PORTMIAMI™

2035 MASTER PLAN

MASTER PLAN FOREWORD

The Port of Miami's mission is to operate and further develop the world's leading cruise port and the largest container port in the State of Florida; to maximize its assets and strengthen its advantage for future growth; promote international trade and commerce as a vital link between North and South America and a growing global trade; support sustainability and operate in an environmentally responsible manner.

At the Port of Miami, with the support of the Mayor and County Commission, we are up for the challenge of the new global trade reality and we are positioning ourselves to compete well into 2035.

The POM 2035 Master Plan is a planning tool used to update the Port of Miami Master Plan Sub element of the County's Comprehensive Development Master Plan (CDMP). This document was prepared simultaneously with the County's Evaluation and Appraisal Report which analyzes if the Port is meeting its goals, policies and objectives.

By incorporating a market analysis for both cruise and cargo and a financial analysis of capital infrastructure, this master plan helps us better understand the direction in which we need to guide the Port. Cruise passenger projections take us from 4.1 million passengers to 5.9 million in 2035. And our cargo projections run from 847,249 TEUs in 2010 to 1.7 – 3.3 million in 2035. Increasing Port business ultimately increases the County's economy.

The 2020 Master Plan presented the need for a tunnel connecting Port traffic directly to the Interstate system and promoted dredging the South Channel to -50'/-52' in order for post-Panamax ships to berth at the Port. These projects are currently underway and their completion should coincide with the completion of the Panama Canal expansion.

The 2035 Master Plan continues to push the envelope and takes us into the future with projects that will help increase both cargo and passenger throughput by adding services, upgrading infrastructure, enhancing efficiency and increasing berthing capacity.

Projects presented in the 2035 Master Plan include a phased implementation plan allowing for development depending on additional changes in the global market. There are three main components to the Ports future progress: Cargo, Cruise and Commercial with an overarching theme of sustainability.

Sustainability:

The Port of Miami is located within the Biscayne Bay Aquatic Preserve, surrounded by the natural environment including sea grass and marine life, as well as the human environment with commercial and residential uses. Protecting both of these environments for future generations is a major concern in how the Port will grow. The Master Plan dedicates much thought to the surrounding areas and outlines projects that will help preserve it.

- **Shore Power**: Also known as cold ironing; allows ships that berth at the Port to plug-in to the electrical grid and turn off their engines, therefore reducing the emission of carbon dioxide.
- **Electrification of Cranes**: The Port of Miami is in the process of retrofitting all of its existing cranes to run on electricity instead of diesel fuel. This not only reduces carbon dioxide emissions but noise emissions as well.
- **LEED Buildings**: All new buildings constructed on the Port must meet the County's minimum requirement of LEED Certification.
- **Green Energy Initiatives**: There are several projects the Port plans to undertake to save energy. These include installing solar panels port-wide, electric generating wind turbines and water turbines.
- Additional sustainable projects outlined in the following sections include the Port of Miami Tunnel, rail service, consolidation of cargo gates, and a multimodal center. All are projects which will help integrate the Port with the community and reduce congestions and emissions.

Cargo:

In preparation to compete for cargo for the next 50 years, the Port of Miami is focusing on three major projects: the construction of the Port of Miami Tunnel which will connect Port traffic directly to the interstate system, dredging the main channel to accommodate post-Panamax ships, and the rehabilitation of rail on Port.

- **Dredge**: This Master Plan, as those prior to it, continues to encourage the dredging of the South Channel. Furthermore, this master plan bases all its calculations and market analysis past 2014 solely as if the dredge has occurred, as it obviously notes that, without the dredge, the Port cannot compete for trade.
- **Rail**: Reintroducing rail service at the Port and the development of an on-Port rail yard which will help decrease traffic congestion and reduce emissions.
- **Inland Distribution Center**: The development of an off-Port Inland Distribution Center in the warehousing district to handle increased container traffic.
- **Consolidation of accessory uses**: such as Customs and Border Protection, fumigation yard, sheds, etc., to one area in order to create continuous cargo area for tenants.
- **Cargo Gates**: Consolidation of the individual tenants' cargo gates to the Port's one Security Cargo Gate complex. This project also includes creating a fast-pass lane to increase efficiency and reduce processing time at the gates.
- **Cranes**: Breaks down the purchase of new cranes over the next 25 years, taking the Port to a total of 23 cranes by 2034.

Cruise:

The cruise industry supports one of the County's biggest economic engines: **tourism**. The Port of Miami, known worldwide as the Cruise Capital of the World, plans to remain number one by competing for the growing cruise industry. To accommodate for this growth in 2035, the Port must begin to invest in new larger terminal complexes and multimodal centers.

- **Berths**: Three new berthing spaces plus the extension of berth 6 to accommodate the new standard of larger cruise ships. This will allow for the berthing of nine of the world's largest class of ships.
- **Cruise Terminals**: The plan outlines several options for two to four new cruise terminals, including introducing the first of its kind twin linear terminals that will offer new efficiencies to cruise lines.

- **Multimodal Center**: A multimodal center allowing for the consolidation of ground transportation, decreasing the sprawled footprint of the Port, therefore allowing for increased efficiency and additional land to be dedicated to cruise or cargo business.

Commercial:

The Master Plan aligns the anticipation of an increase in cruise passengers visiting the Port with the need for providing commercial development onsite. This development is the anchor that will connect the Port and the tourism industry that it serves to the community. By working together we will create a unified waterfront global destination.

- **Cruise Ferry**: Design and development of a cruise ferry to service the Caribbean.
- **Marina**: A marina to berth mega yachts.
- **Hotel and commercial**: Development of a hotel, retail, restaurant, and office space to serve cruise passengers, port users, and the community.
- **Trans-shipment**: The creation of a transshipment area with additional cargo berths at the south channel.
- **Utilities**: Increasing capacity of utilities such as electricity, water, sewer, etc.

The capital improvement elements outlined in this master plan total $2 billion over the next 25 years. The Port, with the goal of creating jobs and building a stronger economy for the community, is aggressively moving forward to implement the projects outlined in this plan, laying the foundation for tomorrow's job and business opportunities.

Bill Johnson
Port Director

Table of Contents

Figures

SECTION 7 – CONTINUED

SECTION 8 – PHASING AND COSTS

SECTION 9 – FINANCIAL PLAN

SECTION 10 – IMPLEMENTATION PLAN

Tables

INTRODUCTION

1.1 HISTORY

Located in the heart of downtown Miami in Biscayne Bay, The Port of Miami is one of the most significant economic generators for South Florida. Through its cargo and cruise activities, the Port has determined that it contributes over $18 billion annually to the South Florida economy and helps provide direct and indirect employment for over 176,000 individuals. The Port is owned and operated by the Seaport Department of Miami-Dade County.

The railroad and hotel baron, Henry Flagler, made Miami the destination of his Florida East Coast Railway in 1896, the same year in which the City of Miami was incorporated. During this time, he also dredged the original harbor for the Port of Miami located at the current American Airlines Arena site. In succeeding decades Flagler became the city's chief builder and promoter.

The current Port of Miami was created through beneficial reuse from the combination of three manmade spoil disposal islands (Dodge, Lummus and Sam's Islands) that have since been combined into a single island. The name of Sam's island, the smallest of the three (see adjacent picture), was eventually dropped. Dodge Island references the western portion and Lummus, the eastern.

On April 5, 1960 the Dade County Board of Commissioners approved Resolution No. 4830, "Joint Resolution Providing for Construction of Modern Seaport Facilities at Dodge Island Site" and on April 6, 1960 the City of Miami approved the same as City Resolution No. 31837 to construct the new Port of Miami, beginning with Dodge Island. Subsequently in 1979 the Port embarked on its single largest project, through its expansion to Lummus and Sam's island, to create its modern container terminal.

Currently, the Port is connected to Downtown Miami by Port Boulevard, a bridge over the Intracoastal Waterway that empties truck traffic, buses and other vehicles into Biscayne Boulevard, the primary downtown artery between the American Airlines Arena and Bayside Park.

In 2010 the Port of Miami handled more than 4.1million cruise passengers and 7.3 million tons of cargo providing a tremendous economic and social benefit to Miami-Dade County and the South Florida community. To meet the challenges of the future in Miami-Dade County and the South Florida region, the Port of Miami will continue its sustainable growth through the development of the cargo, cruise and commercial entities in order to create new jobs in the community. It is timely and relevant for Miami-Dade County to focus attention on this important community asset and plan accordingly for the future.

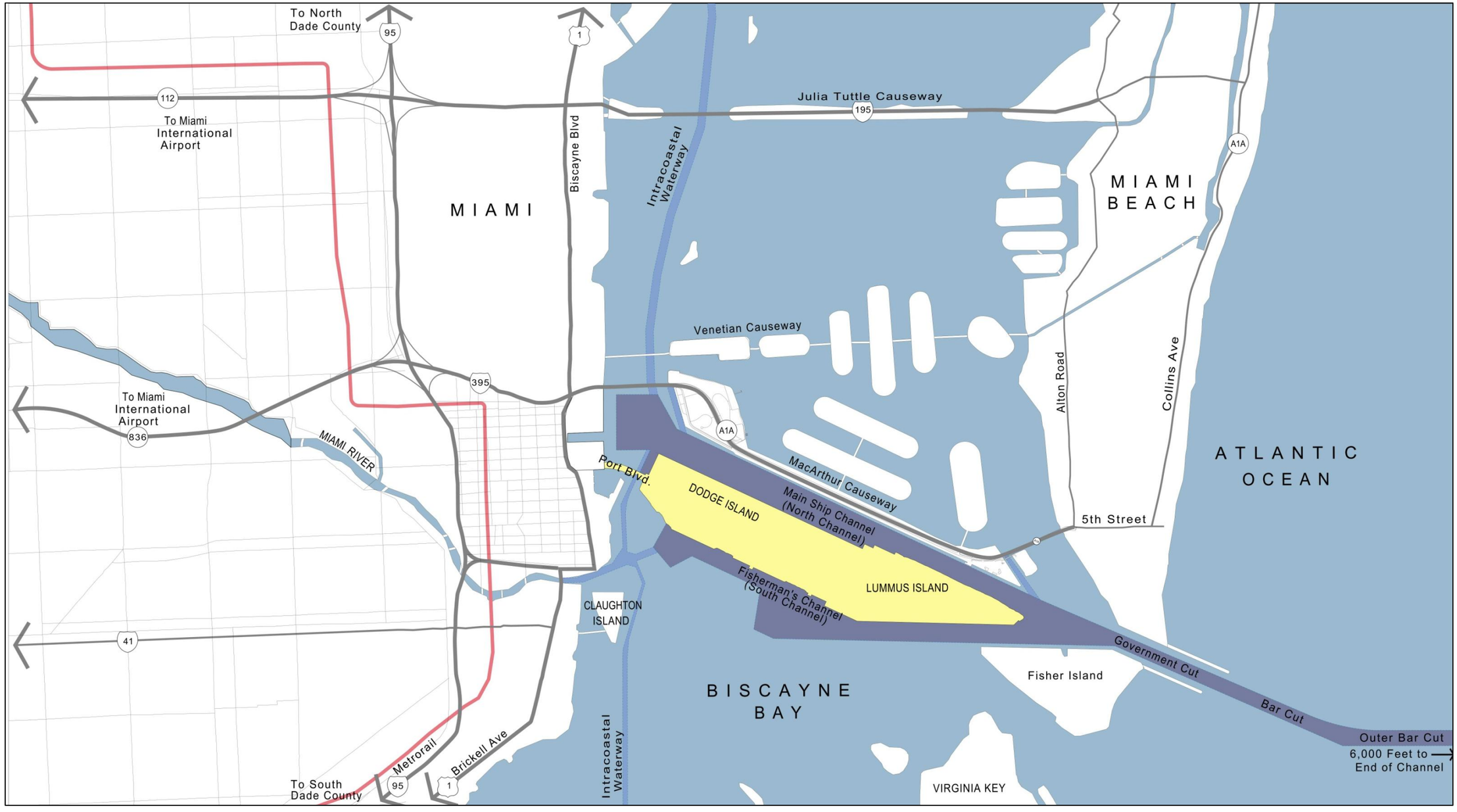
The Port of Miami is recognized as the "Cruise Capital of the World" – it has retained its status as the number one cruise passenger port in the world for well over four decades accommodating cruise vessels of major cruise lines such as Carnival Corporation, Royal Caribbean Cruises, Ltd. and Norwegian Cruise Line.

As the "Cargo Gateway of the Americas", the Port primarily handles containerized cargo and small amounts of break bulk, vehicles and industrial equipment. The Port of Miami is among an elite group of ports in the world which cater to both cruise ships and containerized cargo.

The port industry is in the middle of competitive changes which require ports to adjust if they are to continue to develop. The Port is geographically positioned for growth opportunities as the Panama Canal expansion project is completed in FY2014/15 allowing for post-Panamax vessels to transit the canal. The Port of Miami will be the closest US Port to the Canal. The Port of Miami is currently moving ahead with deepening the South Channel to -50-ft / -52-ft. to accommodate the new post-Panamax ships – a large container vessel providing for faster routes to Florida and the US East Coast. The development of the tunnel, on-port rail and off-site intermodal yard will accommodate this growth opportunity into the future.

For the Port of Miami to continue on its sustainable growth track to serve the South Florida community, it needs to develop intermodal ties with the mainland. This includes an additional means of ingress and egress through tunnel, improvements to access via rail and off-site intermodal container yards to accommodate distribution to the central Florida hinterland and beyond. The tunnel will remove truck traffic from the arterial streets of the City of Miami that will allow for the development of the downtown area along Biscayne Boulevard, thereby reviving the downtown community and invigorating the central business district. Figure 1.1 provides a location overview of the Port as it sits adjacent to the Miami Downtown Business Core, straddling MacArthur Causeway as a link to South Beach. This will provide for less traffic and further reduce emissions due to idling, so as to maintain the Port's share of attaining clean air quality.

FIGURE 1.1: PORT OF MIAMI LOCATION MAP



1.2 BUSINESS APPROACH

This Master Plan is anchored by 5, 15 and 25-year forecasts for cruise and cargo traffic. These forecasts have been assembled through market assessments, the commitments that the Port has in current and planned User Agreements and the Port's recently completed Economic Impact Analysis. These last items are used to assist in the development of a sustainable strategic business plan and a framework for infrastructure planning to meet the projected demands to fulfill the Port's obligation to the community to be fiscally sound.

The Master Plan also addresses the ancillary supportive tasks required to operate the Port, inclusive of berth and mooring assessments, infrastructure improvements and others that are pertinent to the long-term development and success of the Port.

The Plan has been prepared and presented so that it can serve several functions:

- Establish short and long-term capital programs;
- Achieve consensus among the political leadership on the long-term vision for the Port;
- Provide sound public need and justification to support future environmental permits;
- Allow for the incorporation into the County's Comprehensive Development Plan (CDMP) as its Port of Miami Master Plan sub element; and,
- Provide a potential planning vehicle for use in seeking grants.

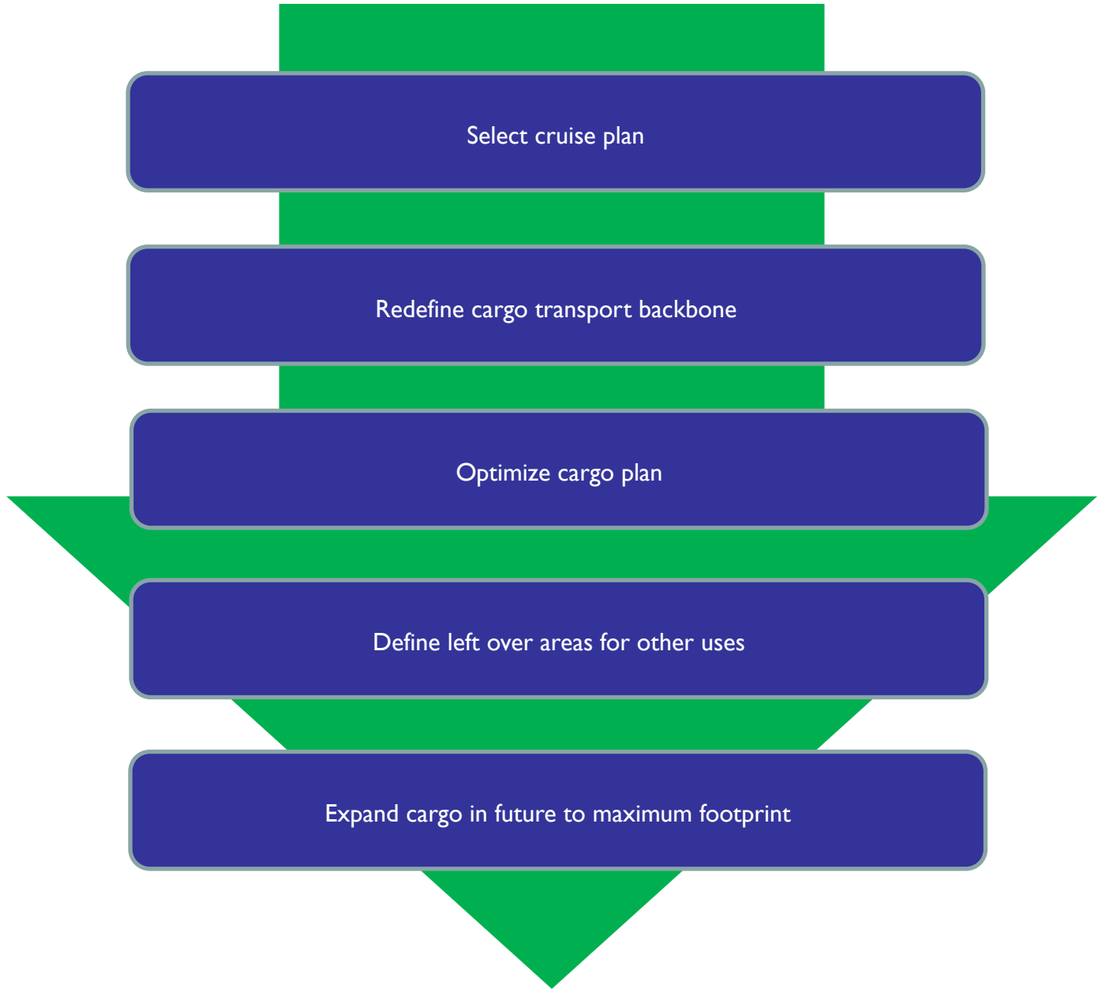
1.3 PLANNING APPROACH

The Master Plan's main focus is to maximize the throughput and optimize its existing "footprint" to obtain sustainable growth. To achieve a plan based on this policy, the Master Plan was crafted in a way that would allow the decision-making logic to support that policy.

As shown in Figure 1.2, the Plan was based on optimizing the cruise plan first as it is a berth intensive use. Once the cruise element was narrowed down, cargo options were then studied on the remianing land as cargo is more land intesive in nature.

By defining the future cruise and cargo market demand for the Port through the market assessment process, the Plan can define the future physical and operational requirements of the Port for each of these main business units within the physical boundaries of the Port area. In the case of cargo, the Plan also explores the creation of off-port sustainable development to meet future demands and provide for increased market opportunities.

FIGURE 1.2: MASTER PLAN LOGIC



1.4 DIRECTION

From the outset there were several major policies that provided the directional framework for the study; these included:

- Port of Miami's mission statement and organization;
- The role of the Port of Miami in the community as an economic engine;
- Growth strategies for cruise, cargo and other commercial interests to strengthen and support the County;
- Priorities associated with trade, environment and community leadership; and,
- Successes and limitations of past master planning efforts of the Port of Miami.

During the course of the master planning process, several major strategies were contemplated that provided the overall direction for this report. These major strategies focused on the key components of the Port today (cruise and cargo) while also providing the platform for future commercial development opportunities. Major strategies linked specifically to the study included the following:

- **Cruise**
  - Development of new terminals; and,
  - Updating existing older terminals to meet the needs of larger modern vessels.
- **Cargo**
  - On-port development;
    - Creation of a flexible yard layout;
    - Increasing the dockside capacity;
    - Increase the number and size of cargo berths;
    - Dredging to meet the requirements of the next generation of cargo vessel; and,
    - Include the Tunnel in the development of the long-term port plan layout.
  - Off-port development;
    - Create port rail access to increase market opportunities; and,
    - Create distribution centers for rail and road movements.
- **Financial**
  - Increase revenues of the port;
  - Increase profitability; and,
  - Diversify revenue streams.
- **Management**
  - Manage to maximize profit through the development of business units.

1.5 OUTREACH

The approach for this plan included extensive outreach to Port users. Stakeholder outreach is an essential component of the Plan to ensure current tenants, facility users and other entities had a role in the assembly and implementation process. This is helpful not only with the physical plan, but more important, it provides the tenant with a sense of "ownership" that can translate into long-term customer support for the Port. Thus, a successful outreach effort, one conducted using both one-on-one and group meetings, allowed the study effort for the Plan to accurately identify strengths, weaknesses, opportunities and threats facing the Port over the long-term planning horizon. This same outreach also provided the opportunity for the exploration and selection of future Port development directions and projects. Finally, this effort will increase the overall acceptance of the Plan by the tenants, community and stakeholders.

1.6 COMPREHENSIVE PLAN COMPLIANCE

On July 1, 2011 the House of Representative passed Bill 399(FSTED) SS 311.14.3(a-e) which requires Ports to have a Board approved Strategic Plan which must include 5 components as outlined below:

Each port shall develop a strategic plan with a 10-year horizon. Each plan must include the following:

1. An economic development component that identifies targeted business opportunities for increasing business and attracting new business for which a particular facility has a strategic advantage over its competitors, identifies financial resources and other inducements to encourage growth of existing business and acquisition of new business, and provides a projected schedule for attainment of the plan's goals.

2. An infrastructure development and improvement component that identifies all projected infrastructure improvements within the plan area which require improvement, expansion, or development in order for a port to attain a strategic advantage for competition with national and international competitors.

3. A component that identifies all intermodal transportation facilities, including sea, air, rail, or road facilities, which are available or have potential, with improvements, to be available for necessary national and international commercial linkages and provides a plan for the integration of port, airport, and railroad activities with existing and planned transportation infrastructure.

4. A component that identifies physical, environmental, and regulatory barriers to achievement of the plan's goals and provides recommendations for overcoming those barriers.

5. An intergovernmental coordination component that specifies modes and methods to coordinate plan goals and missions with the missions of the Department of Transportation, other state agencies, and affected local, general-purpose governments.

To the extent feasible, the port strategic plan must be consistent with the local government comprehensive plans of the units of local government in which the port is located.

