all traffic currently moves on the peak weekend days with some 20 percent on Friday and Monday for an average of 83.5 percent of the traffic over the period. In the past two years weekday traffic has risen by approximately five percent primarily due to the 6-day and 5/5/4-day patterns operated from the port. Moving more traffic to weekdays to enhance berth utilization would be preferable, but this is not always easy or even possible so it is likely that Friday-Monday will continue to be the busiest days for Port Everglades due to the vacation patterns of the North American consumer.

Figure 3.7.2: Distribution of Vessel Calls by Day, 2012-2018

Source: B&A

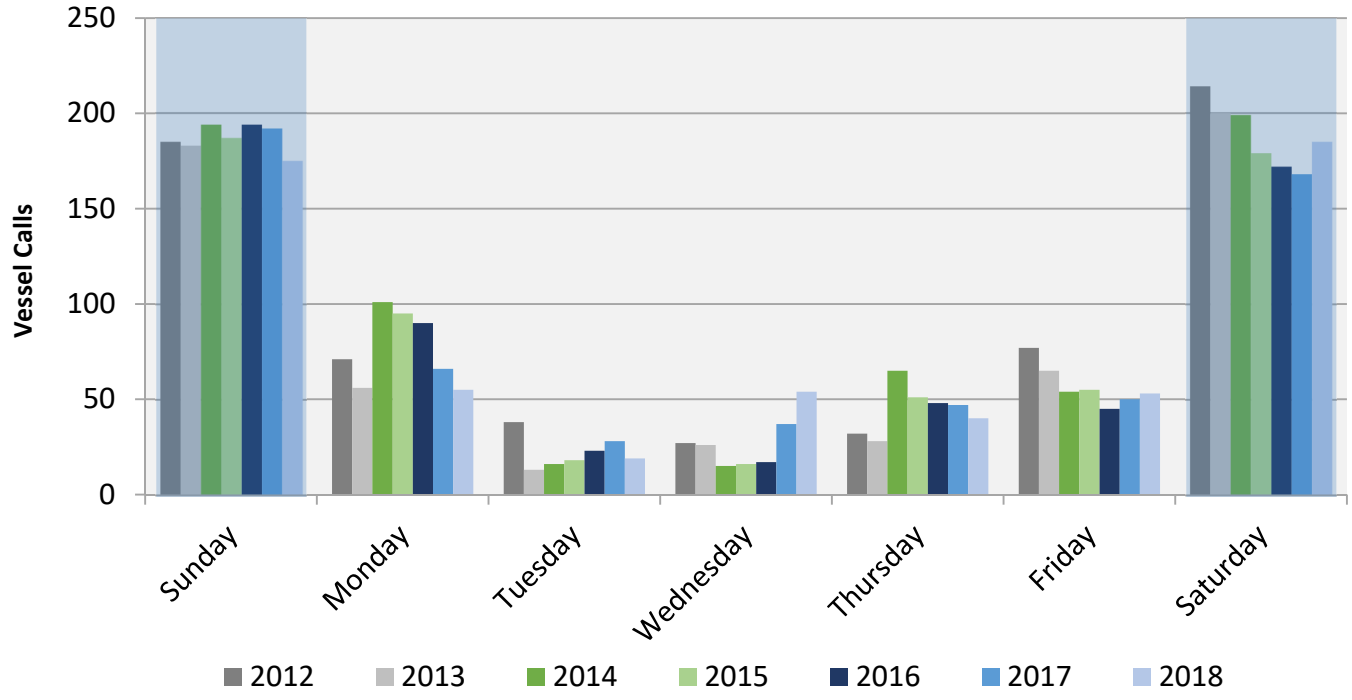


Figure 3.7.3: Peak Season Berth Utilization (Medium Scenario), 2018-2038

Source: B&A

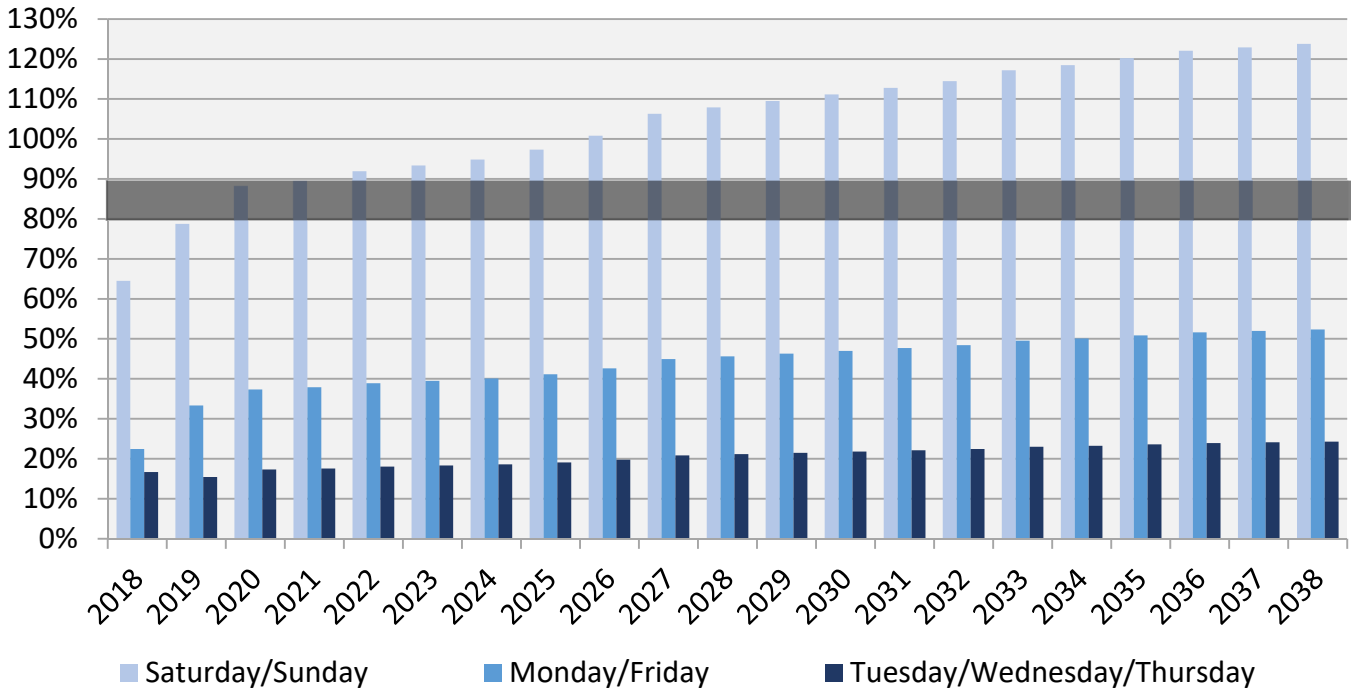


Figure 3.7.3 illustrates anticipated berth utilization specific to cruise during the 20-year planning horizon of the 2018 Update, assuming no additional berths are built. Optimal berth utilization for cruise is 80-90 percent during peak periods. Once this is achieved, an additional berth is typically recommended to be able to meet additional demand and allow for peak use on key weekend days during the core season. However, the total volume of revenue passengers handled at a given berth also factors prominently into the capacity calculation for a cruise port since cruise lines can and do adjust cruise sailing lengths and seasonal deployment strategies dynamically as needed to match consumer demand and maximize market capture.

As a general rule, a million revenue passengers per berth per year is a reasonable upper limit assumption for total passenger throughput. By bringing a ninth cruise berth online prior to 2038, Port Everglades will theoretically have a maximum total capacity of 9 million revenue passengers, though certain operational constraints will make this upper limit difficult to achieve.

Since Port Everglades expects to see fewer than 7 million revenue passengers by the end of the 2018 Update planning horizon (2038), the addition of a ninth cruise berth will allow Port Everglades to continue to add calls during its key weekend and seasonal peaks while simultaneously increasing overall berth utilization, with average throughput by 2038 being approximately 725,000 revenue passengers per berth.

3.7.3 Liquid Bulk Capacity

Liquid bulk capacity at Port Everglades is a function of three basic factors:

- Berth capacity
- Product ship-to-shore transfer capacity
- Storage capacity

Of these, only berth capacity is directly within the Port's control. Given that total liquid bulk volume is expected to remain relatively constant during the 20-year planning horizon covered by the 2018 Update, it is fully expected that the proposed/ongoing improvements to Berths 7-13, including the widening and deepening of Slips 1 and 3 as well as improvements to manifolds and other product transfer infrastructure will be sufficient to meet 100 percent of envisioned future growth for all liquid bulk product types.

3.7.4 Cargo Capacity

Table 3.7.1: Summary of Cargo Activity by Berth

Source: Port Everglades; Hatch

Berth ID	Average Annual % Availability by Cargo Type				Other Uses/Notes	Cargo Operations Impacted by Cruise Seasonality?
	Containers	Cement	Other Dry Bulk	Break-bulk		
2-3	10%	10%			Primarily cruise	No; only used by cargo as needed/when available
4	10%	15%	10%		Primarily cruise	Negligible, due to low usage by cargo overall
5		10%	35%	55%	None	No cruise activity
6		25%	75%		None	No cruise activity
14-15	10%	75%	15%		Mostly cement; long stay at berth.	No cruise activity
16-17	75%				Container and bulk	Yes
18	40%				Primarily cruise; long vessels at Berths 16-18 can block cargo	Yes
19-20	45%				Primarily cruise; No adjacent operating cargo yard or equipment	Yes; cruise occupies berths 19-20 2+ days/week (peak) and 1 day/week (off-peak)
26-27	25%				Primarily cruise	No; negligible due to low cargo usage (containerized bananas)
28F					Only liquid bulk and lay-in; no yard	Tie-down area during the cruise peak season
29	10%			35%	Shared container/cruise; break-bulk (steel) as well	Yes; 2+ days cruise occupancy in peak season, none in off-season
30-32	100%				None	No cruise activity
33	100%				Finger piers at 33B/C rarely used, since Crowley is now Lo-Lo	No cruise activity
30X[1]	100%				STNE (South Berth - 1500')	Proposed; no cruise activity
30W[2]	50%				STNE (West Berth - ~700' operable)	Proposed; no cruise activity

[1] *30X is the working designation for the STNE Berth 30 extension.*

[2] *30W is the working designation given to the 700 foot North-South berth at the Western end of the STNE.*

Port Everglades is unique in that it services a broad range of vessel sizes and types – including cruise, liquid bulk, containers, break-bulk, dry bulk and ro-ro – across numerous shared berths and yards within three different geographic areas: Northport, Midport and Southport. To capture the wide range of container vessel types served at the Port, the capacity at each berth has been calculated using the "berth-foot-hour" metric, which is a measure of the amount of berth resources (time and length) required to move cargo across the berth. A similar methodology has been adopted to assess the berth capacity for dry bulk and break-bulk cargo vessels (berth-foot-hours per ton). Table 3.7.1 summarizes the annual percent availability for container, cement, other dry bulk, and break-bulk cargo, and summarizes other uses for each berth (such as cruise or liquid bulk) and impacts due to cruise seasonality. Berths that do not handle these four types of cargo (i.e. the dedicated petroleum operations at Berths 7–10 and 12–13; or cruise Berths 21-25) are not included.

Containers

Berth capacity specific to containerized cargo primarily depends on the following factors:

- Maximum practical berth utilization
- Amount of cargo handled per vessel call
- Crane productivity
- Number of cranes assigned per vessel call (if any)

Since operations at Port Everglades vary significantly across numerous shared berths, and comprise a vast array of ship sizes, berth-foot-hour values have been used to analyze capacity at each berth. This comprehensive metric incorporates STS crane productivity and assignment for berths using STS cranes, as well as the volume of containerized cargo handled per call. For instance, berths with STS cranes available will generally have lower berth-foot-hour values, indicating they are able to move containers across the berth more rapidly than vessels using ship's gears or truck-mounted cranes.

Overall, the container berth capacity analysis performed as part of Element 1 shows that, when combined, all berths used in part or in full for container operations at Port Everglades have approximately 1.48 million annual TEUs (approximately 0.82 million annual moves) of container capacity. The dedicated container terminals at Southport (Berths 30–33) contribute the majority of this capacity, with a combined container-berth capacity of 1.03 million annual TEUs under the current operating conditions and terminal

configuration (approximately 0.57 million annual moves), assuming 1.80 TEUs per move.

Apart from berth capacity, storage area, more commonly known as container yard (CY) capacity, is the other key factor in determining total throughput capacity. CY capacity is defined as the amount of cargo that can be handled in the cargo-storage yard under the given operating parameters. For containerized cargo facilities, CY capacity primarily depends on the following factors:

- Type of CY operation (i.e. reach stackers, RTGs, RMGs)
- Container dwell times and inventory peaking factors
- Container stacking heights and widths

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 typically adapt their operations to optimize available acreage and increase the overall storage density within the container yard. Port Everglades is unique in that its container storage areas are segregated by operator, despite the shared-berth model, with each operator determining their own CY storage and equipment methods.

Port Everglades Terminal (PET), which is a South Florida-based joint venture with Mediterranean Shipping Company, S.A. (MSC), is currently the only terminal utilizing RTGs for stacking operations, with four RTGs currently utilized within their CY. RTGs provide increased handling efficiencies through the densification of containers within the yard. However, container dwell times are not typically reduced due to the introduction of RTGs, and have been shown to increase.

King Ocean Services and Florida International Terminal (FIT) operate top-pick-based terminals with a small number of containers on wheels. Most of these areas consist of large pick stacks for empties and exports, and low-density narrow pick stacks for imports, which require selectivity for gate service.

Crowley, the largest Southport tenant, in terms of both acreage and volume, used to operate an entirely wheeled operation. However, it has shifted to a mostly grounded operation since 2014.

Table 3.7.2 presents the primary input parameters used in the container-yard capacity analysis, including dwell times, stacking heights for grounded containers, the ratio of

grounded containers, inventory peaking factors by cargo type for each category of terminal operations, and terminal acreages.

Table 3.7.2: Port Everglades Container Yard Capacity - Input Parameters
Source: Port Everglades; Hatch

	Crowley	MSC	King Ocean	FIT	Grid	Vacant	Southport Overall	Midport	Northport
Gross Acreage	80	39	34	36	22.5	8.5	**220**	**26**	
Net-to-Gross Ratio	70%	70%	60%	60%	80%	70%	**68%**	**50%**	
Net Acreage	56	27	20	22	18	6	**149**	**13**	
Import Load % Grounded vs. Wheeled	90%	90%	90%	90%	90%	90%	**90%**	**0%**	
Export load % Grounded vs. Wheeled	90%	90%	90%	90%	90%	90%	**90%**	**100%**	
Empty % Grounded vs. Wheeled	100%	100%	100%	100%	100%	100%	**100%**	**100%**	
Import Load Height (mean stack height)	1.5	2.5	2.0	2.0	2.0	2.0	**1.9**	**2.0**	
Export Load Height (mean stack height)	1.5	2.5	2.5	2.5	2.5	2.5	**2.1**	**2.5**	
Empty Height (mean stack height)	3.0	3.5	3.5	3.5	3.5	3.5	**3.3**	**3.5**	
Import Load Dwell Time (days)	4.3	4.3	4.3	4.3	4.3	4.3	**4.3**	**4.3**	
Export Load Dwell Time (days)	4.3	4.3	4.3	4.3	4.3	4.3	**4.3**	**4.3**	
Empty Dwell Time (days)	8.0	8.0	8.0	8.0	8.0	8.0	**8.0**	**8.0**	
Peak/Mean Import Inventory	125%	125%	125%	125%	125%	125%	**125%**	**125%**	
Peak/Mean Export Inventory	115%	115%	115%	115%	115%	115%	**115%**	**115%**	
Peak/Mean Empty Inventory	110%	110%	110%	110%	110%	110%	**110%**	**110%**	

The layout of a CY can also yield different densities, depending on the configuration of the ground slots within the yard. The density of a container yard is captured as the number of twenty-foot ground slots (TGS) per acre of net container yard. Table 3.7.3 presents typical average slot-density assumptions for different storage modes that have been used to estimate TGS values for Port Everglades.

Table 3.7.3: Container Yard Capacity - Slot Density Assumptions
Source: Hatch

Storage Mode	TGS per Net Acre
Wheeled	50
Pick – Imports	60
Pick – Exports and Empties	115
RTG	100

The Port currently has approximately 100,000 TEUs of annual container storage yard capacity outside of Southport. This acreage is expected to change significantly in the future as cruise and ro-ro (i.e. new automobile imports/exports) operations begin to displace other cargo operations in Midport. However, as in Southport, it is expected that Midport containerized cargo operators will adapt their future operations to the extent possible to optimize available acreage on an ongoing basis.

The Southport future case shows that a broadly adopted RTG operation can increase yard throughput capacity there by about 381,000 annual moves; a 42 percent increase vs. the baseline year (see Table 3.7.4).

Table 3.7.4: Container Yard Capacity - Status Quo and Future Case
Source: Hatch

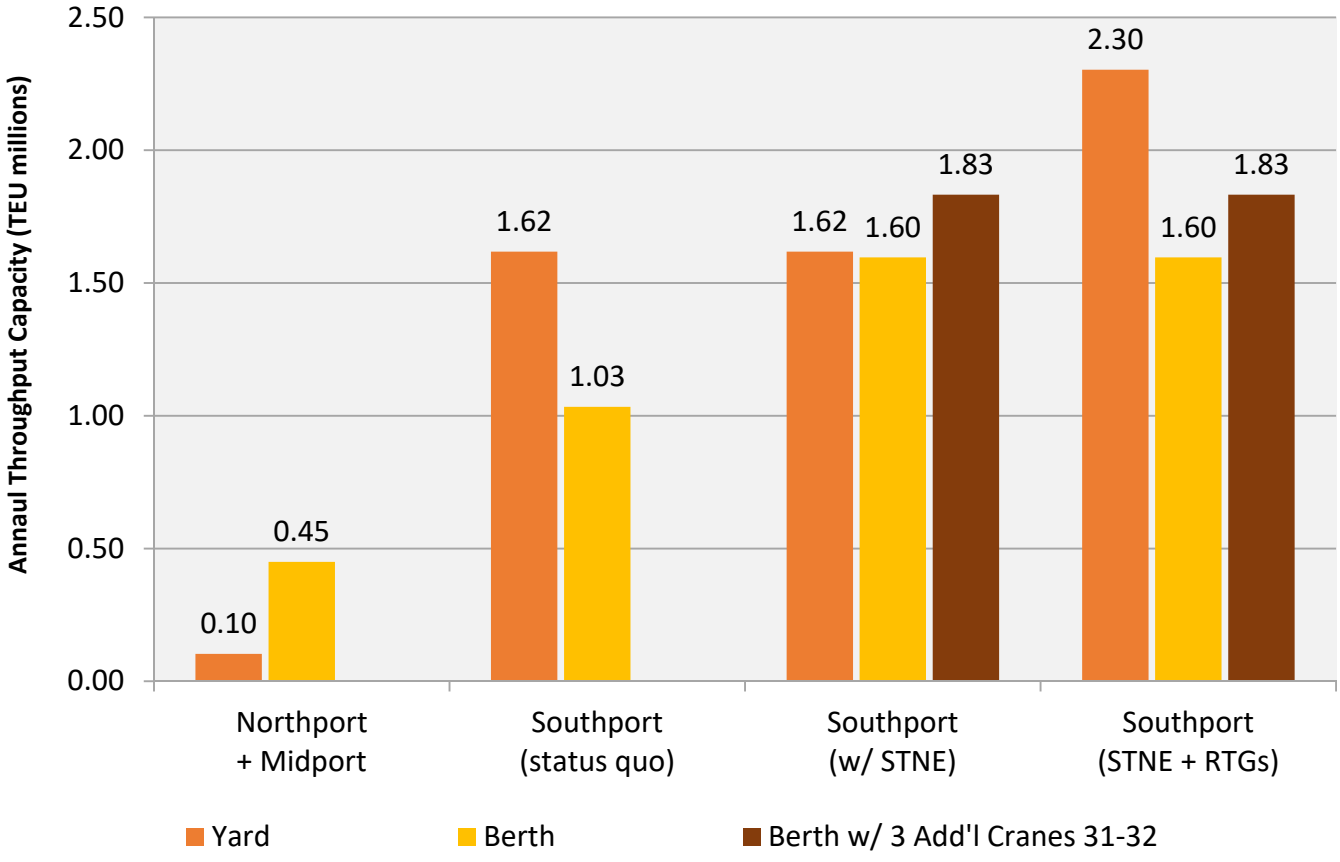
	Yard Throughput Capacity (annual moves)	Yard Throughput Capacity (annual TEUs)	TEU/Gross Acre/Year at Yard Capacity
Midport Total	**57,000**	**103,000**	**3,960**
Northport Total	**0**	**0**	**n/a**
Southport			
Crowley	281,000	506,000	6,330
MSC (PET)	189,000	339,000	8,690
King Ocean	133,000	239,000	7,030
FIT	140,000	253,000	7,030
Grid*	117,000	211,000	9,380
Other	39,000	70,000	8,240
Southport (status quo)	**899,000**	**1,618,000**	**7,350**
Southport (w/ RTGs)	**1,280,000**	**2,303,000**	**10,470**

Note: Because grid operations differ from the primary yard in terms of KPIs, TEU/acre could differ substantially (i.e. if containers only come in for 8 hours, dwell time would be much lower). Therefore, grid yard capacity may be much higher than the primary yard capacity provided in the table.

In summary, with the additional berth length provided by the STNE, once all STS cranes in the current capital plan are operational total berth capacity in Southport alone is expected to reach approximately 1.83 million TEUs per year (see Figure 3.7.4). The addition of one additional Panamax crane on the new Berth 30X toward the end of the 20-year Vision Plan and the potential future use of two mobile harbor cranes on the new Berth 30N would push Southport berth capacity over 1.9 million annual TEUs, depending on crane/berth productivity. Midport is expected to continue to offer a surplus – up to 450,000 additional TEUs – of berth capacity; however, this berth capacity will continue to be constrained to a likely maximum of 100,000 TEUs per year in practice due to limited

available berth-adjacent acres and operating challenges and costs associated with split yard operations, lack of STS cranes in Midport and regular scheduling conflicts with other vessel types, especially cruise vessels. In terms of CY, portwide capacity by 2038 is expected to range between 1.7 million and 2.4 million TEUs per year, depending on operating practices, yard layouts, average dwell times, etc. Again, though, in practice this capacity will be constrained by the availability of yard-adjacent berths. Figure 3.7.4 compares the berth capacity and storage yard capacity for combined Midport and Southport operations. As shown, overall capacity is effectively the lowest of the values presented under each scenario, with approximately 2 million TEUs per year being the projected portwide capacity under an all RTG scenario.

Figure 3.7.4: Berth Capacity vs. Container Yard Storage Capacity
Source: Hatch



Dry Bulk, Break-Bulk and Ro-Ro Capacity
Capacity for non-containerized cargo is a function of both berth and land availability. For the primary bulk and break-bulk cargos, an overall portwide berth-foot-hour factor was

used to determine berth capacity, rather than a berth-specific factor, due to the much smaller overall number of vessel calls for each cargo type, compared to the large number of vessel calls at the cruise and container berths. For example, the total number of cement vessel calls during the baseline year (FY2017) was approximately 50, with some berths handling only one or two total cement vessel calls annually. As illustrated in Table 3.7.5, the annual berth capacity for cement products was assessed at each berth used for significant volumes of cement unloading. The berth capacity assessment indicated that the port operated at just under 40 percent of its capacity for bulk cement during the baseline year.

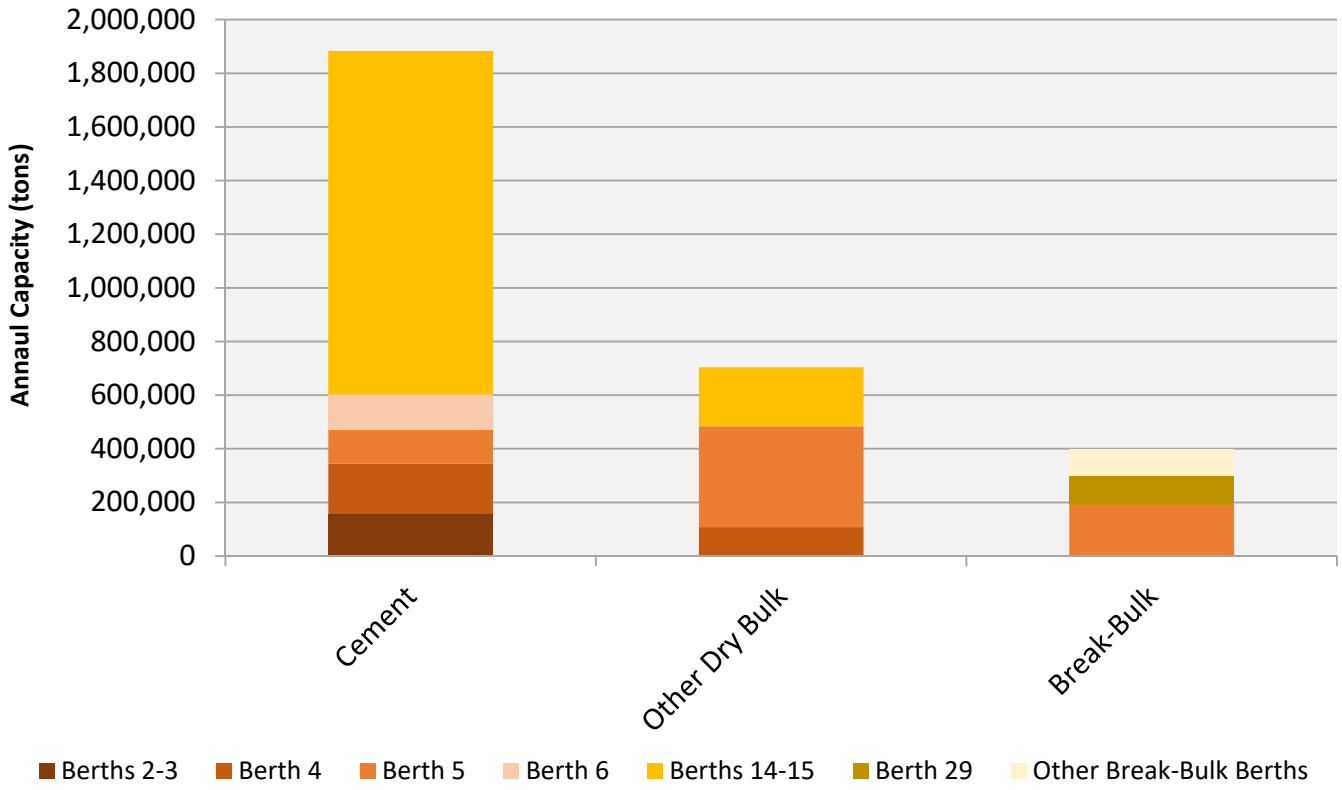
Table 3.7.5: Cement Berth Capacity
Source: *Hatch*

Berth ID	Length (feet)	% Available for Cement	Annual Available Berth-Hours (cement)	Annual Available Berth-Foot-Hours (cement)	Maximum Utilization of Available Berth-Foot-Hours
a	b	c	d = 12*365*c	e = b*d	f
2-3	1,125	10%	438	492,750	70%
4	900	15%	657	591,300	70%
5	900	10%	438	394,200	70%
6	380	25%	1,095	416,100	70%
14-15	1,226	75%	3,285	4,027,410	70%
Total	**4,531**	**30%**	**5,913**	**5,921,760**	**70%**

Berth ID	Maximum Cement Berth-Foot-Hours per Year	FY2017 Mean Berth-Foot-Hours/Ton	Annual Capacity (tons)	FY2017 Tons at Berth	% Capacity
a	g = e*f	h	i = g/h	j	k = j/i
2-3	344,925	2.2	157,000	8,296	5%
4	413,910	2.2	188,000	0	0%
5	275,940	2.2	125,000	13,396	11%
6	291,270	2.2	132,000	3,422	3%
14-15	2,819,187	2.2	1,281,000	657,712	51%
Total	**4,145,232**	**2.2**	**1,883,000**	**682,826**	**36%**

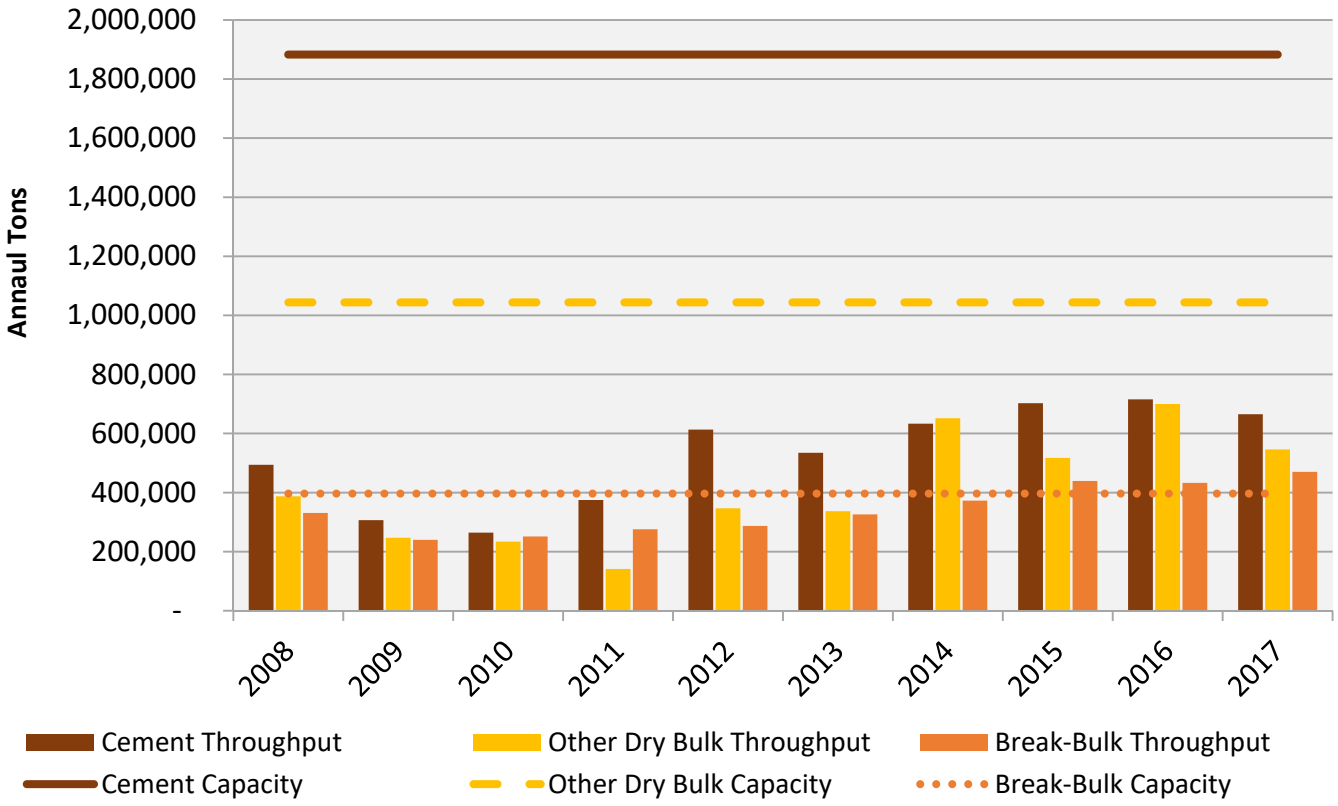
The principal non-cement dry bulk cargos handled at Port Everglades include aggregate, coal, gypsum, and sand, primarily moved across Berths 4, 5, 6, 14, and 15. Based on FY2017 operating conditions, the Port is operating at more than 80 percent of its non-cement dry bulk capacity. Break-bulk cargo at Port Everglades consists primarily of steel products, including rebar and steel coil, handled primarily at Berths 5 and 29. Additional cargos considered in the break-bulk capacity analysis include yachts, used ro-ro products, and project cargo. These commodities are moved across numerous berths on an opportunistic basis, and the overall volumes during the baseline year were quite minimal, compared to the overall volume of steel break-bulk. As shown in Figure 3.7.5, cement has the highest berth capacity of any bulk cargo at Port Everglades (at around 1.8 million annual tons), followed by other dry-bulk products at 740,000 annual tons and break-bulk cargos at approximately 400,000 annual tons. It should be noted that the existing berth-sharing arrangements result in a highly dynamic bulk and break-bulk cargo handling operation at the Port, which is capable of shifting capacity among the cargo types and between different berths and yards, based on market demand and vessel frequency.

Figure 3.7.5: Berth Capacity by Cargo Type and Berth
Source: *Hatch*



To provide additional context related to the variability of the Port's non-containerized cargo volumes, Figure 3.7.6 compares cement, other dry bulk, and break-bulk cargo berth capacities to actual throughput volumes at the port during the past 10 years.

Figure 3.7.6: Current Annual Berth Capacity vs. Historical Throughput by Cargo Type
Source: *Hatch*



In addition to berth capacity, storage yard capacity was also estimated for cement, other dry bulk products, and break-bulk cargo. Storage yard capacity depends primarily on static storage capacity and average cargo dwell time. The 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.

Port Everglades has two sets of cement silos, located at Berths 14 and 15. The silos at Berth 14 were reported to have 44,000 tons of static capacity, while the Berth 15 silos were given as 65,000 tons of static capacity. A dwell time of 15 days was used to estimate maximum annual storage throughput. Table 3.7.6 presents the overall cement storage yard capacity calculations.

Table 3.7.6: Cement Yard Capacity
Source: Hatch

	Bulk Cement	Berth 14	Berth 15	Total
a	Storage type	Silos	Silos	Silos
b	Total static storage capacity (tons)	44,000	65,000	109,000
c	Dwell time (days)	15.0	15.0	15.0
d=365/c	Annual storage turnovers	24.3	24.3	24.3
e=b*d	**Annual cement storage capacity (tons)**	**1,071,000**	**1,582,000**	**2,653,000**

Dry bulk cargos other than cement include gypsum, sand, coal, bauxite, ash, and slag, all of which are live-loaded directly from vessels to trucks to be moved out of the port in real time, meaning berth capacity is the sole determinant of portwide capacity for these cargo types.

Table 3.7.7 presents overall annual break-bulk storage capacity. Previous interviews indicated about 35,000 tons of static storage capacity are available over 15 acres on Berth 5; this metric was similarly applied to the upland acreage in use at Berth 29.

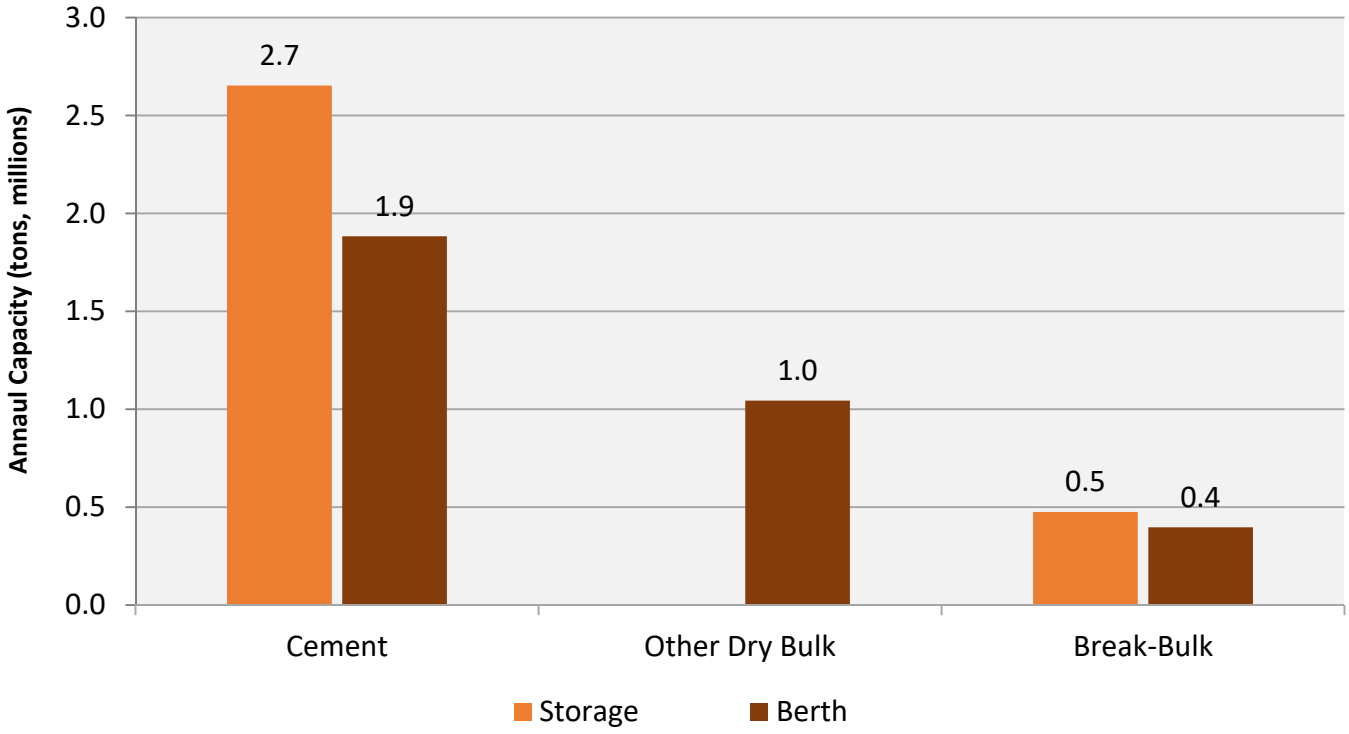
Table 3.7.7: Break-Bulk Yard Capacity
Source: Hatch

	Break-Bulk	Berth 5	Berth 29	Total
a	Type of cargo	Rebar, Coils	Rebar, Coils	Rebar, Coils
b	Terminal acres (acres)	7	6	13
c	Storage type	Outdoor/Decked	Outdoor	Outdoor
d	Total static storage capacity (tons)	21,000	18,000	39,000
e	Dwell time (days)	30.0	30.0	30.0
f=365/e	Annual storage turnovers	12.2	12.2	12.2
g=d*f	**Annual steel storage capacity (tons)**	256,000	219,000	475,000
h=g/b	**Unit throughput capacity (tons/acre)**	36,571	36,500	36,538

Based on Table 3.7.7, Port Everglades has upland storage yard capacity to handle approximately 475,000 annual tons of break-bulk products (primarily rebar and steel coil). The peak break-bulk throughput at Port Everglades over the past 10 years was just over 470,000 tons, including yachts, ro-ro products and project cargo. This means that even if berth constraints are removed, break-bulk throughput is already effectively at capacity from an available upland storage perspective. The 2018 Update recommends developing seven additional acres of breakbulk storage yard in Northport, but this additional acreage will be offset by the loss of a comparable amount of breakbulk laydown area in Midport, so total capacity for break-bulk cargo at Port Everglades is expected to remain unchanged, consistent with expected future demand.

Figure 3.7.7 compares annual storage capacity to annual berth capacity for cement, other dry bulk, and break-bulk product types. The lower of the two values shown for each cargo type is the controlling capacity. Volumes and vessel calls for yachts, used ro-ro products and project cargo have been accounted for in the overall capacity analysis to provide a complete assessment of all current cargos at the Port. New automobile imports and exports are discussed separately below.

Figure 3.7.7: Dry Bulk/Break-Bulk Berth Capacity vs. Storage Capacity
Source: Hatch



In summary, the Port has a total capacity for cement of about 1.9 million tons per year. Other dry bulk cargo is limited to a maximum of about one million tons per year. Break-bulk cargo, including used ro-ro products and yachts, is likely limited to about 500,000 tons per year, though the Port has some ability to increase the effective capacity for break-bulk cargo by reassigning berths and/or multi-purpose storage areas (i.e. grid space) to periodic, short-term break-bulk operations on an as-needed basis.

New Automobile Imports/Exports

The Port's only remaining cargo type not covered by the analyses above is auto cargo. New automobile import/export activity is currently handled primarily at Berth 29. Because auto cargos represent a recent and opportunistic market, limited data are available to accurately capture Port Everglades' technical capacity to handle this cargo. Discussions with the Port's principal automobile import/export tenant indicate that a single berth made available approximately 15% of the time (i.e. one day per week) is sufficient to handle envisioned future ro-ro vessel traffic. Following a general assumption that 1,700 car equivalent units (CEUs) per acre per year is an optimal throughput rate for a standard automobile terminal, a total of 25 acres are required long-term to accommodate projected future volumes. The 2018 Update provides for significant but highly flexible land area to accommodate future automobile import/export activity in order to allow scaling up over time to meet market demand without precluding interim uses unrelated to autos.

3.8 Project Decision Matrix

Consistent with both the 2009 and 2014 Updates, the 2018 Update utilizes a decision matrix to evaluate the projects proposed for inclusion in the revised Master/Vision Plan. Like the 2014 Update, the 2018 Update also ties the evaluation criteria used in the decision matrix directly to the planning principles used to guide the 2018 Update as well as the Port's mission statement, which is as follows:

> *"Port Everglades is Florida's powerhouse global gateway. A respected leader in trade, travel and financial stability, we create economic and social value by working in partnership with world-class clients. We achieve advancements focusing on efficient facilities, trade and cruise expansion, jobs growth, safety, security and environmental*

stewardship for our customers, stakeholders and community."

Table 3.8.1 shows the resulting evaluation criteria used to assess the projects proposed in the 2018 plan. Some of these criteria can be measured quantitatively while others are qualitative in nature. Similarly, some of the measures shown in Table 3.8.1 are more applicable when applied to the Port's overall 20-year development program than to individual projects. B&A's decision matrix accounts for these different levels of evaluation of the 2018 Update as discussed below.

Table 3.8.1: Decision Matrix Criteria
Source: B&A

Category	Evaluation Criteria		
Competitiveness	Capacity	Efficiency	Integration
Economics	Return on Investment (ROI)	Flexibility	Economic Impacts
Sustainability	Asset Preservation	Environmental Stewardship	Resiliency

Before applying the decision matrix above to the Port Everglades Master/Vision Plan, it is important to understand that while all projects included in the 2018 Update fit into at least one of the categories identified in Table 3.8.1, not all projects in the Plan meet all of the evaluation criteria. For example, not all projects in the 5-year Master Plan and/or 10- and 20-year Vision Plans result in increased capacity or direct revenue to the Port or can be linked directly to regional economic benefits. However, many projects proposed in the 2018 Update are necessary to improve overall Port operations by mitigating existing traffic congestion, accommodating changing mobility needs, reducing gateway costs, freeing up or otherwise repurposing land for more productive use, maintaining existing assets in a state of good repair, etc. The proposed I-595 flyover (2025) and commercial consolidation (2035) projects are good examples of projects that can be easily linked to some evaluation criteria (i.e. efficiency, integration) but not so easily to others. Without these and other transportation network/land use improvements, however, the future needs of Port tenants, users, regulatory agency partners and the general public cannot be met, at least

not optimally. These investments contribute indirectly to the success of separate but related revenue-generating projects that are essential to maintaining Port competitiveness, ensuring Port tenant and user satisfaction, meeting regulatory requirements and ultimately providing local and regional economic benefits.

Other projects – such as the petroleum-receiving berth improvements included in the 2018 Update (i.e. expansion of Slips 1 and 3) or the proposed redevelopments of cruise terminals 21 (2023), 29 (2027) and 26 (2030) in Midport – do directly contribute to Port revenues and economic impacts but are required just as much to ensure that liquid bulk and cruise passenger throughput at the Port does not decline due to obsolete infrastructure as to increase liquid bulk and cruise market share. In this sense the benefits associated with some major projects are not necessarily due only to incremental growth assumptions, but also to preservation of existing markets. Such projects all rank highly when evaluated using the decision matrix presented in Table 3.8.1, applied holistically to the overall 20-year development program. However, these same projects may or may not rank highly if evaluated on an individual project basis.

3.8.1 Competitiveness

It is not by accident that competitiveness is the first category of evaluation criteria listed in Table 3.8.1. Maintaining industry competitiveness is at the heart of the Port's mission since only by remaining competitive can Port Everglades provide the regional economic and other benefits associated with maritime trade and commerce (including cruise). For this reason, projects included in the 2018 Update have been evaluated in terms of their ability to provide the additional capacity the Port needs to meet projected future growth but also their ability to enhance operational efficiency and ensure integration with other Port and non-Port plans and projects in both the near-term and long-term. Descriptions of each measure used to assess the competitiveness of projects included in the 2018 Update are provided below. Examples are also given, where applicable.

Capacity

This refers to the ability of the Port to meet projected future demand both in terms of infrastructure (i.e. berths, terminals, upland acreage, cranes, etc.) and operational practices (reduced traffic congestion, reduced dwell times, productivity improvements, etc.).

- For cargo, the STNE project (2023) is perhaps the best example of a capacity-enhancing project; this project adds up to five new berths and six new super post-Panamax STS cranes and is the largest capital project in the Port's history
- For cruise, the proposed Berth 19 finger pier (2037) and terminal 19/20 development (2038) represent the best example of a capacity increase specific to the cruise line of business

Efficiency

This includes both a quantitative and qualitative evaluation of operational processes and practices as reflected in key performance indicators such as gate/terminal processing times, crane productivity, yard dwell times and ultimately cost per unit (i.e. total handling cost per box for containers).

- For liquid bulk, the expansion and modernization of Slips 1 (2027) and 3 (2038) are excellent examples of efficiency-enhancing projects
- For cruise, the redevelopments of existing Midport cruise terminals 21 (2023), 29 (2027) and 26 (2030) are good examples of investments that increase efficiency while also facilitating incremental growth
- For cargo, the proposed Griffin Road extension/NE 7th Avenue improvements (2026) and McIntosh Road realignment (2027) are ideal examples of efficiency-enhancing projects

Integration

This refers to the coordination of near-term and long-term planning efforts across business lines and even across different business entities such that immediate priorities can be addressed without precluding known or likely future needs.

- Construction of an automated people mover (APM) to connect Fort Lauderdale-Hollywood International Airport to both Port Everglades and the Broward County Convention Center demonstrates the importance of coordinating, or integrating, different County assets to maximize synergies between them
- Similarly, for cargo, the privately-funded development of the former Dynegy property, which is now vacant, into a rail-served cold storage logistics center (2023) is an excellent example of integration of related uses since this development will not only enhance the value of the existing intermodal container transfer facility (ICTF) but also help to maximize the potential of the STNE by developing near-port

warehouse capacity that caters specifically to the Port's strong perishables trade

3.8.2 Economics

Just as competitiveness is the priority in terms of evaluating projects for implementation, economics is the priority in terms of evaluating overall Port performance. This is true because competitiveness explains *what* things the Port needs to do but economics ultimately explains *why* the port needs to do them. The three aspects of economics addressed by the decision matrix include return on investment (ROI) to the Port, flexibility and regional economic benefits. Descriptions of each measure used to assess the economics of the 2018 Update are provided below.

Return on Investment (ROI)
ROI as relates to the 2018 Update includes two separate components.

The first component consists of the proposed capital expenses themselves. These include actual construction costs as well as professional design and inspection services (i.e. soft costs). Depending on the nature of a given project, a contingency allowance may also be included in the total estimated capital expense. Initial capital costs must be evaluated as well as long-term maintenance and repair (M&R) costs. Port operating expenses are also applicable to some projects, though as a landlord port project-specific operating expenses tend to be limited since the cost of operations is typically borne by tenants/users rather than the Port itself. All projects included in the 2018 Update use current (2019) dollars as the basis for order-of-magnitude cost estimates to avoid discrepancies in projected escalation factors. Capital expenses are estimated on a project-by-project basis and aggregated to determine the cost of the overall development program.

The second component is revenue. As previously discussed, some of the 50 projects included in the 2018 Update result in direct revenue to the Port, but many others do not, despite being important if not critical to the Port's competitiveness. In addition, revenue can often be attributed to multiple projects that work together to enhance the Port's competitiveness rather than individual projects in isolation, making project-specific allocation of incremental revenue far more of an art than a science in most cases. Because of this, it is difficult and in some cases impossible to accurately quantify the ROI for every individual project included in the 2018 Update. The better approach is to evaluate the Port's overall development program by individual line of business across the entire 20-

year planning horizon in order to demonstrate the ROI that results from overall plan implementation. Rather than focus on the value of an individual project, this "big picture" approach highlights the value and feasibility of the overall multi-year strategy for each line of business and so too provides a long-term programmatic basis for future investment rather than a short-term incremental approach.

Tables 3.8.2-3.8.7 present expected levels of Port return on investment for each Port line of business at the 5-, 10- and 20-year milestone years as well as cumulatively across the full 20-year planning horizon. As shown, the independent rate of return (IRR) for each line of business varies dramatically with cruise, liquid bulk, non-containerized cargo and real estate all expected to result in a positive IRR over 20 years while containerized cargo and parking are expected to generate a negative IRR during the same period.

Evaluating Port return on investment in this more holistic, programmatic way makes the cumulative impact of investment much more clear than a project-by-project approach and avoids the potential risk of eliminating transportation and/or other projects that are critical to efficient Port operations but do not generate positive return on investment as standalone projects.

It is also important to understand that a negative programmatic return on investment, such as that shown for containers, does not mean the Port should not invest in containerized cargo projects because containers score very high against other evaluation criteria, particularly economic impacts. Having a negative long-term IRR does imply that the level of investment being made may merit reconsideration of the Port's current approach to container-related revenue, however. Similarly, for parking, while the level of investment is wholly commensurate with expected future demand, the fact that the expected IRR for parking over 20 years is negative implies that the Port has an opportunity to implement strategies to increase parking revenue. Strategies for increasing Port revenue in these and other areas are presented in Element 4.

Table 3.8.2: Cruise ROI by Milestone Year
Source: B&A

Business Line	Milestone Year			
Cruise	**2019-2023**	**2024-2028**	**2029-2038**	**2019-2038**
Cumulative Net Revenue	$144,863,384	$209,619,321	$673,476,835	**$1,050,555,690**
Future Incremental Revenue	$31,882,638	$96,638,575	$447,515,343	**$576,036,557**
Total Investment	-$117,888,151	-$207,857,931	-$313,468,431	**-$639,214,513**
New Cash Flow	-$86,005,513	-$111,219,355	$134,046,912	
Total Cash Flow	$4,512,742	$1,761,391	$360,008,404	

Table 3.8.3: Liquid Bulk ROI by Milestone Year
Source: B&A

Business Line	Milestone Year			
Liquid Bulk	**2019-2023**	**2024-2028**	**2029-2038**	**2019-2038**
Cumulative Net Revenue	$88,525,051	$103,166,716	$264,533,671	**$470,420,929**
Future Incremental Revenue	$17,547,598	$32,189,263	$122,578,765	**$172,315,626**
Total Investment	-$61,633,034	-$64,286,605	-$132,480,000	**-$261,126,079**
New Cash Flow	-$44,085,436	-$32,097,342	-$9,901,235	
Total Cash Flow	$26,892,017	$38,880,111	$132,053,671	

Table 3.8.4: Containerized Cargo ROI by Milestone Year
Source: B&A

Business Line	Milestone Year			
Containers	**2019-2023**	**2024-2028**	**2029-2038**	**2019-2038**
Cumulative Net Revenue	$84,139,273	$116,850,506	$335,265,104	**$549,903,583**
Future Incremental Revenue	$15,895,776	$48,607,008	$198,778,109	**$263,280,892**
Total Investment	-$515,220,074	-$84,168,886	-$28,858,124	**-$645,575,469**
New Cash Flow	-$499,324,298	-$35,561,878	$169,919,985	
Total Cash Flow	-$431,080,801	$32,681,620	$306,406,980	

Table 3.8.5: Non-Containerized Cargo ROI by Milestone Year
Source: B&A

Business Line	Milestone Year			
Bulk/Break-Bulk + Ro-Ro	**2019-2023**	**2024-2028**	**2029-2038**	**2019-2038**
Cumulative Net Revenue	$19,597,732	$23,665,115	$60,072,162	**$106,306,701**
Future Incremental Revenue	$4,739,268	$8,806,651	$30,355,233	**$43,901,151**
Total Investment	-$10,953,589	-$15,411,123	-$19,797,756	**-$46,162,467**
New Cash Flow	-$6,214,321	-$6,604,473	$10,557,477	
Total Cash Flow	$8,644,143	$8,253,992	$40,274,406	

Table 3.8.6: Parking ROI by Milestone Year
Source: B&A

Business Line	Milestone Year			
Parking	**2019-2023**	**2024-2028**	**2029-2038**	**2019-2038**
Cumulative Net Revenue	$21,916,328	$31,213,673	$94,047,449	**$150,456,074**
Future Incremental Revenue	$5,523,207	$14,820,551	$61,261,206	**$81,604,964**
Total Investment	-$111,801,291	-$22,654,720	-$71,801,200	**-$206,471,335**
New Cash Flow	-$106,278,084	-$7,834,169	-$10,539,994	
Total Cash Flow	-$89,884,963	$8,558,953	$22,246,249	

Table 3.8.7: Real Estate ROI by Milestone Year
Source: B&A

Business Line	Milestone Year			
Real Estate	**2019-2023**	**2024-2028**	**2029-2038**	**2019-2038**
Cumulative Net Revenue	$37,274,142	$44,845,922	$118,501,540	**$207,126,617**
Future Incremental Revenue	$4,749,078	$12,320,859	$53,451,412	**$70,521,349**
Total Investment	$0	$0	-$137,497,761	**-$137,497,761**
New Cash Flow	$4,749,078	$12,320,859	$(84,046,348)	
Total Cash Flow	$37,274,142	$44,845,922	-$18,996,221	

Flexibility

This measure, which is entirely qualitative in nature, refers to the Port's ability to plan and develop its assets to meet the needs of current tenants and users under existing and expected future market conditions while maintaining the ability to adapt to new tenants and users as well as changing market conditions over time. Balancing investment across multiple lines of business (i.e. cruise, containers, liquid bulk, dry bulk, break-bulk, real estate) helps to hedge financial uncertainty by avoiding excessive reliance on a single revenue stream and gives Port Everglades the ability to repurpose its planned investments over time through periodic market assessments, such as those developed as part of Element 2 of the 2018 Update

Economic Impacts

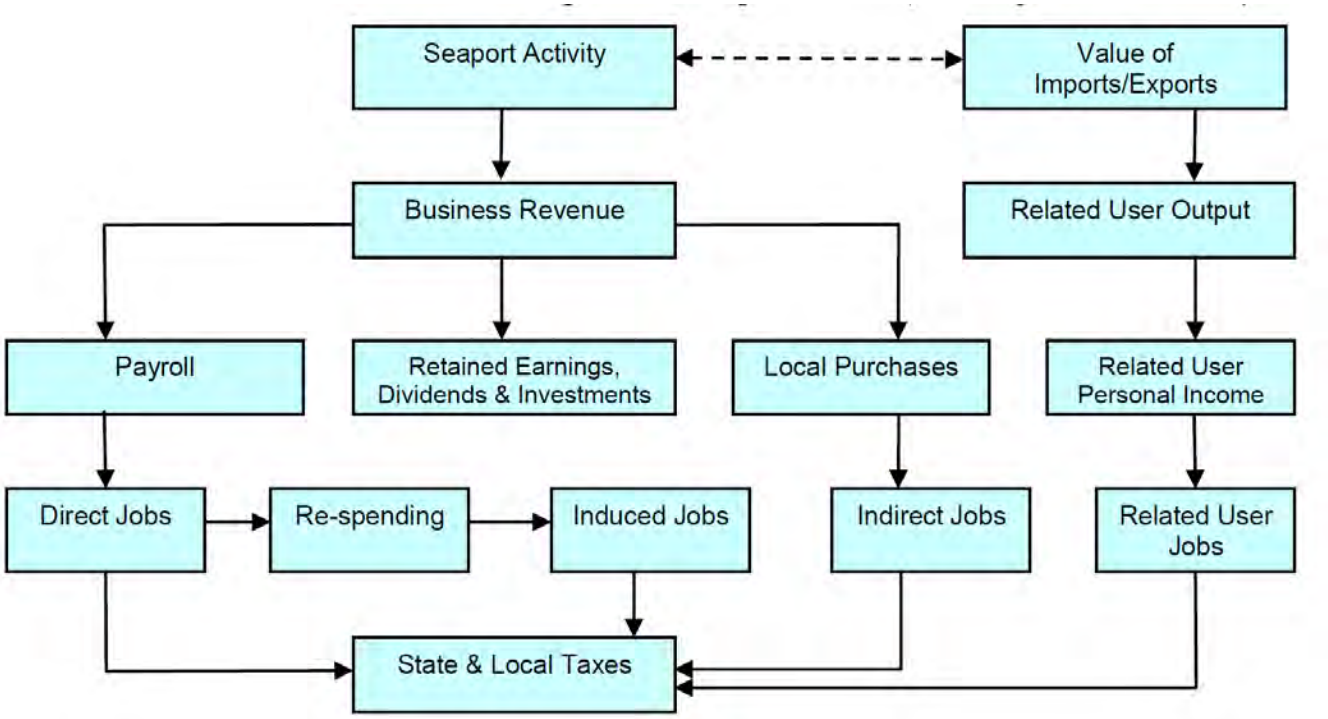
The economic impact assessment completed for the 2018 Update focuses on the stream of benefits generated by all activity at Port Everglades during the 20-year planning timeframe. Consistent with the methodology used by Martin Associates to produce the FY2018 *Local and Regional Economic Impacts of Port Everglades* final report (FY2018 Martin Associates report), annual impacts in year five (2023), year 10 (2028) and year 20 (2038) of the Plan have been estimated in terms of jobs (including direct, indirect and induced jobs), personal income, business revenue, local purchases and State and local taxes. Impacts have been estimated for each line of business at each milestone year, but not for each project.

Figure 3.8.1, which was taken directly from the FY2018 Martin Associates report, graphically illustrates how seaport activity impacts Port Everglades' local and regional economies. As shown, Port activity initially generates business revenue to the firms supplying services to the cargo and cruise industries. This revenue is then used to:

- Hire/employ people to provide these services (direct jobs); and
- Purchase other goods and services from local, national and international firms (indirect jobs)

Induced jobs are also created locally and throughout the regional economy due to purchases of goods and services by people directly employed as a result of Port activity. State and local taxes are generated at all levels by businesses and individuals alike.

Figure 3.8.1: Flow of Economic Impacts of Seaport Activity through the Economy
Source: Martin Associates



Descriptions of the three types of jobs created and/or supported by Port Everglades activity as well as the other economic impacts factored into this assessment are presented below. Related user jobs have not been calculated as part of the 2018 Update.

- **Direct jobs**
  These are jobs with local firms providing support services to the seaport. These jobs are dependent on this activity and would suffer immediate dislocation if the seaport activity were to cease. Seaport direct jobs include jobs with railroads and trucking companies moving cargo to and from Port Everglades' marine terminals, members of the International Longshoremen's Association (ILA) and Teamster's Union, other non-union dockworkers, steamship agents, Broward County Sheriff's Office (BSO), freight forwarders, ship chandlers, warehouse operators, bankers, lawyers, terminal operators, stevedores, etc. Direct employees created by cruise operations include jobs with firms providing direct vessel services –chandlers, pilots, longshoremen, line handlers, local advertising firms, caterers, liquor wholesalers, linen companies, security firms, waste disposal firms, parking, local transportation – as well as the

firms providing services to the passengers on the vessels – hotels, taxi cabs, restaurants and tour packages. Also included are impacts generated at Fort Lauderdale-Hollywood International Airport due to cruise passengers arriving via air.

- **Indirect jobs**
  These include jobs generated in the local economy as a result of local purchases by firms directly dependent on seaport activity. These jobs include jobs in local office supply firms, equipment and parts suppliers, maintenance and repair services, etc.

- **Induced jobs**
  These are jobs created locally and throughout the regional economy due to purchases of goods and services by those directly employed. These jobs are with grocery stores, the local construction industry, retail stores, health care providers, local transportation services, etc., and would also be discontinued if seaport activity were to cease.

- **Employee earnings**
  These consist of wages and salaries and include a re-spending effect (local purchases of goods and services by those directly employed).

- **Business revenue**
  This consists of total business receipts by firms providing services in support of the seaport activity.

- **State and local taxes**
  These include taxes paid by individuals dependent upon the seaport activity.

3.8.3 Sustainability

Sustainability is an essential element of the Port's mission. While most commonly associated with environmental stewardship, sustainability is a broader concept that includes preservation of the Port's assets in a state of good repair as well as resiliency, which is an aspect of asset preservation.

- **Asset preservation**
  The 13 bulkhead repair and replacement projects included across all 20 years of the 2018 Update are quintessential examples of asset preservation investments that are

critical to the sustainability of the Port; as the Port's literal frontline against sea level rise, maintaining these bulkheads in a state of good repair and ensuring that they are repaired and/or replaced consistent with Broward County's climate change models is also a critical component of the Port's resiliency planning

- **Environmental stewardship**
  This includes ongoing and new project mitigation requirements, but also reflects the Port's efforts to go above and beyond regulatory compliance by proactively addressing known Port-related environmental impacts to wildlife, habitat, water resources, etc. (see Element 4)

3.9 Projects Included in the 2018 Update (Final Plan)

The 2018 Update of the Port Everglades Master/Vision Plan, which encompasses the 20-year period from 2019-2038, comprises a total of 50 projects, distributed across three Plan milestone periods as follows:

- 2019-2023 22 projects (~$1,679 million)
- 2024-2028 15 projects (~$540 million)
- 2029-2038 13 projects (~$802 million)

Of these 50 projects, seven are concentrated in Northport; 11 are concentrated in Midport; 12 are concentrated in Southport; seven are portwide projects (i.e. projects whose impact and/or benefit occurs across multiple port areas and/or business units); and 13 are bulkhead repair/replacement projects. It is expected that a total over 20 years of $3.02 billion (2019 dollars) will be required to implement all 50 projects. Of this total, it is anticipated that Port Everglades will be responsible for approximately two thirds ($2.01 billion) with various private, State and Federal entities contributing the remaining one third (~$1.01 billion). See Element 4 for additional details on third-party funding sources and strategies. The 50 projects proposed in the 2018 Update are listed in Tables 3.8.1-3.8.3 by Plan milestone period and by geographic area of implementation. Anticipated project start and completion years are also shown.

Table 3.9.1: 2018 Master/Vision Plan Projects (2019-2023)

Source: B&A

Location	0-5 Year Projects	Start Year	Completion Year
Northport	T2 / T4 Parking Garage	2018	2020
	Maintenance Facility Consolidation	2019	2023
	Port Access Road	2019	2024
	Slip 1 / Phase 1 (Berths 9 / 10 Bulkheads)	2019	2025
Midport	T21 Redevelopment	2020	2023
	Ro-Ro Yard Relocation / Expansion	2020	2023
Southport	3 SPP STS Cranes	2017	2020
	PEV ILC	2019	2020
	Phase 9A	2018	2022
	STNE	2015	2023
	SP Crane Rail	2015	2023
	3 SPP STS Cranes	2021	2023
Portwide/Other	USACE Deepening & Widening (USCG Relocation)	2019	2026
	Former Dynegy Logistics Development	2020	2023
	Auto Terminal West	2020	2023
	USACE Deepening & Widening	2019	2025
	I-595 Flyover	2021	2025
Bulkheads Replacements/ Improvements	Berths 21 & 22 Bulkheads	2019	2022
	Berths 7, 8, 8A & 32 Bulkheads (USACE Design)	2019	2023
	Entrance Channel North Wall	2020	2024
	Berths 9 & 10 Bulkheads (Slip 1 / Phase 1)	2019	2025
	Berths 1A, 1B, 2, & 3 Bulkheads	2021	2025
	Berths 16-18 Bulkheads	2022	2026

Table 3.9.2: 2018 Master/Vision Plan Projects (2024-2028)

Source: B&A

Location	5-10 Year Projects	Start Year	Completion Year
Northport	Break-bulk Yard	2024	2026
	Slip 1 / Phase 2 (Berths 7, 8, 8A & 32 Bulkheads)	2025	2027
Midport	Tracor Basin Fill	2024	2026
	Ro-Ro Yard Expansion	2024	2027
	T29 Redevelopment	2024	2027
	T26 Redevelopment	2026	2030
	T29 / T26 Parking Structure	2026	2030
Southport	Phase 9C-1	2024	2025
	Griffin Road Extension / NE 7th Avenue Improvements	2024	2026
	McIntosh Road Realignment	2024	2027
	Container Terminal Reconfiguration	2024	2028
Portwide/Other	APM/Rail Extension (TBD)	2024	2028
Bulkheads Replacements/ Improvements	Berth 29 Bulkheads	2024	2026
	Berths 14 & 15 Bulkheads (Design Only)	2023	2027
	Berths 7, 8, 8A & 32 Bulkheads (Slip 1 / Phase 2)	2025	2027
	Berths 4-6 Bulkheads	2025	2029

Table 3.9.3: 2018 Master/Vision Plan Projects (2029-2038)

Source: B&A

Location	10-20 Year Projects	Start Year	Completion Year
Northport	Slip 3 Expansion (Berths 11-13 Bulkheads)	2033	2038
	LNG Bunkering + Storage Facility	TBD	TBD
Midport	Ro-Ro Yard Expansion	2030	2033
	Berth 19 Finger Pier	2033	2037
	T19 / T20 Redevelopment	2035	2038
	T19 / T20 Parking Structure	2035	2038
Southport	Phase 9C-2	2029	2032
	1 Small STS Cranes	2029	2032
Portwide/Other	Commercial Consolidation	2031	2035
Bulkheads Replacements/ Improvements	Berths 14 & 15 Bulkheads (construction)	2027	2031
	Berths 11-13 Bulkheads (Slip 3 Expansion)	2033	2038
	Berths 19 & 20 Bulkheads	2034	2038
	Berth 23 Bulkhead	2034	2039
	Berths 24 & 25 Bulkheads	2034	2039
	Berths 26 & 27 Bulkheads	2034	2039

What follows is a description of each project presented in Tables 3.9.1-3.9.3. These projects were the focus of the planning team's efforts, which included stakeholder charrettes, workshops and numerous meetings with Port management and staff. In several cases, various project alternatives were developed, which were then evaluated, discussed and revised with the Port. Only those alternatives that were ultimately deemed sufficiently viable to be recommended for inclusion in the final 2018 Update of the Port Everglades Master/Vision Plan are shown here. A selection of projects that were deemed not to be viable is also presented at the end of this section, along with an explanation as to why. All projects are presented together with a qualitative decision matrix "score" that uses high (H), moderate (M) and low (L) to indicate the relative performance of each project against the different evaluation criteria presented in Table 3.8.1.