Additionally, Bill 7207 (Transportation Element of CDMP) – SS 613.3177.6(a)11.(b)2(b) and 3(b) adds the need for plans for ports, but does not address adoption of a master plan. While Bill 7207 (Coastal Management Element of CDMP) – SS 613.3178.2(k) stipulates that "A port master plan shall be prepared by or for each deep-water port for the purposes of coordinating the activities of the port with the plans of the appropriate local government." The plan is to be incorporated into the Transportation Element of the local government's comprehensive plan and be consistent with the goals, objectives, and policies of that element. Although the Port lies physically within the City of Miami limits, as a facility owned and operated by Miami-Dade County, it falls under the jurisdiction of the County.

An approved master plan must have a 10 year horizon. This plan has a 25 year horizon which is used yearly to update FSTED's Seaport Mission Plan. The Port of Miami Master Plan will need to be updated every 7 years to align with the CDMP.

This Master Plan provides information required for Comprehensive Plan Compliance. It provides discussions on existing and future land uses within the Port; infrastructure needs to support future market conditions, and environmental conditions resulting from any changes to the land uses. These representations are illustrated on aerial maps and other figures within the document.

To guide the Port of Miami through the 2035 Master Plan horizon, this document contains a series of proposed goals, objectives, and policies for implementation to allow for the long-term adoption of the Master Plan for the Port. As part of the 2010 Evaluation and Assessment Report (EAR), the Miami-Dade County Seaport Department and Miami-Dade County Department of Planning & Zoning will coordinate the adoption of the Port of Miami Master Plan subelement within the Comprehensive Development Master Plan.

EXISTING CONDITIONS

2.1 PORT OF MIAMI OVERVIEW

The Port of Miami is situated on an island with a land mass of 520-acres in central Biscayne Bay. It is bounded to the north by the Main Channel adjacent to MacArthur (I-395) Causeway, to the west by downtown Miami, to the east by Miami Beach and Fisher Island, and to the south by Fisherman's Channel and Biscayne Bay (See Figure 2.1).

Though physically one island, it was created as part of a beneficial reuse plan out of three spoil islands: Dodge, Lummus, and Sam's islands. In this 2035 Master Plan, the terminology "on-port" refers to facilities and activities located on these now joined islands (the Port of Miami) and "off-port" refers to locations, facilities or activities elsewhere and outside of the Port of Miami.

The Port is connected to the Downtown Miami mainland area by three bridges: a 65-foot-high, fixed-span vehicular bridge, a decommissioned bascule road bridge, and a bascule rail bridge linking to the Florida East Coast Railroad (FEC) Company's main line track.

Channels and turning basins adjacent to Dodge and Lummus Islands (Port of Miami) provide ship access to the Port's cargo-handling and cruise passenger facilities. Vessels enter and exit the Port of Miami through the federally maintained Outer Bar Cut / Bar Cut / Government Cut Channel. This channel branches at the Fisher Island Turning Basin to run along the north (Main Ship Channel) and south (Fisherman's Channel) sides of the Port.

The Port of Miami acts as a transient point of entry or departure for cargo and, to meet its objectives, relies on its connections with other intermodal facilities such as the Miami International Airport (MIA), the FEC Hialeah Intermodal Facility, and the West Dade trade-related, freight forwarding and consolidation warehouses. The users of the Port of Miami also rely on the local, regional, and inter-regional transportation network components consisting of roads, railway lines, and channels to facilitate the efficient movement of goods and passengers including the Fort Lauderdale / Hollywood International Airport for a considerable amount of cruise passenger traffic departing to and from the Port of Miami.

2.2 PORT OF MIAMI ADMINISTRATION

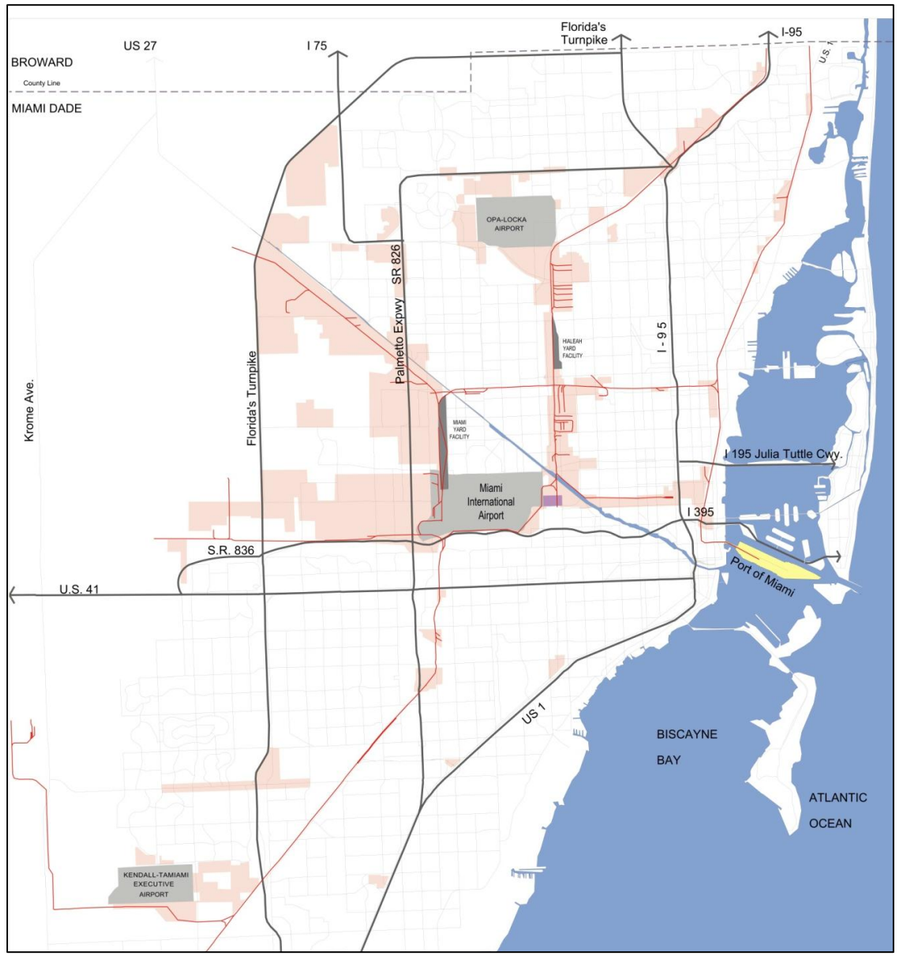
The Port of Miami is a non-operating port owned by Miami-Dade County, Florida and managed by the Miami-Dade County Seaport Department. A "non-operating" port is one that provides, manages, maintains, and leases the facilities for private entities to operate all shipping activities. The Port does not itself provide the services, shipping activities, and/or manpower required to load and off-load vessels. The Port is under the leadership of the Port Director which is appointed by the County Manager.

Responsibilities of the Miami-Dade County Seaport Department include: assignment of ship berths; transit shed space and port cargo operational areas; construction and maintenance of facilities; negotiation and execution of leases to port tenants; supervision and control of facility use; maintenance; security; establishment of Port rates and fees (tariffs); collection of Port revenues; maintenance of records; and business development. The Seaport Department is also responsible for the solicitation of waterborne commerce, maintenance of relationships with cruise and cargo shipping lines, and planning and provision of port facilities to meet the demands of present and future cruise, cargo, and related commercial business for Miami-Dade County. The Port is committed to maintaining these responsibilities while maintaining a sustainable balance between customer's operations and development needs, and preserving the natural resources of the County.

Facilities are either leased or made available to Port users and operators. Tenants include shipping agents, cruise lines, freight forwarders, custom house brokers, stevedores, ship chandlers, federal, state and local agencies, and other port-related firms. The U. S. Coast Guard serves as Captain of the Port in matters relating to safety and inspection.

Fire protection and Police services are provided by Miami-Dade County by contractual agreement with the Seaport Department. The Biscayne Bay Pilot's Association is responsible providing piloting services in the harbor.

FIGURE 2.1: COUNTY-WIDE CONTEXT MAP – PORT, AIR, RAIL AND INDUSTRIAL LANDS



2.3 LAND USES

Land uses are established by Miami-Dade County or the adjacent Municipalities. They are all reflected in the County's Comprehensive Land Use Plan. The entire Port is classified as "Terminal" which allows for a broad range of uses and activities.

This section provides an inventory of existing land uses in areas immediately adjacent to the Port and existing internal land uses within each of the Port's functional areas. An inventory and analysis of shoreline uses and conflicts, the need for water-dependent and water-related uses, and areas in need of redevelopment are also provided.

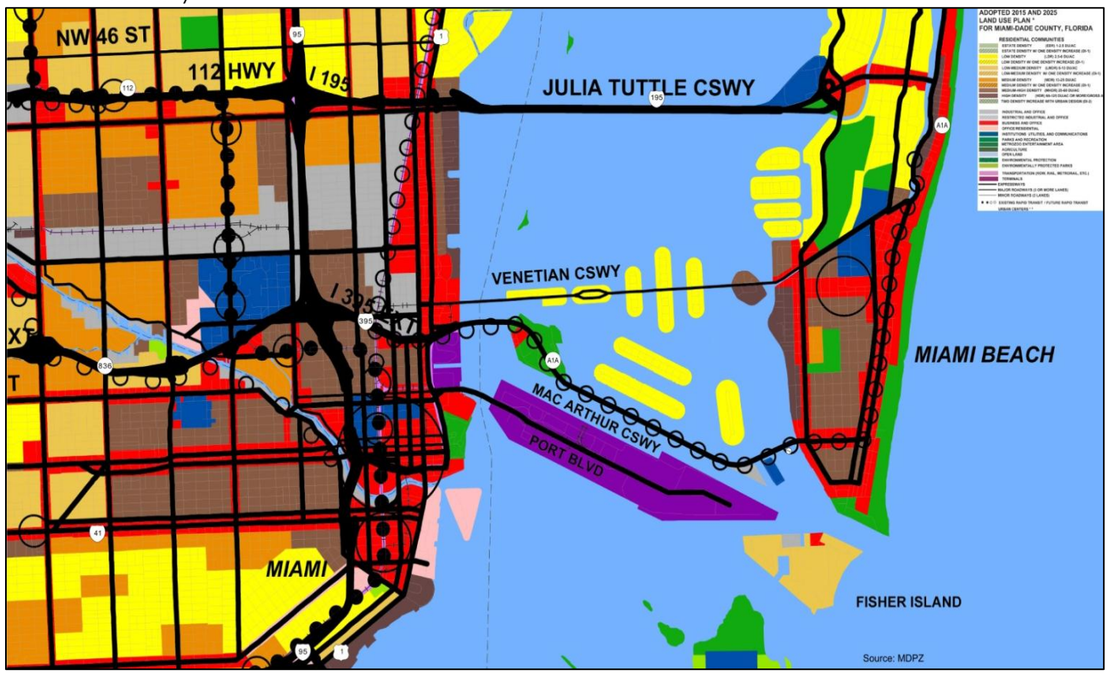
2.3.1 URBAN CONTEXT AND SURROUNDING LAND USES

The Port of Miami is the primary water-dependent land use in Downtown Miami, occupying a prominent location immediately east of the Miami Central Business District (CBD).

The pattern of land uses surrounding the Port of Miami is characterized as a mixture of low, medium, and high-density residential, commercial, office, and park / recreation uses (See Figure 2.2).

FIGURE 2.2: LAND USE PLAN

Source: Miami-Dade County



Specific land uses found to the north of the Port's Main Ship Channel include the MacArthur Causeway (I-395/U.S. 41/AIA), park / recreation and business and office uses at Watson Island, the Terminal island industrial area, and the U.S. Coast Guard Base at Causeway Island. To the north, there are low-density residential uses found beyond the MacArthur Causeway on Palm, Hibiscus, and Star Islands. To the east of the Port are medium and high-density residential, park / recreation, business and office, and institutional land uses on Fisher Island and the South Beach area. Located approximately one-half mile south of the Port across the waters of Biscayne Bay is Virginia Key. Land uses there include park / recreation, environmentally protected areas, and institutional and public facilities including the Miami-Dade County Virginia Key Wastewater Treatment Plant. Miami's Central Business District is found to the west of the port. Land uses range from mixed business and office, transportation, parks / recreation, medium to high-density residential, industrial, institutional, and terminal uses.

Neighboring land uses and facilities found surrounding the waters of the Port of Miami are discussed in greater detail below:

- **WATSON ISLAND:** Under the jurisdiction of the City of Miami, Watson Island is an 86-acre island located approximately 1,000 feet north of Dodge Island. Watson Island is bisected by the MacArthur Causeway. Uses on the north side of Watson Island include a public boat launch, the Miami Yacht Club, and Jungle Island. Uses found on the south side of Watson Island include the Miami Children's Museum, an Aviation Center for helicopter enterprises, vacant land, and park / open space areas. The City of Miami has entered into a series of development agreements for the construction of hotels, retail, and a mega-yacht marina on this property. In addition Watson Island will also house the portal for the tunnel to the Port of Miami.

- **TERMINAL ISLAND:** Uses found on Terminal Island include a small, privately owned cargo facility with 1,600 linear feet of berth, the City of Miami Beach's maintenance yard, a Florida Power and Light (FPL) substation, and the Fisher Island car ferry station. Cargo vessels arriving / departing from Terminal Island use the Main Channel and Government Cut Channel to access the Gulf shipping lanes. The Fisher Island car ferry uses Main Channel and the Government Cut Turning Basin to access Fisher Island.

- **CAUSEWAY ISLAND:** Causeway Island is home to the U.S. Coast Guard Miami Beach Base, also referred to as the U.S. Coast Guard Integrated Support Command (ISC). Coast Guard cutters operating from this facility use the Main Channel and Government Cut Channel to access Biscayne Bay and the Atlantic Ocean. As presented, the U.S. Coast Guard serves as the Captain of the Port in matters of safety and inspection and, therefore, their proximate location to the Port of Miami is essential.

- **PALM, HIBISCUS, AND STAR ISLANDS:** Located approximately 1,200 to 1,700 feet north of the Port of Miami (beyond the MacArthur Causeway), Palm, Hibiscus, and Star Islands are exclusive residential neighborhoods within the municipal limits of the City of Miami Beach. Each of these islands is fully developed with residential densities at below seven dwelling units per gross acre.

- **CITY OF MIAMI BEACH (SOUTH OF 5TH STREET):** The southernmost tip of Miami Beach (South Beach) is mixed use and includes the Miami Beach Marina and several medium to high-density residential towers, business and office uses. South Pointe Park is located along the southern tip of the City adjacent to Government Cut. The MacArthur Causeway is the primary southern access route to the City of Miami Beach.

- **FISHER ISLAND:** Fisher Island, located to the east of the Port, is an exclusive residential community accessible only by ferry from either Terminal Island (car) or the Port of Miami (service and cargo). Fisher Island lies within unincorporated Miami-Dade County and is privately owned. Most of this 216-acre island is devoted to low and medium-density residential units and a golf course. Other uses found on Fisher Island include a fuel tank farm and marine oil transfer facility owned and operated by Coastal Refining and Marketing, Inc. This facility consists of

approximately ten acres of land containing fifteen above-ground fuel storage tanks. Coastal provides fuel bunkering services (barge or truck) for ships berthing at the Port of Miami and the private terminals found along the Miami River.

- **VIRGINIA KEY** is located approximately one half mile south of the Port; this is an 863-acre island under the jurisdiction of the City of Miami and Miami-Dade County. This island contains a variety of public and private land uses including the Miami-Dade County Central District Wastewater Treatment Plant, a spoil disposal area previously used for port dredge material, the Bill Sadowski Critical Wildlife Area, Rosenstiel School of Marine, and Atmospheric Science, Mast Academy, restaurants, marinas, and the Miami Seaquarium parks and recreation areas.

  The Bill Sadowski Critical Wildlife Area, at its nearest point, is located more than 100 feet southeast of South Channel. This area serves as a refuge for migrating birds and is a special manatee protection area. This is further discussed in the later Environmental section of the report.

- **DOWNTOWN MIAMI'S CENTRAL BUSINESS DISTRICT (CBD)** is characterized by four neighborhoods: Central Business, Brickell, Park West, and Media and Entertainment. These areas are proximate to the port and include Bicentennial and Bayfront Parks, Flagler Street, PAC, American Airlines Arena, Government Center, and Mary Brickell Village.

- **BAYSIDE MARKETPLACE** is a retail and entertainment complex located on a City of Miami-owned waterfront site adjacent to Bayfront Park. Its 235,000-square-feet of leasable area are devoted to food and specialty retailing. The Bayside complex also includes the 200-slip Miami Marina. Bayside Marketplace is a significant destination for visitors to South Florida, including cruise ship passengers and crew passing through the Port of Miami.

- **AMERICAN AIRLINES ARENA** is located at the entrance to the Port and is the home for the Miami Heat, as well as a venue for a variety of other entertainment activities such as concerts. The arena seats 20,000 people and can accommodate 1,200 cars in the underground parking garage.

- **BICENTENNIAL PARK** was built in the 1970s on the site of the Port's original waterfront location. Since its dedication in 1976, the park has remained largely underutilized and has been inadequately maintained. This area is now reprogrammed to be "Museum Park" and the future home of several major museums.

- **BISCAYNE BOULEVARD CONDOMINIUM DEVELOPMENTS** includes more than 2,000 new residential units in buildings on the west side of Biscayne Boulevard across from Bicentennial Park, American Airlines Arena, and Bayfront Park. Downtown Miami has developed many new residential buildings over the past ten years with the opening of several major properties adjacent to the Port of Miami within the downtown core. They include 50 Biscayne, Marquis, Ten Museum, 900 Biscayne, Marina Blue, and others to the south and north along the same roadway and throughout the downtown area.

- **THE MIAMI RIVER'S** mouth enters Biscayne Bay just southwest of the Port of Miami. Vessels plying their trade to and from the Miami River must access through the South Channel or via the Intracoastal Waterway. As the administrator of waterborne commerce for Miami-Dade County, the Seaport Department has an affiliated interest in the Miami River. The Miami River Commission, acting as the official clearinghouse for public policy and projects relating to the river, has spearheaded efforts to improve and maintain the river. Ongoing Miami River projects include the Miami River Greenway, continuation of dredge and cleaning of the river's tributaries, and maintaining the mixed-use nature of the river.

2.3.2 PORT OF MIAMI FUNCTIONAL AREAS

Within the Port of Miami, the allocation of land varies from year to year as each business unit grows or decreases. The land can be viewed within the context of four specific functional areas: Cargo operations account for the majority of land uses at the Port of Miami, followed by cruise, administrative / support, and the transportation circulation network.

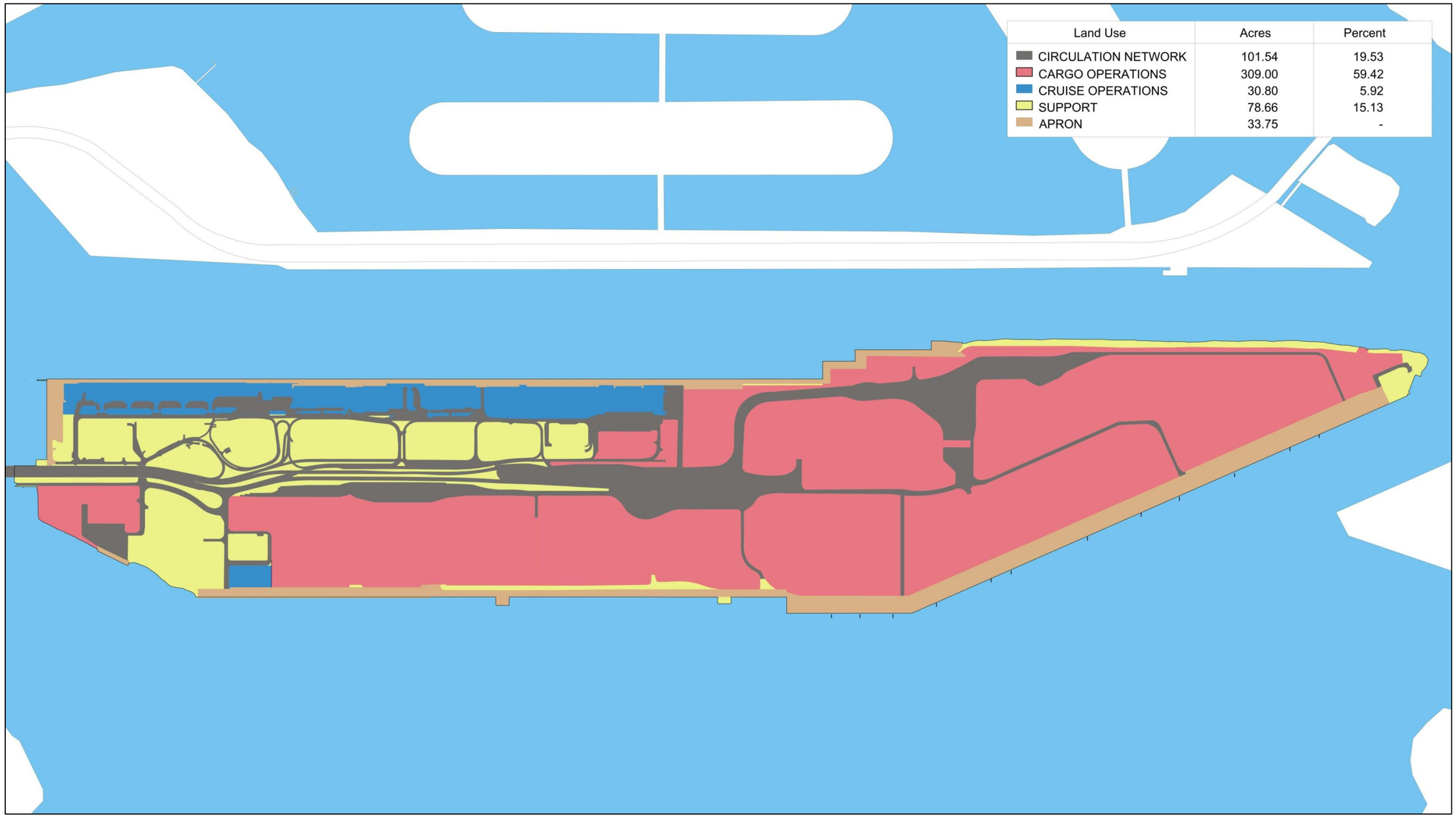
As shown in Table 2.1, as of 2010, a considerable amount of the functional area is designated for cargo operations with more than 59% of all land. There is also a significant land use for the circulation network that is used by cargo, cruise, and the support areas for truck and car movements throughout the port area.

Table 2.1: Functional areas by type (2010)

Land Use / Functional Area	Acres	Percent %
Circulation Network	101.54	19.53 %
Cargo Operations	309.00	59.42 %
Cruise Operations	30.80	5.92 %
Support (all others)	78.66	15.13 %
Total	520.00	100 %
Apron	33.75	

Figure 2.3 provides a visual of the overall land uses for the Port.

FIGURE 2.3: FUNCTIONAL AREAS



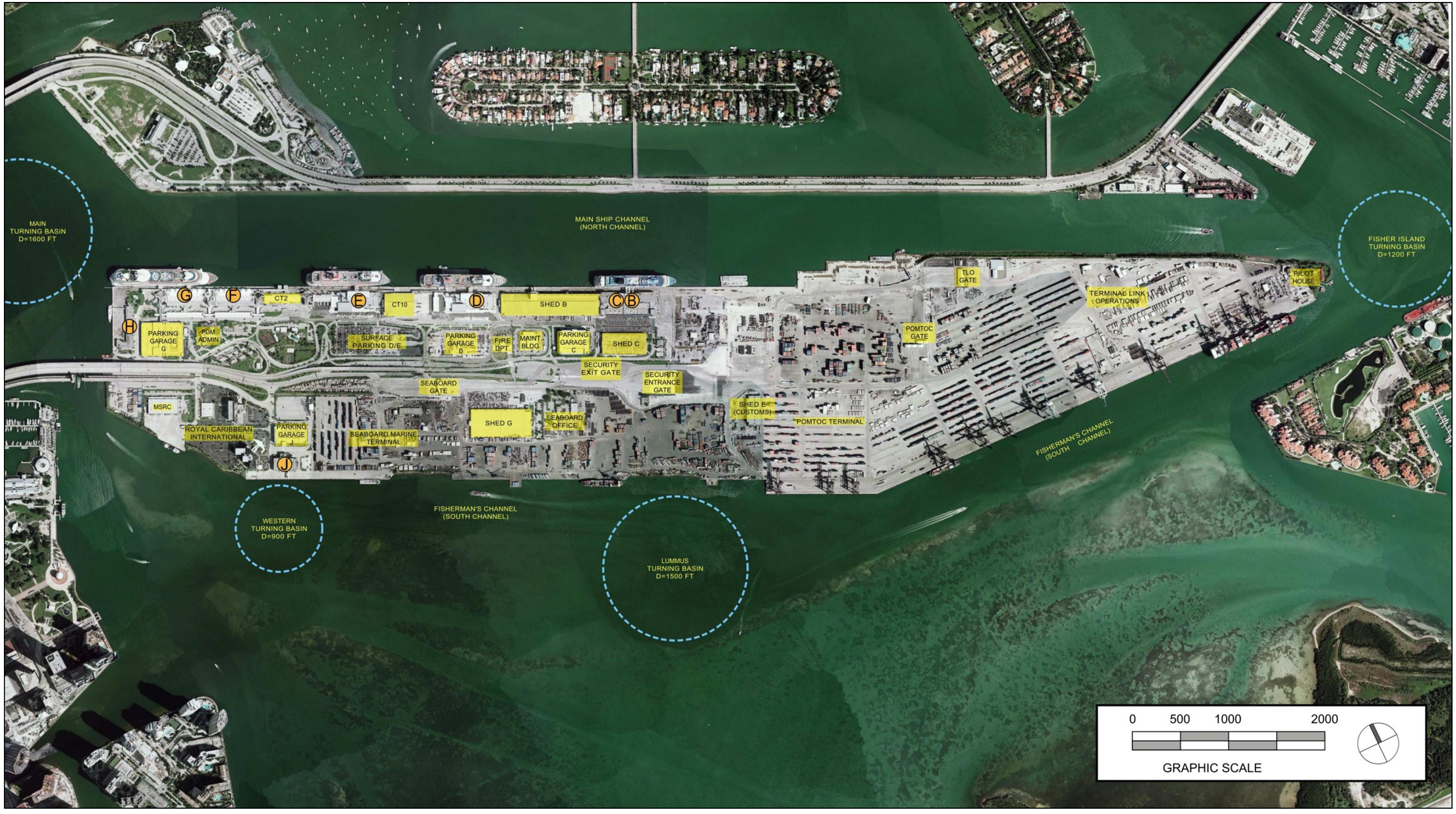
2.4 FACILITIES

Figure 2.4 shows the overall layout of the Port of Miami and defines several of the key areas, structures, and basins that make up the operations of the facility. Since the inception of the Port, there has been continual change to develop and enhance the Port to meet new business needs, growth, changes in the industry, functional and security requirements, and meet the demands of the Users of the Port. In the past few years, transit sheds A and D have been demolished. Shed B is being used mainly for cruise line provisioning for terminal B-C, Shed C is scheduled to be demolished and is currently providing some break-bulk storage area, and Shed G - Cold storage has been partially demolished.

Additionally, the Port of Miami is currently moving forward with the renovations and improvements to Cruise Terminals D & E and F & G, while also contemplating new projects to support future growth and support its customer base.

Future Port Capital Improvement Projects such as the tunnel, rail improvements, channel deepening, parking structures, terminals, gate enhancements, etc. as well as the Seaboard Cargo Yard Master Plan will further develop the Port in the short to mid-term to meet the needs of the users and provide the platform for growth of local commerce.

FIGURE 2.4: FACILITIES OVERVIEW



2.4.1 CIRCULATION NETWORK

The circulation network at the Port of Miami includes roads, bridges, and rail. This network organizes all of the land uses in each of the functional areas and facilitates the internal and external movements of cargo and passengers. The internal circulation network allows for efficient and safe vehicular movement for cruise passengers, port administrative and management functions, security, emergency vehicle access, and employee access. The network includes Port Boulevard, North America Way, Caribbean Way, South America Way, Europe Way, N. Cruise Blvd., Florida Way, Tropic Drive, S. Cruise Blvd., Port Blvd. (eastbound and westbound), Atlantic Way, Panama Way, Africa Way, Asia Way, Bahamas Drive, Chute Road, security gate inbound and outbound lanes, and the spur road to the container yards.

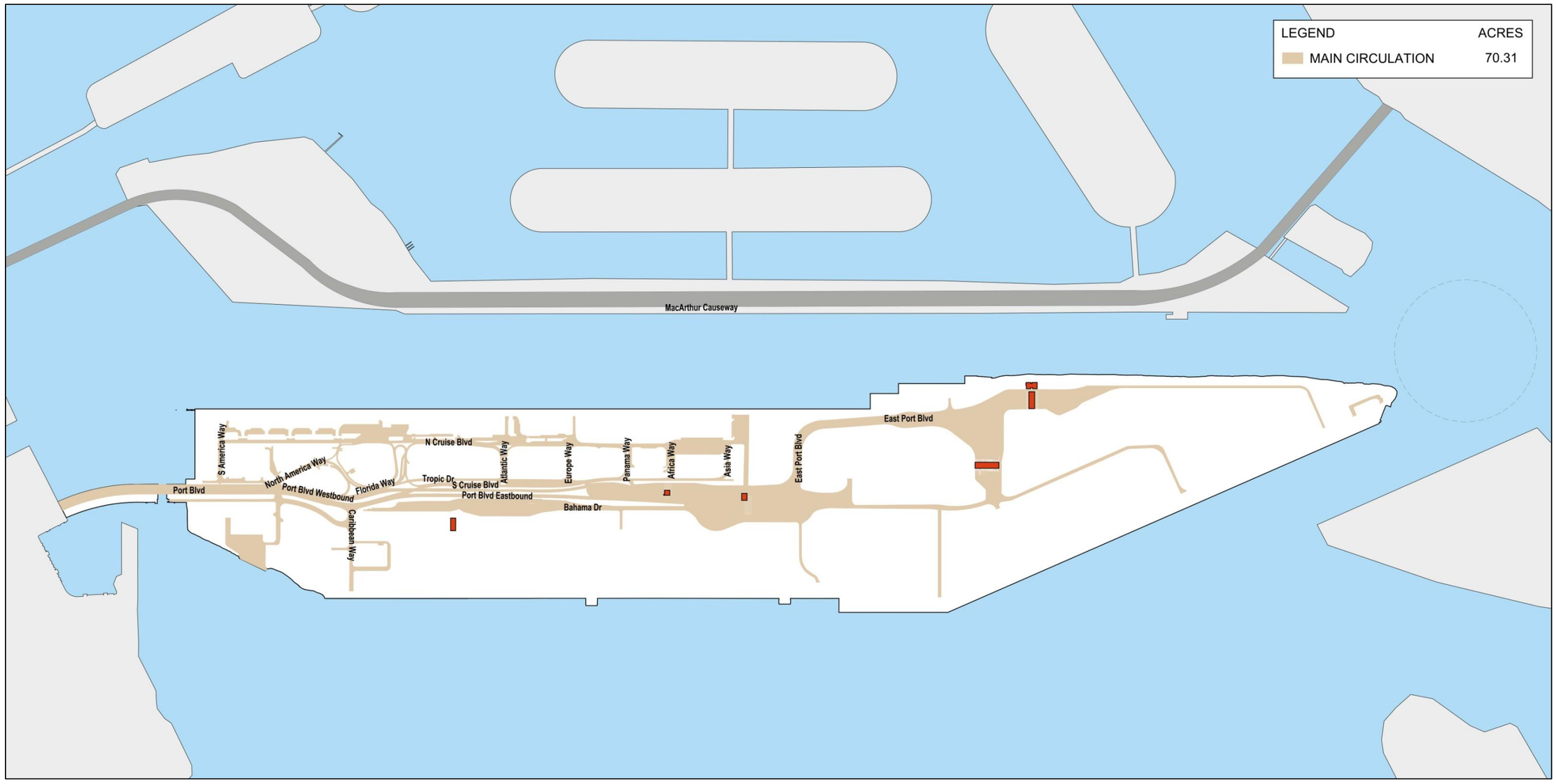
The Port's circulation network consists of the main spine, known as Port Boulevard, with ingress and egress via the Port of Miami Bridge. This road provides access to the cargo, cruise, and support facilities on the western portion. It then splits continuing as Port Blvd. on the south to the cargo area, and as Cruise Blvd. on the north to the cruise area. The main circulation roadways occupy some 62 acres of land as shown in Table 2.2 and Figure 2.5.

Table 2.2: Port Circulation Network

Circulation Type	Acres	Percent %
Major roadways	70.31	98.08 %
Rail (non-active)	1.38	1.92 %
Total	71.69	100 %

There is a rail spur in the Port at present occupying 1.38 acres in the northern portion of the Seaboard cargo area. This area is currently used for large transport cargo storage. Since the railroad has not been operating for the past few years, the Port's intermodal operations are currently limited to mainly ship-to-truck transfers and vice versa. Rail is discussed in greater detail in the Cargo portion of the master plan report.

FIGURE 2.5: ROADWAY CIRCULATION NETWORK



2.4.2 CHANNELS AND TURNING BASINS

The Port's principal shipping channels and turning basins are shown in Figure 2.6 and Table 2.3. These waterways provide access to berthing areas at the Port as well as to the Miami River cargo operations and the Intracoastal Waterway. Ships approaching from the Atlantic Ocean enter the Port of Miami through Outer Bar Cut and travel northwest through Bar Cut to Government Cut and its 1,200-foot radius Fisher Island turning basin. Ships can continue along the northern side of the Port along Main Ship Channel which terminates in the 1,600-foot Main turning basin. Alternatively, ships can proceed west at the Fisher Island Turning Basin and along the Port's South Channel which terminates in the 900-foot diameter Western Turning Basin. The South Channel also has a 1,500-foot diameter Lummus Turning Basin at the juncture of Dodge and Lummus Islands.

A number of smaller channels in the Port vicinity feed vessels into Port channels. These include the Intracoastal Waterway and the Miami River Channel. The depths of these channels vary from 10 to 20 feet. The only open Anchorage at the Port of Miami lies in the Atlantic Ocean about 1.5 nautical miles outside the Outer Bar Cut.

The Port is scheduled to undergo future deepening from its existing -42-foot depth to between -50 and -52 feet in order to accommodate the next generation of new post-Panamax cargo vessels capable of transiting the Panama Canal once that expansion project is completed in 2014. During the dredge, other improvements to the channels will be made including widening the Fisher Island turning basin to 1,500-feet in diameter. Sea grass and artificial reef mitigation is explained further in Section 7.3.

This is reflected in Figure 2.6 as an on-going Port project.

FIGURE 2.6: CHANNELS AND TURNING BASINS

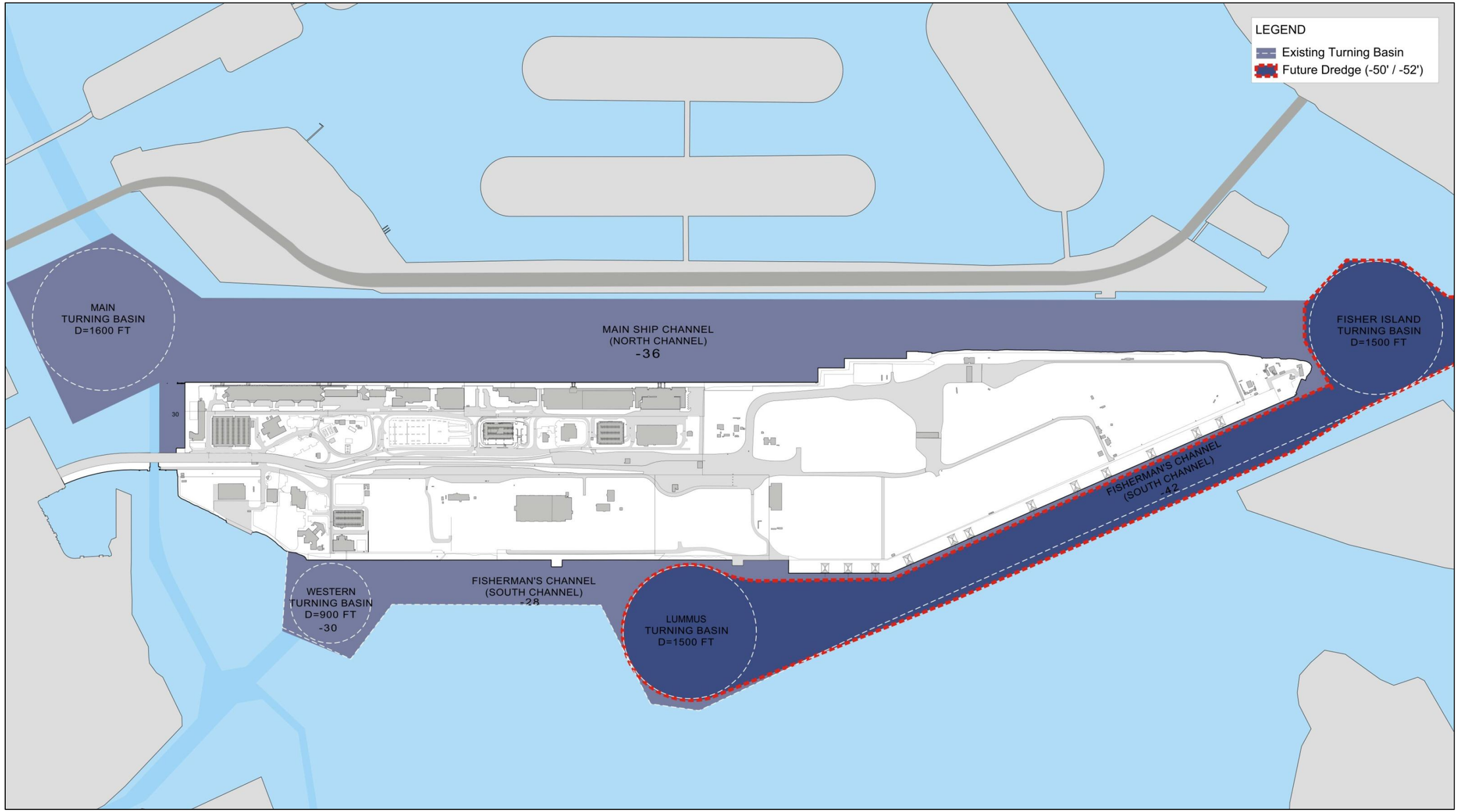


Table 2.3: Channels and Turning Basins				
Type	Name	Width / Radius (feet)	Depth (Feet NGVD)	Length (nautical miles)
Channels	Bar Cut	500 [1]	44	0.66
	Outer Bar Cut	500 [1]	44	1.50
	Government Cut	400 to 500	42 / 44	0.66
	Main Channel	400 / 900 [2]	36	2.44
	South Channel	500	42	2.50
Turning Basins	Fisher Island	1,200	44	n/a
	Main Channel	1,600	36	n/a
	Lummus	1,500	44	n/a
	Western	900	36	n/a

1. At the junction of the Outer Bar Cut and Bar Cut, where a turning movement of 35-degrees is required, a 0.55 nm. Stretch of the channel has been widened to 900 feet
2. The 900 feet width occurs along Dodge Island.

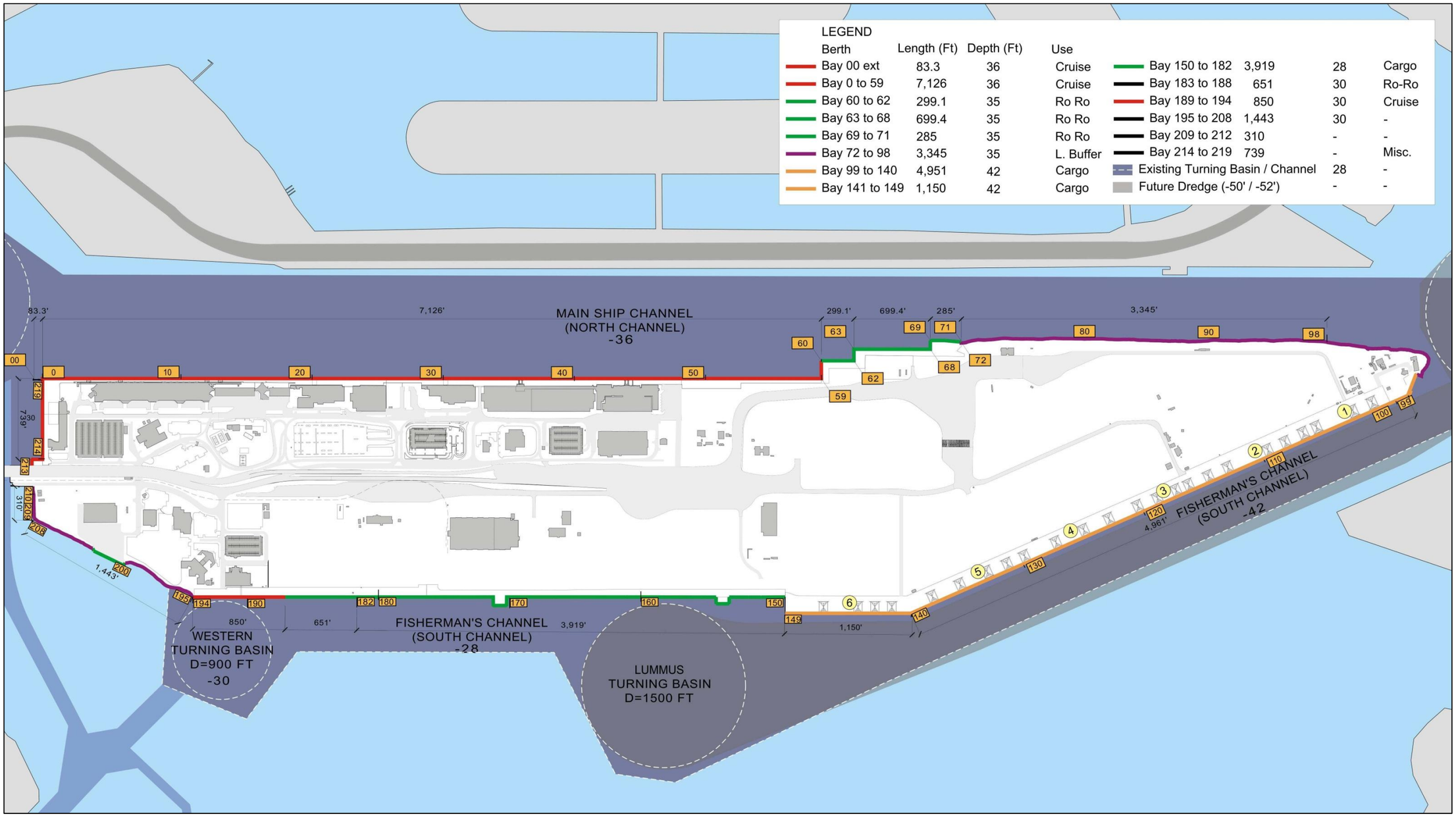
2.4.3 BERTHING INVENTORY

The Port of Miami accommodates cruise, cargo, military, barge, yacht, and numerous other miscellaneous vessels in support of commercial operations. At present, the Port has more than 28,739 feet of linear berth or buffer surrounding the Port. Approximately 8,474 feet of lineal berthing space is provided for cruise ships and 11,458 lineal feet for container ships. Figure 2.7 shows the complete breakdown of the berthing inventory. There is still a considerable amount of lineal water's edge of undeveloped berth space along the Main Channel (5,101 feet) from Bay 69 to 98 and additional space along the southwest corner adjacent to the RCCL headquarters building. Table 2.4 also illustrates the overall layout of the berths.

This inventory has been used to compare against the future berthing capacity needs and overall berth length requirements to accommodate future vessel sizes and shore-side support operations including adjacencies of cruise terminals and cargo facilities.

Table 2.4 Berth Inventory			
Berth / Bay	Length (feet)	Depth (Feet NGVD)	Use
00 ext	83.3	36	Cruise
00 - 59	7,126	36	Cruise
60 - 62	299.1	35	Ro / Ro
63 - 68	699.4	35	Ro / Ro
69 - 71	285	35	Ro / Ro
72 - 98	3,345	35	L. Buffer
99 - 140	4,951	42	Cargo
141 - 149	1,150	42	Cargo
150 – 182	3,919	28	Cargo
183 – 188	651	30	Ro / Ro
189 – 194	850	30	Cruise
195 – 208	1,443	30	-
209 – 212	310	-	-
214 - 219	739	28	Misc.
1) Lo / Lo can also occur at all Ro / Ro berths as shown in this Inventory table.			

FIGURE 2.7: BERTH INVENTORY



2.5 CARGO

The Port of Miami is a general cargo port with strict limitations on handling certain types of bulk products. Principal cargos passing through the port include fruits and vegetables, apparel and textiles, non-refrigerated food products / groceries, paper, electronic equipment, stone, clay and cement tiles, construction and industrial equipment, trucks, buses, and automobiles.

Four types of cargo operations occur at the Port:

- Roll-on / roll-off (Ro / Ro) container operations;
- Lift-on / lift-off (Lo / Lo) container operations;
- Mixed-use bulk cargo operations; and,
- Vehicle exports.