3.9.1 Project Planning/Phasing

Figure 3.9.1: Status Quo (2018) Land Use at Port Everglades
Source: B&A

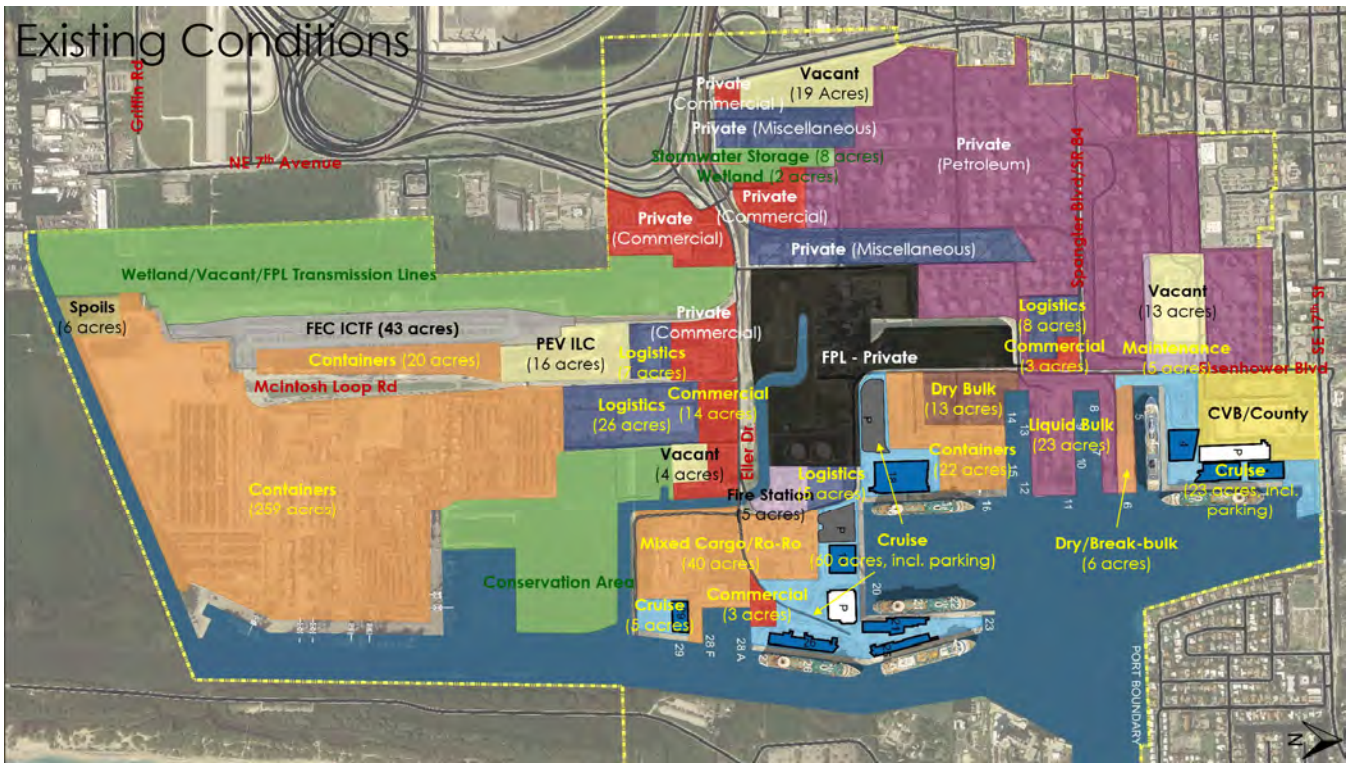


Figure 3.9.1 shows existing land use at Port Everglades for the baseline year (2018).

As previously stated in Section 2 of this element, in order to define those projects that are required to allow Port Everglades to meet the highest possible percentage of future demand while simultaneously maintaining a balanced portfolio of business lines and minimizing costs (both capital and operating), the B&A team used an iterative planning and design process to evaluate and refine future land use alternatives for the Port using the following four principles as a guide throughout:

- Capacity – does the plan increase capacity consistent with projected demand?
- Efficiency – does the plan improve efficiencies and/or reduce operating costs?
- Flexibility – does the plan anticipate and allow for changing conditions over time?
- Integration – does the plan integrate related uses through physical adjacency?

In addition to the projects themselves, how to prioritize and phase the implementation of projects had to be considered. The five principal criteria used to evaluate project prioritization during the planning process included:

- Is there an immediate safety or security issue that this project helps to address/improve/ resolve?
- Is the project critical to both near-term and long-term competitiveness?
- Is the project already approved, funded and/or underway?
- Is the project as important or more important than a competing project and can the port afford (financially and/or operationally) to implement both projects at the same time
- Are there constraints to implementation that necessitate a specific implementation timeframe (i.e. lease terms, permitting, funding)

Fortunately, Port management has been extremely proactive in managing safety and security issues at Port Everglades, meaning none of the projects recommended in the 2018 Update are in response to safety issues. The B&A team was therefore able to focus on the latter four criteria in terms of evaluating the recommended order of priority for implementation. Generally speaking, those projects that are deemed critical and also already approved are all included in the 5-year CIP, which is why the costs associated with the 5-year CIP are higher than those of the other two milestone periods (10-year and 20-year, respectively). Similarly, the differentiation between 10-year and 20-year projects is primarily a result of constraints that necessarily make earlier implementation of the 20-

year projects unlikely or impossible.

Because flexibility is one of the guiding principles of the 2018 Update, as time goes on it is fully expected that both the currently recommended order of implementation and the actual start and completion years for many of the 10-year and 20-year projects will continue to evolve in line with market conditions as well as other internal and external factors. However, it is the intent of the Port that the 5-year Master Plan/CIP be implemented essentially as currently recommended, but with the caveat and understanding that even some of the 5-year projects might change. For each project presented below, a relative "score" against each category and measure included in the project decision matrix outlined in Section 3.8 is included.

3.9.2 5-Year Master Plan/CIP

Figure 3.9.2: Proposed 5-Year Projects at Port Everglades
Source: B&A

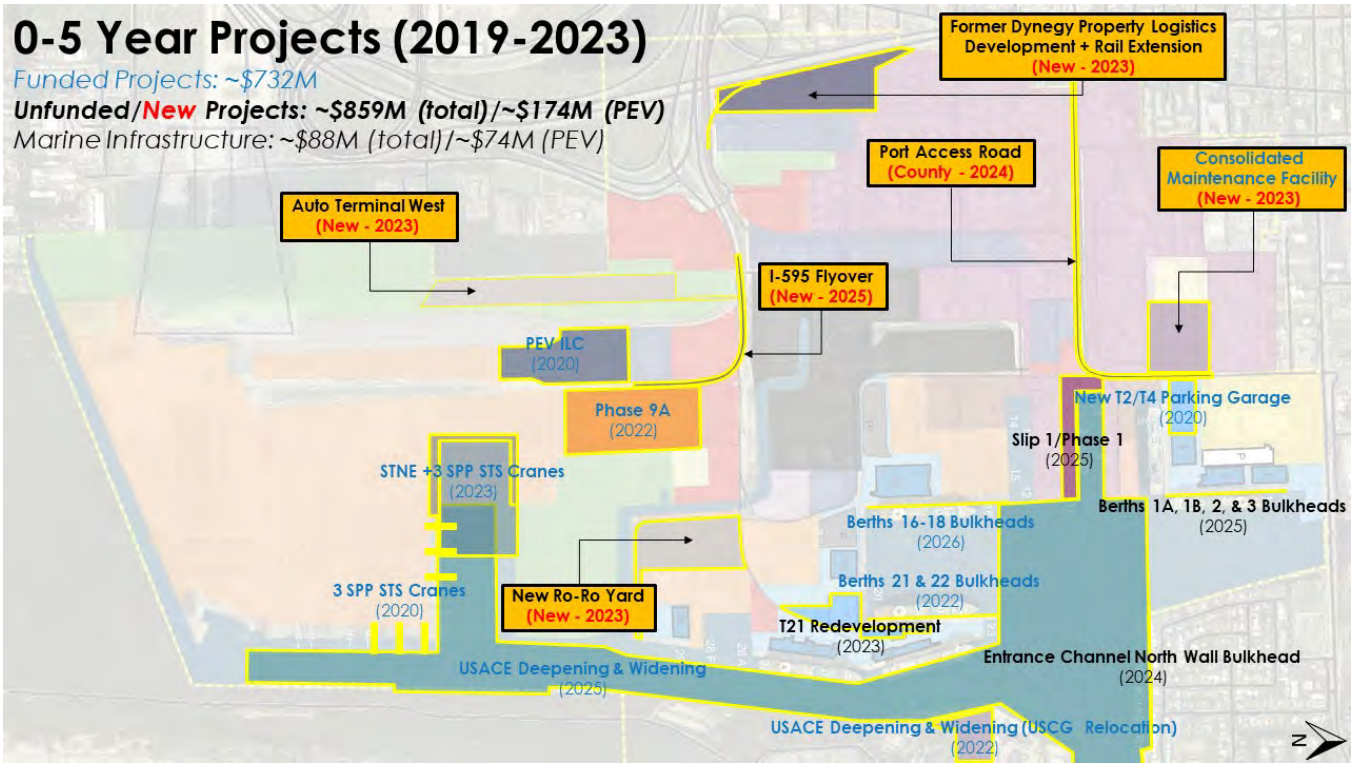


Figure 3.9.2 illustrates all 22 projects proposed for implementation during the initial Master Plan. These 22 projects are distributed across Port business units as follows:

Business Unit	# Projects	Investment (Total/PEV)
• Cruise	4 projects	$196.5/$127 million
• Liquid Bulk	2 projects	$141/$92 million
• Containerized Cargo	7 projects	$665.5/$508 million
• Non-containerized Cargo	1 projects	$10/$10 million
• Parking	1 project	$112/$112 million
• Real Estate	0 projects	$0/$0
• Portwide/Other	7 projects	$554/$104 million
	22 projects	$1,679/$953 million

What follows is a discussion of projects proposed in the 5-year CIP by business unit.

Cruise Projects

Project	Timeframe	Investment (Total/PEV)
• Berths 21 & 22 Bulkheads	2019-2022	$21/$21 million
• T21 Redevelopment	2020-2023	$124/$69 million
• Berths 1A, 1B, 2, & 3 Bulkheads	2021-2025	$25.5/$22 million
• Berths 16-18 Bulkheads	2022-2026	$26/$15 million
		$196.5/$127 million

A total of four projects in the 5-year CIP are categorized as cruise projects. These include three bulkhead repair/replacement projects (i.e. Berths 1-3; Berths 16-18; and Berths 21-22) and one terminal development project – Terminal 21 (T21). When completed, these four projects combined will result in significant positive economic impacts. However, since the majority of these impacts will not accumulate until after 2023, they have not been estimated for the 5-year milestone period. They are reflected in the 10-year economic impacts presented later in this section, however.

The proposed bulkhead repair/replacement projects are substantial projects in their own right from both a level of effort and capital cost perspective. These projects are also critical aspects of the Port's asset preservation and resiliency efforts. However, since they

are essentially standard maintenance and repair (M&R) projects that all ports must plan for and implement as marine assets reach the end of their useful lives, they are not elaborated or further described here. The project decision matrix for these bulkhead projects is presented in Table 3.9.4.

Table 3.9.4: 5-Year Cruise-Related Bulkhead Projects – Decision Matrix
Source: B&A

Project	Category	Evaluation Criteria					
Berths 21 & 22 Bulkheads							
	Competitiveness	Capacity	L	Efficiency	M	Integration	H
	Economics	Port ROI	M	Flexibility	M	Economic Impacts	M
	Sustainability	Asset Preservation	H	Environmental Stewardship	L	Resiliency	H
Berths 1A, 1B, 2, & 3 Bulkheads							
	Competitiveness	Capacity	L	Efficiency	M	Integration	H
	Economics	Port ROI	M	Flexibility	M	Economic Impacts	M
	Sustainability	Asset Preservation	H	Environmental Stewardship	L	Resiliency	H
Berths 16-18 Bulkheads							
	Competitiveness	Capacity	L	Efficiency	M	Integration	H
	Economics	Port ROI	M	Flexibility	M	Economic Impacts	M
	Sustainability	Asset Preservation	H	Environmental Stewardship	L	Resiliency	H

Figure 3.9.3 presents a conceptual illustration of the T21 Redevelopment project. Table 3.9.5 presents the project decision matrix for this project.

Figure 3.9.3: Terminal 21 (T21) Redevelopment Project

Source: B&A

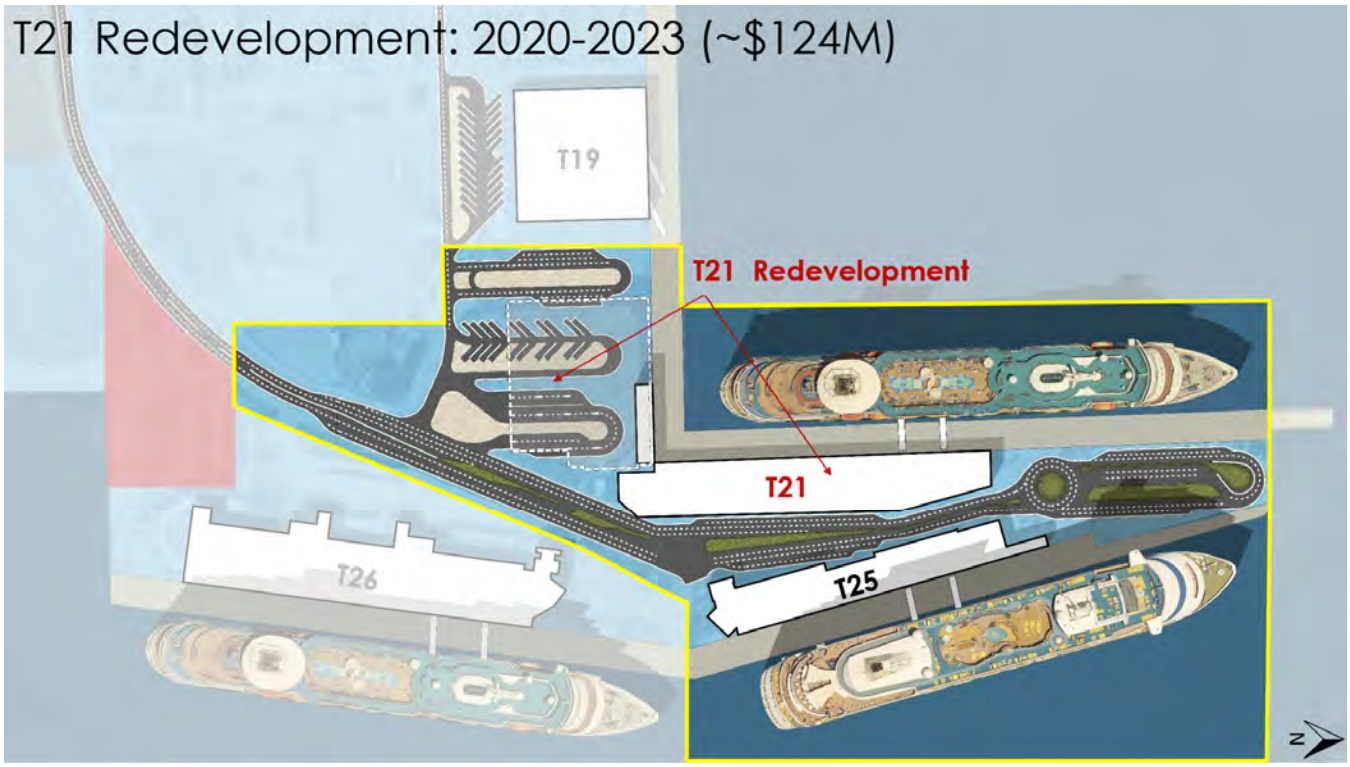


Table 3.9.5: Terminal 21 Redevelopment – Decision Matrix

Source: B&A

Project	Category	Evaluation Criteria					
Terminal 21 Redevelopment							
	Competitiveness	Capacity	M	Efficiency	H	Integration	H
	Economics	Port ROI	H	Flexibility	H	Economic Impacts	H
	Sustainability	Asset Preservation	H	Environmental Stewardship	M	Resiliency	L

Redevelopment of T21 in Midport is critical to the Port's near-term and long-term future competitiveness. While it does not increase the Port's berth capacity, it does improve an

existing asset that is generally inadequate in size and configuration to meet the needs of current and future generations of cruise vessels. In particular, since T21 is one of the main cruise terminals used by Carnival Corporation, it must be redeveloped in order to accommodate a class of cruise vessel – Carnival Cruise Line's XL class – that did not exist and was not anticipated in the design of T21 when it was last renovated, but is now expected to homeport at Port Everglades as soon as 2023. In order to minimize design costs and maximize operational efficiencies, it is envisioned that the proposed redevelopment of T21 will involve a complete or near-complete tear down and rebuild, similar to what occurred just across the street with Terminal 25 (T25). The proposed T21 project will also develop a new ground transportation area (GTA) on the ground level of the existing Midport parking structure in order to optimize physical adjacency between the new terminal and the GTA and in order to minimize the total footprint of the project and in so doing preserve as much land within Midport as possible. As noted previously, an important best practice in current cruise infrastructure development is to ensure sufficient available apron width to allow provisioning trucks and other service vessels dockside access to the vessel. This and other considerations must be factored into the ultimate design of the redeveloped T21 to ensure that it meets best-in-class standards today and can help Port Everglades continue to service its cruise line customers at the highest level possible.

Liquid Bulk Projects

Project	Timeframe	Investment (Total/PEV)
• Berths 7, 8, 8A & 32 BH (Design)	2019-2023	$3/$3 million
• Slip 1/Phase 1 (Berths 9/10)	2019-2025	$138/$89 million
		$141/$92 million

A total of two projects in the 5-year CIP are categorized as liquid bulk projects. The smaller of the two projects comprises design by the U.S. Army Corps of Engineers (USACE) of the bulkheads at Berths 7, 8, 8A and 32 to support the portwide deepening and widening project currently scheduled for completion in 2026. These bulkhead projects, which are comparable to other bulkhead projects included in the 2018 Update in terms of their decision matrix score, are not further discussed here. The combined economic impacts of these two liquid bulk projects are presented in Table 3.9.6.

Table 3.9.6: Estimated Economic Impacts of Liquid Bulk Projects – 2023
Source: Martin Associates; B&A

Impact Category	Impact Value
JOBS	
DIRECT	58
INDUCED	42
INDIRECT	31
TOTAL JOBS	**131**
PERSONAL INCOME ($ 000)	
DIRECT	$2,657
INDUCED	$5,279
INDIRECT	$1,470
TOTAL PERSONAL INCOME ($ 000)	**$9,405**
BUSINESS SERVICES REVENUE ($ 000)	**$10,071**
LOCAL PURCHASES ($ 000)	**$3,103**
STATE & LOCAL TAXES ($ 000)	**$922**

The principal liquid bulk project included in the 5-year Master Plan is the excavation of terra firma behind Berths 9 and 10 by approximately 150 feet to the south in order to widen Slip 1 so that it can better accommodate a wider range of future liquid bulk vessels, including larger international as well as coastwise tankers and barges. As part of this project new liquid bulk transfer capabilities are being added to Berths 14-15 so that liquid bulk operations can shift to those berths during Slip 1 expansion, thereby ensuring continuity of the Port's critical petroleum operations, which account for 100% of South Florida's jet fuel and gasoline supply. Figure 3.9.4 presents a conceptual illustration of the Slip1/Phase 1 project. Table 3.9.7 presents the project decision matrix for this project. Because this project requires entirely new bulkheads to be constructed as part of the Slip 1 expansion, this project results in a high resiliency score.

Figure 3.9.4: Slip 1/Phase 1 (Berths 9/10) Project

Source: B&A

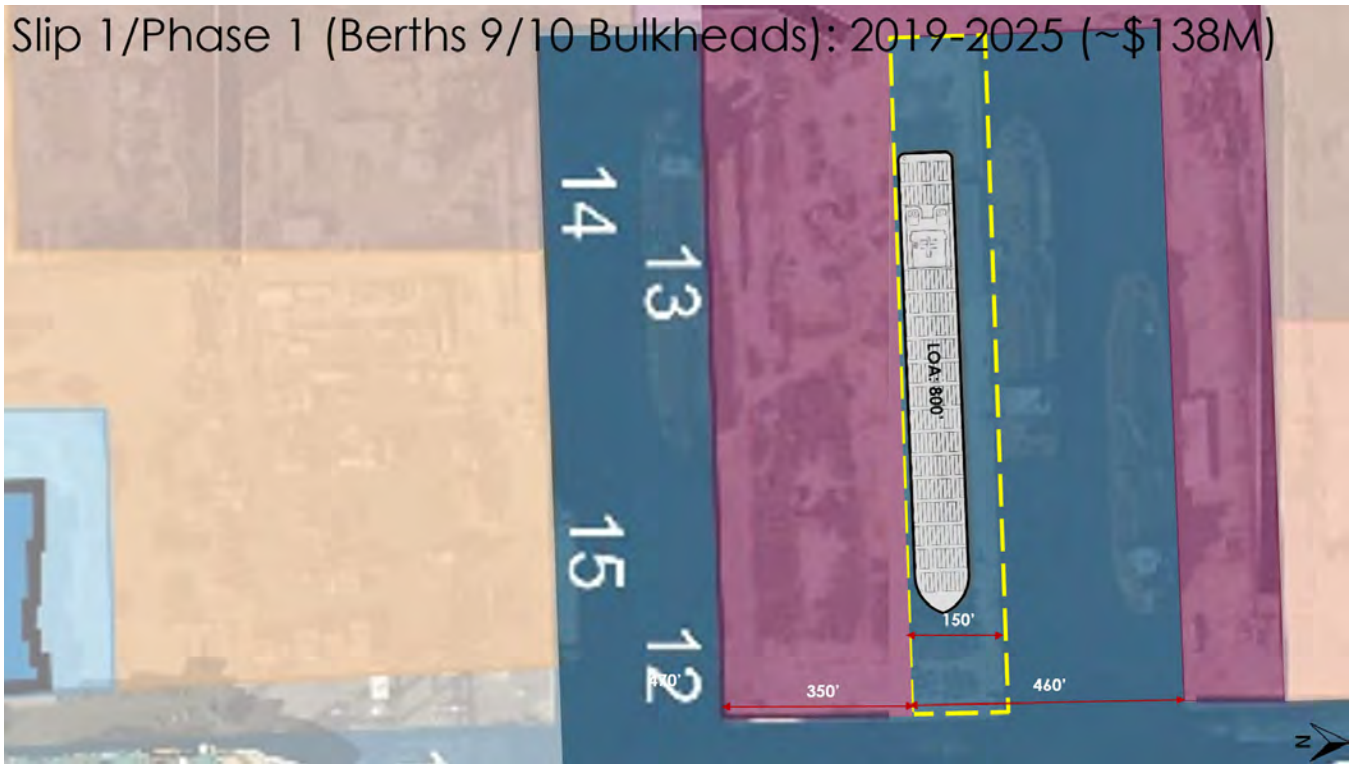


Table 3.9.7: Slip 1/Phase 1 (Berths 9/10) – Decision Matrix

Source: B&A

Project	Category	Evaluation Criteria					
Slip 1/Phase 1 (Berths 9/10)							
	Competitiveness	Capacity	M	Efficiency	H	Integration	H
	Economics	Port ROI	H	Flexibility	H	Economic Impacts	H
	Sustainability	Asset Preservation	H	Environmental Stewardship	L	Resiliency	H

Containerized Cargo Projects

Project	Timeframe	Investment (Total/PEV)
• 3 SPP STS Cranes	2017-2020	$54.5/$45 million
• PEV ILC	2019-2020	$30/$3 million
• Phase 9A (Container Yard)	2018-2022	$18.5/$19 million
• Southport Turning Notch Expansion	2015-2023	$391.5/$336 million
• Southport Crane Rail	2015-2023	$79.5/$64 million
• Former Dynegy Logistics Area	2020-2023	$50 million/$0
• 3 Additional SPP STS Cranes	2021-2023	$41.5/$41 million
		$665.5/$508 million

A total of seven projects in the 5-year CIP are categorized as containerized cargo projects. All but two of these (PEV ILC, Former Dynegy Logistics Area) are associated directly with berth and container yard (CY) capacity enhancements in Southport. The two projects that are not directly related to berth or CY capacity enhancements are indirectly related since both the PEV ILC and the Former Dynegy Logistics Area will improve and/or add on- or near-port third-party logistics capabilities. Together, these seven near-term projects substantially improve the Port's value proposition related to containerized cargo, particularly when also combined with the planned USACE deepening and widening project.

The combined economic impacts of these seven containerized cargo projects are presented in Table 3.9.8. Figures 3.9.5-3.9.10 present conceptual illustrations for each of these projects. Tables 3.9.9-3.9.13 present the decision matrix for each project, respectively.

Table 3.9.8: Estimated Economic Impacts of Containerized Cargo Projects – 2023
Source: Martin Associates; B&A

Impact Category	Impact Value
JOBS	
DIRECT	938
INDUCED	715
INDIRECT	869
TOTAL JOBS	**2,521**
PERSONAL INCOME ($ 000)	
DIRECT	$45,671
INDUCED	$90,721
INDIRECT	$41,384
TOTAL PERSONAL INCOME ($ 000)	**$177,777**
BUSINESS SERVICES REVENUE ($ 000)	**$283,599**
LOCAL PURCHASES ($ 000)	**$87,387**
STATE & LOCAL TAXES ($ 000)	**$18,447**

Figure 3.9.5: Super Post-Panamax Ship-to-Shore (STS) Cranes
Source: Port Everglades

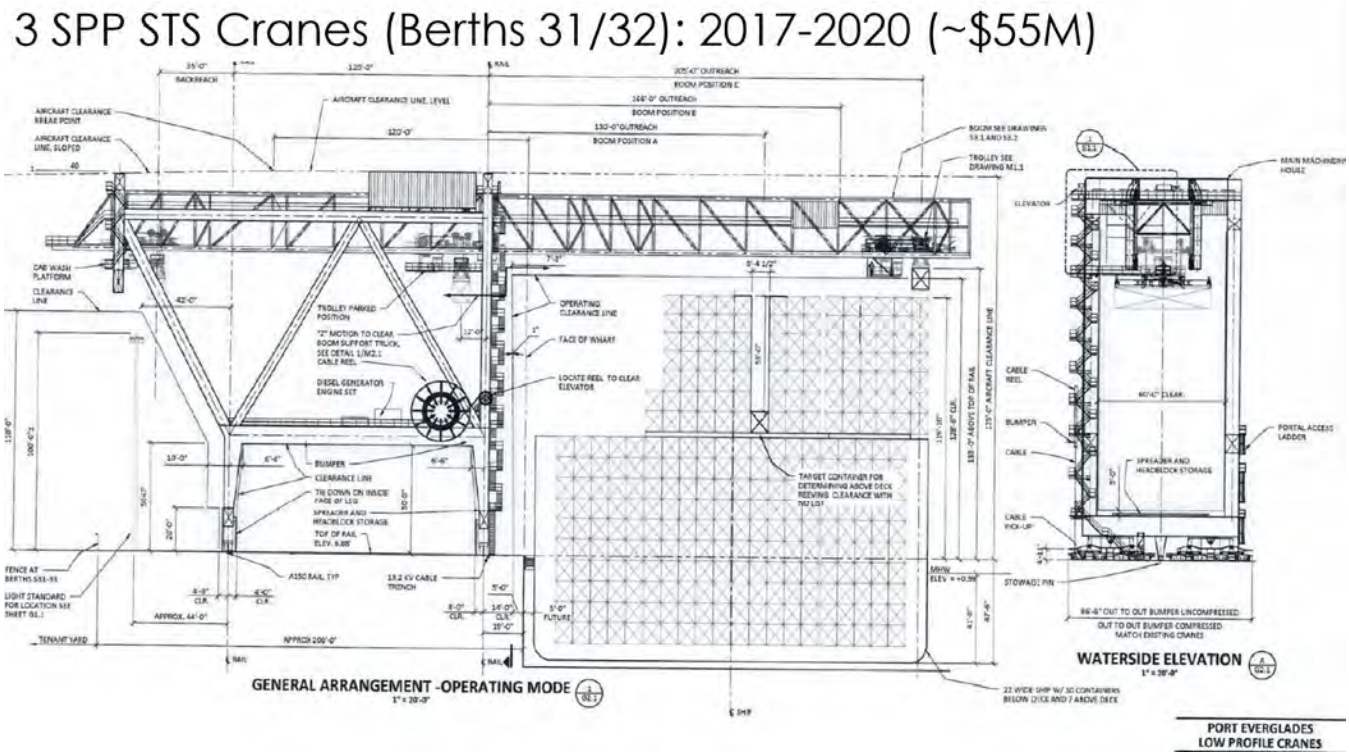


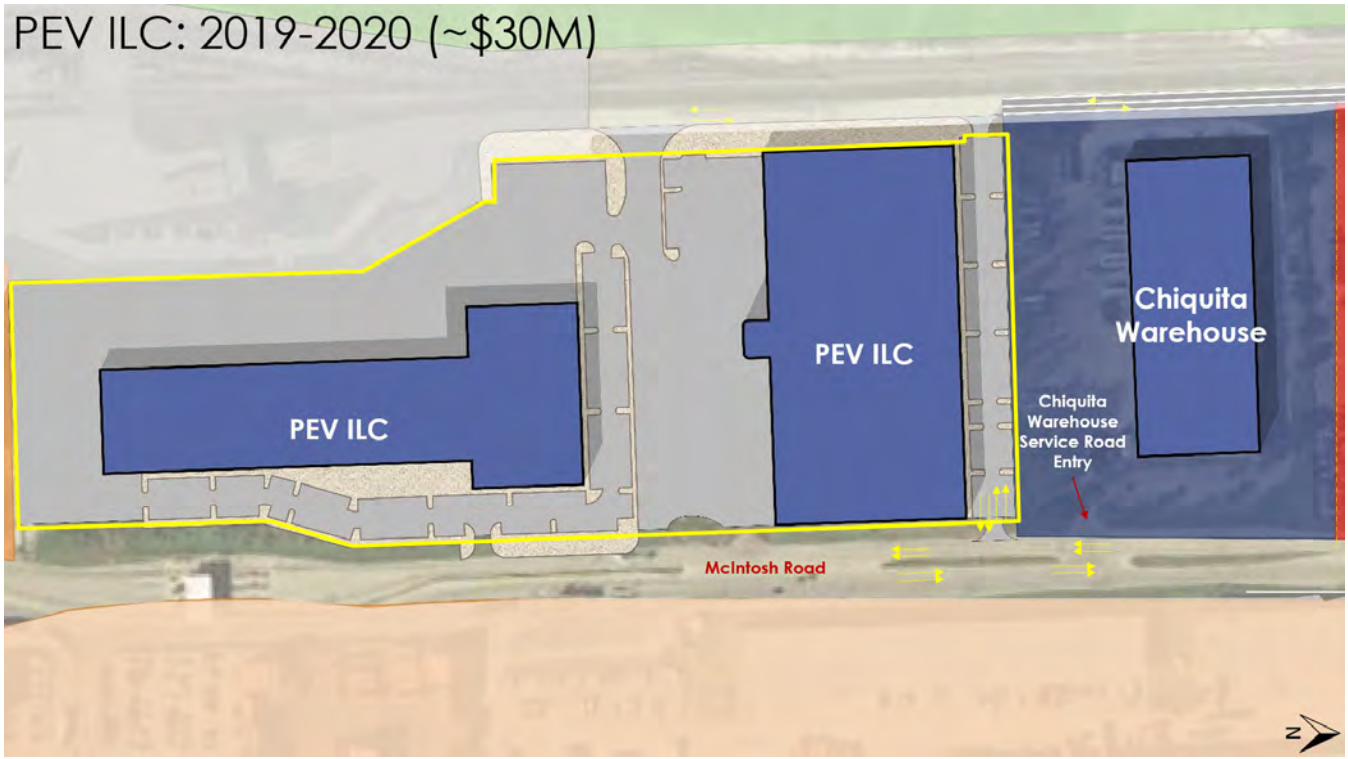
Table 3.9.10: Super Post-Panamax STS Cranes – Decision Matrix
Source: B&A

Project	Category	Evaluation Criteria					
Super Post-Panamax STS Cranes							
	Competitiveness	Capacity	H	Efficiency	H	Integration	H
	Economics	Port ROI	H	Flexibility	H	Economic Impacts	H
	Sustainability	Asset Preservation	L	Environmental Stewardship	L	Resiliency	L

A total of six super post-Panamax (SPP) ship-to-shore (STS) cranes are proposed in the 2018 Update, all six of which are expected to be delivered and operational by 2024. As discussed in Section 3.7 of this element, berth capacity specific to containerized cargo depends in part on both crane density (i.e. the number of cranes assigned per vessel call) and crane productivity. Berths with STS cranes available will generally have lower berth-foot-hour values, indicating they are able to move containers across the berth more rapidly than vessels using ship's gears or truck-mounted cranes. Because of this, given the limited total length of berth available for container operations at Port Everglades, and considering the rapid cascading of larger vessels from major east-west trade lanes (i.e. Transpacific) into north-south trade lanes (i.e. inter-Americas) that has occurred in recent years and is projected to continue to occur in the future, it is crucial for Port Everglades to have an appropriate number of STS cranes that are also of sufficient size – including height, reach and lift capacity – to efficiently work a wide range of container vessels, up to and including neo-Panamax vessels (i.e. 12,000-14,000 TEUs).

Currently, Port Everglades has just seven total STS cranes in its primary Southport container handling area, and all seven of these cranes are too small to efficiently work large (post-Panamax) container vessels. This limitation adds a major constraint to Port Everglades in terms of its competitiveness for containerized cargo due to the fact that both Port*Miami* and JAXPort have numerous SPP STS cranes already in service. The addition of the six recommended SPP STS cranes – three of which have already been ordered and are currently under construction – will help to level the playing field for Port Everglades in terms of containerized cargo infrastructure and, when combined with the new berths created by the STNE project, will enhance the Port's capacity and operational efficiency and so too result in higher future revenues and greater local and regional economic impacts.

Figure 3.9.6: PEV International Logistics Center (ILC)
Source: B&A



The approximately 16-acre PEV ILC, which is funded primarily by private entities, is under construction as of the writing of Element 3 and will add value to Port Everglades in two distinct and important ways. First, this project replaces the existing Foreign Trade Zone No. 25 (FTZ 25) site at the Port with a new, state-of-the art logistics center that has the capability to absorb all existing FTZ activity while also offering modern warehouse space and associated amenities. Second, and just as importantly, development of the PEV ILC on a formerly undeveloped parcel of land to the west of McIntosh Road frees up approximately 26 acres of land to the east of McIntosh Road that is adjacent to existing Southport container yard. As a result, much of the CY acreage excavated as part of the STNE project can be replaced in a more-or-less equivalent location as illustrated in Figure 3.9.7.

Figure 3.9.7: Phase 9A Container Yard
Source: B&A

Table 3.9.11: PEV ILC + Phase 9A Container Yard – Decision Matrix
Source: B&A

Project	Category	Evaluation Criteria					
PEV ILC + Phase 9A CY							
	Competitiveness	Capacity	H	Efficiency	H	Integration	H
	Economics	Port ROI	H	Flexibility	H	Economic Impacts	H
	Sustainability	Asset Preservation	L	Environmental Stewardship	L	Resiliency	L

The combined result of the PEV ILC and Phase 9A container yard developments is the replacement of obsolete warehousing with a modern on-port logistics complex and a nearly no-net loss of berth-adjacent CY acreage.