The Port allows container lines and/or stevedores to operate at the port. At present there are three major terminal operators at the Port:

- **SEABOARD MARINE** - is an ocean transportation company that provides direct, regular service between the United States and the Caribbean Basin, Central America, and South America. Established in 1983, Seaboard Marine is a wholly-owned subsidiary of Seaboard Corporation. Seaboard now serves nearly forty ports in over twenty five countries. Seaboard Marine's facilities include a private terminal of 76.69 acres and it is currently redeveloping its cargo yard facilities under a long-term lease for a specified amount of land. This is a non-3rd Party operator.

- **SOUTH FLORIDA CONTAINER TERMINAL (SFCT)** is a joint venture terminal operator and stevedoring company between Terminal Link (CMA CGM) and APM Terminals. This unit operates on 71.32 acres. The facility has been operating in the Port of Miami for over 20 years; it is formerly known as APM. This is an open 3rd Party operator.

- **PORT OF MIAMI TERMINAL OPERATING COMPANY (POMTOC)** has been operating at the Port for more than 10 years on 120 acres. POMTOC serves over 30 ocean carriers and handles over 200,000 TEU's annually. This is an open 3rd Party operator.

The Port is continuing to implement elements of the 2020 Cargo Master Plan through its Capital Improvements Program. This includes the continued expansion of berths and upland areas to assist in improving functionality and efficiencies of the operators. The cargo operations are also supported by a series of gate structures for inbound and outbound traffic to track containers and conduct safety inspections on trucks (typical yard operation), and provide security through the Port and Customs authorities (typical port operation). Each yard has an independent gate complex as well as those provided for by the Port in the main circulation network. Currently the Port, in conjunction with the container operators, is assessing the potential for some consolidation of efforts to further enhance the Port throughput capacity.

The main cargo projects to date include dredging deeper in order to meet the future new post-Panamax cargo vessels that can easily reach the Port following the expansion of the Panama Canal, new Tunnel providing for increased ingress and egress capacity for cargo with direct access to the main highway system, rail, cargo gate expansion with new inbound and outbound lanes, software modernization to increase throughput efficiencies, and a possible consolidation of gate functions to expedite processing times, replacing rip-rap with new bulkheads to accommodate additional vessels for cargo operations, stronger storm protection, and cargo yard improvements to increase overall efficiencies.

The fumigation yard, which has a mandated safety ring prohibiting uses in close proximity, and the Customs and Border Patrol facilities will be relocated in the short to mid-term from their present locations.

Table 2.5 and Figure 2.8 identify the current cargo operational areas and support facilities.

Table 2.5: Cargo Facilities

Cargo Berth / Bay	Length (feet)	Depth (Feet NGVD)	Use
60 - 62	299.1	35	Ro / Ro
63 - 68	699.4	35	Ro / Ro
69 - 71	285	35	Ro / Ro
99 - 140	4,951	42	Cargo
141 - 149	1,150	42	Cargo
150 – 182	3,919	28	Cargo
183 – 188	651	30	Ro / Ro
Cargo Yard Operator	**Acres**	**User Type**	**Equipment**
POMTOC	120	Open 3rd Party	7 x 50 long ton post-panamax cranes; 2 x 65 long ton super post-panamax cranes
S.F.C.T.	71.32	Open 3rd Party	
Seaboard Marine	76.69	Non 3rd Party Ops	Mobile Cranes
1) Port rail access via bascule bridge – approx. 3,500 parallel rail intermodal yard proposed available for access by all on-port yard operators.			

FIGURE 2.8: CARGO FACILITIES

2.6 CRUISE

The Port of Miami serves as a primary port of embarkation / debarkation (home port) for the Caribbean region and is mostly used by the top three cruise lines in the world - Carnival Corporation (principal Miami brand – Carnival Cruise Line), Royal Caribbean Cruise Lines (Royal Caribbean International, Celebrity Cruises and Azamara Club Cruises) and Norwegian Cruise Line. Cruise operations occur on the north side of the island.

Cruise facilities located in this area includes six cruise terminals with 724,684 square feet of interior operational space, cruise berths, cruise ship loading and support aprons, customs inspection and storage areas, provisioning spaces, and parking areas (see Figure 2.9). Additionally, Terminal J is located on the Southwest side of the Port and is able to accommodate cruise vessels up to 800 feet in length based upon current pilot standards. The landside portion of cruise terminal operations, including parking, comprises approximately 52 acres. Table 2.6 illustrates the characteristics and sizes of the present cruise terminals at the Port.

Table 2.6: Cruise Terminals

Terminal	Interior Facility Size (square feet)	Primary Tenant	Passenger Capacity	Year Built / Refurbished
B	91,782	NCL	5,000	1980 / 2010
C	91,782	NCL	5,000	1980 / 2010
D	115,000	CCL	4,000 +	2007
E	115,000	CCL	4,000 +	2007
F	127,500	RCCL	4,000 +	1999
G	127,500	RCCL	4,000 +	1999
J	56,120	SMALL SHIP	1,500	1988

Since their inception in the early 1970's all of the Port's cruise terminals have been remodeled or redeveloped to accommodate increasing passenger ship capacities and user demand. Government inspection functions have also been added. All of the cruise terminal facilities have modern gangway systems to meet the cruise vessel shell door requirements.

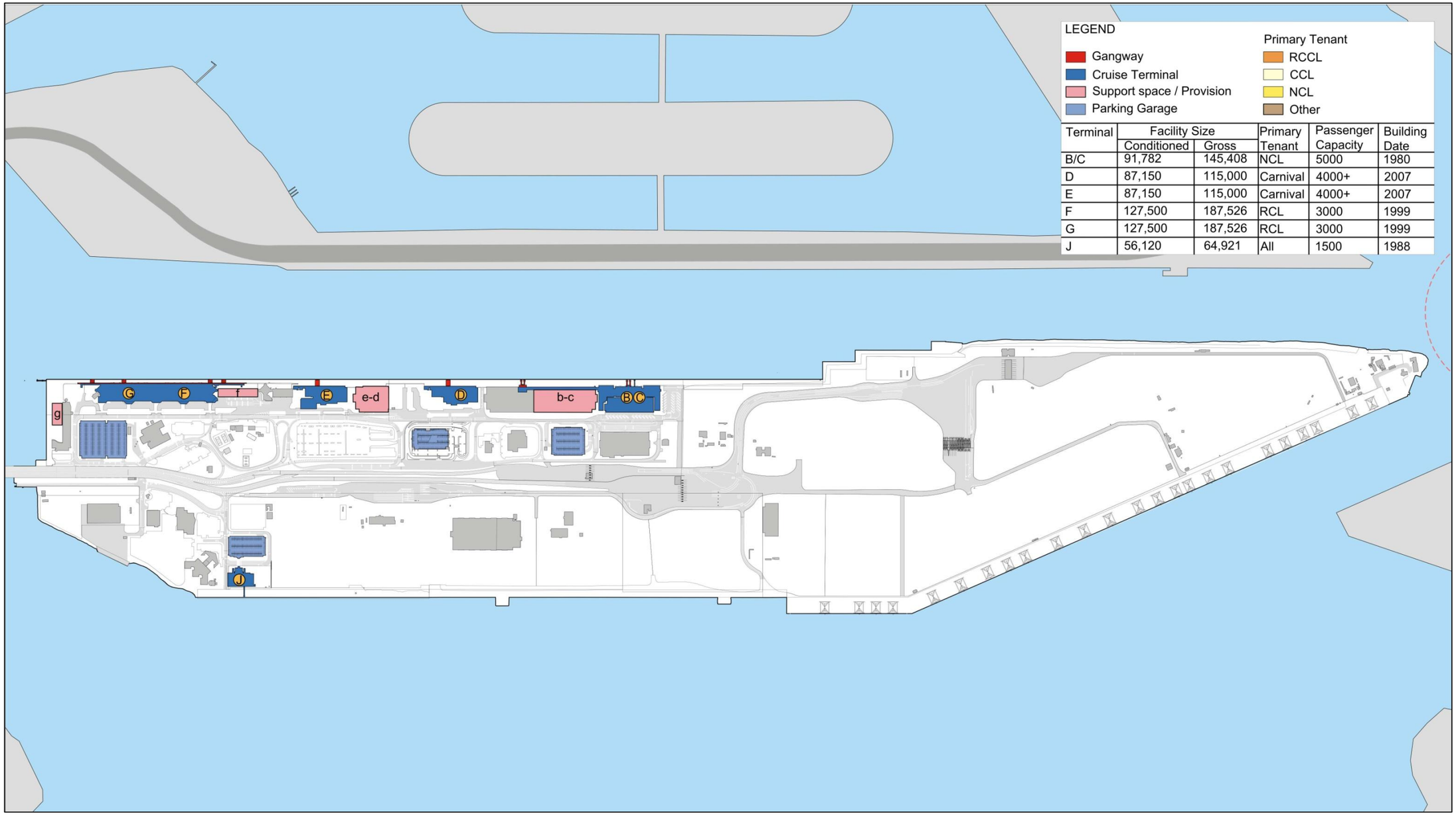
The following are major upgrades or changes implemented to the terminals:

- **TERMINALS B AND C** - refurbished in 2010 utilizing green performance standards for the use by NCL for their new large ship "Epic".
- **TERMINALS F AND G** – Built in 1999 these are allocated to RCCL. The Port of Miami plans to renovate these facilities to meet long-term cruise needs.
- **TERMINALS D & E** – Built in 2007, they are allocated to Carnival Corporation. These facilities are currently being renovated to meet future vessel capacity and passenger demands for completion in 2012.
- **TERMINAL J** is used by luxury brand cruise lines with smaller ships.

The continued growth in the size of vessels affects the Port's ability to handle the mega-vessel passenger throughput. As discussed, and as shown as a major part of this 2035 Master Plan, some of these facilities will require renovations in the future to accommodate this increased demand.

One of the major issues for the Port of Miami at present and over the long-term is the ability to accommodate larger cruise vessels of 1,200 feet in length with larger passenger capacities. The current layout of the terminals does not provide for flexibility to accomplish this. This element is further discussed in the sections that follow.

FIGURE 2.9: CRUISE FACILITIES



Terminal	Facility Size		Primary Tenant	Passenger Capacity	Building Date
	Conditioned	Gross			
B/C	91,782	145,408	NCL	5000	1980
D	87,150	115,000	Carnival	4000+	2007
E	87,150	115,000	Carnival	4000+	2007
F	127,500	187,526	RCL	3000	1999
G	127,500	187,526	RCL	3000	1999
J	56,120	64,921	All	1500	1988

2.7 PARKING FACILITIES

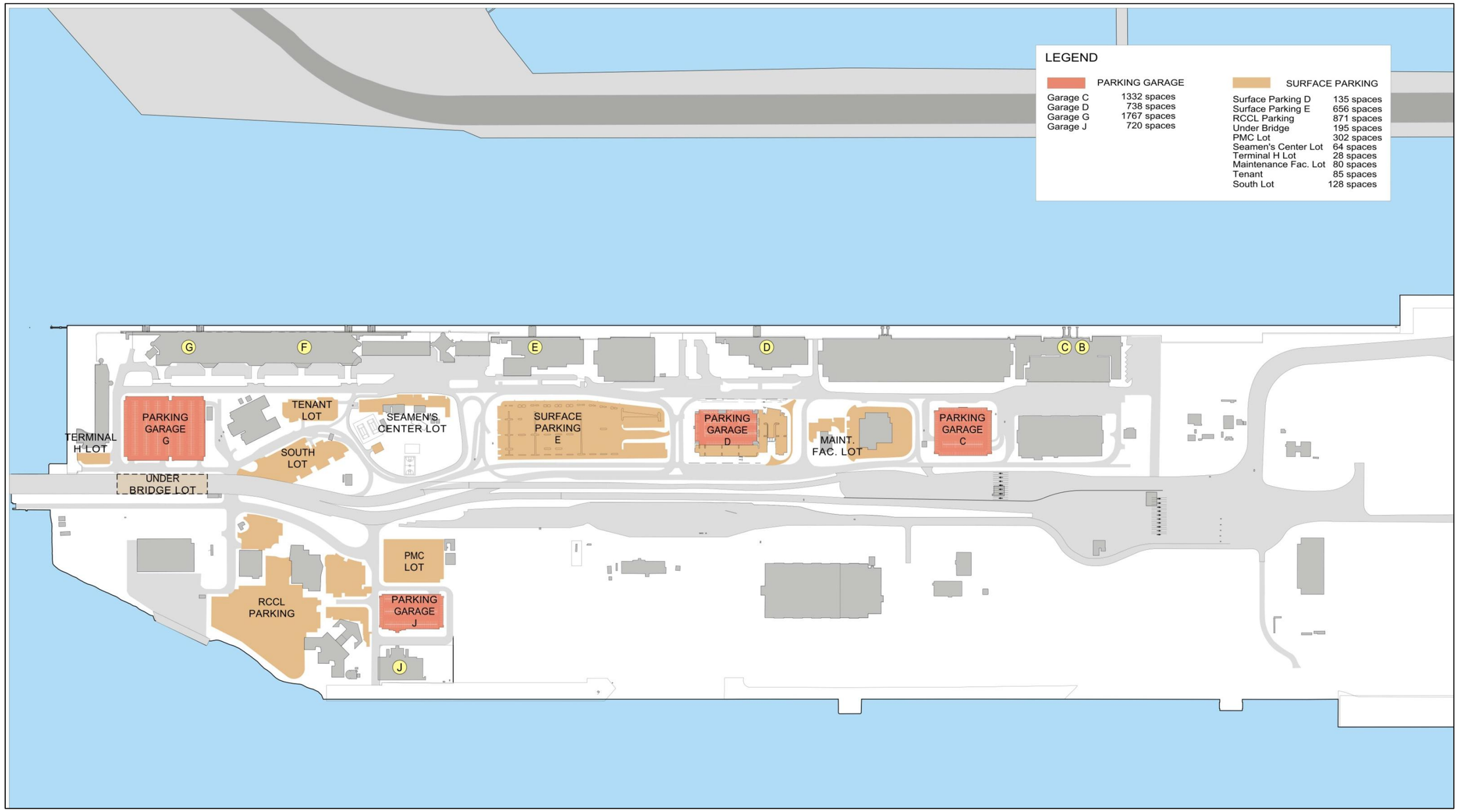
Parking at the Port of Miami for cruise ship passengers, visitors, and employees is provided in surface lots and structured parking facilities throughout the Port. With the addition of Garage D in 2010 (864 spaces), the Port provides a total of 4,557 structured parking spaces and 791 surface spaces for cruise operations, 871 spaces for RCCL office parking and another 882 spaces for tenant, government, and visitor parking. These smaller lots associated with security, CBP, Port of Miami services, and others for operational concerns of the Port are located adjacent to the Miami World Trade Center and other key areas throughout the Port. The inventory of the parking facilities is shown in Table 2.7.

Table 2.7: Parking Inventory

Type	Garage Facility	Capacity (spaces)	Uses
Structured Garage Parking	C	1,332	Cruise
	D	738	Cruise
	G	1,709 / 58	Cruise / Govt.
	J	720	Cruise
Surface Lots	D	135	Cruise
	E	656	Cruise
	PMC	302	Seaboard / Visitor
	RCCL	871	RCCL
	Under Bridge / Office	195	POM / CBP / Visitor
	Tenant	85	POM Tenants
	Seamen's Center	64	Visitor
	South Lot	128	Visitor
	Maintenance Bldg.	80	POM / Visitor
	Terminal H	28	POM / CBP

Generally, cruise passenger parking lots are located across from the cruise passenger terminals along Cruise Blvd. However, since cruise volumes are not balanced among cruise terminals, the passenger parking demand and availability is misaligned. Since the parking structures are individual and not connected, this creates operational issues between passengers walking to and from their vehicles. The inventory of the port parking facilities is shown in Figure 2.10.

FIGURE 2.10: PARKING FACILITIES



2.8 SUPPORT FACILITIES

The support functional areas consist of administrative office space for the Seaport Department, government agencies, and private-sector cruise and cargo tenants. This land use area comprises approximately 5.24 acres. There are minor circulation areas used for internal operations and movement to and from facilities. Included in the support areas are Seaport offices, RCCL offices, Terminal operations office space, Miami-Dade County Fire Department, Federal Government agencies including Customs and Border Protection, International Seamen's Center, a recreational facility located next to the Seaport Maritime complex, soccer field, tennis courts, and a swimming pool. The Biscayne Bay Pilot's Association is located at the easternmost tip of Lummus Island.

Since the Port of Miami is conducting operations on a twenty-four hour basis, it has not been designed to accommodate recreational opportunities for the general public because of attendant safety and security considerations. For that reason, public access points to the port shoreline and public access facilities providing recreational opportunities such as roads with scenic overlooks, marinas, boat ramps, and public docks are limited.

Generally, the facilities to which public access is granted include the following: the passenger terminals (limited public access) and parking lots, Port administration building, RCCL headquarters, and Seaman's Center.

See Figure 2.11 for an overview of support facilities.

FIGURE 2.11: SUPPORT FACILITIES

2.9 UTILITIES – WATER, SANITARY SEWER, ELECTRIC, COMMUNICATION, STORM DRAINAGE, IMS

Existing utility infrastructure facilities at the Port of Miami include potable water, sanitary sewer, electric, and telecommunication and drainage systems. Each of these systems presently has adequate capacity to accommodate the present demands. Future needs for these infrastructure facilities related to the recommended plan for port expansion through the year 2035 are evaluated in Section 7.

The Seaport Department owns and operates the water distribution system on the Port. The 20-inch water transmission main connection to downtown is owned by WASD and is part of a loop system to Fisher Island and Virginia Key. This 20-inch water transmission main extends from downtown to both Dodge and Lummus Islands and links with existing 20-inch mains on Fisher Island and Virginia Key. This loop allows the Port and those adjacent users to be served from both directions, thereby eliminating the vulnerability of a single direction supply main. A network of pipelines with sizes ranging from one to twenty inches in diameter, off of the 20-inch water main, provide domestic and fire protection service to the Port. The primary users of potable water at the Port of Miami are cruise ships, cargo ships, and support facilities.

Cruise and cargo ships which use the vast majority of potable water are supplied via hose connections at all berths. Potable water is sold to cruise and cargo ships.

The Seaport Department owns and operates the wastewater collection system, transmission mains, and the on-port pump stations. The existing sanitary sewage system includes 6 pump stations and a wastewater collection system consisting of eight and ten inch gravity lines and properly spaced manholes.

The Port's main pump station is a dry-well/wet-well type with two pumps, each rated at a capacity of 720,000 gallons per day (GPD). This pump station, located approximately southeast of the intersection of Port Boulevard and Europe Way, pumps into the WASD collection system through an existing eight inch force main running along Port Boulevard. Wastewater generated at the Port is collected and routed to the WASD system for treatment at its Central District Wastewater Treatment Plant on Virginia Key. The rated capacity of the plant can accommodate the present wastewater flows generated by the Port. Wastewater flows are generated almost entirely from the offices and terminals at the Port of Miami. Currently, cruise and cargo ships do not discharge their wastewater into the Port's collection system.

The existing drainage system at the Port of Miami has been developed in tandem with the evolution of the Port from its initial construction on Dodge Island in 1960 to its expansion to Lummus Island after 1979. The system was designed to conform to standards in place at the time of physical development.

The drainage system at the Port of Miami consists of an interconnected series of drainage wells, surface ponding storage, retention basins, and pollution-retardant basins with several emergency overflow discharge connections to Biscayne Bay. Where possible, surface water runoff is routed either through grass swales or overland flow into catch basins that are interconnected into a series of drainage wells.

All new drainage systems are being designed to handle a 25-year, 24-hour duration storm in compliance with the Miami-Dade County Public Works Department policies. Additional runoff storage is being provided on the ground surface. Grassed swales with retention basins are being incorporated where open space is available, such as the southwest complex on Dodge Island. Upgrade of these systems is ongoing.

The drainage system is designed to retain at least the first inch of runoff within the well system prior to emergency overflow to Biscayne Bay. Pollution-retardant basins act to retain greases, oils, and other pollutants within the system, thereby diminishing the potential degradation of the water quality within Biscayne Bay.

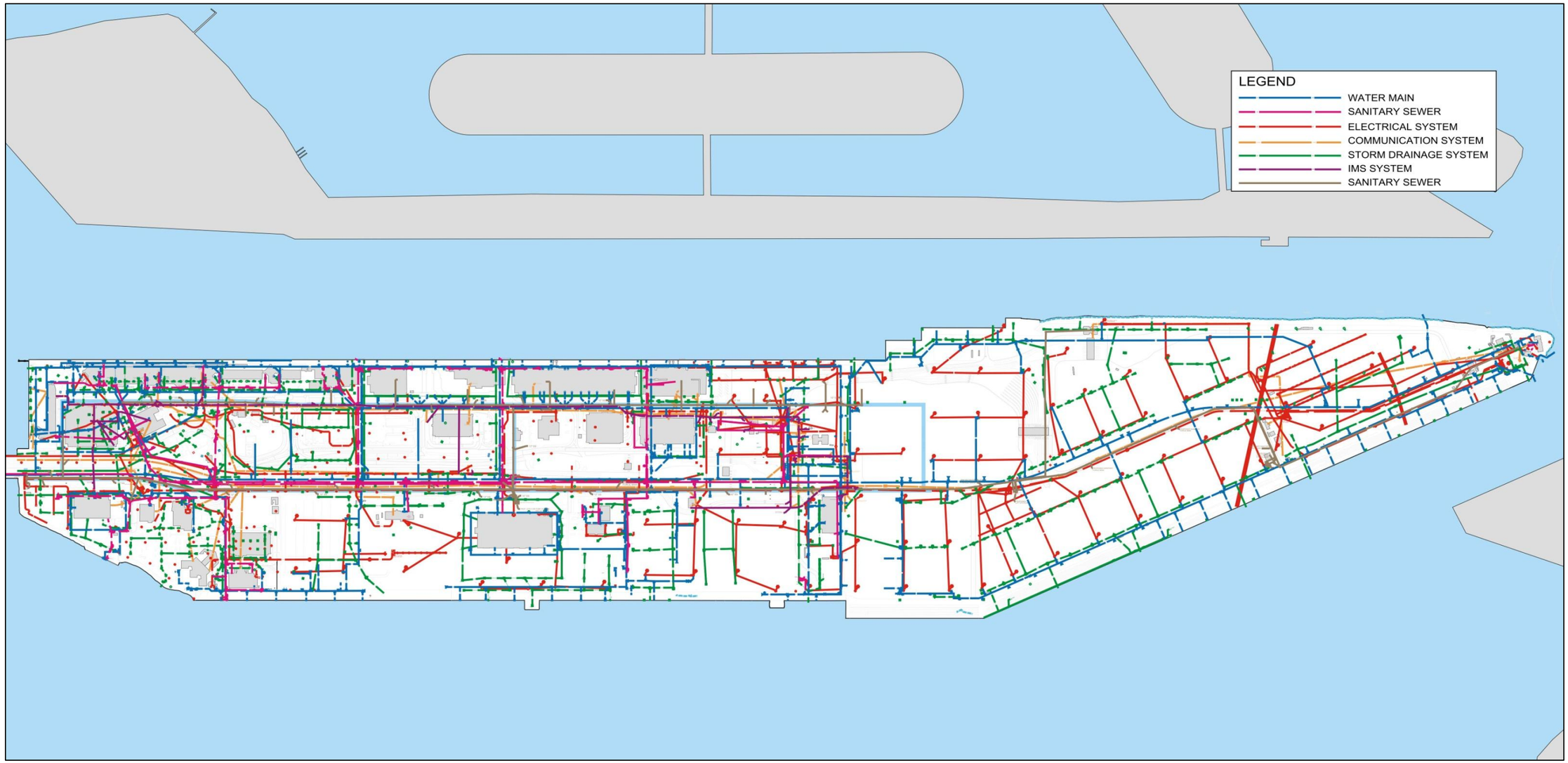
The operation and maintenance of the surface water drainage system is the responsibility of the Miami-Dade County Seaport Department.

Florida Power and Light (FPL) is the primary power provider for Port of Miami operations. The power is provided from two 13.2-kilovolt feeders on Dodge Island. There is also an on-port substation on the eastern portion of Lummus Island and a cogeneration facility providing electricity and chilled water for the Port.

All existing communications facilities are provided by AT&T which expands its service to meet Port needs. A state-of-the-art fiber optic ring (IMS) runs throughout the Port to provide for enhanced communications.

See Figure 2.12 for an overview of all Port of Miami utilities.

FIGURE 2.12: UTILITIES



SECTION 3

GOALS, OBJECTIVES AND POLICIES

3.1 CURRENT STATUS

This Master Plan updates and replaces the Port's previously-adopted 2020 Master Plan. This new Master Plan calls for sustainable growth in operations and expansion in cruise and cargo activities through enhancements of existing facilities, the development of a commercial business unit, and the creation of a financial model whereby the Port maximizes profitability, prioritizes expenditures, diversifies revenues streams, protects our natural resources, and allows for the Port to become self-sustaining.

The Port faces a number of challenges which require looking into the future to determine how to best position itself to meet its mission and role within the community. It must understand the issues and recognize the opportunities and limitations allowed for the creation of a realistic and sustainable Plan that can serve the Port beyond 2035.

Among the critical issues studied and evaluated as part of the Master Plan were the following:

- The location of the Port within the urban core of a major metropolitan area and its role in terms of the types of cargoes that move through it on a daily basis;
- The nature of an island port and its ability to expand (or not) within the Biscayne Bay Aquatic Preserve;
- The economic impact and role of the Port in terms of job creation within Miami-Dade County;
- The role that international trade will have on the future of the South Florida community;
- The realities of the inland transportation of freight from the Port and through the interstate highway system and beyond into the rest of the US hinterland, specifically, the use of rail to service the Port;
- The current economic condition of the Port and its ability to fund future capital programs;
- The Port is committed to achieving a sustainable balance between its customers, operations and development, while continually focused on its environmental responsibilities; and,
- The mobilization and diversification of cruise outside of the U.S. and Miami.

Cargo and cruise capacity throughputs have been consistent over the past few years. Therefore, increasing the level of competition and challenges in the traditional market share of cruise and cargo that the Port of Miami will need to meet over the next 25-years will be essential, not only to keep pace, but to strive to meet the demands of the markets it serves.

Moving forward, the Port will need to expand its physical footprint outside of the Port to remain competitive, diversify its financial capacity through the introduction of a commercial component to its cruise and cargo portfolio that is not tied to tariff income, increase its operational efficiencies in meeting the demands of the Port's key sectors through the application of technology to increase productivities for port users, and strengthen its marketing efforts to leverage these expansion efforts into additional customer successes.

3.2 PROPOSED GOALS, OBJECTIVES AND POLICIES

The following proposed goals, objectives, and subsequent policies provide the platform for implementation of the 2035 Port of Miami Master Plan. To ensure consistency moving forward, specific policies are also outlined allowing for program development and evaluation of the implementation of the Plan.

GOAL

THE PORT OF MIAMI SHALL CARRY OUT ITS DAY-TO-DAY OPERATIONS AND ITS LONG-TERM EXPANSION PROGRAM THROUGH COORDINATION WITH FEDERAL, STATE, AND LOCAL AGENCIES IN ORDER TO RETAIN AND EXPAND ITS SHARE OF THE MARKET AS THE TOP-RANKING CRUISE PORT IN THE WORLD AND AS ONE OF THE LEADING CONTAINER PORTS IN THE NATION WHILE CONSIDERING ITS EFFECT ON THE COMMUNITY AND THE ENVIRONMENT.

OBJECTIVE PM-1

THE PORT SHALL MAINTAIN AND RENOVATE EXISTING PASSENGER FACILITIES AND COMPLETE THE CONSTRUCTION OF NEW PASSENGER FACILITIES REQUIRED BY THE YEAR 2025 TO ACCOMMODATE THE PROJECTED NUMBERS OF CRUISE AND FERRY PASSENGERS AND SHIPS.

POLICIES

PM-1A. The Port shall construct new berths and terminals to the extent possible to accommodate the projected volumes of passengers and ships.

PM-1B. The Port shall construct parking, roads, and other ancillary improvements required on and off island to service existing and new cruise facilities.

PM-1C. The Port shall rehabilitate existing terminal facilities wherever required and possible.

PM-1D. The Port shall continue its policy for flexibility in the construction of its facilities so as to accommodate both mega-cruise ships and smaller cruise ships.

PM-1E. The Port shall respond to new and expanding passenger and car ferry markets through appropriate studies and construction of appropriate facilities.

OBJECTIVE PM-2

THE PORT SHALL EXPAND ITS CARGO-HANDLING AND RELATED INTERMODAL FACILITIES TO THE OPTIMUM EXTENT POSSIBLE BY THE YEAR 2025 TO ACCOMMODATE THE PROJECTED CARGO TONNAGES.

POLICIES

PM-2A. The Port shall construct new berths, aprons, operations areas, and storage areas to the extent required for the projected cargo tonnages.

PM-2B. The Port shall provide and manage its cargo-handling equipment to the extent necessary to load and off-load the projected cargo in an efficient and competitive manner.

PM-2C. The Port shall construct additional railroad tracks, marshaling yards, intermodal logistic transfer facilities on-island and off-island as well as other access improvements necessary for the efficient, competitive, and rapid movement of cargo.

PM-2D. The Port shall continue to monitor cargo operations and update its cargo master planning documents as needed.

OBJECTIVE PM-3

THE PORT SHALL COORDINATE LANDSIDE AND WATERSIDE TRANSPORTATION ISSUES WITH PERTINENT FEDERAL, STATE, REGIONAL, COUNTY, AND CITY AGENCIES.

POLICIES

PM-3A. The Miami-Dade County Seaport Department shall continue to work in partnership with the Florida Department of Transportation (FDOT), the South Florida Regional Transportation Authority (SFRTA), the Metropolitan Planning Organization (MPO), Miami-Dade Transit (MDT), the City of Miami, the Downtown Development Authority (DDA), and other affected entities to coordinate updates to plans and programs affecting the County's roadway and transit networks that are important to the movement of port-related freight and cruise passengers, and to incorporate recommended provisions, as appropriate. These plans include: the Long Range Transportation Plan (LRTP), the Transportation Improvement Program (TIP), the Strategic Intermodal System Plan (SIS), the Miami Downtown Transportation Master Plan (MDTMP), the Downtown Development Master Plan (DDMP), and similar plans and programs of other responsible entities.

PM-3B. The Port shall continue to work with applicable agencies on comprehensive analyses of its transportation requirements for the next 20 years to meet additional projected cruise passenger and cargo transport needs.

PM-3C. The Port shall continue to work with the Florida Department of Transportation and all applicable agencies to implement the Port of Miami Tunnel which will create a direct port/interstate transportation link.

PM-3D. The Port shall continue to work with all appropriate State, Regional, County, and City agencies and governments to assure that any actions that could either facilitate or impede planned port growth and development are fully evaluated.

PM-3E. The Port shall collaborate with regional agencies who seek synergistic solutions to the region's multimodal transportation constraints. Collaborative activities reflecting the growing importance of regional transportation planning are expected to include implementation of inclusive plans and studies.

PM-3F. The Port shall continue to work with State, County, and City agencies to identify and improve the key problem intersections and improve access to and from the Port.

PM-3G The Port shall continue its partnership with the US Army Corps of Engineers to improve both capacity and safety issues with the Miami Harbor Navigational Channel.

OBJECTIVE PM-4

THE PORT SHALL MAINTAIN AND IMPROVE EXISTING FACILITIES AND SUPPORT INFRASTRUCTURE TO EXTEND THEIR SERVICE LIFE AND MAXIMIZE EFFICIENCY SO AS TO MINIMIZE THE REQUIREMENTS FOR NEW FACILITIES, AND KEEP PACE WITH EVOLVING INDUSTRY TRENDS AND TECHNOLOGY.

POLICIES

PM-4A. The Port shall continue to update its comprehensive preventive maintenance program for its facilities.

PM-4B. The Port shall continue to provide adequate facilities and personnel to implement its preventive maintenance program.

PM-4C. The Port shall continue to evaluate and improve equipment, technologies, and related facilities deemed necessary to support existing and expanded operations.

PM-4D. The Port shall continue to encourage its users to be more efficient in their use of land and operations.

PM-4E The Port, as a single purpose enterprise fund, shall manage its finances accordingly to invest in maintaining the Port's facilities and infrastructure for its daily operations and the safety and security of its users.

OBJECTIVE PM-5

THE PORT SHALL COORDINATE PORT EXPANSION ACTIVITIES TO ACHIEVE APPROPRIATE LAND USES, JOINT-USES, AND JOINT-VENTURE PARTNERSHIPS.

POLICIES

PM-5A. The Port shall work with other agencies and the private sector to maximize the economic benefits to be derived from expanded port operations.

PM-5B. The Port shall consider other uses including, but not limited to, commercial, recreational, cultural, and hospitality uses accessible to port users, county visitors, and residents in its on-island and off-island port developments, so long as these uses are compatible with the primary port use.

PM-5C. The Port shall consider multi-use options for all new facilities, including dual purpose, cruise terminals, parking garages, and mixed-use development.

OBJECTIVE PM-6

THE PORT SHALL CONTINUE TO IDENTIFY AND OBTAIN, IN A TIMELY MANNER, ALL REQUIRED PERMITS, LEASES, DEVELOPMENT APPROVALS OR LAND ACQUISITION NEEDED TO IMPLEMENT ITS MASTER DEVELOPMENT PLAN; TO CONSTRUCT AND OPERATE ITS FACILITIES IN COOPERATION WITH THE APPROPRIATE FEDERAL, STATE, AND LOCAL AGENCIES, AND IN CONFORMANCE WITH THE MIAMI-DADE COUNTY COMPREHENSIVE DEVELOPMENT MASTER PLAN.

POLICIES

PM-6A. The Port shall develop and operate its facilities in conformance with applicable Federal, State, and County regulations.

PM-6B. The Port shall take cognizance of all relevant portions of the Miami-Dade County Comprehensive Development Master Plan and development regulations in the construction and operation of its facilities while, at the same time, recognizing the unique needs and public role (including navigational safety) of deep-water port facilities in Miami-Dade County. Of particular relevance are the provisions of the land use, conservation, coastal management, and transportation elements which must reflect port requirements.

PM-6C. The Port shall work with the Miami-Dade County Department of Planning and Zoning to consider the appropriateness of a seaport overlay zoning district to accommodate port-compatible mixed-uses, appropriate landscaping and review of setbacks and signage, such that by not having a County zoning designation, it is understood that, as per State Statute 125.015, the Port, being owned and operated by Miami-Dade County and lying within boundaries of the City of Miami, shall be under the exclusive jurisdiction of the County and shall be without the jurisdiction of said municipality.

PM-6D. The Port shall represent the County's maritime community in enhancement of navigation, safety, and commerce.

OBJECTIVE PM-7

THE PORT SHALL WORK WITH COUNTY DEPARTMENTS AND UTILITY PROVIDERS TO ENSURE THAT NECESSARY CAPACITY IS AVAILABLE TO SUPPORT EXISTING AND PROPOSED USES IN ADVANCE OF NEED.

POLICIES

PM-7A. The Port shall continue to implement best management practices, monitoring programs and other measures to improve stormwater quality per its National Pollutant Discharge Elimination System Stormwater Pollution Prevention Plan.

PM-7B. The Port shall continue to implement its Stormwater Management Master Plan which identifies existing stormwater infrastructure conditions and any potential need for infrastructure improvements that may be required to meet NPDES and State of Florida water quality standards. The Port shall propose amendments to the Capital Improvement Element to implement improvements, either through planned development and redevelopment activities or through retrofitting of existing areas.

PM-7C. The Port shall continue to work in partnership with Miami-Dade County's Water and Sewer Department (WASD) to assess the capacity of water lines and determine if additional capacity or water pressure is needed to accommodate future development. The Port shall schedule necessary improvements to the water system in the Capital Improvement Element.

PM-7D. The Port shall continue to work cooperatively with its utility providers to determine cost-saving sustainable projects to be implemented on-island.

OBJECTIVE PM-8

THE PORT SHALL PROMOTE SOUND ENVIRONMENTAL PRACTICES IN ITS DAY-TO-DAY OPERATIONS AND LONG-TERM MAINTENANCE AND EXPANSION PLANS CONSISTENT WITH THE UNIQUE ROLE AND RESPONSIBILITIES OF DEEP-WATER PORT FACILITIES THROUGH COOPERATION WITH ALL LEVELS OF GOVERNMENT AND THE COMMUNITY.

POLICIES

PM-8A. The Port shall continue to periodically review its environmental practices in response to new information and community issues.

PM-8B. The Port shall continue to maintain or obtain, as appropriate, environmental agency approvals for existing and proposed port expansion activities including extension of existing permits as necessary and preparation of new master expansion permits to address longer range expansion plans. The Port shall ensure that required mitigation is implemented, including but not limited to, creation of artificial reefs and habitat restoration and enhancement activities in Biscayne Bay. The capital projects proposed in this plan element constitute the development program to be undertaken by the Port, with full acknowledgement that each project may proceed only after required environmental and community evaluations are conducted, regulatory and CDMP conformity are determined, and regulatory approvals are obtained.

PM-8C. The Port shall update the Dredged Materials Management Plan, as needed, to continue to address long-term needs for spoil disposal and beneficial use of dredged material. It will include reasonable effort to place beach quality sand from construction and maintenance dredging and Port-development projects on adjacent eroding beaches.

PM-8D. The Port shall continue to encourage its users to comply with applicable existing policies designed to minimize particulate emissions from ships in port.

PM-8E. The Port shall continue to ensure that the disposal of any spoil not used as fill in its land area is conducted in accordance with permits.

PM-8F. The Port shall continue to stabilize all its remaining unconsolidated shorelines and minimize the turbidity associated with maintenance dredging.

PM-8G. The Port shall explore the feasibility of implementing sustainable projects on-island and off-island which will reduce the inefficient use of natural resources. When applicable, the Port shall follow County Ordinance 07-65 which promotes green design, construction, and operation of buildings that are developed, constructed, and managed by the County.

OBJECTIVE PM-9

THE PORT SHALL COORDINATE OFF-ISLAND EXPANSION ACTIVITIES WITH AFFECTED COMMUNITIES.

POLICIES

PM-9A. The Port shall conduct the following analyses relative to off-island expansion activities as part of an integrated planning and public participation process: impact analysis on surface transportation linkages, environmental resources, adjacent land uses, and water, wastewater, and solid waste facilities.

PM-9B. The Port shall integrate expansion activities into the physical, social, and economic fabric of the surrounding communities.

PM-9C. The Port shall provide public access to the waterfront when appropriate and not in conflict with safety and operation practices.

OBJECTIVE PM-10

THE PORT SHALL RECOGNIZE FEDERAL, STATE, AND LOCAL SECURITY NEEDS IN ALL PORT OPERATIONS, EXPANSION AND NEW CONSTRUCTION.

POLICES

PM-10A. The Port shall continue to assess its security operations as required by Federal, State, and Local security requirements. The Port shall update its Security Plan to address requirements as needed.

PM-10B. The Port shall seek funding from Federal, State, and Local sources to address security issues related to the approved Security Plan. The Port shall construct improvements and make operational modifications as funding becomes available.

PM-10C. The Port shall ensure that new projects are designed and constructed in accordance with the approved Security Plan and applicable local, state, and federal security laws.

PM-10D. The Port shall consider operational and infrastructure modification to accommodate military vessels and uses, as warranted, fulfilling security needs.

PM-10E. In the event of an apparent conflict between the Port's security requirements (as defined by the Port's Security Plan, Federal, State, and Local law and/or agency directives) and other objectives in this sub element, the security-based requirements shall prevail.

SECTION 4

CRUISE AND FERRY

4.1 OVERVIEW

This section discusses the future of cruises at the Port of Miami and the facilities required to meet the needs. These forecasts are used as the baseline for the business plan and physical master plan efforts for the Port to determine future facility demand and financial performance.

The cruise forecasts assess the current industry trends impacting future cruise passenger and vessel throughput for the Port of Miami over the 25-year planning period (2010 - 2035). This assessment of the Port's main revenue drivers identifies global and regional market trends that impact potential levels of traffic.

4.2 PROJECTION OF CRUISE TRAFFIC

The projection models and results used to forecast the Port of Miami traffic are based upon current knowledge of the region and historical data collected during the assessment process.

Qualifications for the Port of Miami's growth scenarios offered within this section, based on the projection models, include the following:

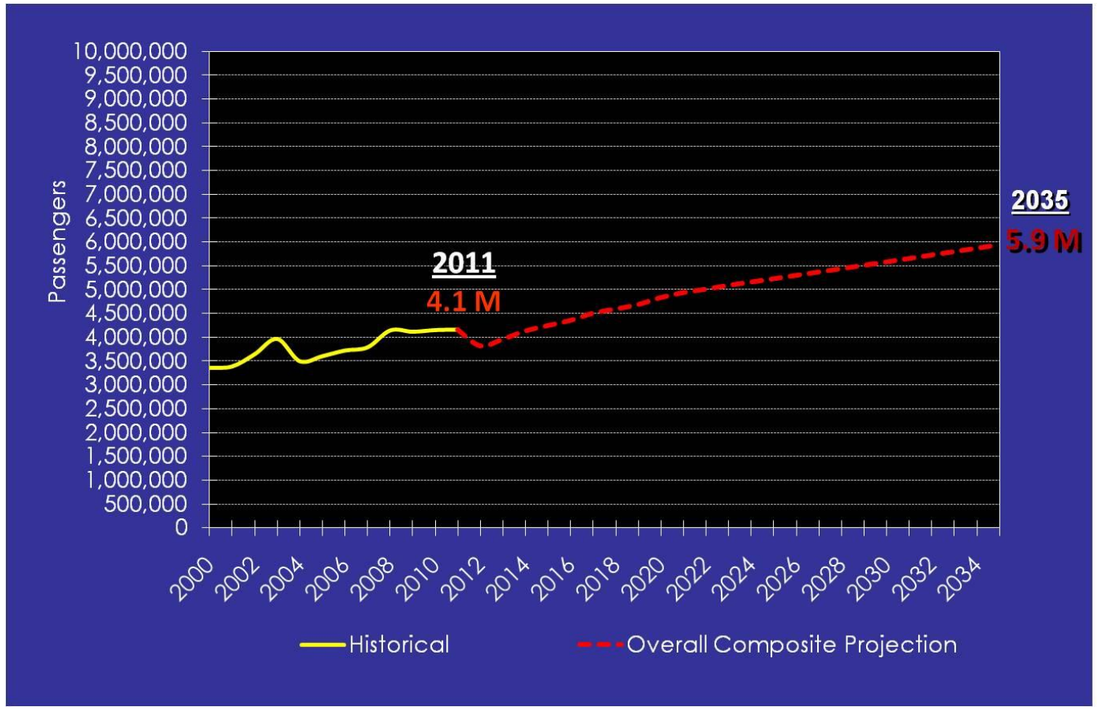
- Despite recent (and potential future) major events in world affairs, projections anticipate that the cruise industry will continue to follow fundamental positive trends.
- The forecast methods and various assumptions inherent in each incorporate the Consultant Team's best interpretation of demand and supply conditions in the marketplace as of the date of this assessment.
- Projections were developed for cruise passenger throughput first, with anticipated vessel arrivals extrapolated from this total using observed average vessel sizes for the Port of Miami.
- Tariff and general destination service levels are assumed to remain constant with those presently observed.

The projections are unconstrained and do not consider the potential berth capacity, peaking utilization, or other limiting factors of the Port of Miami as well as downstream port facilities within the Caribbean or other future cruise patterns that may be served. In the berth demand section of the Master Plan Report a deeper assessment on impacts of utilization and peaking are provided.

From information assembled as part of the planning process, several scenarios were developed for cruise operations which reflect the most likely assumptions for growth for the Port of Miami through 2035.

Figure 4.1shows the most likely passenger throughput scenario for the Port of Miami with a growth rate of 1.79% per annum. However, the cruise line industry deployments do not necessarily increase at a steady annual rate, but rather through a saw tooth pattern based upon the deployment of larger vessels replacing smaller or the placement of a new vessel into an itinerary. Therefore, annual fluctuations will occur in these projections.

FIGURE 4.1: MOST LIKELY PASSENGER PROJECTION, 2011 - 2035



In Figure 4.2 the most likely cruise calls are shown based upon the composite. As presented, the passengers per sailing moves from 2,733 in 2011; 2,632 in 2015; 2,728 in 2020; 2,839 in 2025; 2,954 in 2030; and, 3,074-passenger per sailing in 2035. This is an increase of 0.52% per annum.