Figure 3.9.8: Southport Turning Notch Expansion (STNE) Project
Source: B&A

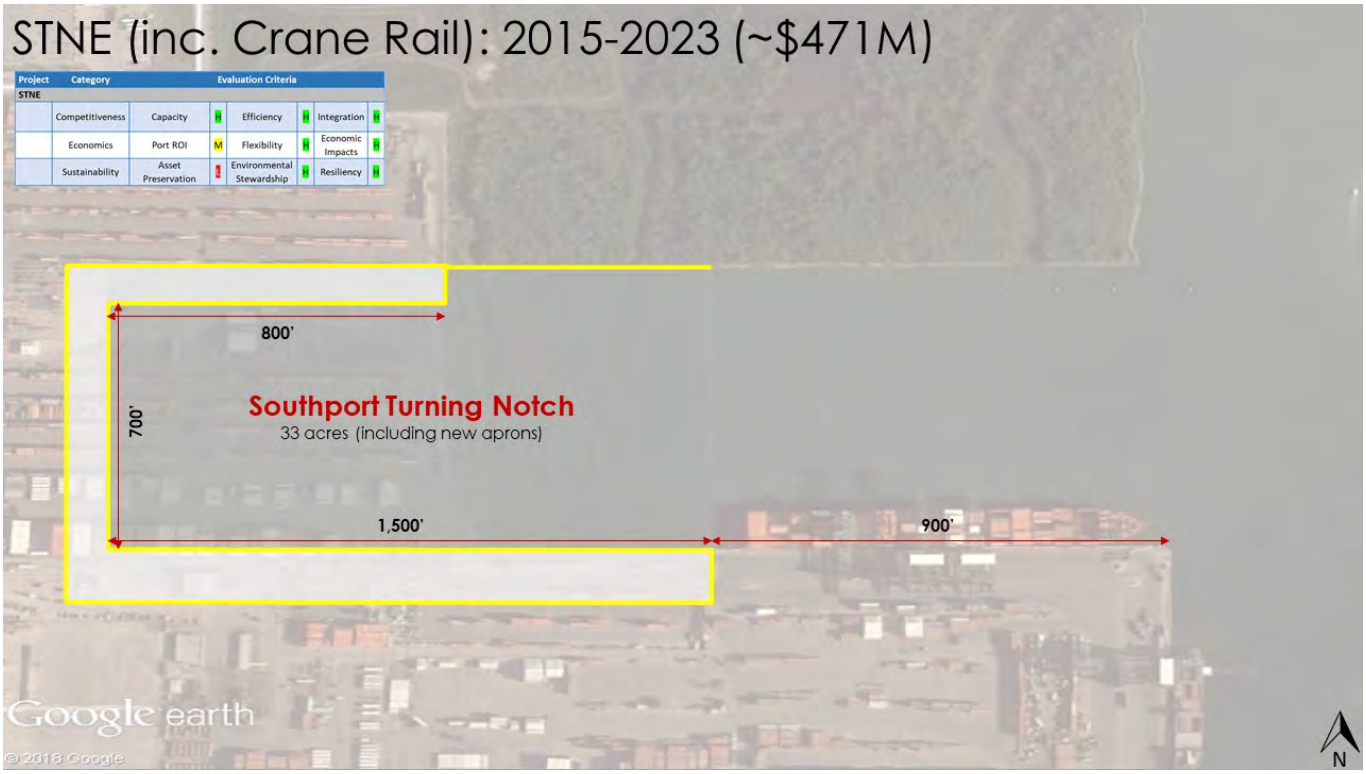


Table 3.9.12: Southport Turning Notch Expansion (STNE) Project – Decision Matrix
Source: B&A

Project	Category	Evaluation Criteria					
STNE							
	Competitiveness	Capacity	H	Efficiency	H	Integration	H
	Economics	Port ROI	M	Flexibility	H	Economic Impacts	H
	Sustainability	Asset Preservation	L	Environmental Stewardship	H	Resiliency	H

Without question, one of the most important projects in the 2018 Update as in the 2014 Plan is the STNE. This project, which lengthens the existing turning notch from about 900 feet to 2,400 feet, received unanimous approval from the Broward County Board of County Commissioners in May 2017. The existing Berth 30 is being extended and will be dredged to 48 feet, in conjunction with the USACE deepening and widening project. The new berths created to the west will have a depth alongside of 42 feet. This expansion project will be one of the most significant capital projects in Port Everglades' history and, when including the six new SPP STS cranes previously described, is the cornerstone of the Port's strategy to increase its containerized cargo capacity and handling capabilities in order to reach approximately 1.8 million TEUs of containerized cargo by 2038. Already under construction, this critical project is scheduled for completion in 2023 and will contribute more in terms of direct incremental future economic impacts than any other project included in the 2018 Update.

Figure 3.9.9: Former Dynegy Logistics Development
Source: B&A

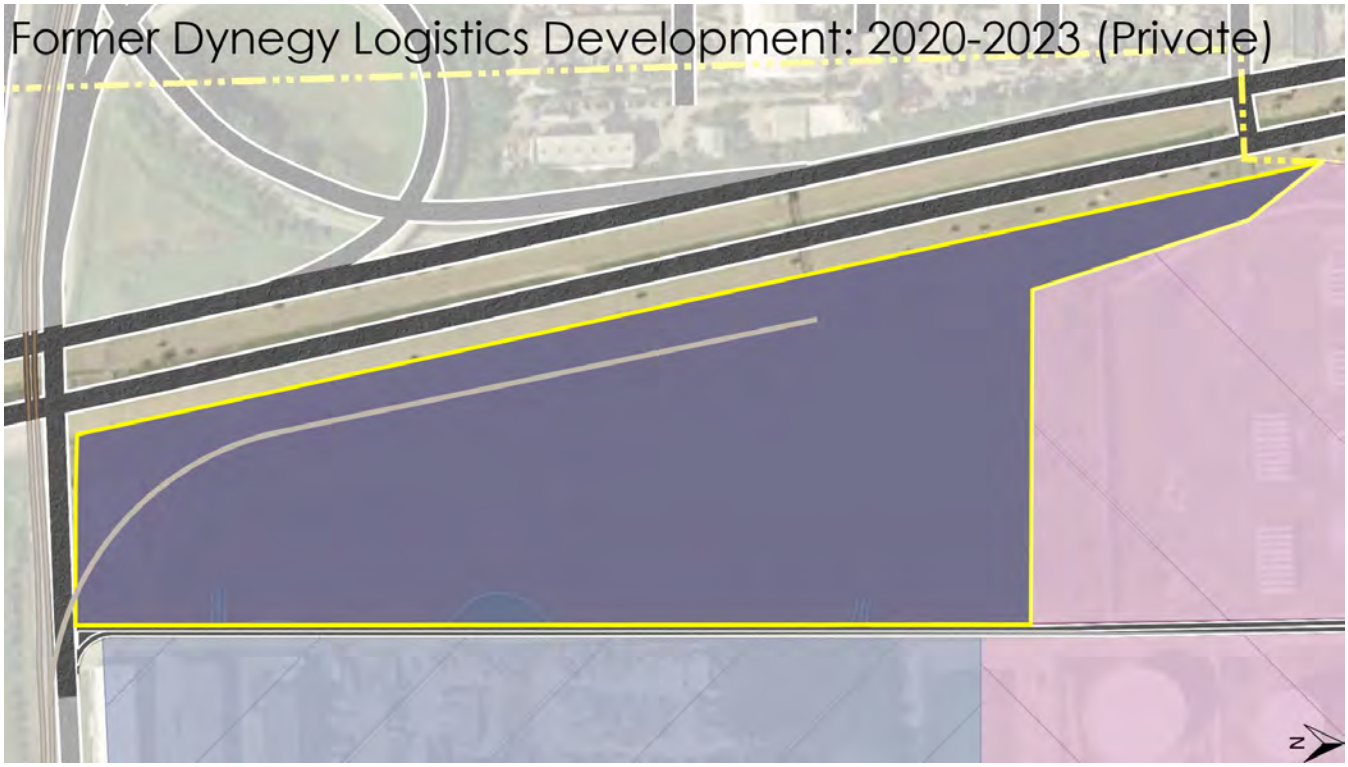


Table 3.9.13: Former Dynegy Logistics Development – Decision Matrix
Source: B&A

Project	Category	Evaluation Criteria					
Dynegy Logistics Development							
	Competitiveness	Capacity	H	Efficiency	H	Integration	H
	Economics	Port ROI	M	Flexibility	H	Economic Impacts	H
	Sustainability	Asset Preservation	L	Environmental Stewardship	L	Resiliency	L

The final containerized cargo project included in the 5-year CIP section of the 2018 Master/Vision Plan Update comprises development of the former Dynegy property into a new, state-of-the-art logistics center. As with the PEV ILC site, this site is currently vacant except for one small building located along the far southern edge of the property. Also like the PEV ILC site, it is expected that this new 19-acre parcel will be developed with little or no capital contribution from the Port. Rather than compete with the PEV ILC, however, the vision for the former Dynegy property is to develop new refrigerated warehouse/cold storage facilities that cater specifically to the Port's sizable refrigerated cargo markets and give the port a considerable speed-to-market advantage for such cargo by virtue of including not just on-/near-port cold storage, but also a direct-to-rail transfer facility that allows refrigerated import containers to be broken down and their contents transshipped without the containers themselves leaving the Port. Similarly, for refrigerated export cargo, the cold chain could be maintained over long distances via refrigerated rail cars that could then be reverse transshipped into refrigerated ISO containers at the new site and then loaded onto outbound vessels at Port Everglades in close to real time.

Non-Containerized Cargo Projects

Project	Timeframe	Investment (Total/PEV)
• Ro-Ro Yard Relocation/Expansion	2020-2023	$10/$10 million
		$10/$10 million

The sole non-containerized cargo project included in the 5-year CIP of the 2018 Update is a proposed relocation and expansion of the existing ro-ro facility in Midport from nine acres in 2018 to 15 acres by 2023. This expansion will facilitate projected growth in new automobile imports and exports at the Port as described in Element 2 while also paving the way for additional future growth of ro-ro business as well as new cruise infrastructure developments by reconfiguring several existing parcels within the Port's Midport area. See Figure 3.9.10 and Table 3.9.15 (decision matrix). This project constitutes the first of three ro-ro expansion phases. Economic impacts associated with this project are presented in Table 3.9.14.

Table 3.9.14: Estimated Economic Impacts of Non-Containerized Cargo Projects – 2023
Source: Martin Associates; B&A

Impact Category	Impact Value
JOBS	
DIRECT	8
INDUCED	7
INDIRECT	2
TOTAL JOBS	**17**
PERSONAL INCOME ($ 000)	
DIRECT	$469
INDUCED	$932
INDIRECT	$101
TOTAL PERSONAL INCOME ($ 000)	**$1,502**
BUSINESS SERVICES REVENUE ($ 000)	**$693**
LOCAL PURCHASES ($ 000)	**$214**
STATE & LOCAL TAXES ($ 000)	**$137**

Figure 3.9.10: Ro-Ro Yard Relocation/Expansion (Phase 1)
Source: B&A

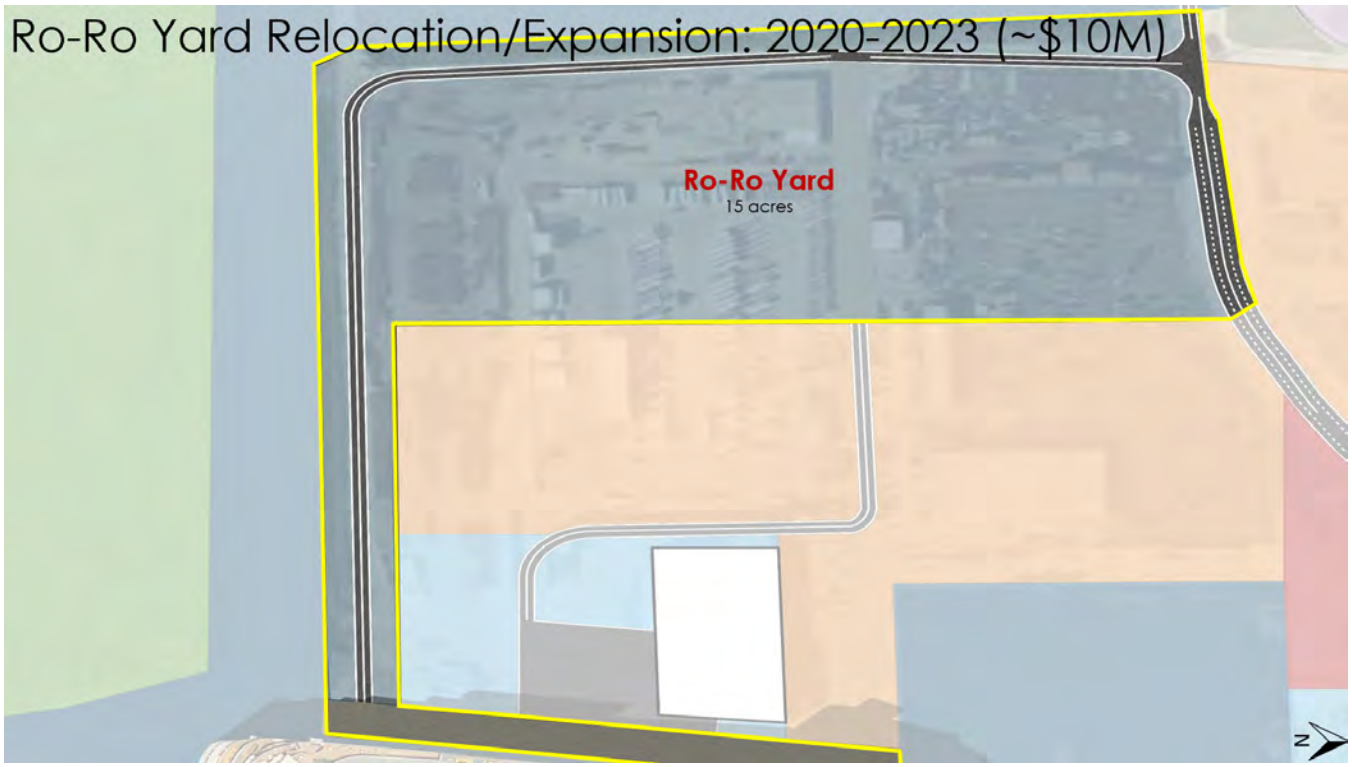


Table 3.9.15: Ro-Ro Yard Relocation/Expansion (Phase 1 of 3) – Decision Matrix
Source: B&A

Project	Category	Evaluation Criteria					
Ro-Ro Yard Relocation/Expansion (Phase 1 of 3)							
	Competitiveness	Capacity	H	Efficiency	H	Integration	H
	Economics	Port ROI	H	Flexibility	M	Economic Impacts	H
	Sustainability	Asset Preservation	L	Environmental Stewardship	L	Resiliency	L

Parking Projects

Project	Timeframe	Investment (Total/PEV)
• T2/T4 Parking Garage	2018-2020	$112/$112 million
		$112/$112 million

Only one parking project – the T2/T4 parking garage in the Port's Northport area – is included in the 2018 Update's 5-year CIP. This project will replace spaces lost as a result of the partial demolition of the existing Convention Center parking structure and will serve both Terminal 2 and Terminal 4 via a modern, indoor climate-controlled people-mover/moving sidewalk system. A total of approximately 1,800 new spaces will be available in this structure upon completion in 2020. This new garage will also incorporate critical GTA elements at ground level to support both of the Port's Northport cruise facilities. The decision matrix for this project is presented in Table 3.9.16.

As illustrated, this project does not score highly in most categories or against most evaluation criteria when evaluated on its own. However, because parking demand in Northport must be satisfied in order to meet the needs of drive-in cruise passengers, this project is vital to the continuing operations at Terminals 2 and 4.

Figure 3.9.11: T2/T4 Parking Garage

Source: B&A

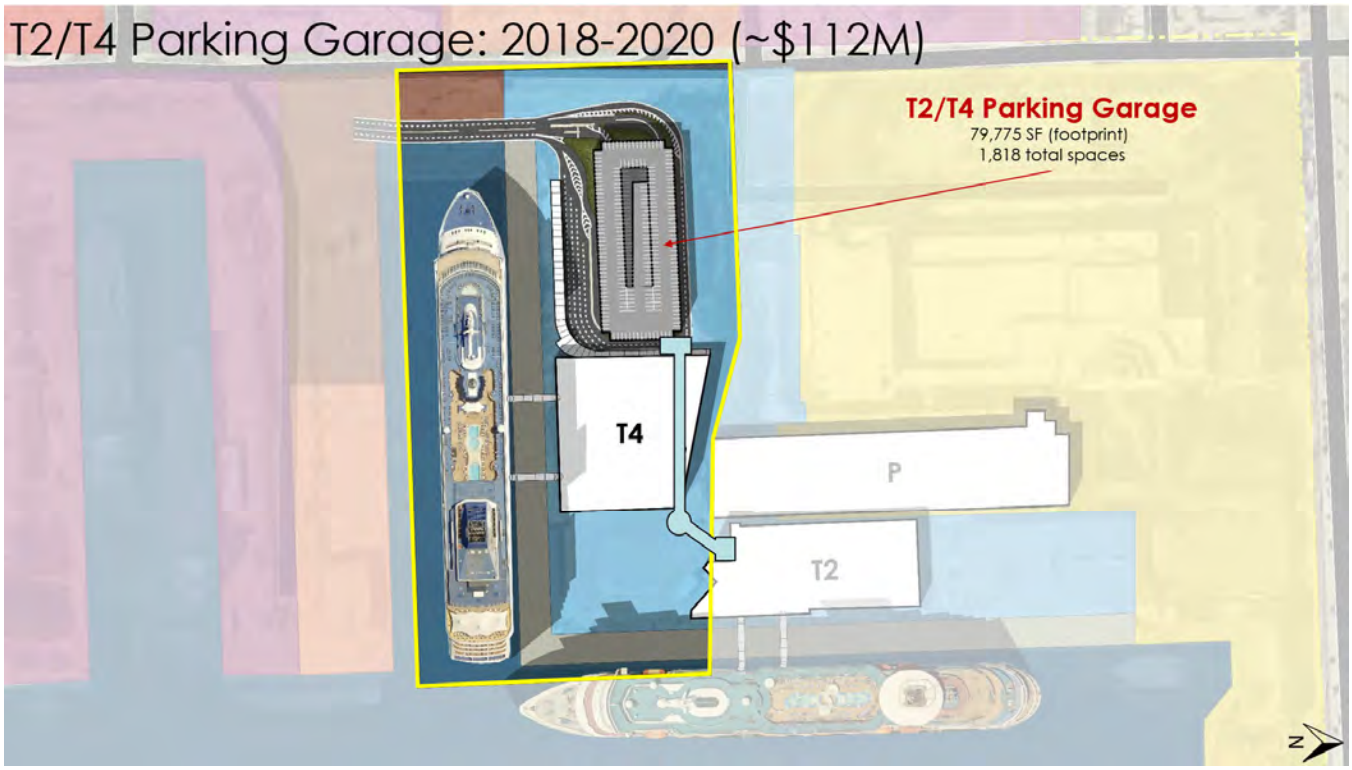


Table 3.9.16: T2/T4 Parking Garage – Decision Matrix

Source: B&A

Project	Category	Evaluation Criteria					
T2/T4 Parking Garage							
	Competitiveness	Capacity	M	Efficiency	H	Integration	H
	Economics	Port ROI	M	Flexibility	M	Economic Impacts	L
	Sustainability	Asset Preservation	L	Environmental Stewardship	M	Resiliency	L

Real Estate Projects

No projects that are directly related to the Port's real estate business unit are proposed in the 5-year CIP.

Portwide/Other Projects

Project	Timeframe	Investment (Total/PEV)
• Maintenance Facility Consolidation	2019-2023	$21/$18 million
• Port Access Road	2019-2023	$35 million/$0
• Auto Terminal West	2020-2023	$20 million/$0
• Entrance Channel North Wall (BH)	2020-2024	$12/$12 million
• USACE Deepening & Widening*	2019-2025	$420/$67 million
• I-595 Flyover	2021-2025	$46/$7 million
		$554/$104 million

**Includes USCG relocation*

A total of seven projects in the 5-year CIP are categorized as portwide/other projects. Two of these (Port Access Road, Auto Terminal West) are third party developments that include no capital contribution from Port Everglades but stand to impact Port Everglades, and so have been included. The remaining five projects vary widely in terms of their impact on and/or benefit to the Port. However, all of them have been prioritized for near-term implementation either because they significantly enhance the Port's capacity and competitiveness (i.e. USACE deepening & widening, I-595 flyover) or because they are necessary to the ongoing operation of the Port (i.e. maintenance facility consolidation, entrance channel north wall bulkhead). Figures 3.9.12-3.9.16 present conceptual illustrations for each of these projects. Tables 3.9.17-3.9.21 present each project's decision matrix. In terms of economic impacts, the USACE deepening and widening project will have substantial and long-lasting positive economic impacts across all of the Port's lines of business when completed. No separate economic impact table has been included here specific to this project since the economic impacts associated with this project as of 2023 are already captured in Tables 3.9.6, 3.9.8 and 3.9.14 for liquid bulk, containerized cargo and non-containerized cargo, respectively. All other portwide projects included in the 5-year Master Plan will similarly benefit multiple port lines of business but do not generate significant economic impacts on their own.

Figure 3.9.12: Maintenance Facility Consolidation

Source: B&A

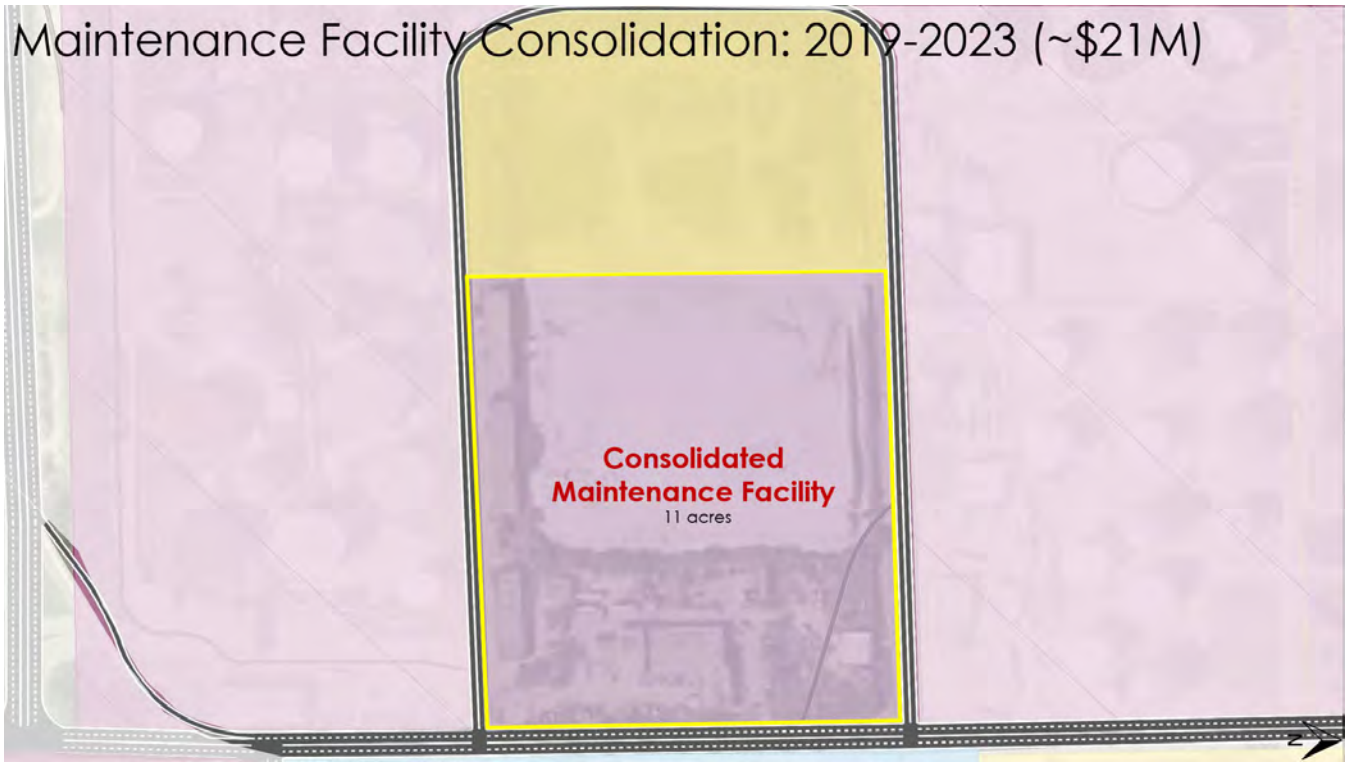


Table 3.9.17: Maintenance Facility Consolidation – Decision Matrix

Source: B&A

Project	Category	Evaluation Criteria					
Maintenance Facility Consolidation							
	Competitiveness	Capacity	M	Efficiency	H	Integration	H
	Economics	Port ROI	L	Flexibility	M	Economic Impacts	L
	Sustainability	Asset Preservation	H	Environmental Stewardship	L	Resiliency	M

This $21 million project calls for developing a new consolidated maintenance campus on approximately 11 acres in Northport, much of which is currently vacant, but some of which is already occupied by various facilities used by the Port's public works staff. The rationale behind this project is twofold.

First, it is a best practice to consolidate maintenance facilities and operations at ports as a means to increase efficiency, reduce waste/lost time and lower operating costs.

Second, vacating some two dozen smaller satellite facilities in various locations across the Northport, Midport and Southport areas of the Port creates opportunities to consolidate land in those areas in pursuit of higher and better uses that directly support the Port's core revenue-producing lines of business (i.e. cruise, cargo, etc.). Because this project replaces existing infrastructure and does not result in new revenue to the Port, it does not score particularly well against the evaluation criteria in the decision matrix. In this sense it is a an improvement to internal infrastructure and operations that constitutes a necessary cost of doing business much as other public works projects (i.e. roadway improvements, utility enhancements, etc.) do.

Figure 3.9.13: Port Access Road

Source: Broward County Administration; B&A

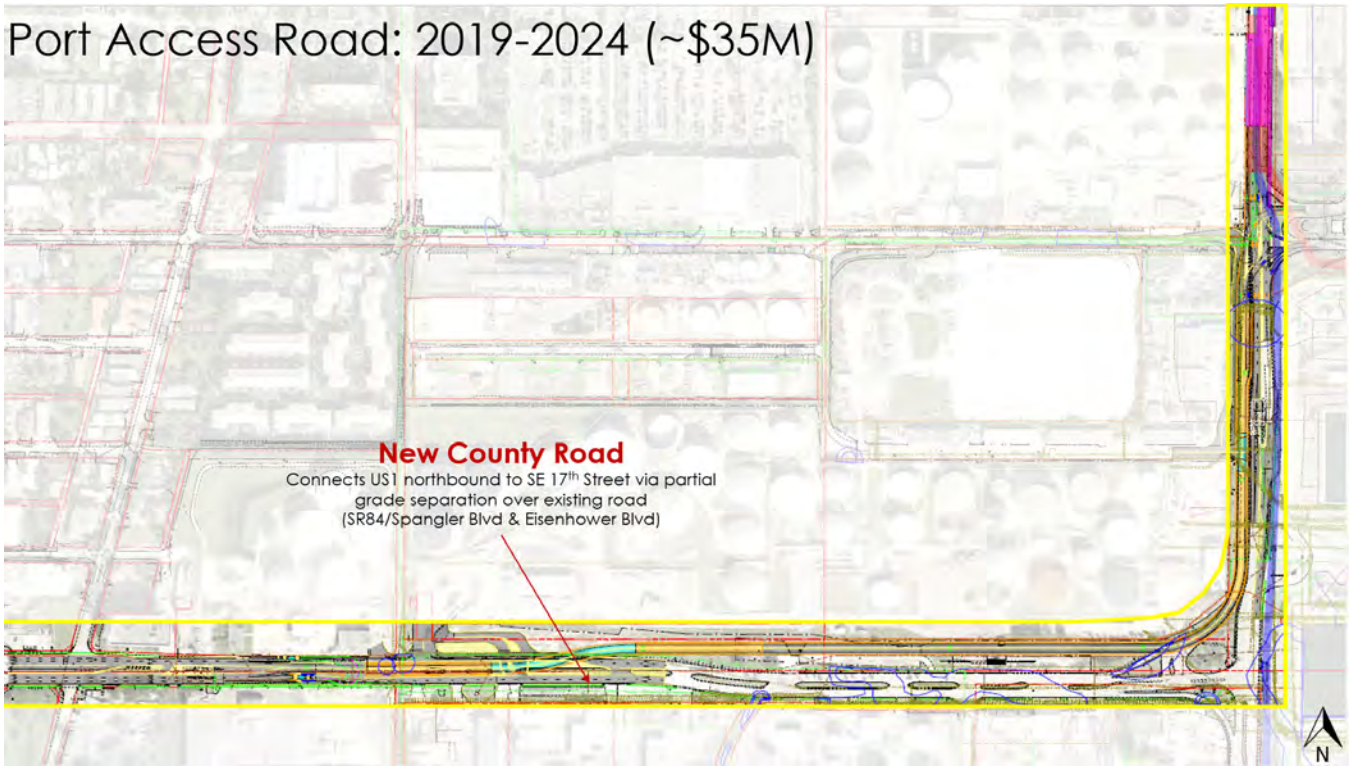


Table 3.9.18: Port Access Road – Decision Matrix

Source: B&A

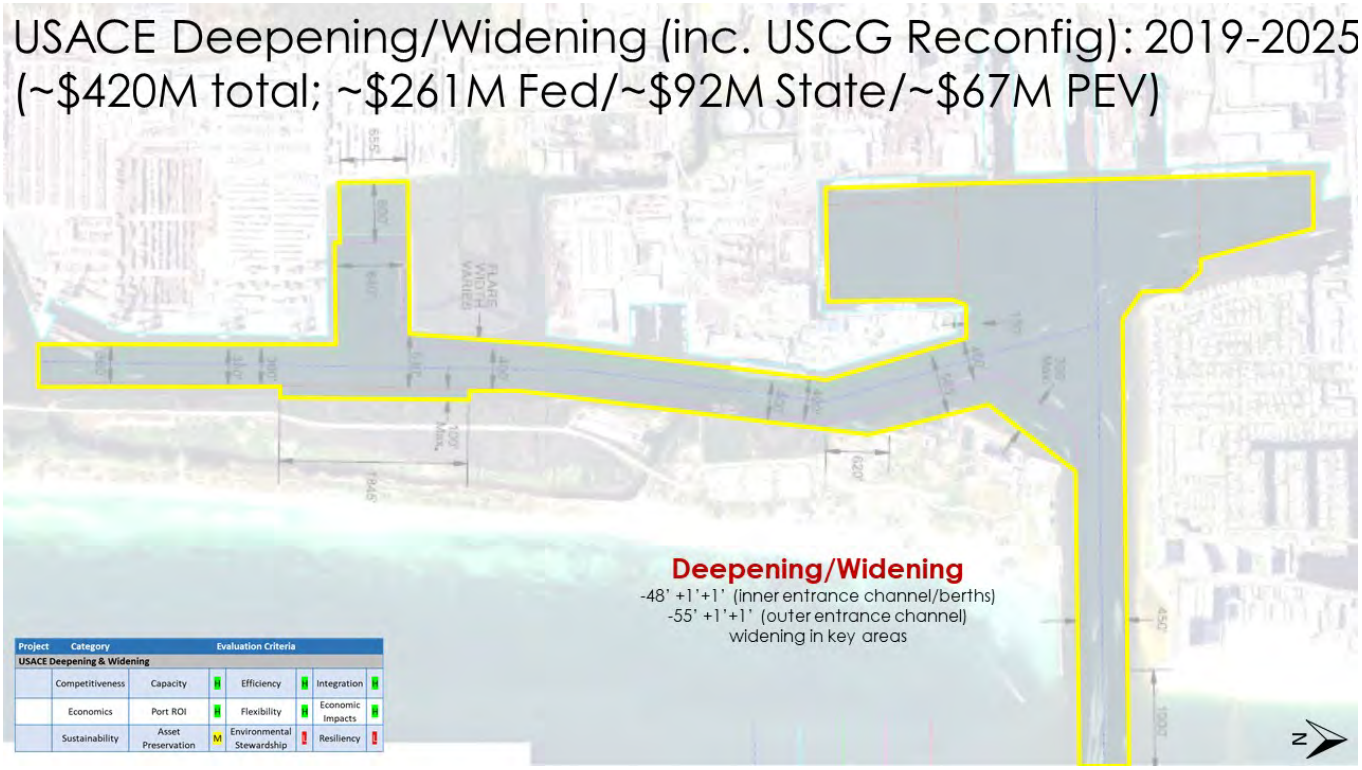
Project	Category	Evaluation Criteria					
Port Access Road							
	Competitiveness	Capacity	L	Efficiency	L	Integration	M
	Economics	Port ROI	L	Flexibility	M	Economic Impacts	L
	Sustainability	Asset Preservation	L	Environmental Stewardship	L	Resiliency	L

This ancillary transportation project is led by the Broward County Administration in conjunction with the City of Fort Lauderdale and will include $0 in Port funds. The

principal goal of this project is to provide an alternate route for Beach traffic and in so doing improve traffic at the intersection of U.S. Highway 1 and SE 17th Street, which has been identified for many years as a critical chokepoint in the Fort Lauderdale transportation network. This project is unlikely to benefit the Port either directly or indirectly and in fact was shown through future simulation conducted by CTS to have a negative impact on Northport traffic. Still, as a priority for Broward County and other Port stakeholders, this project is expected to move forward as planned and has therefore been included here.