FIGURE 4.2: MOST LIKELY PASSENGERS PER CRUISE SAILING, 2011 – 2035

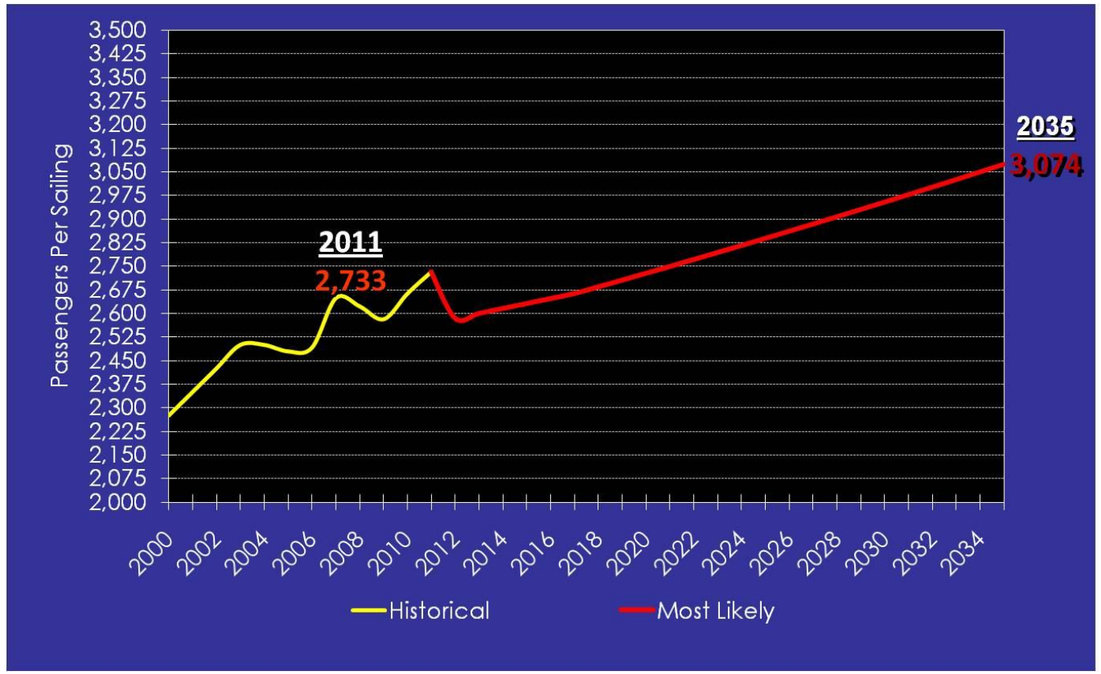
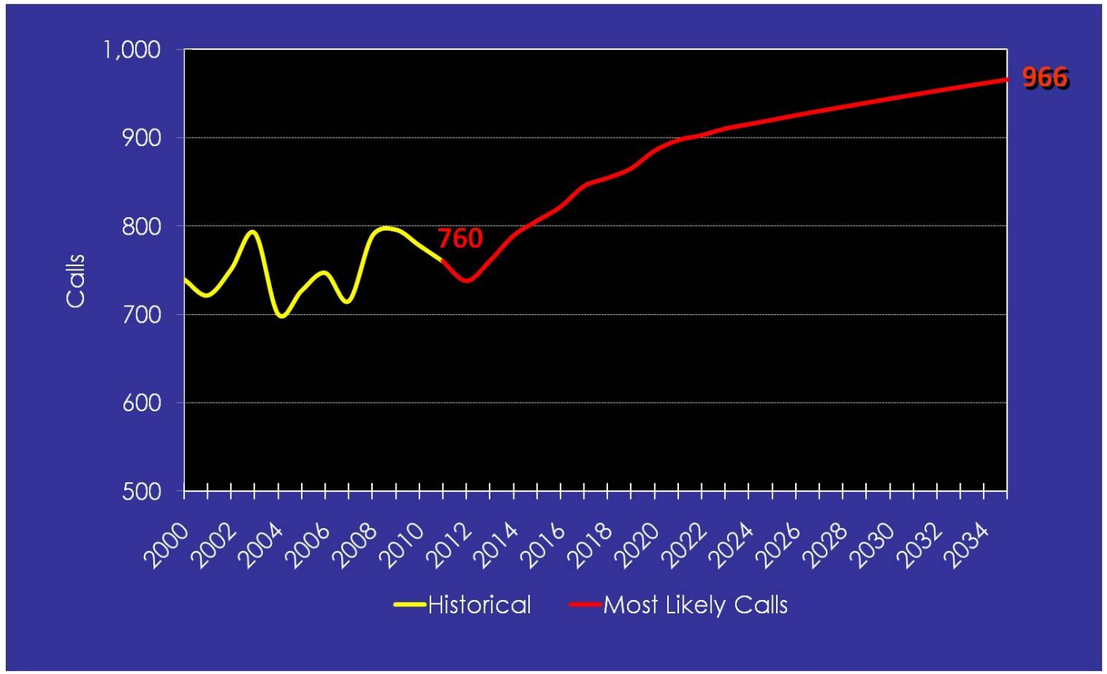


FIGURE 4.3: MOST LIKELY CRUISE CALLS PROJECTION, 2011 – 2035



Based upon the most likely revenue passenger projection and the passengers per sailing as illustrated on a per year basis the overall number of anticipated calls grows from 760 in 2011 to 885 in 2020 and to 966 calls in 2035 as shown in Figure 4.3.

4.3 CRUISE BERTH DEMAND

4.3.1 CRUISE VESSEL GROWTH TRENDS

To forecast the facility requirements to meet the projections, it is important to take into account the anticipated trends in ship construction and deployment. This section illustrates the requirements of the industry relevant to the construction and deployment of cruise vessels in the worldwide cruise market and Caribbean region, in general. A summary of this section is presented below:

- In November 2009, Royal Caribbean International delivered the first new-build of the next generation of cruise vessel – *Oasis of the Seas*. It is approximately 43 percent larger than their other largest vessel delivered in spring 2006 – *Freedom of the Seas* - at 220,000 gross tons (GT). The sister ship - *Allure of the Seas* – was delivered in fall 2010. Also in summer 2010 the 150,000-GT, 325-meter LOA cruise vessel - *Norwegian Epic* - capable of accommodating more than 4,200 passengers and crew began seasonal sailings from the Port of Miami. NCL also ordered two additional vessels for delivery in 2013 and 2014 at 4,000 passengers each. RCCL has also begun a new shipbuilding program named *Project Sunshine* to deliver their next generation 4,100 passenger vessel.

- As of July 2011, 18 new cruise vessels (large and small types) with a total berth capacity of 56,215 are scheduled for delivery over the next six years (2010 through 2016). A total of 18 vessels have been delivered since December 2010 with a berth capacity of more than 36,000 berths. For comparison purposes, in December 2006, the forward cruise vessel order book contained 29 vessels with a berth capacity of approximately 85,000.

- The evolution of the cruise vessel has been one of the principal mechanisms propelling industry growth. Over the past ten years, the newest and most popular generation of vessels continues to offer greater passenger volumes, beams and lengths to accommodate the area needed for large-scale outside cabin development. These vessels range in length from 965 to 1,300 feet and have an average lower berth passenger complement of between 1,950 and 5,400.

For the Port of Miami to remain competitive in the regional marketplace and be able to fully accommodate the service requirements of the future generation of cruise vessels, current and future berth, terminal facilities, and upland support areas will need to accommodate these large cruise vessels. This will include the ability to offer industry operators facilities and venues capable of accommodating a passenger complement upwards of 5,000 to 6,000 passengers per vessel into the mid to long-term. The core market will continue to reflect the predominant brands sailing from the Port of Miami including vessels ranging from 2,000 to 4,200-passengers per vessel.

Selection of a model design vessel or vessels dictates a programmatic response for the Port of Miami that will allow the Port to meet cruise industry needs, maintain competitiveness in the region, and plan homeport operations as deemed

viable and within best practices, established in conjunction with stakeholders, to be a marquee cruise homeport and cruise tourism destination.

CRUISE VESSEL NEW-BUILD PROGRAM

Cruise operators have been highly successful in introducing new vessel inventory and developing onboard products that generated sustained interest in cruising. Lines continually work to improve the quality and quantity of onboard experiences with more diverse food and beverage venues, entertainment and deck activities, meeting and conference facilities, and recreation areas.

Amongst the largest of their efforts is the continuous repositioning of smaller older vessels and the creation of larger and more lavish vessels furnished with veranda-style outside cabins, grand central atriums, health spas, and other amenities found in the best land-based resorts. This trend became the norm in the mid-1990s and has continued as cruise brands introduce innovative products and services on the newest vessels to further differentiate themselves from the competition and generate renewed public interest in cruising.

The review of future vessel deliveries, as shown in Tables 4.1 and 4.2, remains the primary tool used to project future industry passenger growth. Responding to cruise passenger demand, cruise operators continue to order new vessels, although at a more restrained pace than observed at the peak of vessel orders in the late 1990s and early 2000s.

In the past two years, eight new small and mid-size ships have been delivered into the marketplace. Oceania Cruises (1,260-pax.) and Hapag-Lloyd (516-pax.) each have ships on order for delivery in 2012 and 2013.

For European consumers, cruise operators have added numerous products and services to meet the needs and expectations of the cruise passenger inclusive of themed areas, pubs, multiple dining areas, expanded casinos, and onboard interior themes.

The last of the larger 100,000-GT plus vessels for delivery into the worldwide cruise fleet is far from over. More than half of the vessels delivered or on order since 2009 exceed the 120,000-GT mark with this number increasing annually.

Based on cruise line interviews and an understanding of the cruise line market, these next generation vessels (more than 1,050 to 1,400 feet) will be, for the most part, purpose-built and intended for specific deployments – most likely the Caribbean and Mediterranean.

Table 4.1: Large Cruise Vessels on Order Worldwide, July 2011
Source: Cruise Community and B&A

Cruise Operator	Vessel Name	Gross Tonnage	Lower Berth Capacity	Cost (US$ Millions)
2012				
AIDA Cruises	*AIDAmar*	71,000	2174	$565
Carnival Cruises	*Carnival Breeze*	130,000	3690	$738
Celebrity Cruises	*Celebrity Reflection*	122,000	2850	$798
Costa Cruises	*Costa Fascinosa*	114,200	3012	$726
MSC Cruises	*MSC Divina*	140,000	3502	$742
Disney Cruise Line	*Disney Fantasy*	124,000	2500	$899
2013				
AIDA Cruises	*unnamed*	71,300	2192	$417
Princess Cruises	*Royal Princess*	141,000	3600	$735
NCL	*Project Breakaway*	143,500	4000	$950
Costa Cruises	*unnamed*	132,500	4928	$790
2014				
Princess Cruises	*unnamed*	141,000	3600	$735
NCL	*Project Breakaway*	143,500	4000	$950
RCCL	*Project Sunshine*	158,000	4100	$1,032
2015				
P&O Cruises	*unnamed*	141,000	3611	$760
AIDA Cruises	*unnamed*	125,000	3250	TBA
2016				
AIDA Cruises	*unnamed*	125,000	3250	TBA

Table 4.2: Small and Mid-Size Cruise Vessels on Order Worldwide, July 2011
Source: Cruise Community and B&A

Cruise Operator	Vessel Name	Gross Tonnage	Lower Berth Capacity	Cost (US$ Millions)
Oceania Cruises (2012)	*Riviera*	65,000	1260	$530
Hapag-Lloyd (2013)	*Europa 2*	39,500	516	$360

DESIGN VESSEL REQUIREMENTS

Design vessel requirements for the Port of Miami homeport operations provide a heavy leaning toward the deployment of larger vessels into the Port and marketplace. Historically, the Port has catered to the mid-size to larger cruise vessels in the North American and, more recently, the worldwide fleet. This trend is likely to continue into the long-term. Albeit, the Port does serve some smaller vessels of the Oceania, Crystal, SeaDream, and World cruise fleets.

Using large vessel design parameters, consideration can be given to each of the primary infrastructure categories required to support the Port of Miami's cruise operations with specific emphasis on the primary infrastructure of entrance channels, turning basins, berths, passenger terminals, ground transportation areas, and other elements.

The Port of Miami presently has demand to serve post-Panamax and super post-Panamax vessels into the long-term. For the Port, the ability to accommodate ships of more than 120,000 to 150,000 GT and approximately 1,200 feet LOA, is a key factor in its ability to serve as a primary regional cruise homeport. The net result of the vessel development trend is that current and future facilities will need to accommodate large cruise vessels for the Port to remain competitive.

DESIGN VESSELS

Selection of a model design vessel(s) dictates a programmatic response for the Port of Miami. This will allow the Port to meet cruise industry needs, maintain competitiveness, and plan homeport operations as deemed viable and within best practices established in conjunction with cruise line stakeholders to be a key cruise homeport and destination. To facilitate the Port of Miami 2035 Master Plan, a recommended series of design vessels for the Port over time is presented. Based upon the plan layout for berthing it is envisioned that, to accommodate all classes of vessels that may utilize the Port, facilities that berth layout design must be in conjunction with the super post-Panamax vessels allowing for a 1,200-foot berth. Upland areas may be developed to provide for a wider range of facilities to then accommodate vessels ranging from post to super post-Panamax as shown in Table 4.3.

These design vessels incorporate the features of the various classes that are becoming industry standards, including the *Destiny*, *Dream*, *Victory*, *Voyager*, *Freedom, Oasis,* and *Epic* classes. Based on these design vessel characteristics, a series of berth requirements for future master planning of cruise infrastructure development is outlined below:

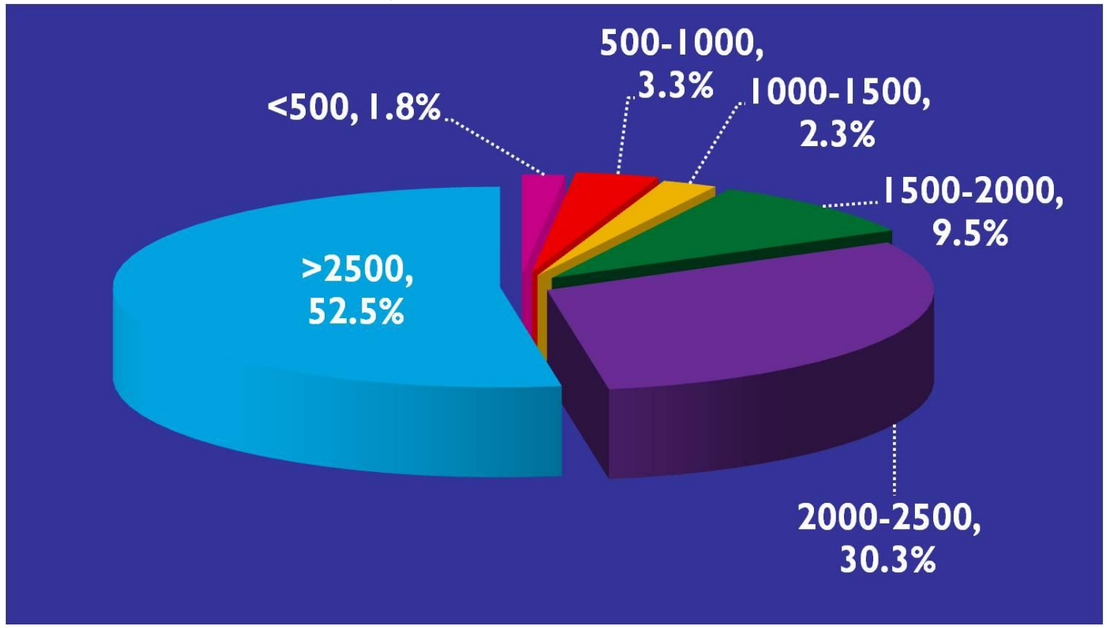
- Berth: 1,200-foot LOA plus approx. 60-ft. berth separation (1,260-ft. operational berth)
- Draft: 32-foot (excludes the Queen Mary 2 which requires 37 feet)
- Apron: 60 - 75 foot width
- Pier: 150- to 250-ton bollards
- Utilities: Water, telecommunications, power (alternative marine power assessment)
- Navigation: Adequate maneuvering and turning basins at 1.2 to 1.5 times vessel LOA

Table 4.3: Recommended Design Vessels for Port of Miami

TYPE	CURRENT	NEW BERTHS
	Design Vessel 2 (post-Panamax)	Design Vessel 3 (super post-Panamax)
Passengers	2,500 to 4,000	4,200 to 5,400
Crew	800 to 1,000	1,000 +
Gross Tons	90,000 to 130,000	140,000 to 225,000
Length Overall (feet)	985 to 1,100	1,100 to 1,300
Beam (feet)	130 to 165	140 to 185
Draft (feet)	28 to 32.8	28 to 32
Air Draft (feet)	Up to 210	210 +

Additionally, Figure 4.4 shows the dramatic differences in use of the Port of Miami facilities based upon overall passenger volume per sailing over a five year period. Some 82% of all cruise vessels sailing from the Port had volumes of more than 2,000-passengers. Over 52% of the cruise vessel sailings were more than 2,500-passengers. Over the mid- to long-term this overall disparity between large and small vessels at the Port will continue with less than 9% of the overall volume being less than 1,500-paassengers per vessel.

FIGURE 4.4: CRUISE VESSEL SIZE SPLIT, 2006 - 2010



4.3.2 TRAFFIC ANALYSIS

Part of the process in identifying long-term berth demand is to develop an understanding of the traffic patterns for the facility. For the Port of Miami a defined seasonal, monthly, and daily traffic pattern emerges through analysis of the historical traffic data. The drivers associated with the Port of Miami traffic patterns include the seasonality of the regional cruise market sector (Caribbean and Bahamas), profitability, and competition from cruise regions throughout the year, based on the same factors. Berth demand factors fall into five categories:

- **TOTAL VOLUME**. Volume depends on the amount of cruise traffic at the Port and the potential for future traffic within the peak seasons, months, or days;

- **SIZE OF VESSEL**. Larger vessels within the market over time will likely decrease the total volume of vessel calls, while increasing passenger throughput. Additionally, the LOA of the vessel is an important component in assessing the size of future infrastructure needed to support cruise operations;

- **SEASONALITY**. The majority of traffic is set during the peak Caribbean winter months of November through April due to weather conditions, but also because of the attainable profits seen in other summer markets such as Europe, Alaska, and the Mediterranean;

- **LENGTH OF CRUISE**. Cruise length directly affects the peak days in which a port experiences the majority of its cruise calls. For the Port of Miami, the majority of cruises are less than 8 days with future deployments likely falling into 5, 5, 4-day patterns. These patterns drive the peaking of weekend days; and,

- **DAILY FLUCTUATIONS**. The Port of Miami is relatively consistent in the types of sailing patterns. Thus, peak days occur on the peak weekend days (Fri – Mon) with other days of the week filling gaps required for the cruise lines to fill out their deployment patterns in the region.

Traffic patterns for the Port of Miami were evaluated based upon an historical assessment. The following elements contributing to Port demand were identified:

- Seasonal and monthly traffic patterns are primarily driven by the winter Caribbean season with a focus on November through April. Redeployment to the Caribbean is shrinking each year as the Mediterranean and other competing destinations worldwide draw away cruise vessels from the Caribbean region;

- The Port of Miami is successful as a key regional homeport providing service to the Caribbean and Bahamas regions as the primary target;

- Over the five year period (2006 – 2010) the months of December, January, and March provide the highest volume of cruise calls and passenger traffic with 10.7%, 11.1% and 10.8% respectively; and,

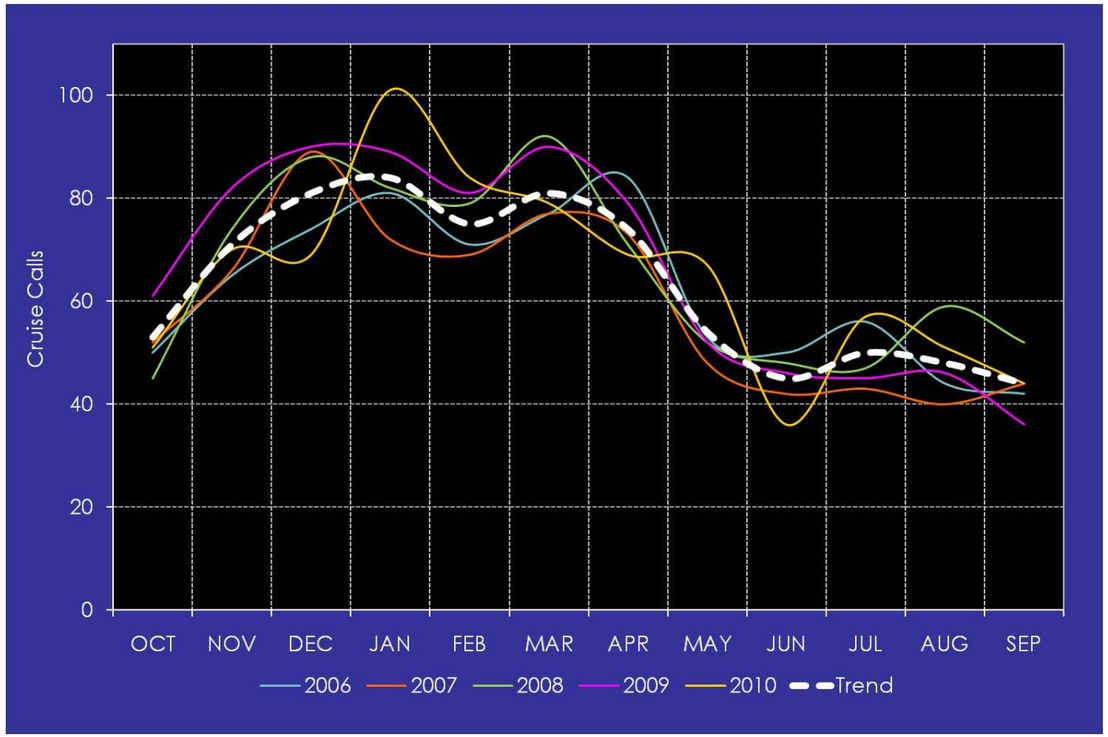
- The peak day for traffic over the period was Sunday. However, in 2009 there was a shift to more capacity sailings on Friday and Monday. That was somewhat offset in 2010.

MONTHLY TRAFFIC ANALYSIS AND SEASONALITY

For the Port of Miami, the peak monthly traffic occurs in the winter months of November through April each year. During this 6-month period, more than 61.9% of the annual traffic moves through the Port (10.3% per month). This is in line with the typical Caribbean winter cruise season. Additionally, the Port has maintained a year-round presence in the region from May through October with some 6.4% traffic per month over this period. This pattern will continue into the long-term barring any unforeseen changes in the Caribbean region.

Should Cuba open for North American (US resident) travel and cruise line visits providing additional port options then it is likely this figure will increase to some degree. Seasonal cruise activities can also be attributed to outside influences, primarily Europe, Alaska, and Mediterranean market trends. See Figure 4.5 for the actual numbers of calls on a monthly basis over the 5-fiscal year period. The trend line is indicative of the Ports traffic pattern and used as the long-term baseline for monthly traffic throughput.

FIGURE 4.5: MONTHLY PASSENGER TRAFFIC, 2006 - 2010



Based upon the most likely passenger throughput scenario over the 25-year projection term and the trend line from the monthly traffic splits, Figure 4.6 shows the long-term monthly throughput for every five years over the period. In the peak months of December, January, and March cruise calls grow from 82, 84, and 82 in 2011 to 104, 107, and 105 respectively in 2035.

Based on the projection assumptions, growth is envisioned to occur in a consistent seasonal pattern for regional traffic on sailings of less than eight days. This is primarily due to the competition from other worldwide summer destinations whereby the revenues will continue to draw traffic out of the regional cruise market catchments over the 25-year planning period.

Much of the long-term passenger growth (not cruise call growth) will be a reflection of the increased passenger capacity of the cruise vessels. This will be defined by the type of cruise sailing from the key regional homeports over the period. Further out into the projection planning period, it is more difficult to accurately reflect this outcome due to the number of influencing factors on deployments.

FIGURE 4.6: MONTHLY PASSENGER TRAFFIC, 2011 - 2035

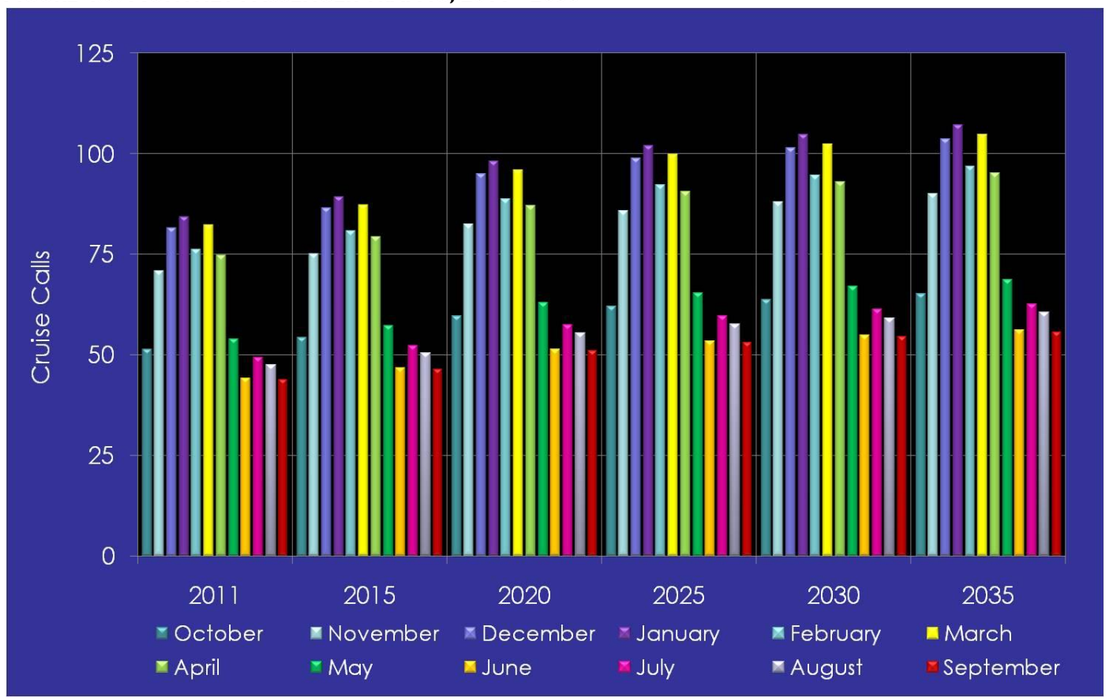
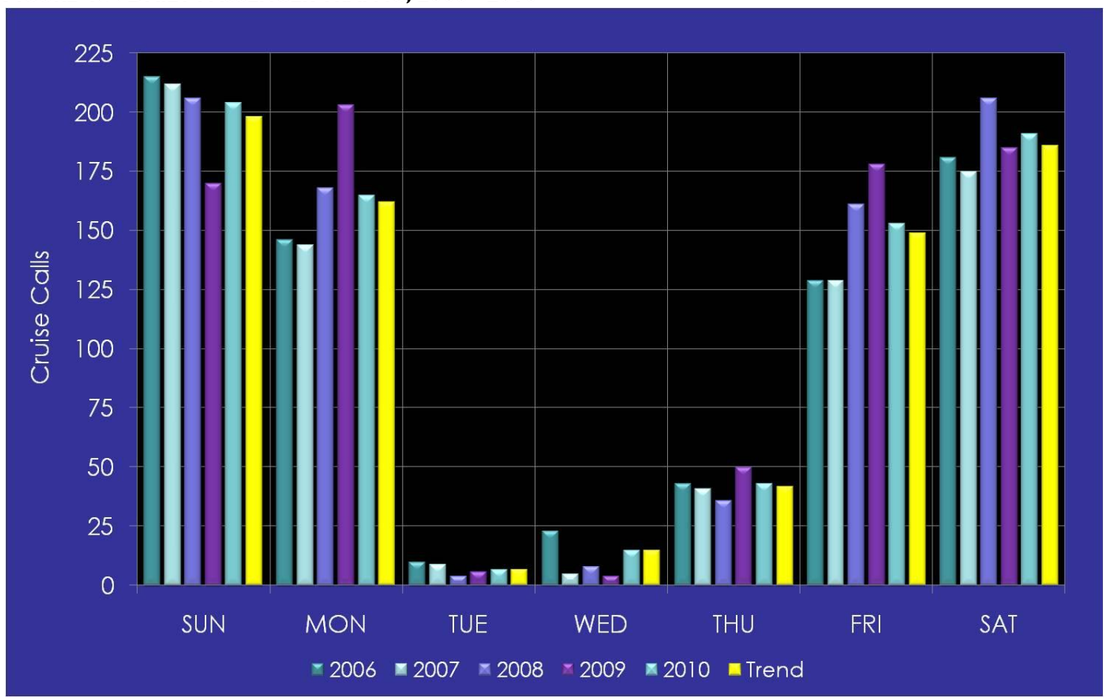


FIGURE 4.7: DAILY PASSENGER TRAFFIC, 2006 - 2010



DAILY TRAFFIC ANALYSIS

Figure 4.7 shows the daily passenger traffic patterns for the Port of Miami from 2006 through 2010. From a passenger volume perspective, Saturday and Sunday consistently have shown the highest passenger throughputs.

However, in 2009, there was a considerable increase in the Monday and Friday traffic accompanied by a decrease in weekend cruise calls. This change was due in part to the addition of the *Jewel of the Seas* on Monday/Friday departures; *Norwegian Sky* on Monday/Friday departures; and the switch of the *Carnival Destiny* on Monday/Thursday for the *Carnival Fascination* on Monday/Friday amongst others. The days from Friday through Monday will continue to be the busiest days for the Port of Miami as they are based upon the vacation patterns of the North American consumer.

If these change, and the European consumer becomes more prevalent in the market, these may be modified slightly into some additional mid-week sailings with a particular emphasis on Thursdays. These patterns are also indicative of a short-cruise duration market with an emphasis on 8-day; 5, 5, 4-day; and 3 and 4-day sailings that meet the demands of the North American consumer.

As shown, Saturday and Sunday are peak traffic days for the Port of Miami over the period with an average capture rate of 24.5% and 26.2% respectively. Monday is at 21.3% and Friday 19.6% on average.

Figure 4.8 illustrates a couple of different interesting facts for 2006 – 2010. First, it shows a comparison of the traffic splits between the Port of Miami and Port Everglades as the main South Florida competitor ports for traffic. As shown, the split in weekend vs. weekday traffic for Port Everglades is smaller than the Port of Miami due in part to the wider range of cruise type activities including day cruises and a larger variety of longer duration sailings of more than 8 days that typically come and go through the homeport on a variety of days. However, due to the deployment of RCI's *Oasis and Allure* on weekends this has incident has shifted.

For the Port of Miami, a more consistent traffic pattern is shown with an average of 91.6% of its traffic placed on the peak weekend days (Fri, Sat, Sun, Mon) and the remaining 8.4% on the midweek days. This is compared to approximately 80% of the traffic on peak weekend days and 20% on midweek days for Port Everglades over the period. There has been a slight increase in the peak weekend day capacity over the past three years with most of that traffic attributed to larger vessels and the deployment of ships to slots on Monday and Friday.

FIGURE 4.8: DAILY PASSENGER TRAFFIC PERCENTAGE COMPARISON, 2006 - 2010

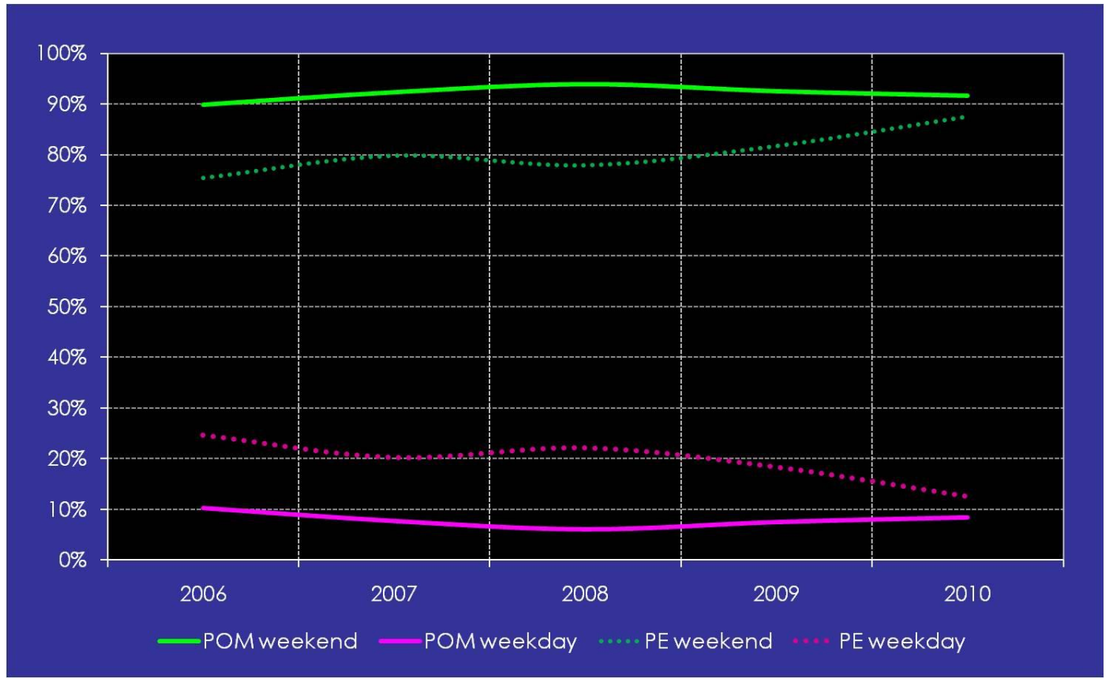
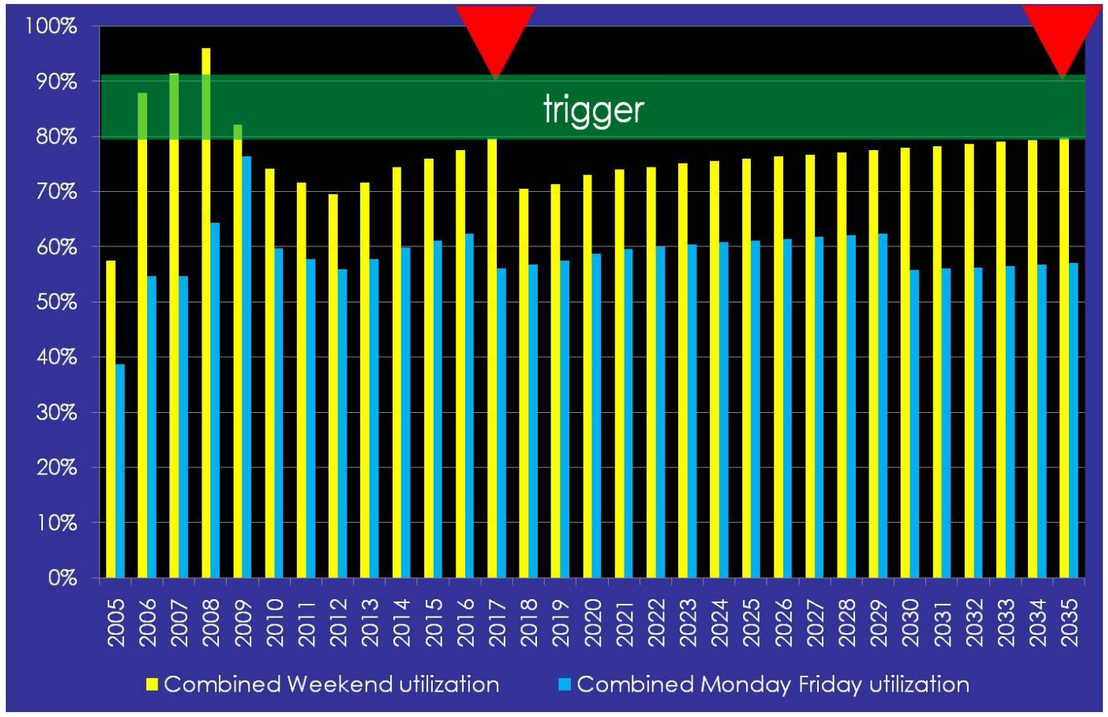


FIGURE 4.9: BERTH DEMAND, 2010 - 2035



For cruise ports, the consistency of cruise traffic calling on a year-round basis is a positive attribute. This consistency allows the Port to manage the cruise facilities through revenue planning, personnel scheduling, and other defined areas of operations. If cruise traffic is inconsistent on an annual basis, it poses challenges in terms of apportioning reserves to maintenance during low cruise traffic periods and places more demands on other aspects of the cruise operation.

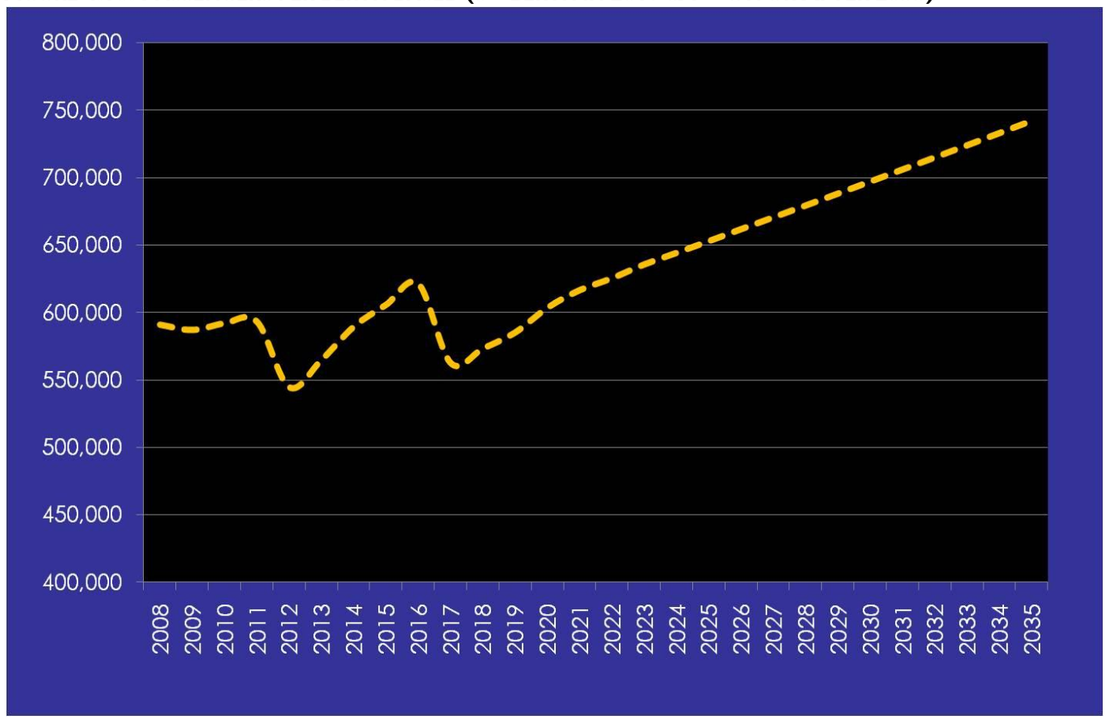
4.3.3 FACILITY DEMAND

Translating cruise passenger traffic assessment and forecasts into berth or facility demand over the projection period is an essential element in the overall master planning process for the Port of Miami. This process looks to identify the facility need over time and, more specifically, to focus on the timing of the facilities required to accommodate future traffic demand. Facility-demand forecasting relies on identifying cruise deployment patterns, establishing future vessel sizes, and forecasting vessel calls. The projection scenarios discussed prior provide a planning perspective that allows the Port's future decision-making processes to envision the potential maximum use of existing and future required facilities, whether berth, terminal, ground transportation areas or others.

Optimum berth demand is between 80 to 90% based upon daily or weekend utilization. Once this is achieved, an additional berth is likely needed to be able to meet the demand and allow for peak use on weekends and key days. For the purposes of this master planning study, we believe the majority of the berths should be able to accommodate the future design vessels of 1,100 feet LOA (berth size 1,260 feet). With this size berth, the facility can also accommodate vessels of less than these dimensions. Thus, the berth demand and projected requirements are based upon this berth length.

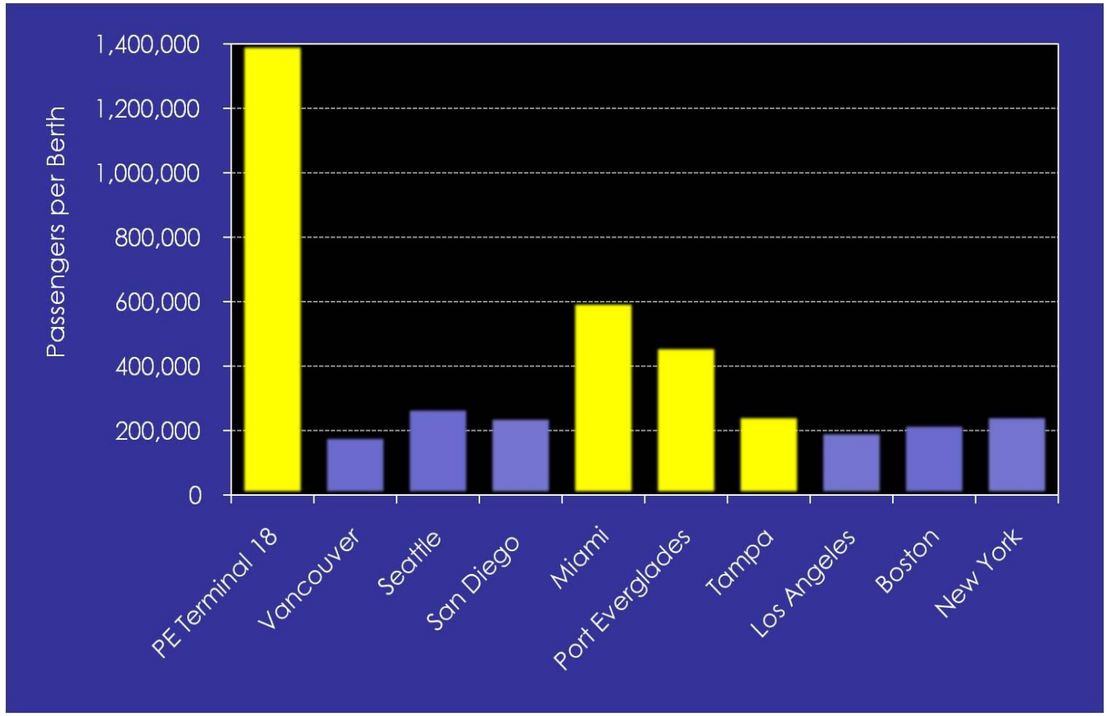
Figure 4.9 illustrates the anticipated demand for berths in the upcoming years based upon the triggers. As shown there is a total demand for up to 9 berths during the projection period with an extension of berth 6 and a seventh now; an 8th berth in 2017; and, a 9th berth in approximately 2035. As presented in the Master Plan, vessels of more than 900 ft. would berth along the North Channel due to pilotage concerns with moving larger cruise vessels along the South Channel. The Southern Terminal "J" would act as the overflow facility until 8 to 9 berths are built along the North Channel. All cargo would continue to be berthed along the South Channel long-term.

FIGURE 4.10: PASSENGERS PER BERTH BASED (8TH BERTH IN 2017 & 9TH ON OR AFTER 2035)



Based upon the berth demand scenarios presented in the Port of Miami projections, Figure 4.10 illustrates the numbers of passengers per berth use over the long-term. As shown, passengers per berth grow as high as 630,000 and 742,000 respectively before a new berth is added to lessen the strain on the cruise facility.

FIGURE 4.11: PASSENGER PER BERTH COMPARISONS, 2010



Additionally, Figure 4.11 shows the average per passenger per berth usage rates for a variety of North American ports. For 2010, the Port of Miami carried approximately 592,000 passengers per berth.

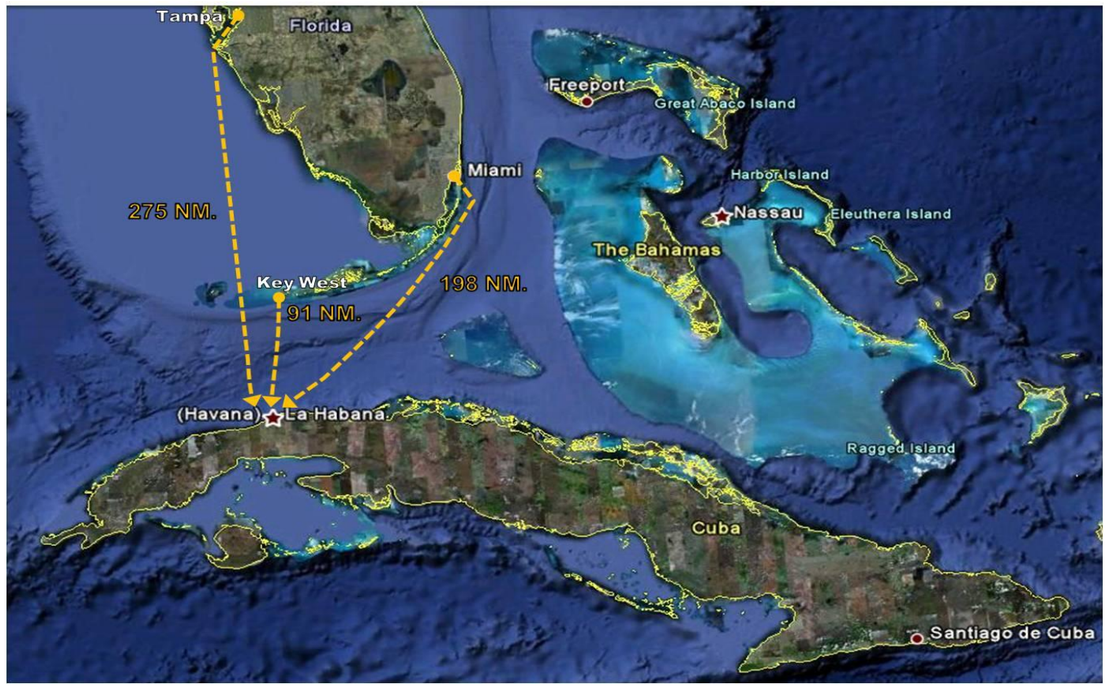
4.4 FERRY

North American operators have had success in understanding how to market and develop cruise products that appeal to the tastes of many diverse consumer groups. These operators suggest there are still opportunities within the Caribbean cruising region; as such, this region will be one of the many focuses of their development in the mid to long-term. For instance, the development of Cuba, offering a series of cruise ports and the continued development of new destinations throughout the region, will bolster mid to long-term interest in the region by cruise lines, and more important, by consumers. Cruise line deployments will also continue to be based upon outside influences directly related to other potential markets in Europe and Asia as these begin to open and develop.