Figure 3.9.14: USACE Deepening & Widening

Source: USACE; Port Everglades: B&A



Along with the STNE project, the proposed USACE deepening and widening project is one of the seminal infrastructure projects currently planned for Port Everglades. Some 20-years in the planning at this point, this project remains vital to the Port's competitive future. The project not only calls for deepening the port's navigational channels, but just as importantly widening the ICW along the Northeast side of the channel to allow larger vessels to access Southport in the future, including while one or more cruise ships are

berthed in Midport (T25, T26, and/or T29). This project is currently in the pre-construction engineering and design phase, after receiving a signed Chief of Engineers Report from the USACE on June 26, 2015, and U.S. Congressional authorization in December 2016.

Table 3.9.19: USACE Deepening & Widening – Decision Matrix
Source: B&A

Project	Category	Evaluation Criteria					
USACE Deepening & Widening							
	Competitiveness	Capacity	H	Efficiency	H	Integration	H
	Economics	Port ROI	H	Flexibility	H	Economic Impacts	H
	Sustainability	Asset Preservation	M	Environmental Stewardship	L	Resiliency	L

In addition to widening the Port Everglades channel, the Project calls for deepening and widening the Outer Entrance Channel from an existing 45-foot project depth over a 500-foot channel width to a 55-foot depth over an 800-foot channel width. The project will also deepen the Inner Entrance Channel and Main Turning Basin from 42 feet to 48 feet (with a 2-foot overdredge allowance), and widen the channels within the Port to increase the margin of safety for ships transiting to berth.

The total estimated cost is $420 million, which includes approximately $39 million to relocate the existing USCG facility. The Port's share of this total cost is now approximately $67 million. Crucially, widening and deepening the channel is projected to create 4,789 construction jobs in the near term, and 1,491 regional jobs when cargo usage is operating at full capacity (i.e. 10 years after completion).

Figure 3.9.15: Auto Terminal West

Source: Port Everglades: FEC Railway; B&A

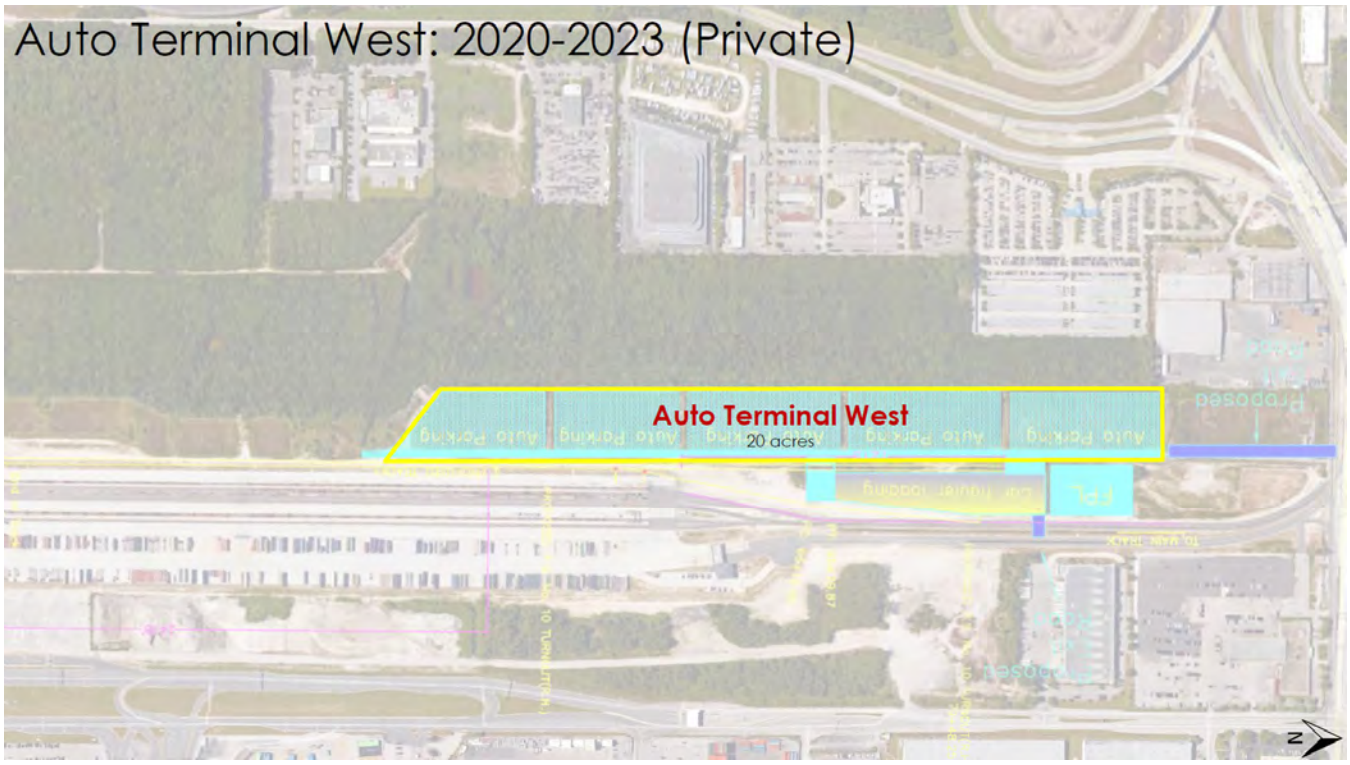


Table 3.9.20: Auto Terminal West – Decision Matrix

Source: B&A

Project	Category	Evaluation Criteria					
Auto Terminal West							
	Competitiveness	Capacity	M	Efficiency	M	Integration	M
	Economics	Port ROI	L	Flexibility	M	Economic Impacts	M
	Sustainability	Asset Preservation	L	Environmental Stewardship	L	Resiliency	L

This 100 percent privately-funded third party project is not a high priority for Port Everglades but is included in the 5-year CIP since it is likely to be developed within the

same timeframe. Essentially, this is envisioned to be a satellite yard for the ICTF that that handles primarily domestic automobile cargo that moves into South Florida from other U.S. states via the FEC railway. This yard would also have the capability to handle import and/or export automobiles on an overflow basis or as an interim staging location. As previously stated, this project does not impact the Port's capital plan since no Port funds will be used to develop the site.

Figure 3.9.16: I-595 Flyover
Source: B&A

In addition to the STNE and USACE deepening and widening projects, one of the most critical projects in the Port's 5-year CIP is the proposed I-595 flyover. This project would separate Southport traffic, which consists primarily of trucks moving containers into and out of the Port's container terminals and/or the ICTF, from traffic that continues straight into the Midport area via Eller Drive using a multi-lane bi-directional grade separation that links McIntosh Road directly to I-595. The separate Traffic Study being conducted in conjunction with the 2018 Update of the Master/Vision Plan shows that, when combined with additional future Southport transportation improvement projects (i.e. Griffin Road

Extension/NE 7th Avenue Improvements, McIntosh Road Realignment, removal of Sotuhport security checkpoints) the I-595 flyover greatly improves truck-related congestion at the intersection of Eller Drive and McIntosh Road while also eliminating most of the eastbound truck queueing that currently occurs at this intersection during peak weekday periods.

Table 3.9.21: I-595 Flyover – Decision Matrix
Source: B&A

Project	Category	Evaluation Criteria					
I-595 Flyover							
	Competitiveness	Capacity	H	Efficiency	H	Integration	H
	Economics	Port ROI	L	Flexibility	M	Economic Impacts	H
	Sustainability	Asset Preservation	L	Environmental Stewardship	L	Resiliency	L

It is important to note that this project does not address let alone resolve peak weekend traffic issues associated with other modes of transportation (i.e. POVs, taxis/app rides, busses) that need to access the Port's Midport (or Northport) cruise facilities via I-595. However, modeling done to date suggests that this project does contribute to a substantial improvement in Southport traffic conditions.

It is also worth noting that this project requires acquisition of or a sizable easement within the property located at the corner of Eller Drive and McIntosh Road, which is informally referred to as the Alamo Rent-a Car property.

The project itself is estimated to cost approximately $46 million but it is anticipated that the State of Florida would contribute the majority of funds to implement the project since it would directly improve I-595 traffic conditions as a "last mile" transportation project.

The final project included in the 5-year CIP for the 2018 Update is replacement/improvement of the Entrance Channel North Wall bulkhead. As with other bulkhead repair/replacement projects the proposed improvements to the bulkhead along

the north wall of the Port's entrance channel is important. In this case it is even more consequential since this bulkhead replacement is associated with the USACE deepening and widening project. However, given that this project ultimately involves the replacement of the existing bulkhead in the same location, an elaborate description of the project is not presented here.

2023 Land Use

Figure 3.9.17 shows the result of implementation of all 22 of the projects included in the 5-year CIP of the 2018 Master/Vision Plan in terms of portwide land use. Table 3.9.22 presents the total estimated annual economic impacts of Port Everglades as of 2023.

Figure 3.9.17: Proposed 2023 Land Use (Post-Implementation)

Source: B&A

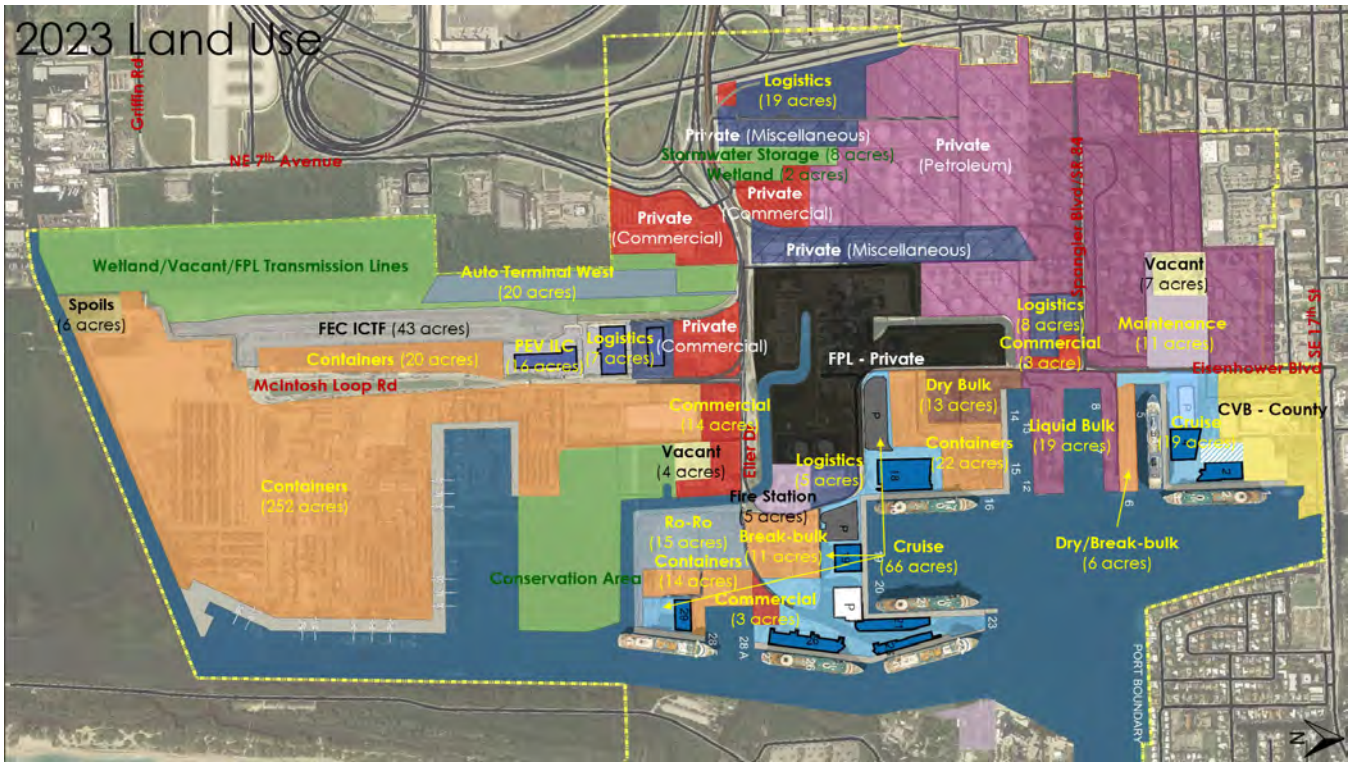


Table 3.9.22: Total Estimated Economic Impacts of the Port – 2023

Source: Martin Associates; B&A

Impact Category	2018 (Total)	2023 (Cruise)	2023 (Cargo)*	2023 (Total)
JOBS				
DIRECT	13,127	6,618	8,276	14,893
INDUCED	8,624	3,437	6,329	9,766
INDIRECT	9,660	4,638	6,492	11,130
TOTAL JOBS	**31,411**	**14,693**	**21,096**	**35,789**
PERSONAL INCOME ($ 000)				
DIRECT	$531,097	$195,650	$405,322	$600,972
INDUCED	$1,008,260	$335,623	$805,131	$1,140,754
INDIRECT	$396,137	$147,613	$309,293	$456,906
TOTAL PERSONAL INCOME ($ 000)	**$1,935,494**	**$678,886**	**$1,519,746**	**$2,198,632**
BUSINESS SERVICES REVENUE ($ 000)	**$3,804,571**	**$2,254,777**	**$2,119,538**	**$4,374,315**
LOCAL PURCHASES ($ 000)	**$744,436**	**$206,838**	**$653,104**	**$859,942**
STATE & LOCAL TAXES ($ 000)	**$202,577**	**$76,288**	**$154,339**	**$230,627**

** Includes liquid bulk, containers, dry bulk, break-bulk, ro-ro and all other miscellaneous cargo types*

3.9.3 10-Year Vision Plan

Figure 3.9.18: Proposed 10-Year Projects at Port Everglades
Source: B&A

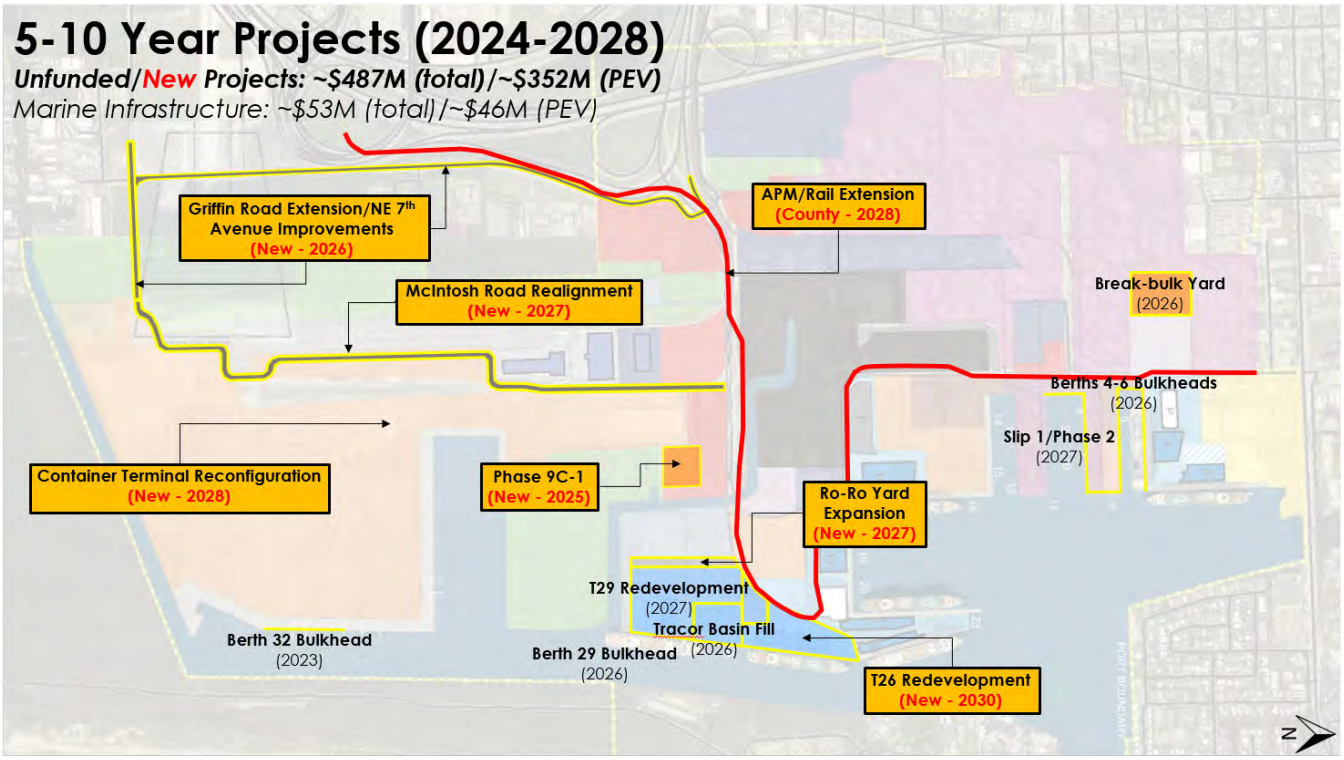


Figure 3.9.18 illustrates all 15 projects proposed for implementation between 2024 and 2028, a period which constitutes the first phase of the Vision Plan beyond the planned CIP. These 15 projects are distributed across Port business units as follows:

Business Unit	# Projects	Investment (Total/PEV)
• Cruise	5 projects	$366/$232 million
• Liquid Bulk	1 project	$41/$37 million
• Containerized Cargo	4 projects	$81/$81 million
• Non-containerized Cargo	3 projects	$11/$7 million
• Parking	1 project	$41/$41 million
• Real Estate	0 projects	$0/$0
• Portwide/Other	1 project	$TBD/$0
	15 projects	$540/$398 million

What follows is a discussion of projects proposed in the 10-year Vision Plan by business unit.

Cruise Projects

Project	Timeframe	Investment (Total/PEV)
• Tracor Basin Fill	2024-2026	$68/$65 million
• Berth 29 Bulkhead	2024-2026	$17/$14 million
• T29 Redevelopment	2024-2027	$124/$62 million
• Berths 4-6 Bulkheads	2025-2029	$33/$30 million
• T26 Redevelopment	2026-2030	$124/$62 million
		$366/$232 million

A total of five projects in the 10-year Vision Plan are categorized as cruise projects. These include two bulkhead repair/replacement projects (i.e. Berth 29; Berths 4-6) two terminal development projects – Terminals 29 (T29) and 26 (T26) – and one slip fill project (Tracor Basin). Figures 3.9.19-3.9.21 present conceptual illustrations and brief descriptions of the three non-bulkhead projects. The combined economic impacts of these five cruise projects are presented in Table 3.9.23.

As with the bulkhead repair/replacement projects included in the 5-year Master Plan, those included in the 10-year Vision Plan are substantial projects in their own right from both a level of effort and capital cost perspective. However, since they are essentially standard maintenance and repair (M&R) projects that all ports must plan for and implement as marine assets reach the end of their useful lives, they are not elaborated or further described here. The project decision matrix for the Berths 4-6 bulkhead project is presented in Table 3.9.24.

Table 3.9.23: Estimated Economic Impacts of Cruise Projects – 2028

Source: Martin Associates; B&A

Impact Category	Impact Value
JOBS	
DIRECT	522
INDUCED	265
INDIRECT	380
TOTAL JOBS	**1,168**
PERSONAL INCOME ($ 000)	
DIRECT	$14,930
INDUCED	$25,510
INDIRECT	$12,087
TOTAL PERSONAL INCOME ($ 000)	**$52,527**
BUSINESS SERVICES REVENUE ($ 000)	**$182,879**
LOCAL PURCHASES ($ 000)	**$17,075**
STATE & LOCAL TAXES ($ 000)	**$5,937**

Table 3.9.24: 10-Year Cruise-Related Bulkhead Projects – Decision Matrix

Source: B&A

Project	Category	Evaluation Criteria					
Berths 4-6 Bulkheads							
	Competitiveness	Capacity	L	Efficiency	M	Integration	H
	Economics	Port ROI	M	Flexibility	M	Economic Impacts	M
	Sustainability	Asset Preservation	H	Environmental Stewardship	L	Resiliency	H

Figure 3.9.19: Tracor Basin Fill Project

Source: B&A

This project, which has carried over from the 2014 Plan, benefits the Port's cruise operations and is closely linked to the redevelopment of T29. The filling of Tracor Basin, which creates approximately four acres of new land in addition to adding about 575 linear feet of new, contiguous berth and apron, increases both the efficiency and the flexibility of Berth 29 for cruise operations but also for ro-ro vessels, since Berth 29 will continue to be a shared, multi-purpose berth. The extension of the apron allows for more efficient cruise vessel provisioning and baggage handling and also maximizes the potential service range of the passenger boarding bridges (PBBs) that will service T29 in the future. The additional acreage will also permit a more functional GTA between T29 and T26. The USACE deepening and widening project will allow for increased vessel traffic on the Intracoastal Waterway and also allow larger vessels to utilize Berth 29; this project is an important enabler of larger vessel calls at Berth 29.

The project decision matrix for the Tracor basin fill project is shown in Table 3.9.25.

Table 3.9.25: Tracor Basin Fill – Decision Matrix

Source: B&A

Project	Category	Evaluation Criteria					
Tracor Basin Fill							
	Competitiveness	Capacity	M	Efficiency	H	Integration	H
	Economics	Port ROI	H	Flexibility	H	Economic Impacts	H
	Sustainability	Asset Preservation	H	Environmental Stewardship	M	Resiliency	M

Additional aspects of the proposed T29 redevelopment project are discussed separately below in the context of an integrated T29/T26 cruise node. It must be noted that, in the 2014 Plan, both a complete fill and a partial fill option were considered, but for the 2018 Update only a complete fill has been proposed since the operational benefits of a partial fill are less clear despite the still relatively high cost of investment. It should also be noted that, in the 2014 Plan, this project was considered in part to benefit Midport container operations. However, since one of the key strategies of the 2018 Update is to consolidate similar uses and improve berth-upland adjacencies for each individual business line, it is not expected that Berth 29 will service container vessels going forward as there will no longer be container yard space available in close proximity.

The T29/T26 redevelopment projects and parking structure are illustrated in Figure 3.9.20. The combined project decision matrix for the T29 redevelopment, T26 redevelopment and T29/T26 parking structure is shown in Table 3.9.26.

Figure 3.9.20: Terminal 29 (T29) and Terminal 26 (T26) Redevelopment Projects
Source: B&A

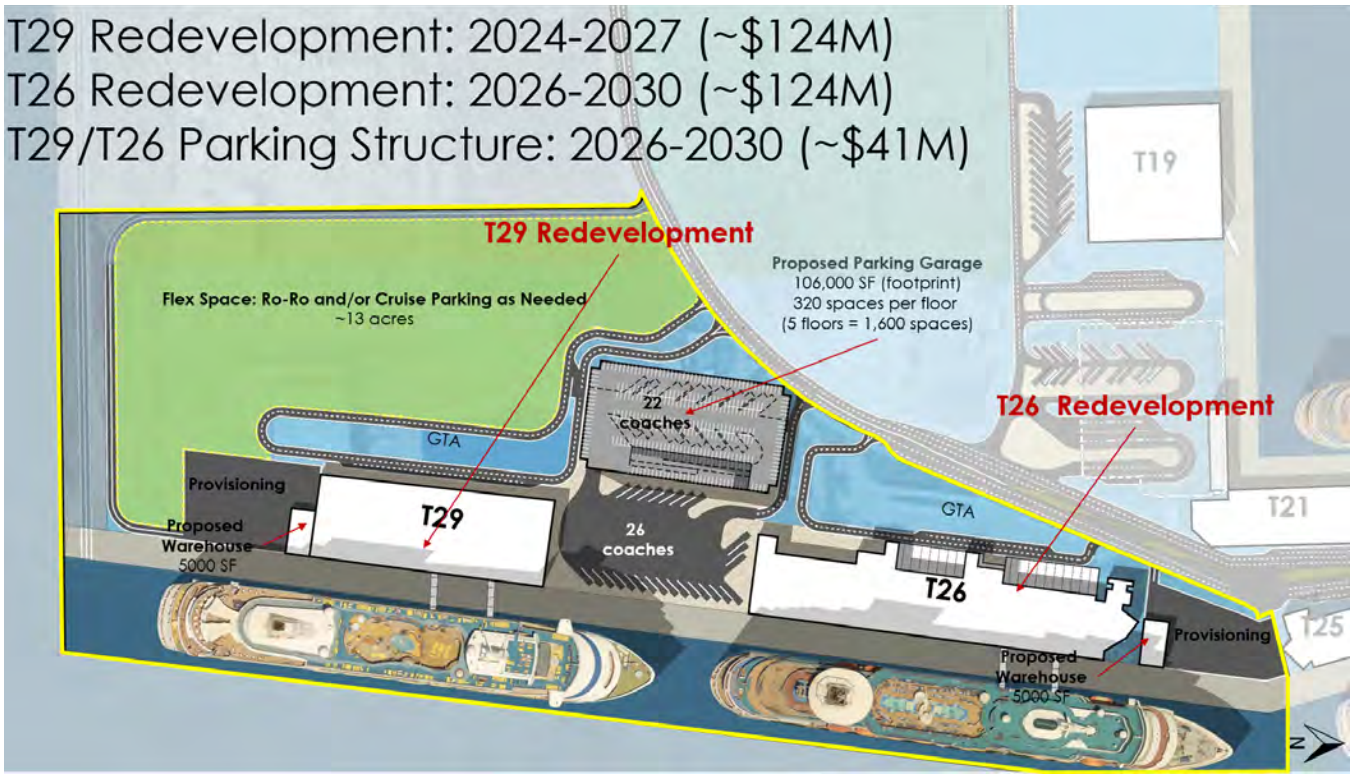


Table 3.9.26: T9 and T26 Redevelopment; T29/T26 Parking Structure – Decision Matrix
Source: B&A

Project	Category	Evaluation Criteria					
T29/T26 Redevelopments + T29/T26 Parking Structure							
	Competitiveness	Capacity	H	Efficiency	H	Integration	H
	Economics	Port ROI	H	Flexibility	H	Economic Impacts	H
	Sustainability	Asset Preservation	H	Environmental Stewardship	M	Resiliency	L

The 2018 Update calls for redeveloping T29 and T26 as well as building a new shared parking structure to service both new terminals as shown in Figure 3.9.20. While the end

result will be a totally new and largely integrated Midport cruise complex, each of the three projects is envisioned to be a standalone initiative that is separately funded and phased. T29 is in the poorest existing condition and will soon be obsolete for large vessels as a result of its size and overall location/configuration. Because of this, T29 is expected to be the first new cruise project to move forward once the Tracor Basin fill is complete, with the redevelopment of T26 and the construction of a new parking structure and partially shared GTA coming online shortly thereafter. While none of these projects will increase the number of berths available at Port Everglades to service cruise vessels, the berth extension associated with the Tracor Basin fill plus the proposed terminal and upland improvements at T29 and T26, respectively, will substantially improve operational efficiency, passenger throughput capacity (by virtue of berths, terminals and upland areas that can accommodate the largest class of vessels calling Port Everglades now and into the future) and guest experience, making them vital to the Port's future competitiveness. The proposed parking structure will similarly improve the guest experience by giving drive-in passengers the convenience of directly adjacent parking access to both terminals.

As with the T21 redevelopment proposed in the 5-year Master Plan, in order to minimize design costs and maximize operational efficiencies, it is envisioned that the proposed redevelopment of both T29 and T26 will involve a complete or near-complete tear down and rebuild. As noted previously, an important best practice in current cruise infrastructure development is to ensure sufficient available apron width to allow provisioning trucks and other service vessels dockside access to the vessel. This and other considerations must be factored into the ultimate design of the redeveloped T29 and T26 facilities to ensure both meet best-in-class standards at the time of construction.

Liquid Bulk Projects

Project	Timeframe	Investment (Total/PEV)
• Slip 1/Phase 2 (Berths 7, 8 & 8a BH)	2025-2027	$41/$37 million
		$41/$37 million

Only one project in the 10-year Vision Plan is categorized as a liquid bulk project. This project comprises phase 2 of the Slip 1 improvements made during the 5-year Master Plan and will repair/replace all of the bulkheads on the northern and western sides of this slip, which is the original and oldest slip at Port Everglades. Figure 3.9.21 illustrates this

project. Table 3.9.27 presents the project decision matrix for this project. Table 3.9.28 presents the economic impacts in 2028 of this project.

Figure 3.9.21: Slip 1/Phase 2 (Berths 7, 8 and 8a Bulkheads) Project
Source: B&A

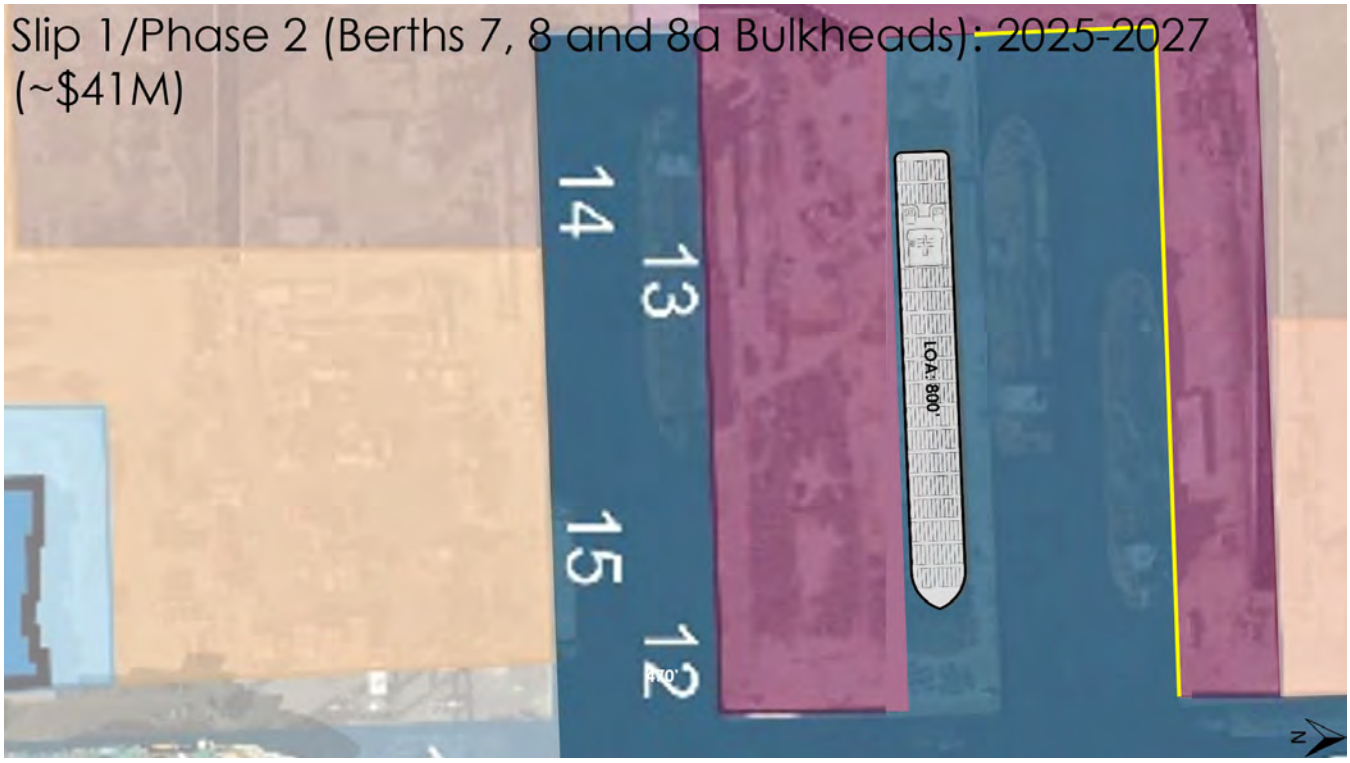


Table 3.9.27: Slip1/Phase 2 – Decision Matrix
Source: B&A

Project	Category	Evaluation Criteria					
Slip 1/Phase 2							
	Competitiveness	Capacity	L	Efficiency	H	Integration	H
	Economics	Port ROI	H	Flexibility	H	Economic Impacts	H
	Sustainability	Asset Preservation	H	Environmental Stewardship	M	Resiliency	H

Table 3.9.28: Estimated Economic Impacts of Liquid Bulk Projects – 2028
Source: Martin Associates; B&A

Impact Category	Impact Value
JOBS	
DIRECT	81
INDUCED	59
INDIRECT	43
TOTAL JOBS	**183**
PERSONAL INCOME ($ 000)	
DIRECT	$3,720
INDUCED	$7,390
INDIRECT	$2,057
TOTAL PERSONAL INCOME ($ 000)	**$13,168**
BUSINESS SERVICES REVENUE ($ 000)	**$14,099**
LOCAL PURCHASES ($ 000)	**$4,344**
STATE & LOCAL TAXES ($ 000)	**$1,290**

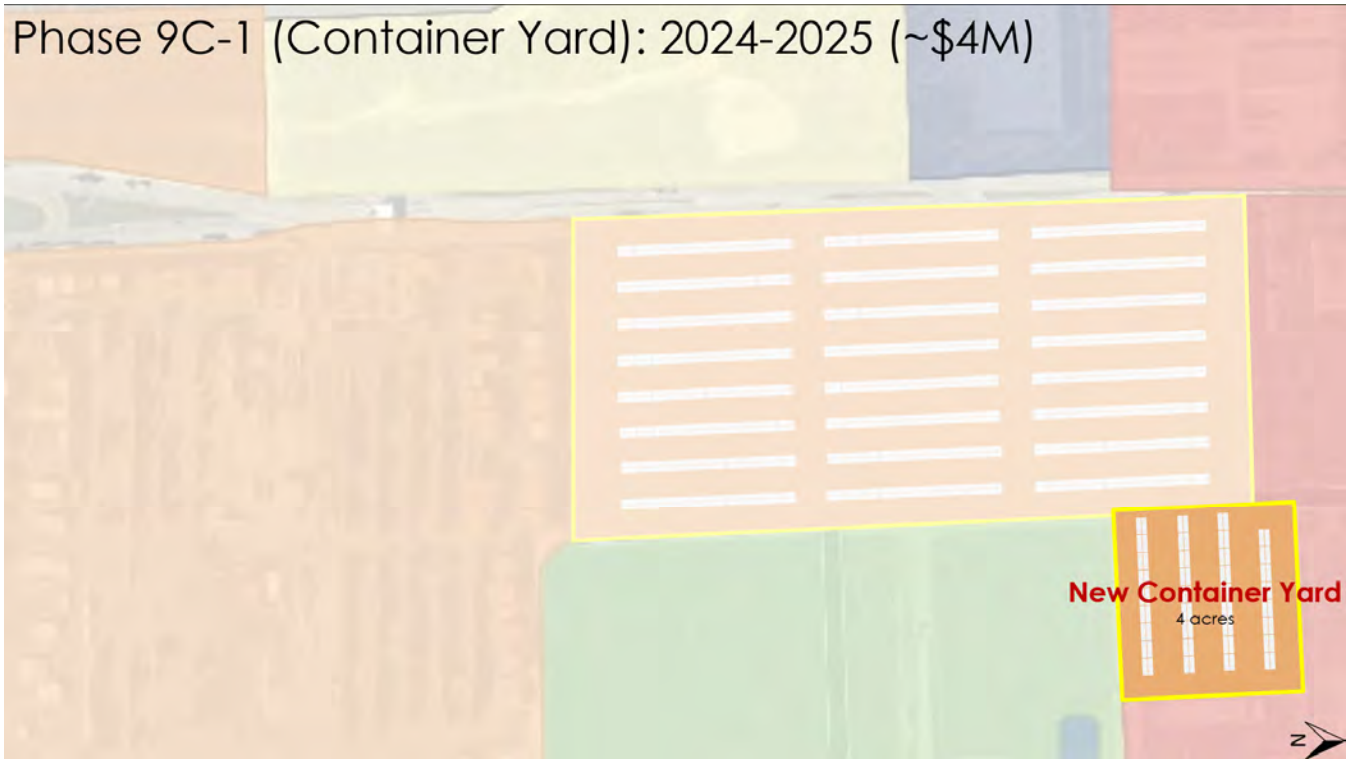
Containerized Cargo Projects

Project	Timeframe	Investment (Total/PEV)
• Phase 9C-1	2017-2020	$4/$4 million
• Griffin Road Extension/NE 7th Ave	2019-2020	$21/$21 million
• McIntosh Road Realignment	2018-2022	$18/$18 million
• Container Terminal Reconfiguration	2015-2023	$38/$38 million
		$81/$81 million

A total of four projects in the 10-year Vision Plan are categorized as containerized cargo projects. Three of these (Griffin Road Extension/NE 7thAvenue Improvements, McIntosh Road Realignment and Container Terminal Reconfiguration) are associated with

Southport transportation/terminal access enhancements while the fourth project (Phase 9C-1) calls for expansion of the Southport container yard area by approximately four additional acres. Together with the seven containerized cargo projects proposed in the 5-year Master Plan, these four projects will complete the bulk of a massive multi-year Southport redevelopment program that will see the completion of the USACE deepening and widening project as well as the addition of five new container berths, six new SPP STS cranes, a secondary access road and a net increase of four acres of container yard added to the Port's primary cargo handling area. As a result, Port Everglades will effectively double its containerized cargo capacity vis-à-vis existing conditions (2018).[3] Figures 3.9.22-3.9.23 present conceptual illustrations for each of these projects along with a summarized project description. The combined economic impacts of all four of these containerized cargo projects are presented in Table 3.9.29.

Figure 3.9.22: Phase 9C-1 Container Yard Project
Source: B&A



[3] *Capacity increase estimate is based on capital improvements listed as well as assumptions related to terminal operator yard configurations and operating practices as discussed in Section 3.7*

Table 3.9.29: Estimated Economic Impacts of Containerized Cargo Projects – 2028

Source: Martin Associates; B&A

Impact Category	Impact Value
JOBS	
DIRECT	1,713
INDUCED	1,304
INDIRECT	1,585
TOTAL JOBS	**4,602**
PERSONAL INCOME ($ 000)	
DIRECT	$83,361
INDUCED	$165,588
INDIRECT	$75,536
TOTAL PERSONAL INCOME ($ 000)	**$324,485**
BUSINESS SERVICES REVENUE ($ 000)	**$517,635**
LOCAL PURCHASES ($ 000)	**$159,502**
STATE & LOCAL TAXES ($ 000)	**$33,669**

Table 3.9.30: Phase 9C-1 Container Yard – Decision Matrix

Source: B&A

Project	Category	Evaluation Criteria					
Phase 9C-1 CY							
	Competitiveness	Capacity	H	Efficiency	H	Integration	H
	Economics	Port ROI	H	Flexibility	H	Economic Impacts	H
	Sustainability	Asset Preservation	L	Environmental Stewardship	L	Resiliency	L

Table 3.9.30 shows the project decision matrix for the Phase 9C-1 project. This project proposes to convert four acres of existing, partially unimproved land that is currently used for cruise-related taxi staging and other surface transportation operations to container yard. This four-acre site is adjacent to the approximately 26-acres proposed for conversion in the 5-year Master Plan immediately following demolition of the existing FTZ 25 facilities. While small, this additional acreage helps to increase overall available containerized cargo yard space within Southport and so too improves the Port's ability to accommodate projected future growth.

Figure 3.9.23: Griffin Road Extension/NE 7th Avenue Improvements and McIntosh Road Realignment Projects
Source: B&A

By far the most significant and potentially impactful cargo projects proposed in the 10-year Vision Plan are the Griffin Road extension and NE 7th Avenue improvements. These two projects, while distinct to some extent, are very closely linked and are proposed to be developed as part of a single, phased design and construction program. Currently, the sole point of access to the Port's main container handling area (i.e. Southport) is via the

existing McIntosh Loop Road. This one-way in, one-way out situation means that 100 percent of truck traffic must access all of Southport's container terminals via a single entry point by transiting a single intersection (i.e. McIntosh Road at Eller Drive). The proposed Griffin Road extension proposes to open a secondary access point for Southport via an extension of Griffin Road. This extension will connect the southern end of McIntosh Road with the existing Griffin Road, thereby redistributing an estimated 25 percent of future truck traffic away from the I-595 terminus.

It is unclear at this stage of planning how far west trucks will be allowed to travel upon leaving Southport or whether or not trucks traveling inbound to Southport will be able to access the new Griffin Road extension via U.S. Highway 1 and/or I-95. Because of this, an expansion of NE 7th Avenue is also proposed in conjunction with the Griffin Road extension project so that truck traffic can also access the southern access point for Southport via this alternative route while still having the option to connect to I-595 in both directions.

When combined with the I-595 Flyover project proposed in the 5-year Master Plan and the elimination of the existing Southport security checkpoint, modeling shows that even with a doubling of future truck trips, traffic within the Southport area will flow more smoothly than it does today during peak periods once these improvements are made.

The other major cargo-related transportation project proposed in the 10-year Vision Plan is the realignment of McIntosh Road. This project proposes to replace the existing one-way on-port McIntosh Loop Road with a bi-directional multi-lane truck route that connects the proposed I-595 Flyover to the proposed Griffin Road extension via the new southern access point. In addition, this project calls for shifting the existing location of McIntosh Road to the farthest possible western alignment in order to allow all available land to the east of the new road to be used for container yard and/or container terminal gate complexes (see Figure 3.9.23). This westward realignment creates additional contiguous CY for all Southport terminal operators, consistent with the goals of the 2018 Update. The project decision matrix for these three critical Southport transportation projects is shown in Table 3.9.31.

Table 3.9.31: Griffin Road/NE 7th Avenue/McIntosh Road – Decision Matrix
Source: B&A

Project	Category	Evaluation Criteria					
Griffin Rd Extension/NE 7th Ave Improvements/McIntosh Rd Realignment							
	Competitiveness	Capacity	M	Efficiency	H	Integration	H
	Economics	Port ROI	L	Flexibility	H	Economic Impacts	H
	Sustainability	Asset Preservation	L	Environmental Stewardship	L	Resiliency	L

The final project in the 10-year Vision Plan related to containerized cargo comprises miscellaneous yard and other improvements associated with the McIntosh Road realignment project since such realignment will require a substantial redesign of terminal access points and gate complexes in order to accommodate the new two-way traffic patterns. Similar to the transportation improvements illustrated in Figure 3.9.23, this project does not increase capacity but it is vital to achieving higher container terminal throughput since it will facilitate greater fluidity at the terminal gates and greater container yard efficiencies. The decision matrix for this project is presented in Table 3.9.32.

Table 3.9.32: Container Terminal Reconfiguration – Decision Matrix
Source: B&A

Project	Category	Evaluation Criteria					
Container Terminal Reconfiguration							
	Competitiveness	Capacity	M	Efficiency	H	Integration	H
	Economics	Port ROI	L	Flexibility	H	Economic Impacts	H
	Sustainability	Asset Preservation	L	Environmental Stewardship	L	Resiliency	L

Non-Containerized Cargo Projects

Project	Timeframe	Investment (Total/PEV)
• Break-bulk Yard	2024-2026	$7/$3 million
• Berth 14/15 Bulkheads (Design)	2023-2027	$3/$3 million
• Ro-Ro Yard Relocation/Expansion	2024-2027	$1/$1 million
		$11/$7 million

A total of three non-containerized cargo projects are included in the 10-year Vision Plan of the 2018 Update.

The first of these comprises the development of approximately seven acres of new break-bulk storage yard in Northport.

The second is the design portion of a bulkhead repair and replacement project at Berths 14 and 15, which handle the vast majority of the Port's dry bulk vessel calls. This project is not further elaborated here due to its being the first phase of a standard capital maintenance and repair project. A decision matrix for the construction phase of this project, which will occur during the 20-year Vision Plan phase of the 2018 Update, is included later in this section (See Table 3.9.47).

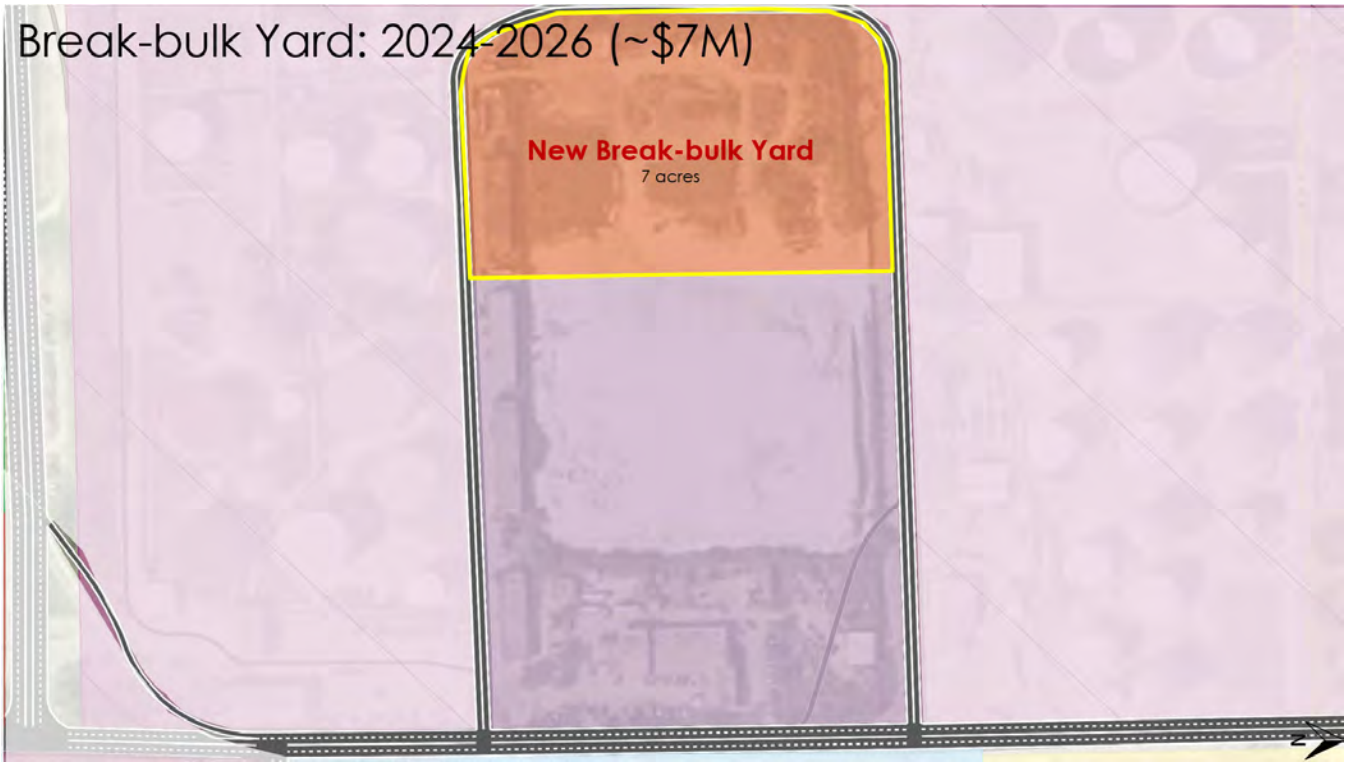
The third project involves further expansion of the Midport ro-ro yard that was initially created in the 5-year Master Plan to accommodate future growth in new automobile imports and exports. See Figures 3.9.24-3.9.25 for illustrations and descriptions of these projects and Tables 3.9.34-3.9.35 for their decision matrices. The combined economic impacts of these three non-containerized cargo projects are presented in Table 3.9.33.

Table 3.9.33: Estimated Economic Impacts of Non-Containerized Cargo Projects – 2028
Source: Martin Associates; B&A

Impact Category	Impact Value
JOBS	
DIRECT	8
INDUCED	7
INDIRECT	2
TOTAL JOBS	**18**
PERSONAL INCOME ($ 000)	
DIRECT	$502
INDUCED	$997
INDIRECT	$108
TOTAL PERSONAL INCOME ($ 000)	**$1,607**
BUSINESS SERVICES REVENUE ($ 000)	**$742**
LOCAL PURCHASES ($ 000)	**$229**
STATE & LOCAL TAXES ($ 000)	**$147**

Figure 3.9.24: New Break-Bulk Yard

Source: B&A



This project proposes to develop approximately seven acres of new break-bulk yard adjacent to the Port's new consolidated maintenance facility as proposed in the 5-year Master Plan (shown in violet to the east in Figure 3.9.24). This site, which historically was used for liquid bulk storage, has been vacant for many years and is not only currently unimproved and not being used, but also located in close proximity to Berth 5, which sits just on the other side of Eisenhower Boulevard. Since Berth 5 is expected to be the Port's principal break-bulk berth in the future, this site is an ideal break-bulk cargo laydown area as it minimizes the distance and cost associated with moving break-bulk products between the berth and the yard.

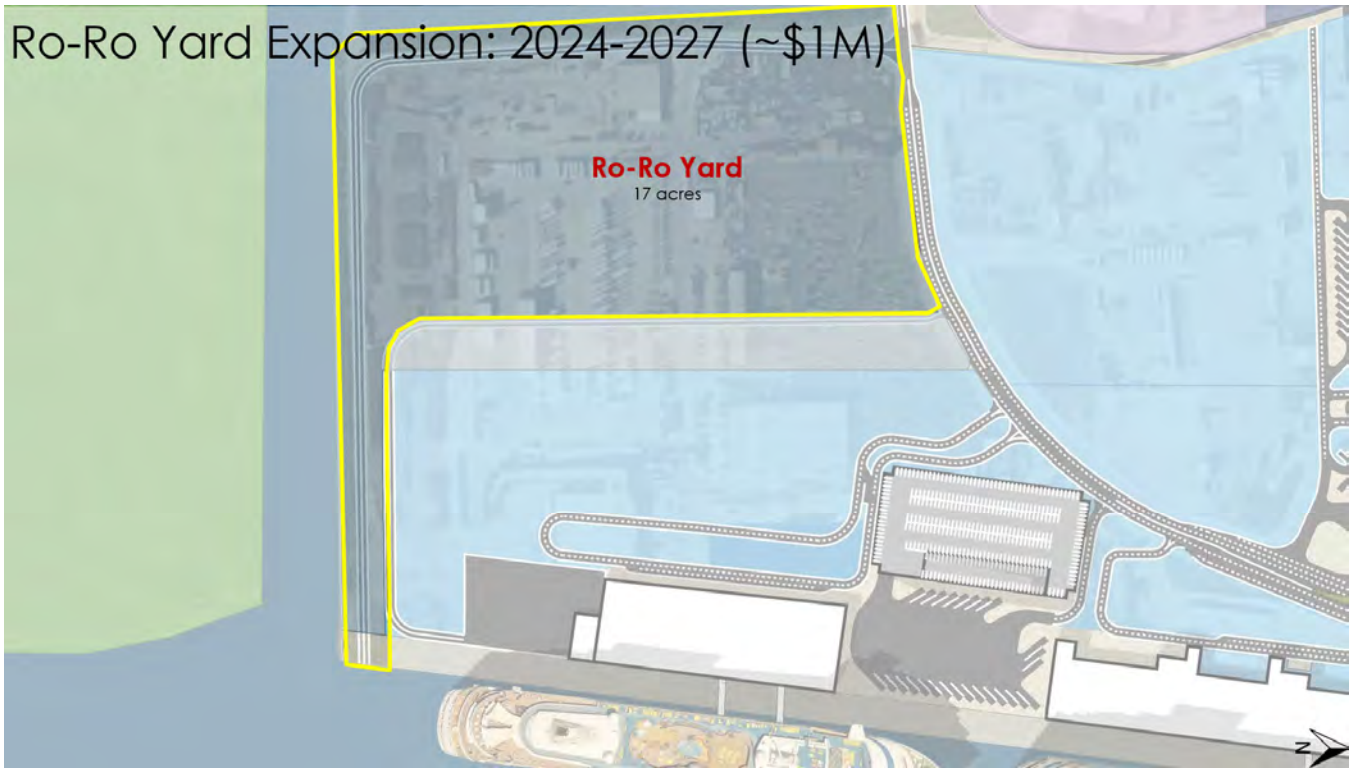
Table 3.9.34: New Break-Bulk Yard – Decision Matrix

Source: B&A

Project	Category	Evaluation Criteria					
New Break-Bulk Yard							
	Competitiveness	Capacity	H	Efficiency	H	Integration	H
	Economics	Port ROI	M	Flexibility	M	Economic Impacts	L
	Sustainability	Asset Preservation	L	Environmental Stewardship	L	Resiliency	L

Figure 3.9.25: Ro-Ro Yard Relocation/Expansion (Phase 2)

Source: B&A



The final non-containerized cargo project proposed in the 10-year Vision Plan is the second phase of expansion (plus two acres) of the new ro-ro area created in Midport as

part of the 5-year Master Plan. This minor incremental improvement is expected to be necessary to accommodate projected growth in new automobile import and export activity. There is sufficient area surrounding the proposed footprint that additional acreage could be absorbed into the Midport ro-ro operator's lease area if necessary. Alternatively, if future volumes are less than those projected by the 2018 market assessment, this project coule be modified or postponed with the proposed additional acreage being repurposed as necessary (i.e. temporary grid space, construction laydown area, cruise operations support space, etc.).

Table 3.9.35: Ro-Ro Yard Relocation/Expansion (Phase 2 of 3) – Decision Matrix
Source: B&A

Project	Category	Evaluation Criteria					
Ro-Ro Yard Relocation/Expansion (Phase 2 of 3)							
	Competitiveness	Capacity	H	Efficiency	H	Integration	H
	Economics	Port ROI	H	Flexibility	M	Economic Impacts	H
	Sustainability	Asset Preservation	L	Environmental Stewardship	L	Resiliency	L

Parking Projects

Project	Timeframe	Investment (Total/PEV)
• T29/T26 Parking Garage	2026-2030	$41/$41 million
		$41/$41 million

Only one parking project – the T29/T26 parking garage in the Port's Midport area – is included in the 2018 Update's 10-year Vision Plan. This project is described above under the *Cruise Projects* section and illustrated in Figure 3.9.20 since it is closely linked to the redevelopment of the T29/T26 cruise node.

Real Estate Projects

No projects that are directly beneficial to the Port's real estate business unit are proposed in the 10-year Vision Plan.

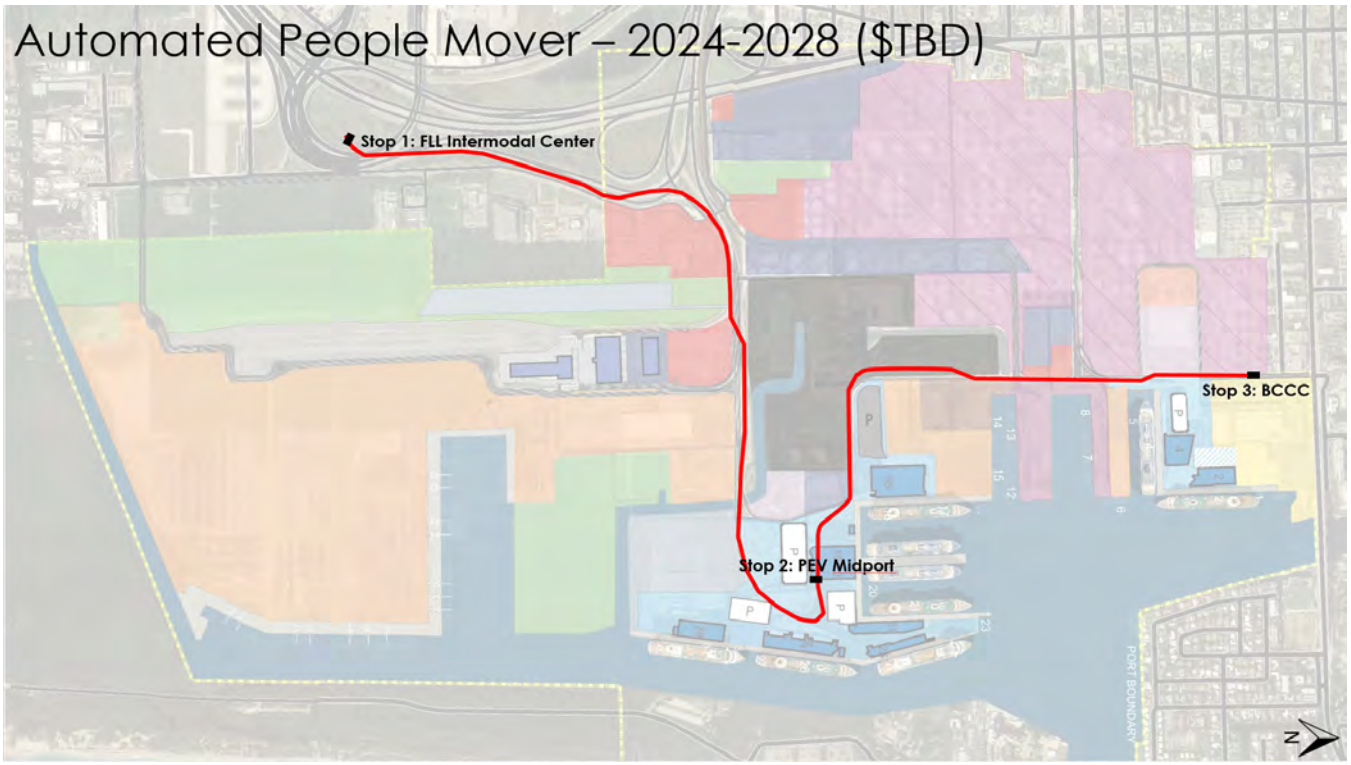
Portwide/Other Projects

Project	Timeframe	Investment (Total/PEV)
• Automated People Mover	2024-2028	$TBD/$0
		$TBD/$0

Only one project in the 10-year Vision Plan of the 2018 Update is categorized as a portwide or "other" project. Known as the automated people mover (APM), this project proposes the development of an alternative County-led transit mode to connect Fort Lauderdale-Hollywood International Airport (FLL) to both Port Everglades and the Broward County Convention Center (BCCC) via the general route shown in Figure 3.9.26.

Figure 3.9.26: Automated People Mover (APM)

Source: B&A



Broward County, in its 2020 Vision Plan, outlined a framework for future development at FLL, Port Everglades and the BCCC, including elements that would promote regional transportation/transit improvements. One of the key elements of this County vision is the proposed APM. The southern terminus of this dedicated transport system will be the Intermodal Center (IMC) currently proposed within the Broward County Aviation Department's (BCAD) long-range master plan (labeled Stop 1 in Figure 3.9.26). The APM will transport passengers within and between FLL, Port Everglades (shown above as Stop 2) and the BCCC (Stop 3) via a dedicated tram or similar system and is expected to include connections to regional transportation modes at the IMC. The APM will improve the level of service to airline passengers moving between FLL terminals but also to fly-in/fly-out cruise passengers looking to access one of the Port's eight (or future nine) cruise terminals as well as convention goers. This project will also relieve traffic congestion on the airport and within Port Everglades itself by virtue of removing taxis, buses, shuttles and other rideshare vehicles that routinely transport cruise passengers and convention goers between FLL and Stops 2 and 3, respectively. The total system length is expected to be approximately five miles in each direction (i.e. 10 miles roundtrip) and it is currently envisioned that this entire length will consist of mainline guideway (i.e. an elevated tram system) and between 8 to 10 total stops/stations (including intra-airport stops). The total cost of the full build out of the project is unknown at this time but it is expected to be well over $1 billion. Table 3.9.36 shows the decision matrix for this County project. It is unknown what the economic impacts of this project will be and so too not currently possible to quantify them. Qualitatively, B&A expects the impacts to be moderate.

Table 3.9.36: Automated People Mover (APM) – Decision Matrix
Source: B&A

Project	Category	Evaluation Criteria					
Automated People Mover (APM)							
	Competitiveness	Capacity	M	Efficiency	H	Integration	H
	Economics	Port ROI	L	Flexibility	H	Economic Impacts	M
	Sustainability	Asset Preservation	L	Environmental Stewardship	H	Resiliency	L

In terms of the Port specifically, this project has significant potential to reduce current and anticipated future traffic impacts by eliminating most vehicle trips into and out of the Port that begin or end at FLL. This project may also allow for baggage concierge service to occur at the IMC such that cruise passengers have the option to check their bags via secure means all the way through to their stateroom onboard their cruise vessel upon arrival at FLL and/or to similarly check their bags onto their outbound flight from the Midport APM station. Such operational and service details remain to be determined at this point in the planning process, but such options are being actively discussed.

2028 Land Use

Figure 3.9.27 shows a portwide land-use plan that includes implementation of all 15 projects included in the 10-year Vision Plan of the 2018 Master/Vision Plan in addition to the 22 projects included in the 5-year CIP.

Figure 3.9.27: Proposed 2028 Land Use (Post-Implementation)

Source: B&A

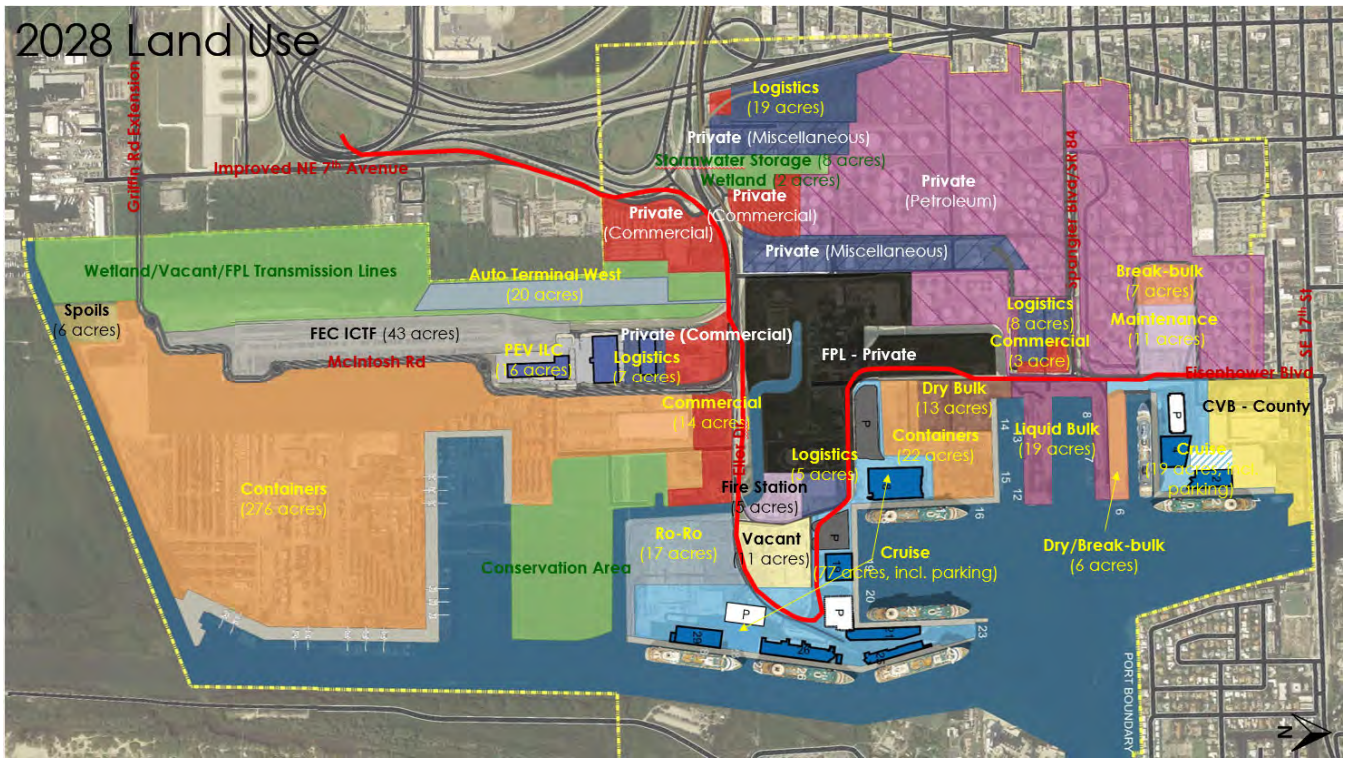


Table 3.9.37: Total Estimated Economic Impacts of the Port – 2028

Source: Martin Associates; B&A

Impact Category	2018 (Total)	2028 (Cruise)	2028 (Cargo)*	2028 (Total)
JOBS				
DIRECT	13,127	9,029	8,090	17,119
INDUCED	8,624	6,903	4,187	11,090
INDIRECT	9,660	7,197	5,720	12,917
TOTAL JOBS	**31,411**	**23,129**	**17,997**	**41,126**
PERSONAL INCOME ($ 000)				
DIRECT	$531,097	$442,052	$237,794	$679,847
INDUCED	$1,008,260	$878,093	$407,685	$1,285,777
INDIRECT	$396,137	$342,903	$182,032	$524,935
TOTAL PERSONAL INCOME ($ 000)	**$1,935,494**	**$1,663,048**	**$827,511**	**$2,490,558**
BUSINESS SERVICES REVENUE ($ 000)	**$3,804,571**	**$2,349,862**	**$2,774,011**	**$5,123,873**
LOCAL PURCHASES ($ 000)	**$744,436**	**$724,075**	**$255,838**	**$979,913**
STATE & LOCAL TAXES ($ 000)	**$202,577**	**$169,228**	**$93,144**	**$262,372**

** Includes liquid bulk, containers, dry bulk, break-bulk, ro-ro and all other miscellaneous cargo types*

3.9.4 20-Year Vision Plan

Figure 3.9.28: Proposed 20-Year Projects at Port Everglades
Source: B&A

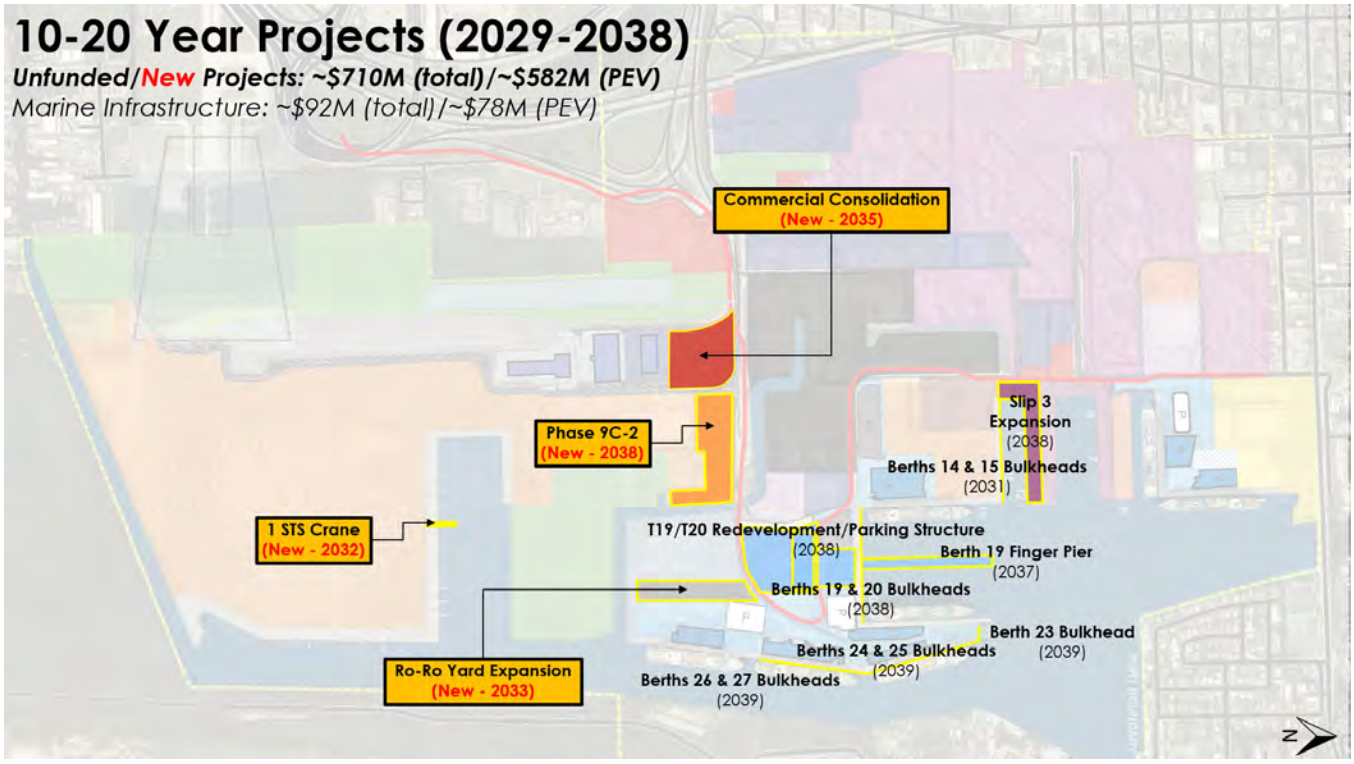


Figure 3.9.28 illustrates all 13 projects proposed for implementation between 2029 and 2038, which is the final phase of the 2018 Update of the Port Everglades Master/Vision Plan. These 13 projects are distributed across Port business units as follows:

Business Unit	# Projects	Investment (Total/PEV)
• Cruise	6 projects	$402/$278 million
• Liquid Bulk	1 project	$136/$132 million
• Containerized Cargo	2 projects	$36/$29 million
• Non-containerized Cargo	2 projects	$33/$30 million
• Parking	1 project	$57/$53 million
• Real Estate	1 project	$137/$137 million
• Portwide/Other	0 projects	$0/$0
	13 projects	$802/$660 million

What follows is a discussion of projects proposed in the 20-year Vision Plan by business unit.

Cruise Projects

Project	Timeframe	Investment (Total/PEV)
• Berth 19 Finger Pier	2033-2037	$125/$121 million
• T19/20 Redevelopment	2035-2038	$214/$104 million
• Berths 19 & 20 Bulkheads	2034-2038	$20/$16 million
• Berth 23 Bulkhead	2034-2039	$4/$4 million
• Berths 24 & 25 Bulkheads	2034-2039	$21/$17 million
• Berths 26 & 27 Bulkheads	2034-2039	$20/$17 million
		$402/$278 million

A total of six cruise projects are included in the 20-year Vision Plan. Four of these are bulkhead repair/replacement projects. The other two together with the proposed T19/20 parking structure comprise one of the most significant cruise projects in Port Everglades' history. Figures 3.9.29-3.9.30 present conceptual illustrations and brief descriptions of these non-bulkhead projects. The combined economic impacts of these projects are presented in Table 3.9.38.

As in other areas of the port, the proposed Midport bulkhead repair/replacement projects included in the 20-year Vision Plan are substantial projects in their own right from both a level of effort and capital cost perspective. However, as standard maintenance and repair (M&R) projects that all ports must plan for and implement as marine assets reach the end of their useful lives, they are not elaborated or further described here. A decision matrix for these bulkhead projects is presented in Table 3.9.39

Table 3.9.38: Estimated Economic Impacts of Cruise Projects – 2038

Source: Martin Associates; B&A

Impact Category	Impact Value
JOBS	
DIRECT	724
INDUCED	368
INDIRECT	527
TOTAL JOBS	**1,619**
PERSONAL INCOME ($ 000)	
DIRECT	$20,699
INDUCED	$35,366
INDIRECT	$16,756
TOTAL PERSONAL INCOME ($ 000)	**$72,821**
BUSINESS SERVICES REVENUE ($ 000)	**$253,536**
LOCAL PURCHASES ($ 000)	**$23,672**
STATE & LOCAL TAXES ($ 000)	**$8,231**

Table 3.9.39: 20-Year Cruise-Related Bulkhead Projects – Decision Matrix

Source: B&A

Project	Category	Evaluation Criteria					
Berths 19 & 20 Bulkheads							
	Competitiveness	Capacity	L	Efficiency	M	Integration	H
	Economics	Port ROI	M	Flexibility	M	Economic Impacts	M
	Sustainability	Asset Preservation	H	Environmental Stewardship	L	Resiliency	H
Berth 23 Bulkhead							
	Competitiveness	Capacity	L	Efficiency	M	Integration	H
	Economics	Port ROI	M	Flexibility	M	Economic Impacts	M
	Sustainability	Asset Preservation	H	Environmental Stewardship	L	Resiliency	H
Berths 24 & 25 Bulkheads							
	Competitiveness	Capacity	L	Efficiency	M	Integration	H
	Economics	Port ROI	M	Flexibility	M	Economic Impacts	M
	Sustainability	Asset Preservation	H	Environmental Stewardship	L	Resiliency	H
Berths 26 & 27 Bulkheads							
	Competitiveness	Capacity	L	Efficiency	M	Integration	H
	Economics	Port ROI	M	Flexibility	M	Economic Impacts	M
	Sustainability	Asset Preservation	H	Environmental Stewardship	L	Resiliency	H

Figure 3.9.29: Berth 19 Finger Pier Project

Source: B&A

This project, which has carried over from the 2014 Plan, is currently the only known opportunity to add a cruise berth at Port Everglades, taking it from eight such berths in 2018 to nine by 2038. As such, it represents the only true capacity-enhancing cruise project in the entire 2018 Master/Vision Plan. Other cruise-related projects proposed in the 5-year Master Plan and 10-year Vision Plan enhance the Port's cruise operations, improve the level of service provided to both cruise lines and cruise passengers and increase capacity by virtue of allowing larger vessels to call and be serviced more efficiently than existing infrastructure allows (i.e. Tracor Basin Fill, T21, T29 and T26 Redevelopment). However, the Berth 19 finger pier, together with the proposed redevelopment of Terminal 19 (see Figure 3.9.30) into a twin terminal complex, gives Port Everglades the ability to service nine cruise vessels simultaneously, which is currently impossible.

Given the importance of adding a cruise berth to the Port's future competitiveness this project is one of the cornerstones of the 20-year Vision Plan and is vital for Port Everglades

to achieve projected future growth, even under the lowest envisioned demand scenario. Table 3.9.40 shows the decision matrix for the Berth 19 finger pier project.

Table 3.9.40: Berth 19 Finger Pier – Decision Matrix

Source: B&A

Project	Category	Evaluation Criteria					
Berth 19 Finger Pier							
	Competitiveness	Capacity	H	Efficiency	H	Integration	H
	Economics	Port ROI	H	Flexibility	H	Economic Impacts	H
	Sustainability	Asset Preservation	L	Environmental Stewardship	L	Resiliency	L

Figure 3.9.30: Terminal 19/20 (T19/20) Redevelopment Project

Source: B&A

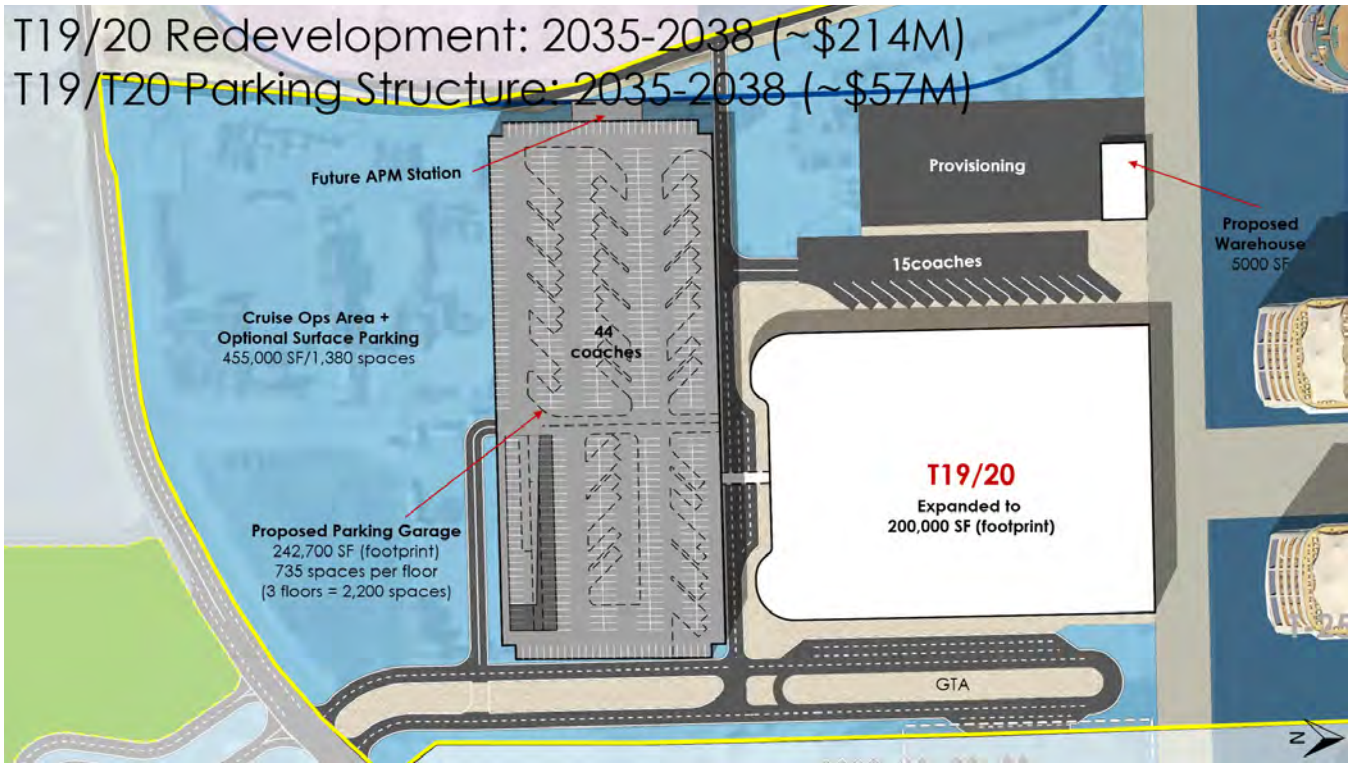


Figure 3.9.30 also shows the addition of a new 2,200 space parking structure adjacent to the redeveloped T19/20 complex. The 2014 Plan called for a large multi-modal center at this same location that would serve all Midport cruise terminals via enclosed moving sidewalk-style people mover systems. The 2018 Update has reduced the size of the project proposed in the 2014 Plan, effectively splitting the multimodal center into two separate parking structures (i.e. one structure adjacent to and serving the T29/T26 cruise node and the structure shown above serving the new T19/20 complex) in order to reduce construction costs and improve the level of service to cruise passengers by placing the parking facilities as close as possible to the terminals themselves.

It is expected that the overall redevelopment concept proposed above will increase the Port's capacity by between 500,000 and one million passengers per year by creating a new cruise berth and by removing vessel LOA and berthing restrictions currently associated with Berth 19 during multiple-ship days. The concept calls for split-level circulation with all vessel servicing (i.e. provisioning, waste removal, bunkering) occurring at ground level on the pier itself and all passenger embarkation and disembarkation activity occurring via a secure and fully enclosed elevated concourse that services both new berths simultaneously. As noted previously, an important best practice in current cruise infrastructure development is to ensure sufficient available apron width to allow provisioning trucks and other service vessels dockside access to the vessel. For the Berth 19 finger pier, this will be a critical consideration of the final design since the pier will need to be able to service two vessels simultaneously without constraints. See Table 3.9.41 for the decision matrix for the combined T19/20 redevelopment and T19/T20 parking structure.

Table 3.9.41: Terminal 19/20 (T19/20) Redevelopment – Decision Matrix
Source: B&A

Project	Category	Evaluation Criteria					
T19/20 Redevelopment; T19/T20 Parking Structure							
	Competitiveness	Capacity	H	Efficiency	H	Integration	H
	Economics	Port ROI	H	Flexibility	H	Economic Impacts	H
	Sustainability	Asset Preservation	H	Environmental Stewardship	M	Resiliency	L

Liquid Bulk Projects

Project	Timeframe	Investment (Total/PEV)
• Slip 3 Expansion (Berths 11-13 BH)	2033-2038	$136/$132 million
		$136/$132 million

Only one project in the 20-year Vision Plan is categorized as a liquid bulk project. This project comprises a third phase of the Northport petroleum berth and transfer infrastructure improvements already discussed as part of the 5-year Master Plan and 10-year Vision Plan. Once complete, this project will allow Port Everglades to service the largest class of liquid bulk tankers and barges expected to call in the foreseeable future at three separate berths and potentially also at Berths 14-15 due to some of the redundant infrastructure being added there as part of this overall initiative. This project is vital not just to Port Everglades' future competitiveness, but more importantly to the future of the South Florida economy given the dependency of all of the region's airports on jet fuel that is offloaded at Port Everglades and similar dependency of most of the region's automobile fueling stations on gasoline and other products offloaded at the Port. Figure 3.9.31 illustrates this project. Table 3.9.42 presents the project's decision matrix. The economic impacts of this project are presented in Table 3.9.43.

Figure 3.9.31: Slip 3 Expansion (Berths 11-13 Bulkheads) Project

Source: B&A

Table 3.9.42: Slip 3 Expansion – Decision Matrix

Source: B&A

Project	Category	Evaluation Criteria					
Slip 3 Expansion							
	Competitiveness	Capacity	M	Efficiency	H	Integration	H
	Economics	Port ROI	H	Flexibility	H	Economic Impacts	H
	Sustainability	Asset Preservation	H	Environmental Stewardship	L	Resiliency	H

Table 3.9.43: Estimated Economic Impacts of Liquid Bulk Projects – 2038
Source: Martin Associates; B&A

Impact Category	Impact Value
JOBS	
DIRECT	162
INDUCED	119
INDIRECT	86
TOTAL JOBS	**367**
PERSONAL INCOME ($ 000)	
DIRECT	$7,441
INDUCED	$14,780
INDIRECT	$4,115
TOTAL PERSONAL INCOME ($ 000)	**$26,335**
BUSINESS SERVICES REVENUE ($ 000)	**$28,199**
LOCAL PURCHASES ($ 000)	**$8,689**
STATE & LOCAL TAXES ($ 000)	**$2,581**

Containerized Cargo Projects

Project	Timeframe	Investment (Total/PEV)
• Phase 9C-2	2029-2032	$21/$18 million
• One Small STS Crane (Berth 30X)	2029-2032	$15/$11 million
		$36/$29 million

With the majority of cargo investment happening within the first 10 years (2019-2028) of the updated Master/Vison Plan, just two projects in the 20-year Vision Plan are categorized as containerized cargo projects. These include the conversion of 14 acres that are currently used for commercial office space and associated surface parking into contiguous container yard as well as the procurement of a 14th STS crane in Southport. It

is important to note that this new crane is envisioned to be located along the new Berth 30X, meaning it likely will need to be a Panamax crane similar in size and capacity to the Port's existing cranes rather than a SPP STS crane in order to comply with Federal Aviation Administration (FAA) height restrictions. This means that this final Southport crane will have built-in vessel size and servicing constraints despite costing an estimated $15 million. Table 3.9.44 presents the decision matrix for the proposed 14th STS crane in Southport. Figure 3.9.32 presents the proposed Phase 9C-2 container yard project. Table 3.9.45 presents the decision matrix for this project.

Figure 3.9.32: Phase 9C-2 Container Yard Project
Source: B&A

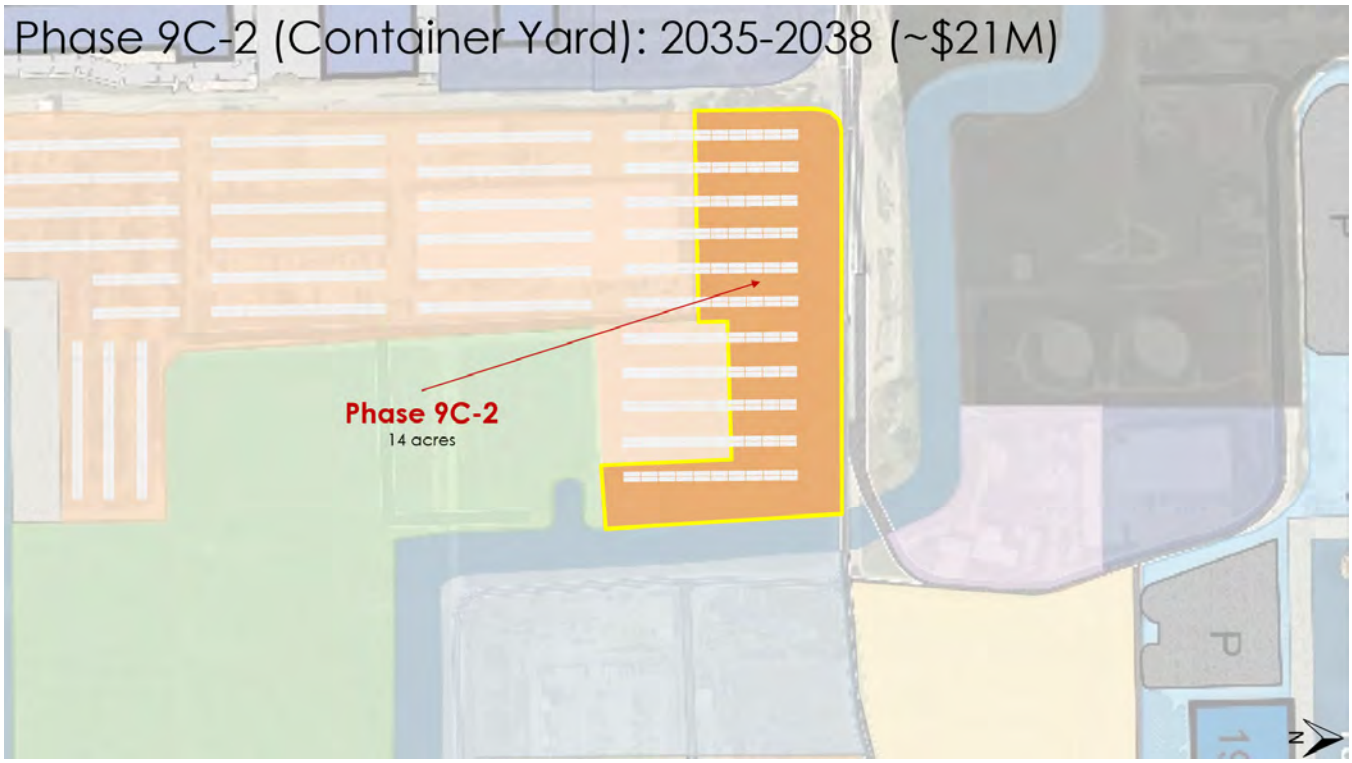


Table 3.9.44: Final Southport STS Crane (post-Panamax) – Decision Matrix
Source: B&A

Project	Category	Evaluation Criteria					
Final STS Crane in Southport							
	Competitiveness	Capacity	H	Efficiency	H	Integration	H
	Economics	Port ROI	M	Flexibility	H	Economic Impacts	H
	Sustainability	Asset Preservation	L	Environmental Stewardship	L	Resiliency	L

Table 3.9.45 Phase 9C-2 Container Yard – Decision Matrix
Source: B&A

Project	Category	Evaluation Criteria					
Phase 9C-2 CY							
	Competitiveness	Capacity	H	Efficiency	H	Integration	H
	Economics	Port ROI	H	Flexibility	H	Economic Impacts	H
	Sustainability	Asset Preservation	L	Environmental Stewardship	L	Resiliency	L

In order for the Phase 9C-2 project shown above to happen, the two existing office buildings on this same site must first be relocated so that the site can be cleared for conversion to CY. Such relocation is indeed programmed between 2031 and 2035 and this project is illustrated later in this section (see Figure 3.9.34).

Table 3.9.46 presents the economic impacts associated with both containerized cargo projects proposed in the 20-year Vision Plan.

Table 3.9.46: Estimated Economic Impacts of Containerized Cargo Projects – 2038
Source: Martin Associates; B&A

Impact Category	Impact Value
JOBS	
DIRECT	2,614
INDUCED	1,991
INDIRECT	2,420
TOTAL JOBS	**7,025**
PERSONAL INCOME ($ 000)	
DIRECT	$127,247
INDUCED	$252,763
INDIRECT	$115,302
TOTAL PERSONAL INCOME ($ 000)	**$495,313**
BUSINESS SERVICES REVENUE ($ 000)	**$790,148**
LOCAL PURCHASES ($ 000)	**$243,472**
STATE & LOCAL TAXES ($ 000)	**$51,395**

Non-Containerized Cargo Projects

Project	Timeframe	Investment (Total/PEV)
• Berths 14 & 15 Bulkheads	2027-2031	$28/$25 million
• Ro-Ro Yard Relocation/Expansion	2030-2033	$5/$5 million
		$33/$30 million

Apart from repair/replacement of the bulkheads at Berths 14 and 15, the sole non-containerized cargo project included in the 20-year Vision Plan of the 2018 Update is the third and final phase of expansion of the Port's Midport ro-ro facility for new automobile imports and exports. In keeping with anticipated market demand for such cargo the 20-year Vision Plan will add another 8 acres of contiguous ro-ro yard to the east of the

proposed Midport facility bringing the total acres available in Midport for this cargo to 25. A project decision matrix for the Berths 14 and 15 repair/replacement project is shown in Table 3.9.47.

See Figure 3.9.33 for a visual description of the final footprint and Table 3.9.48 for the decision matrix for this project.

Table 3.9.49 presents the combined economic impacts associated with both non-containerized cargo projects proposed in the 20-year Vision Plan.

Table 3.9.47: Berths 14 and 15 Bulkheads – Decision Matrix
Source: B&A

Project	Category	Evaluation Criteria					
Berths 14 & 15 Bulkheads							
	Competitiveness	Capacity	L	Efficiency	H	Integration	H
	Economics	Port ROI	H	Flexibility	H	Economic Impacts	H
	Sustainability	Asset Preservation	H	Environmental Stewardship	M	Resiliency	H

Figure 3.9.33: Ro-Ro Yard Relocation/Expansion (Phase 3)

Source: B&A

Table 3.9.48: Ro-Ro Yard Relocation/Expansion (Phase 3 of 3) – Decision Matrix

Source: B&A

Project	Category	Evaluation Criteria					
Ro-Ro Yard Relocation/Expansion (Phase 3 of 3)							
	Competitiveness	Capacity	H	Efficiency	H	Integration	H
	Economics	Port ROI	H	Flexibility	M	Economic Impacts	H
	Sustainability	Asset Preservation	L	Environmental Stewardship	L	Resiliency	L

Table 3.9.49: Estimated Economic Impacts of Non-Containerized Cargo Projects – 2038
Source: Martin Associates; B&A

Impact Category	Impact Value
JOBS	
DIRECT	10
INDUCED	8
INDIRECT	3
TOTAL JOBS	**21**
PERSONAL INCOME ($ 000)	
DIRECT	$576
INDUCED	$1,145
INDIRECT	$124
TOTAL PERSONAL INCOME ($ 000)	**$1,845**
BUSINESS SERVICES REVENUE ($ 000)	**$852**
LOCAL PURCHASES ($ 000)	**$262**
STATE & LOCAL TAXES ($ 000)	**$168**

Parking Projects

Project	Timeframe	Investment (Total/PEV)
• T19/20 Parking Garage	2035-2038	$57/$57 million
		$57/$57 million

As discussed previously and as shown in Figure 3.9.30, the 20-year Vision Plan includes a new 2,200 space parking structure adjacent to the redeveloped T19/20 complex. This new parking structure will effectively complete the Port's Midport cruise infrastructure development program, at least for the foreseeable future.

Real Estate Projects

As referenced above, in order to allow the Phase 9C-2 container yard project to move forward Port Everglades must first construct a new commercial office complex to house a new Port Administration building as well as other existing and anticipated future commercial office spaces. The current Port Administration building was built in the 1980s and is nearing the end of its useful life. The 1800 Eller Drive building is also nearing the end of its useful life. However, this latter building is under lease through 2035, meaning the Port cannot demolish the building until the lease expires. Once this building's lease has expired it will be torn down along with the existing Port Administration building in order to make the 14 acres on which both buildings currently sit available for container yard conversion. In anticipation of this tear-down schedule, the proposed commercial consolidation project will construct a new approximately 400,000 square foot office complex at the corner of Eller Drive and McIntosh Road to house all existing on-port commercial office space along with a 25% growth factor. The envisioned location of this project is shown in Figure 3.9.34; its decision matrix is presented in Table 3.9.50.

Figure 3.9.34: Commercial Consolidation Project

Source: B&A

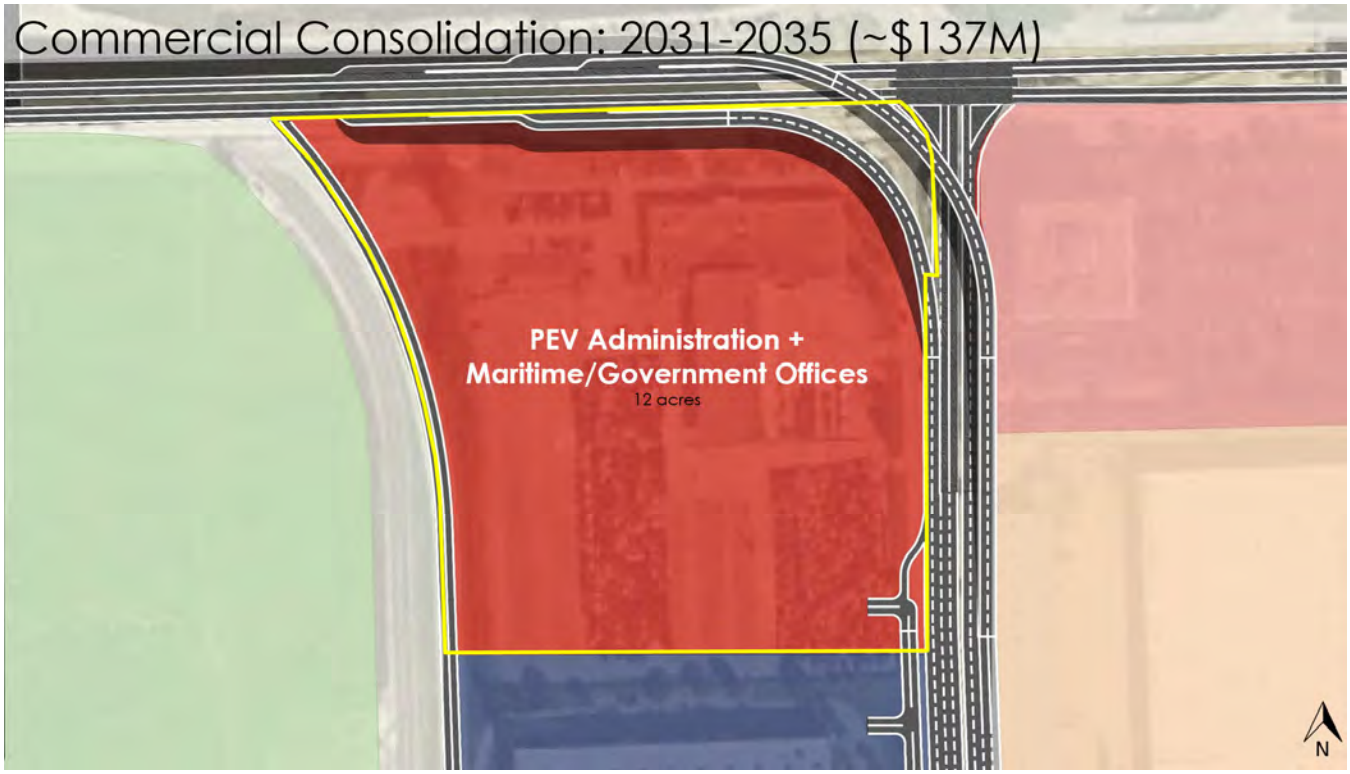


Table 3.9.50: Commercial Consolidation – Decision Matrix

Source: B&A

Project	Category	Evaluation Criteria					
Commercial Consolidation							
	Competitiveness	Capacity	H	Efficiency	H	Integration	H
	Economics	Port ROI	M	Flexibility	H	Economic Impacts	M
	Sustainability	Asset Preservation	L	Environmental Stewardship	M	Resiliency	L

Portwide/Other Projects

No portwide projects are proposed in the 20-year Vision Plan.

2038 Land Use

Figure 3.9.35 shows the end result of implementation of all 50 of the projects included in the 5-year CIP as well as the 10-year and 20-year Vison Plans in terms of portwide land use. Table 3.9.51 presents the total estimated annual economic impacts of Port Everglades in 2038 at the end of the 2018 Update planning horizon.

Figure 3.9.35: Proposed 2038 Land Use (Post-Implementation)

Source: B&A

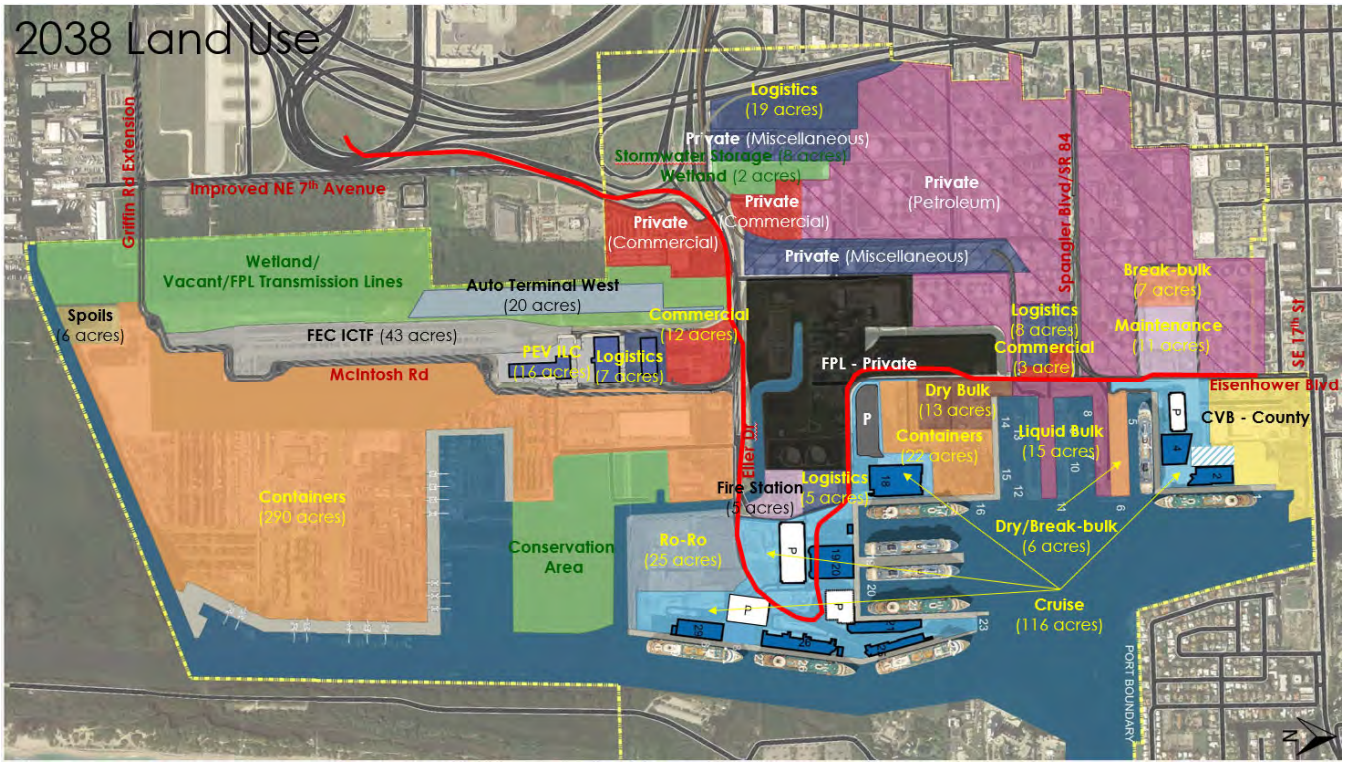


Table 3.9.51: Total Estimated Economic Impacts of the Port – 2038

Source: Martin Associates; B&A

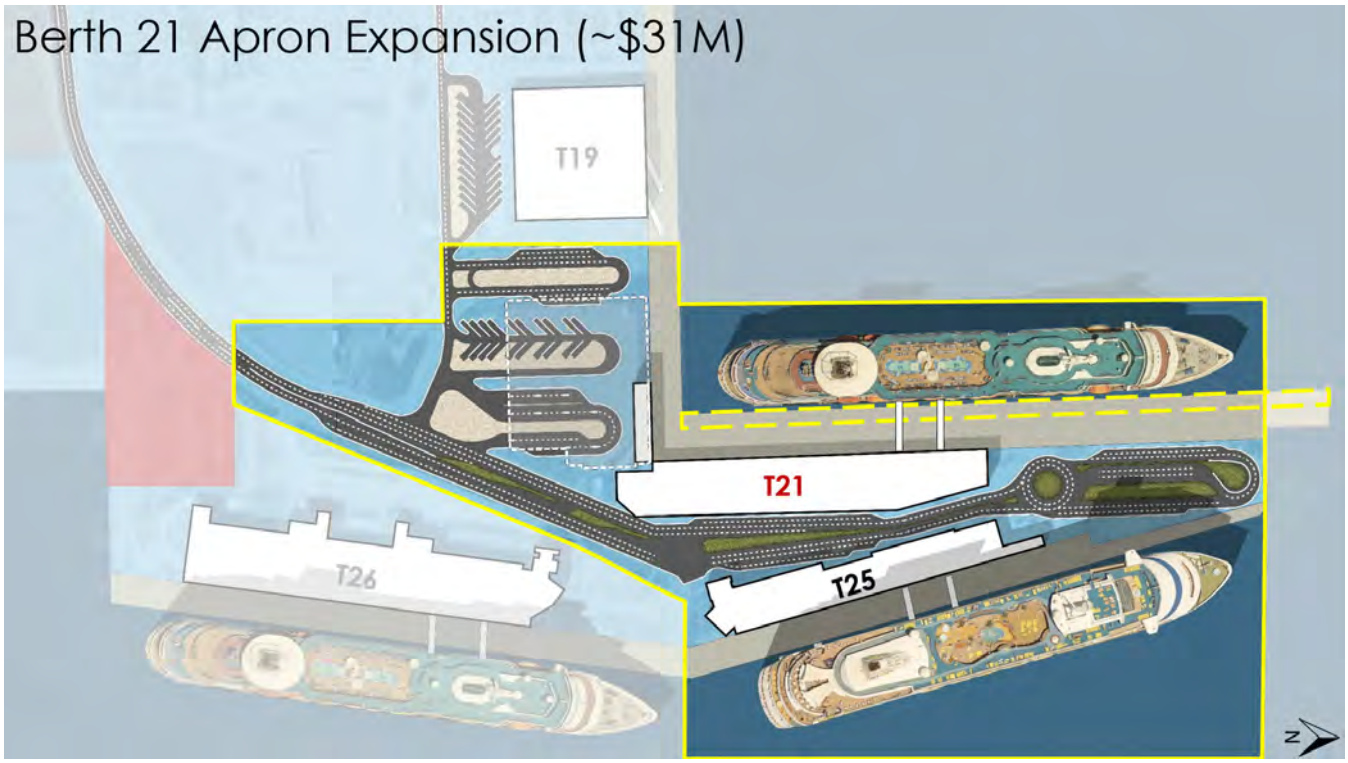
Impact Category	2018 (Total)	2038 (Cruise)	2038 (Cargo)*	2038 (Total)
JOBS				
DIRECT	13,127	10,040	9,958	19,998
INDUCED	8,624	7,670	5,134	12,804
INDIRECT	9,660	8,090	7,135	15,225
TOTAL JOBS	**31,411**	**25,799**	**22,227**	**48,027**
PERSONAL INCOME ($ 000)				
DIRECT	$531,097	$490,981	$291,110	782,092
INDUCED	$1,008,260	$975,285	$498,611	1,473,896
INDIRECT	$396,137	$385,433	$226,969	612,403
TOTAL PERSONAL INCOME ($ 000)	**$1,935,494**	**$1,851,699**	**$1,016,691**	**$2,868,391**
BUSINESS SERVICES REVENUE ($ 000)	**$3,804,571**	**$2,641,315**	**$3,448,424**	**$6,089,739**
LOCAL PURCHASES ($ 000)	**$744,436**	**$813,882**	**$320,564**	**$1,134,446**
STATE & LOCAL TAXES ($ 000)	**$202,577**	**$188,698**	**$114,608**	**$303,307**

** Includes liquid bulk, containers, dry bulk, break-bulk, ro-ro and all other miscellaneous cargo types*

3.9.5 Other Projects Considered

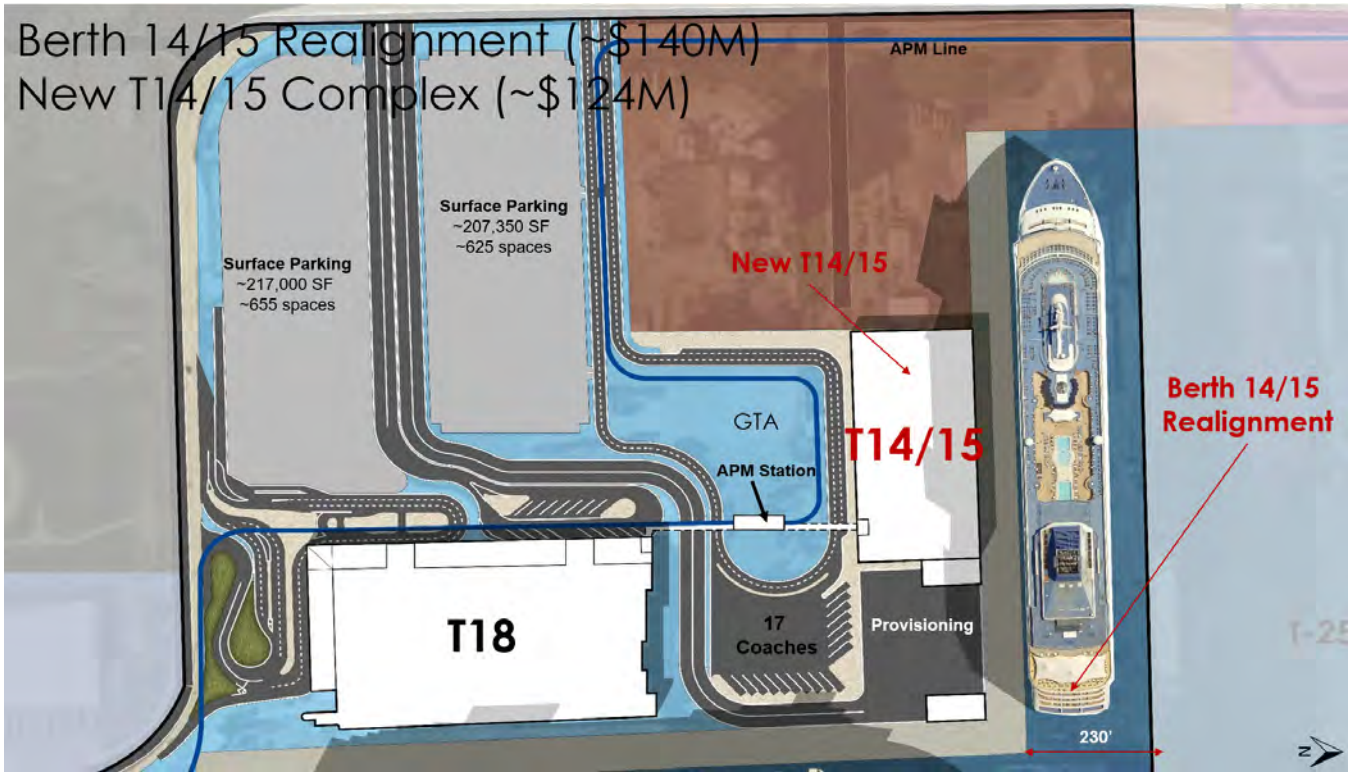
In addition to the 50 projects recommended for inclusion in the final 2018 Update as presented in Section 3.8.5, four projects were considered for final inclusion but ultimately eliminated due to reasons ranging from operational need to estimated cost of implementation to potential for future regulatory challenges. These four additional projects are presented and described in Figures 3.9.36-3.9.39. Project decision matrices have not been included for these projects since they were eliminated at the Port's direction prior to being evaluated by B&A.

Figure 3.9.36: Berth 21 Apron Extension
Source: B&A



This project, which was considered as an optional variation on the T21 redevelopment project presented in Figure 3.9.20 as part of the 5-year Master Plan, called for a 20-foot lateral extension of Berth 21 in order to increase the overall area of the service apron located adjacent to the improved T21. As previously discussed, a best practice and important consideration in cruise infrastructure development is having sufficient available apron width to allow provisioning trucks and other service vessels dockside access to the vessel. The Berth 21 extension project was conceived as a means to ensure this capability. However, as the T21 redevelopment project progressed during the planning process, it was ultimately determined that the new terminal footprint itself could be modified in such a way that the existing apron width would be sufficient to accommodate the necessary service vehicles as well as PBBs without need for the extension. As a result, this $31 million project was eliminated from the 2018 Update.

Figure 3.9.37: Berth 14/15 Realignment; T14/15 Development Project
Source: B&A



The 2018 Update calls for the addition of a ninth multi-day cruise berth (Berth 19 Finger Pier) toward the end of the 20-year Vision Plan. The B&A team originally also recommended the development of an additional cruise berth in the 10-year Vision Plan (2024-2028) in order to keep up with future demand and potentially achieve the high forecast scenario for cruise. The only possible location of this 10th cruise berth is at Berth 14/15, which lies at the boundary between Midport and Northport.

Currently Berth 14/15 serves as the Port's main berth for dry bulk (primarily cement) offloading. There are two separate cement storage silos in close proximity to Berths 14 and 15, both of which feature underground pneumatic transfer systems that connect the berths directly to the storage silos. Berths 14 and 15 are also occasionally used for container loading/unloading as well as other non-cement dry bulk operations. Berths 14 and 15 currently share a slip (Slip 3) that is approximately 290 feet wide with Berths 12 and 13, which together constitute one of Port Everglades' three critical liquid bulk berths. The Slip 3 Expansion project as proposed in the 20-year Vision Plan will increase the width

of this slip by 180 feet (see Figure 3.9.31), bringing the total width of Slip 3 to 470 feet. However, the planned expansion of Slip 3 will not be complete until 2038. For various reasons, it was determined during the planning process that this project cannot be advanced. As a result, B&A suggested excavating Berths 14 and 15 approximately 230 feet to the south in order to increase the width of Slip 3 from 290 feet to 520 feet prior to the completion of the Slip 3 expansion project, and from 520 feet to 700 feet once the Slip 3 expansion is complete in 2038. B&A continues to believe that this southern excavation (see Figure 3.9.37) and resulting Slip 3 width of 520 feet (interim) and 700 feet (ultimate) would be more than sufficient to accommodate the additional cruise berth being proposed for Berth 14/15 while still allowing unconstrained access to the critical liquid bulk infrastructure at Berths 12 and 13.

Building another cruise berth at Berth 14/15 prior to the Berth 19 finger pier would not only increase the Port's long-term cruise berth capacity by an additional berth but also ensure minimal impact to business operations during the construction of the Berth 19 finger pier by mitigating the loss of use of Berth 19 during construction by virtue of having built a replacement berth (Berth 14/15) in advance. During the planning process, despite its merits, several challenges emerged related to this project.

The first challenge relates to safety and security concerns expressed by Port management given the current position of some local U.S. Coast Guard personnel related to the shared simultaneous use of a single slip for passenger and liquid bulk operations. B&A had conversations with multiple individuals at the U.S. Coast Guard related to these same safety and security concerns and was led to believe that the final decision lies with the Port, not the U.S. Coast Guard, meaning the Port technically has the ability to pursue this project should it so desire. Ultimately, however, Port management did not feel comfortable with the berthing arrangement since it would involve a cruise ship and a liquid bulk vessel sharing the same slip.

An additional though less critical challenge expressed by Port management was the disruption of dry bulk operations that excavation of Berths 14 and 15 would necessarily entail. While constructing a new cruise berth in this location would avoid interruption of cruise activity elsewhere in the Port it would take the Port's principal dry bulk berths out of service for up to three years and would also require the demolition of some 40 percent of the Port's dry bulk storage capacity. While B&A believes such a trade-off to be

acceptable in terms of the future return on investment potential, Port management was ultimately uncomfortable with such a significant disruption to its dry bulk operations.

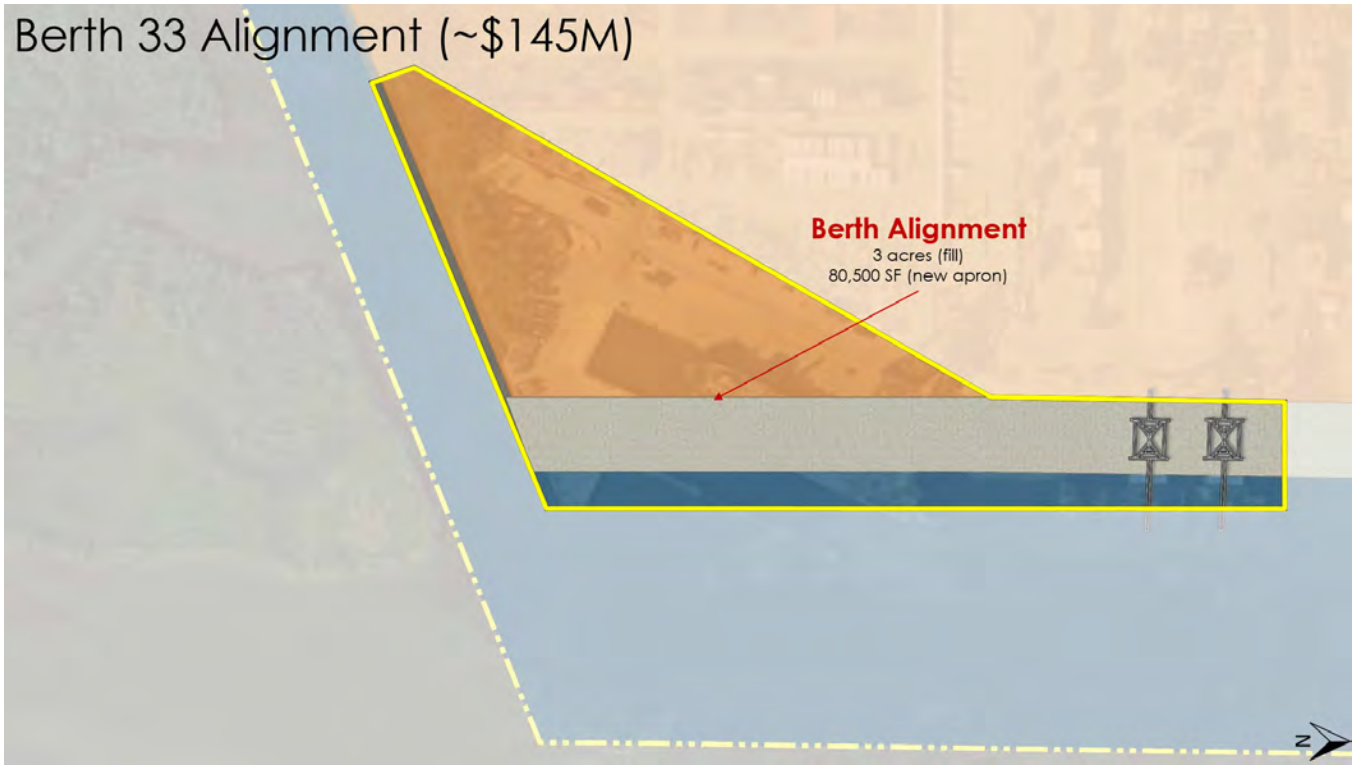
A third consideration in allowing this project to be eliminated from the final 2018 Update was cost. With an expected price tag of approximately $264 million, Port management expressed concerns that this project would put too great a strain on its debt coverage capacity when combined with all of the other projects already included in the plan.

For all of the above reasons, the additional cruise berth project was eliminated from the final 2018 Update of the Master/Vision Plan. This Berth 14/15 concept remains technically viable long-term assuming the Port and the U.S. Coast Guard can successfully resolve any concerns or perceived issues related to cruise and liquid bulk sharing a 700 foot slip. However, given the substantial capital outlay already included in the 2018 Update's recommended project list, it is unclear at what point in time the Port will again have the financial capacity to pay for this project. Given PEV's current berth utilization rates, without bringing a 10th cruise berth online there is a lower long-term ceiling for growth, but there are also still opportunities to grow, namely by:

- Extending the season/increasing year-round deployments
- Attracting different itinerary patterns, including shorter sailings (i.e. 3/4, 5/5/4) that increase mid-week utilization
- Attracting larger vessels to generate more revenue PAX per sailing
- Improving/redeveloping existing terminals to match what your direct competitors are doing in terms of quality and amenities (i.e. T25 as the new bar)

All of these strategies are discussed in detail in Element 2 and numerous projects recommended for inclusion in the final 2018 Update reflect these strategies, meaning B&A believes that Port Everglades still has a path to achieving its constrained future growth scenario without building a 10th cruise berth.

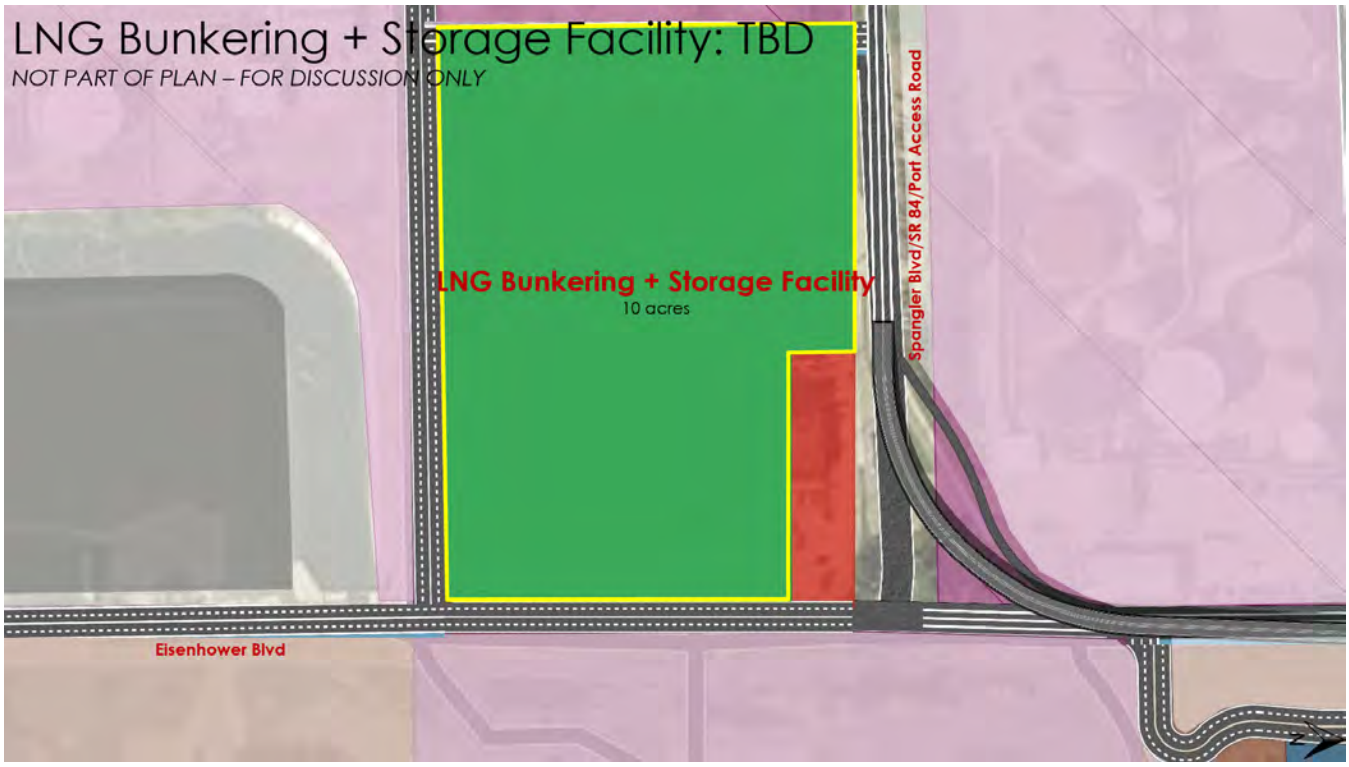
Figure 3.9.38: Berth 33 Alignment Project
Source: B&A



The third project considered for inclusion in the 2018 Update but ultimately eliminated is the Berth 33 alignment project. This project, which carried over from the 2014 Plan, would increase the efficiency of operations in Southport by straightening Berth 33 so that it is fully aligned with Berth 32. Such alignment gives Southport operators additional flexibility since Berths 31-33 would essentially function as a single contiguous berth, meaning both vessels and cranes would have the ability to locate and be worked anywhere along the three berths. This project would also add approximately three acres of new berth- and crane-adjacent land in Southport, which is highly valuable. The challenge with this project – and the reason it was ultimately eliminated from the final 2018 Update – is cost. With an expected cost of $145 million, it was determined by Port management that the operational benefits of the project, while not negligible, simply could not justify the cost of implementation given that it does not add a new container berth or contribute sufficient upland acreage to significantly increase the Port's overall containerized cargo capacity or capabilities.

Figure 3.9.39: LNG Bunkering and Storage Facility

Source: B&A



The fourth and final project considered for inclusion in the 2018 Update but ultimately not moved forward is the liquefied natural gas (LNG) bunkering and storage facility. This project consists of converting approximately 10 acres of land – part of which is owned and used by the Port and part of which is owned and used by Vecenergy – in the Northport area of Port Everglades from miscellaneous commercial/port industrial use to a dedicated LNG storage facility that is capable of receiving, storing and bunkering up to 10 million gallons of LNG on a weekly or bi-weekly basis at Berths 9, 10, 12 and/or 13. This site, which was one of many candidate sites evaluated, proved to be the only viable location for such a potential facility given its proximity to the berths at Slip 1 and Slip 3 and the ability to integrate this new LNG site into the existing liquid bulk cluster that already occupies the majority of land within Northport. Given the current shift to LNG as a primary fuel for cruise vessel newbuilds, this facility would give the Port a competitive advantage in attracting new LNG cruise vessels to homeport in Port Everglades. Estimated to cost more than $100 million, this project would necessarily have to be funded mostly if not

entirely by the private sector (i.e. an energy company, a cruise line, or some combination of the two). The Port is therefore not expected to invest directly in such a facility now or in the future and would have no operating role. In this sense the envisioned LNG site would operate very similarly to how the Port's current petroleum operator sites do, with the user of the site making most if not all improvements to the site and paying the port on a per-volume basis for use of its berths and berth-adjacent liquid bulk transfer infrastructure. Because this project has the potential to distinguish Port Everglades from its competitors in terms of its ability to service the newest class of cruise vessels in the global fleet, it has not been ruled out for future Plan iterations. However, as a project that depends entirely on private-sector investment, despite its merits it is presented here as a placeholder only and not as part of the 2018 Update.

3.10 Affordability Analysis

Port Everglades has been successful in the past in securing private, State, and Federal funding in the form of public/private co-investment, grants and loans that have helped to develop several critical projects, including among others:

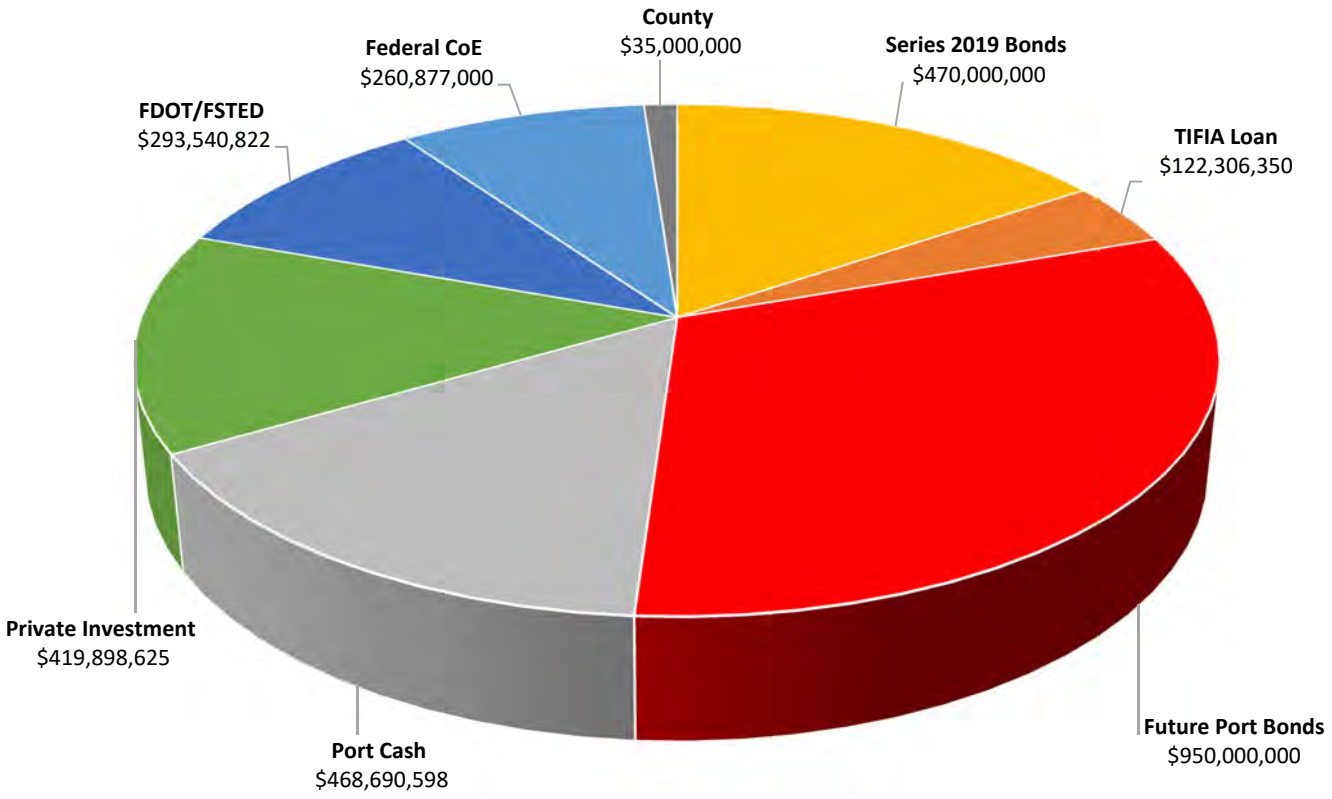
- Cruise Terminal 18 (T18) (public/private co-investment)
- ICTF (public/State/private)
- STNE (Federal)
- Eller Drive-I-595 overpass (State)

The 2018 Update assumes that Port Everglades will continue to be successful not only in securing State and Federal grant dollars but in achieving a greater degree of public/private co-investment in its facilities in partnership with its tenants and other users. These third-party partnerships are vital to the feasibility of the overall Plan. Not only can the Port not afford to develop all projects included in the 2018 Update using only Port funds, but it is no longer a reasonable expectation that the Port should have to do so given the number of public/private co-investment precedents that exist for both cruise and cargo projects at other ports across the U.S.

In light of this new reality as relates to port development, the 2018 Update of the Master/Vision Plan assumes that Port Everglades will be responsible for roughly two

thirds ($2.01 billion) of the $3.02 billion overall capital improvement program included in the updated Plan. Figure 3.10.1 presents the assumed distribution of 20-year capital contributions associated with the 50 projects included in the 2018 Update by funding source.

Figure 3.10.1: 20-Year Distribution of Capital Contributions ($3.02B)
Source: Port Everglades; B&A



As is often the case at seaports in the U.S., the largest source of future capital for the Port will be Port-issued bonds, with just under half (~$1.42 billion) of the funds required to implement the 50 projects included in the 2018 Update expected to come from this source.

Surplus revenues (Port cash) not required to cover the Port's bond commitments will account for the second largest source of future capital (~$469 million).

Direct capital contributions from the private sector, including Port tenants and other users, will account for the third largest source of capital during the 20-year life of the 2018 Update (~$420 million).

The Federal government is expected to be the fourth largest contributor to the 2018 Update as the result of an approximately $261 million contribution to the deepening and widening project plus a separate Transportation Infrastructure Finance and Innovation Act (TIFIA) loan of approximately $122 million.

The State will also contribute approximately $294 million to help implement the 2018 Update in the form of both Florida Department of Transportation (FDOT) and Florida Seaport Transportation and Economic Development (FSTED) grants.

Last but not least, Broward County will make major contributions to two specific projects included in the 2018 Update. County contributions will include approximately $35 million to design and construct the proposed Port Access Road connecting US Highway 1 to SE 17th Street and an as-yet unknown amount to design and construct the proposed Automated People Mover (APM) connecting Fort Lauderdale-Hollywood International Airport to the several Port Everglades cruise terminals as well as the Broward County Convention Center.

Based on the distribution of 20-year capital contributions described above, both B&A and the Port believe that all projects included in the 2018 Update are affordable within the planned timeframes. That said, how, when and in what form capital for each project is secured will be determined on an ongoing and in some cases project-specific basis, meaning the Port will need to continuously update its near-term and long-term capital plans using dynamic financial modeling.

3.10.1 Financial Model

In partnership with Port Everglades management, B&A developed a dynamic planning and financial "affordability" model to determine potential mechanisms to finance the proposed 5-year Master Plan and 10- and 20-year Vision Plan projects between 2019 and 2038. The Port intends to incorporate the financial model into the annual budget development and planning process beginning with fiscal year 2021. This model will need to be calibrated on an ongoing basis to ensure that actual revenues and costs are properly accounted for and projected as accurately into the future as possible based on changing

market and operating conditions, among other factors, but the overall structure of the model gives the Port the capability to simulate virtually unlimited future financing scenarios in essentially real time.

The purpose of utilizing this model as part of the 2018 Update process was to provide an informed estimate of the potential financial impact of implementing all 50 projects proposed in the 2018 Update according to the proposed 5-, 10-, and 20-year milestone periods, and to assess the Port's ability to pay for the overall 20-year development program. Such understanding is vital in order to demonstrate that the Port can:

- Meet the requirements of existing bond covenants from past investments that were financed in part through debt; and
- Maintain existing operations and continue to meet bond covenants while undertaking these new investments

To calculate the estimated financial impact, which depend on data inputs, as well as future assumptions, the model was used to project potential future revenues and expenses through the end of the 20-year planning horizon. Estimated net income was also calculated and compared with the level of debt the Port would have to carry forward to finance all 50 projects.

Future Revenue Calculations

Future Port revenue will be generated by three sources:

- Existing/ongoing operations carried forward with assumed escalation factors
- Incremental new revenue generated from new projects as they come online
- Alternative funding sources, including State and Federal capital grants as well as other third-party capital contributions (i.e. Port users)

To calculate future revenues for existing business lines, the model used actual revenue from FY2012-FY2018 and estimated revenue for FY2019 as the historical base numbers and then applied an annual growth factor through 2038. An annual 3.0 percent tariff increase was assumed to calculate total future revenues for each year. Revenue from new projects was then layered into the financial analysis based on assumptions consistent with the proposed 5-, 10-, and 20-year development programs.

Future Expense Calculations

To calculate future expenses the model applied a ratio of operating expenses as a percentage of revenues. The calculated revenues minus the assumed expenses provide the net operating income necessary to meet minimum requirements of existing debt service as well as additional future bond tests.

Existing Debt Service

In September of 2019, the Port refunded some of its existing debt and issued $470 in new debt to finance Master Plan projects including the new T2/T4 parking garage (2020) and the STNE project and new STS cranes (2023). The debt service for these issuances were incorporated into the financial model.

3.10.2 Alternative Future Scenarios

As previously stated, both B&A and the Port agree that all projects included in the 2018 Update are affordable within the planned timeframes based on the assumptions made related to estimated project costs, future revenues and distribution of funding sources as presented in Figure 3.10.1. This affordability determination notwithstanding, in keeping with the guiding principles of the 2018 Update – which clearly state that the Port must preserve flexibility even as it acts on the best information available at the time a given decision is made – flexibility must be built into project implementation since many of the projects described in Section 3.9 will inevitably evolve over time.

The most important function of the Port's financial model is to test different future scenarios in order to understand the impact that different assumptions have on future development plans so that the Port can adapt its approach to individual projects as needed. As the 2018 Update moves from the planning stage to the implementation stage, the Port will almost certainly need to adjust some of the assumptions initially made and modify inputs to its financial model accordingly. Port bond covenants require minimum coverage ratios of 1.25 for senior debt and 1.10 for subordinate debt, both of which ratios are calculated by dividing annual operating income by annual debt service requirements. Since some $950 million of the $3.02 billion capital cost of the 2018 Update is expected to consist of Port-issued bonds, maintaining debt service coverage ratios in excess of these minimum thresholds will be one of the most critical indicators of affordability during the life of the plan.

Should the Port determine at some point that assumptions included in the initial affordability analysis for the 2018 Update have changed to the extent that certain aspects of the overall plan are deemed to be unaffordable, options for addressing any affordability gaps include:

- Advance or otherwise modify planned bond issuance(s)
- Secure additional third-party funding to support one or more of the projects included in the 5-year Master Plan and/or 10- and 20-year Vision Plans
- Modify the proposed implementation schedule of one or more project(s) such that the capital demand in years where there is a projected deficit or other financial challenge is reduced or eliminated, with some or all of that capital demand being shifted to a year in which there is a projected surplus (i.e. delay the start of the Berths 16-18 and Berths 21 & 22 bulkhead repair/replacement projects from 2020 to 2021/2022)
- Bridge the deficit years using a short-term, one-time loan specific to each respective annual deficit

In all likelihood a combination of all four of these strategies/realities will occur during the 20-year life of the 2018 Plan. The second option – additional third-party funding – is clearly the preferred means to address any gaps in funding for new projects at the Port and the Port should absolutely continue to pursue additional State, Federal and private-sector investment in its future. Since third-party funds are not always available, however, the simplest means to address any future Port pay-go shortages will likely be to incur additional debt, subject to the minimum coverage ratio thresholds previously mentioned.

Regardless of how Port Everglades ultimately chooses to fund different plan components, it is almost certainly the case, based on historical precedent, that not all projects will ultimately be implemented according to the exact schedules proposed in the Master/Vision Plan, including some of those in the 5-year Master Plan. The schedule for the USACE deepening & widening project, for example, while critical to the Port's future success, is not wholly within the Port's ability to control, meaning there is a strong possibility that target dates included in the 2018 Update for this project may not be met exactly as planned. Should this and/or other projects included in the 2018 Update be delayed then the timing of bond issuance(s) and other project funding efforts may need to change as well. Such changes are largely unavoidable and should be expected, which

is why the Port needs to continuously assess affordability issues and different potential funding scenarios on an ongoing basis.

3.10.3 Affordability Conclusions

For the 5-year Master Plan, other than the USACE deepening and widening project, the Port mostly controls its destiny in terms of which projects it will implement when. B&A and the Port believe that all of the projects included in the 5-year Master Plan are affordable with minimal or no modifications to the proposed project schedules expected or required.

B&A and the Port also believe that the Port can afford to implement the projects proposed in the 10- and 20-year Vision Plans. However, since many of these projects will be completed in response to market projections prepared in 2018, it will be in the Port's best interest to use the financial model developed as part of the 2018 Update to continue to revisit 10- and 20-year projects regularly to ensure that they are still aligned with ever-changing market realities. Past Port Everglades Master/Vision Plans have proven that many of the projects that emerge from the planning process stand the test of time while others fade away in favor of new ideas that respond to different and as-yet-unknown future challenges and opportunities. The projects and analyses included in the 2018 Update, particularly those in the 10- and 20-year Vision Plans, should therefore be viewed not as a blueprint for future development that must be followed to the letter according to a precise implementation schedule, but rather as a recipe for future development that includes all of the key ingredients for success but still needs to be stirred once in a while to avoid becoming stale.