It is not believed, based upon cruise line interviews, that the introduction of Cuba at any point will have a dramatic effect on increased capacity from the South Florida market. However, this will assist the region in maintaining its dominance. Additionally, there are likely limited opportunities for passenger ferry service as the airline industry will capture much of the market to the dispersed cities of Cuba. There is an opportunity in the short-term for ferry Ro-Pax services and Ro-Ro services to move people, vehicles, and construction supplies to the island community.

The Port of Miami is approximately 198 nautical miles from the Port of Havana as compared to 275 from Tampa (see Figure 4.12). This would allow for a competitive advantage from a speed and distance perspective in the development of ferry and cargo operations.

FIGURE 4.12: HAVANA, CUBA FERRY TRAFFIC



The development of shorter patterns sailings from South Florida on 3 to 5-day patterns to take advantage of the proximity of key Cuban ports may increase passenger throughput to some degree with the opening of Cuba to cruise tourism. However, many experts agree that the development of the infrastructure to support cruise tourism operations as seen in other Caribbean islands may take up to 2 to 3 years to develop once Cuba is open. This time period should also allow adequate development time for any U.S. ports to transition infrastructure, if necessary, to support new cruise operations.

FIGURE 4.13: PORTS OF CUBA

For both cruise and ferry operations, the island of Cuba provides a number of potential itinerary options including the following destinations, plus more:

- Havana;
- Matanzas;
- Baracoa;
- Santiago de Cuba:
- Manzanillo;
- Santa Cruz del Sur; and,
- Cienfuegos, among others.

From a competitive homeport standpoint, in the long-term, Havana, Cuba may compete for international (particularly European) homeport traffic as the airline industry deploys to the island with direct flights. However, the major portion of the cruise consumer market will be North American and is much more likely to use Cuba as a port-of-call rather than a homeport operation.

4.5 CRUISE LAYOUT ALTERNATIVES

4.5.1 OVERVIEW

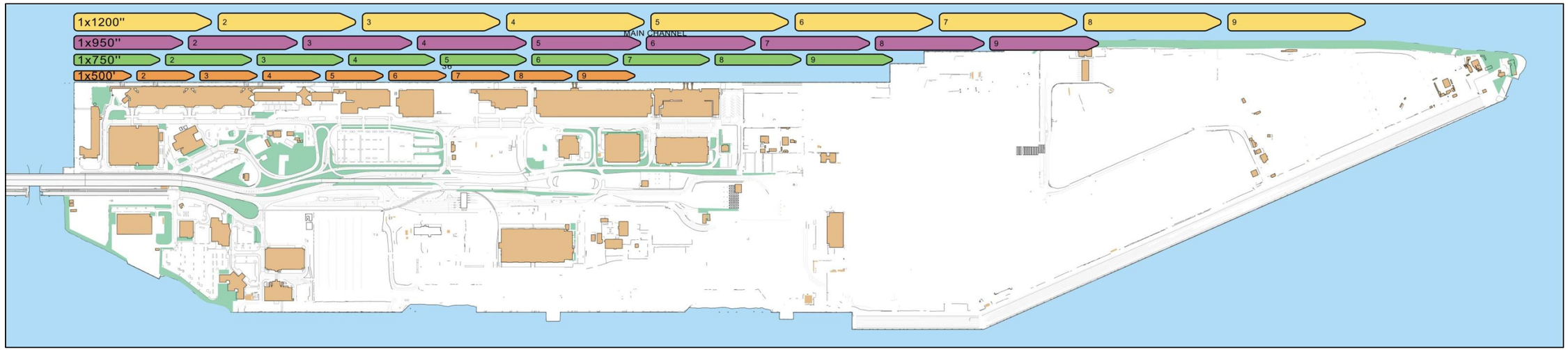
Historically, the Port of Miami has grown its cruise facilities organically as the need has arisen. This means that, as cruise vessel volumes (numbers of total vessels needing to be accommodated) as well as the vessel size (increases in vessel length, tonnage and passenger capacity) have increased, the Port has created the upland cruise terminal, ground transportation areas, and parking to accommodate the need. In many instances, the Port had to respond to customer needs within months and resorted to building a terminal at a location that might not be the best from a planning perspective, but rather it was the only practical solution at the time. While this mode of growth appears to be appropriate from a financial perspective, whereby the Port does not overly extend itself, this method does not work for long-term planning. What has occurred at the Port is that facilities built in the mid-1990's to serve that generation of cruise vessels are now out of place, creating conditions that impact operations and service for the Port and cruise line users.

As shown in Figure 4.14, as vessels have grown in length from 500-feet to more than 1,200-feet over the past thirty years, upland facilities built early on by the Port have been displaced along the berth and have become less user-friendly by increasing the walking distances. The drawing shows nine vessels ranging in length from 500-ft, 750-ft, 950-ft, and, 1,200-ft to illustrate the need for additional berth space as well as for making a careful and forward thinking decision when choosing the placement of appropriate upland cruise support facilities to meet future demands.

The Port already has a major investment in the four westernmost terminals (F, G, D, and E) as well as Terminals B and C where an additional $21million was recently spent to accommodate the *Norwegian Epic. T*he next question will arise when additional terminals are needed to the east. Therefore, for planning purposes, it is important to layout the optimum berth configuration and then decide upon the most appropriate location.

Of course, because of the flexibility inherent in this plan, the final decision of when and where to place the terminal can and should be made at the time that the need arises, however this will allow the Port to proceed with items that are very long-term in nature such as the environmental permitting and financial planning.

FIGURE 4.14: VESSEL IMPACTS ON UPLAND CRUISE FACILITIES



4.5.2 BERTH CONFIGURATION

In assessing the alternatives for the Port, a design vessel for the future was chosen and illustrated in the section above based upon cruise industry input. This design vessel allows for an understanding of the potential berth length requirements and assists in establishing the placement of upland facilities to allow for the best use of uplands.

Based upon the cruise market assessment and berth demand analysis, there is a demand for up to 9 berths of 1,200-ft. over the projection period of 2035. As such a 7th berth is required now, followed by an 8th berth in 2020 and a 9th berth in 2032. All of this cruise development would occur along the North Channel. This area would be separated from cargo operations to provide a passenger-friendly and sustainable cruise operations zone. In the short to mid-term, all cruise vessels over 900 ft. would berth along the North Channel. Terminal "J" on the South Channel would continue to be used for smaller vessels until at least 8 berths are built. Cargo would utilize the South Channel only.

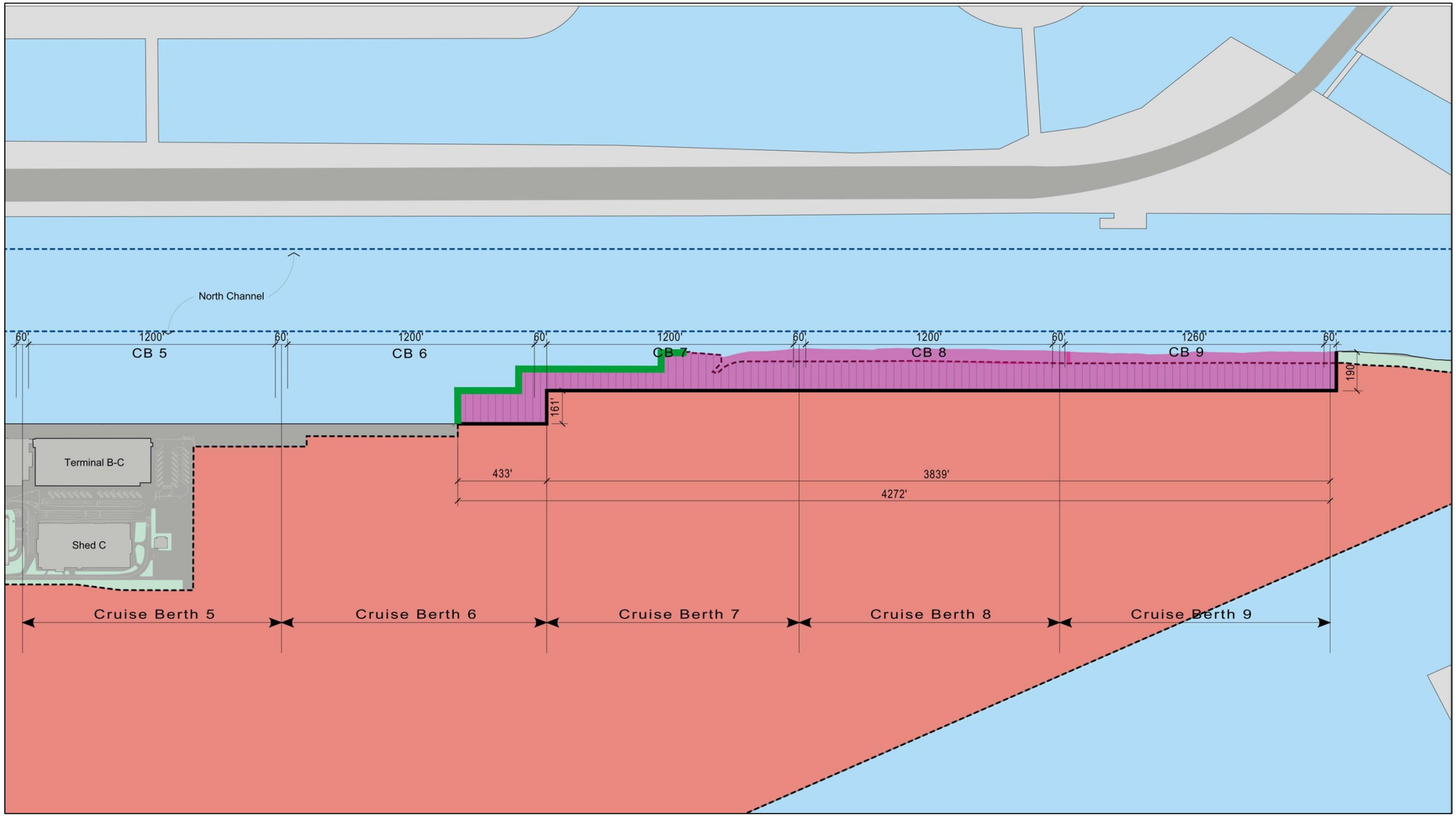
In order to accommodate the requirements for up to 9 – 1,200-ft. berths along the North Channel of the Port, an analysis was done as to the most viable approach to add these berths to the channel.

To allow for the extension of berth 6 and add at least two more berths along the channel, the option was chosen to cut into the island based upon cost, marine elements, and environmental balance.

Figure 4.15 shows the layout for up to 8 berths in the mid-term (through 2020) with a potential 9th berth in 2032 being placed to the east of berth 8. The green line on Figure 4.15 illustrates the existing bulkhead that would be removed and the proposed bulkhead added to create the linear berth configuration. These efforts would be phased in to the Port as required by demand. In making the determination of this decision, an option was studied that would include filling out in front of the existing bulkheads; that option, however, proved to be an inferior one due to cost implications, environmental considerations, and impeding traffic along the Main Channel.

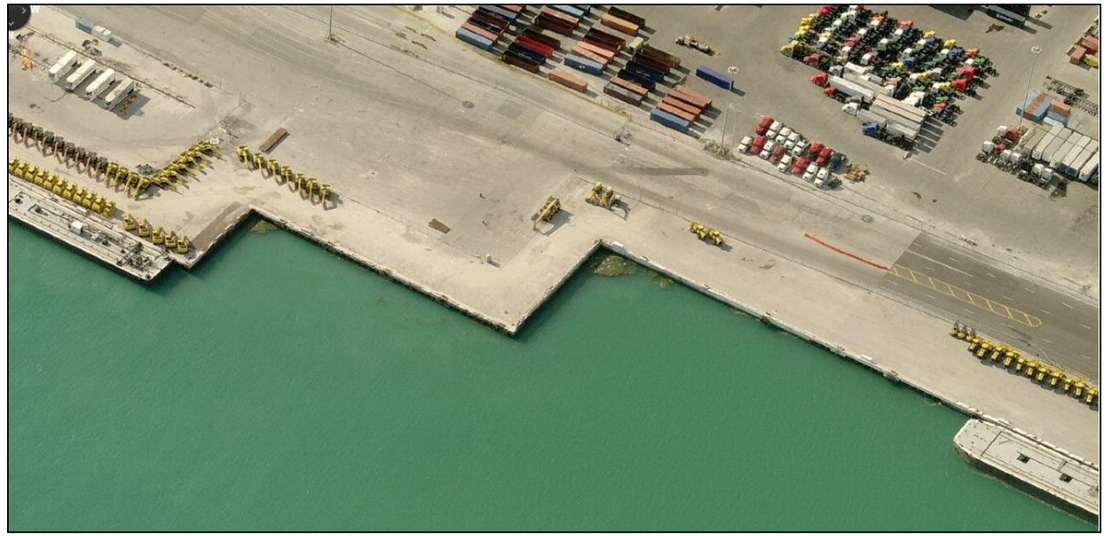
Approximately 12.1-acres of cargo area would be needed in order to develop this new cruise berth area and uplands support areas. The 9th berth would require an additional approximate 6 acres of cargo space. To fully implement the plan additional cargo area of more than the acreage needed for the berths would be required for the terminals and upland support areas.

FIGURE 4.15: NORTH CHANNEL CRUISE BERTH LAYOUT



The most significant challenge faced is the demolition of the existing bulkhead at the notch to accommodate a 6th large vessel. Figure 4.16 shows the notch along the North Channel. Also, of significance in the development of these new berths is the ability to provide a safe zone for cruise vessels to maneuver and pass along the North Channel. The Biscayne Bay Pilots conducted a series of cruise vessels simulations at the Star Center in Dania, Florida to ensure that there were no safety issues with the development of these new berths along the North Channel that may be hazardous to the cruise vessels. Based upon the simulation results and input from the Biscayne Bay Pilots, the preferred new berth development along the channel is shown.

FIGURE 4.16: NORTH CHANNEL BULKHEAD NOTCH



Costs were developed for each berth which includes demolition / removal, dredging, and construction of a new bulkhead for each berth. Table 4.4 illustrates the cost for each berth development project. As shown, the total cost for 8 berths is $65,900,000. Long-term (2033) an additional 9th berth may be required based upon projections at a cost of approximately $27.8-million. This is a total of $93.7-million.

Table 4.4: North Channel Berth Costs

Berth	Cost
6	$ 11,500,000
7	$ 26,600,000
8 (2020)	$ 27,800,000
9 (2032)	$ 27,800,000
TOTAL	$ 93,700,000

4.5.3 CRUISE TERMINAL LAYOUT

The Port has a fixed amount of land that can be used in various ways including cruise, cargo, and commercial. From a cruise perspective, future development of upland facilities should maintain maximum flexibility and return on investment. However, from the Port's perspective, the allocation of land is a more complex evaluation which weighs the available solutions' impact on each user, the environment, and the overall needs of the community.

The traditional approach of terminal development at the Port has been to build almost independent terminals for each ship. This now requires extensive infrastructure and the need for multiple Customs, Immigration, and security stations. As part of this plan, other options were considered to this approach. The concept of the sustainable development of twin or mega-terminals that can be positioned to service multiple vessels, that can align with different berth configurations, that can be accessed via walkways, that can be adjacent to the Ground Transportation Area (GTA) and parking facilities, and that can provide for mixed operations (such as security, CBP) to save on costs and perhaps even combining baggage and check-in long-term into the formula may apply.

Over the course of the study, numerous configurations were assessed for their merit into the long-term for cruise operations. Four long-term cruise layout alternatives were presented for assessment. They include the following:

4.5.3.1 ALTERNATIVE A1

These are linear twin terminals positioned to accommodate cruise traffic from berths 5 and 6; and, 7 and 8 respectively. Parking currently exists to service this terminal facility. The basic terminal package includes terminal, GTA and provisioning areas for each vessel with a shared parking area. See Figure 4.17.

FIGURE 4.17: ALTERNATIVE A1 LINEAR TWIN TERMINALS

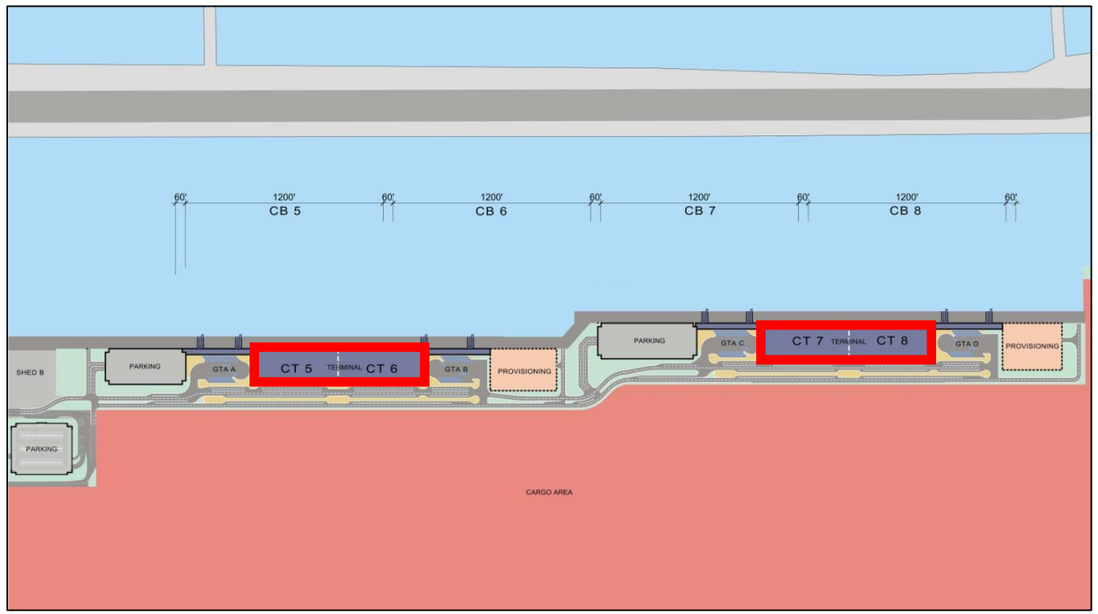


Table 4.5 provides the overall costs for this terminal alternative. As shown, parking is not required for the first CT 5 and CT 6 terminal as existing parking is available to provide adequate spaces. The addition of the CT 7 and CT 8 cruise complex does require an additional parking structure to accommodate approximately 1,400 vehicles at a cost of $15.4 million per terminal.

The cost for each terminal, inclusive of terminal structure, GTA, circulation, and provisioning area, is $52 million each. The total for the A1 Linear Twin Terminal Alternative is $30.8 million for parking structures and $208 million for the additional terminals.

Table 4.5: Alternative A1 Linear Twin Terminals Cost Estimate	
Parking for Cruise Terminals (CT)	
CT 5	Existing
CT 6	Existing
CT 7	$ 15,400,000
CT 8	$ 15,400,000
TOTAL	$ 30,800,000
Cruise Terminals (CT)	
CT 5	$ 52,000,000
CT 6	$ 52,000,000
CT 7	$ 52,000,000
CT 8	$ 52,000,000
TOTAL	$ 208,000,000

4.5.3.2. ALTERNATIVE A2

This Alternative reuses the existing terminals B and C positioned to accommodate cruise traffic from berths 5 and 6 and adds a new CT 7 and 8. Parking currently exists to service CT 5 and 6. The basic terminal package includes terminal, GTA, and provisioning areas for each vessel with a shared parking area. See Figure 4.18.

FIGURE 4.18: ALTERNATIVE A2 REUSE EXISTING TERMINALS B & C

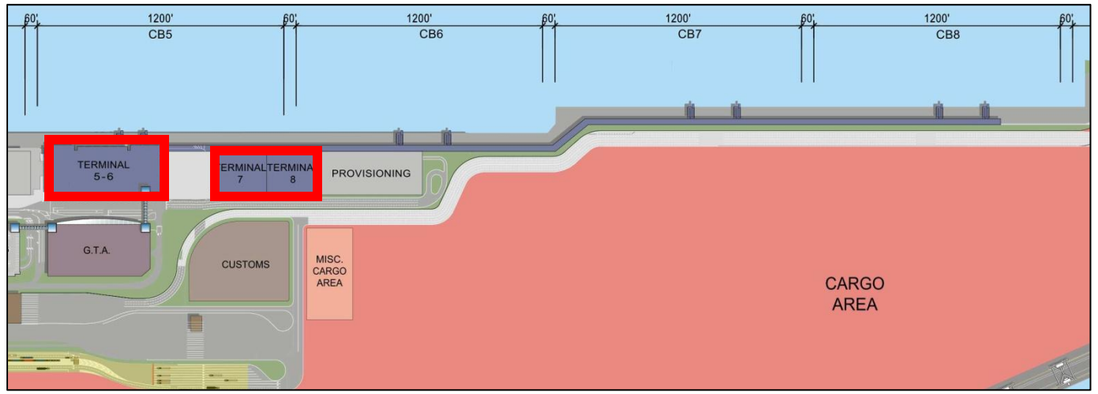


Table 4.6 provides the overall costs for this terminal alternative. As shown, parking is not required for the first CT 5 and CT 6 terminals as existing parking is available to provide adequate spaces for Terminals B and C. The addition of the CT 7 and CT 8 cruise complex does require an additional parking structure to accommodate approximately 1,400 vehicles at a cost of $15.4 million per terminal. A combined parking structure and GTA is the preferred alternative to service the entirety of the cruise complex.

The cost for each terminal, inclusive of terminal structure, GTA, circulation, and provisioning area is $52 million each. The total for the A2 Alternative is $30.8 million for parking structures and $155.6 million for the new terminals. Terminals B and C would undergo improvements to coordinate operations and combine functions, such as security and CBP, and to enlarge the spaces to accommodate the anticipated passenger throughput.

Table 4.6: Alternative A2 Reuse Existing Terminals B & C Cost Estimate	
Parking for Cruise Terminals (CT)	
CT 5	Existing
CT 6	Existing
CT 7	$ 15,400,000
CT 8	$ 15,400,000
TOTAL	$ 30,800,000
Cruise Terminal (CT)	
CT 5	$ 25,800,000
CT 6	$ 25,800,000
CT 7	$ 52,000,000
CT 8	$ 52,000,000
TOTAL	$ 155,600,000

4.5.3.3. ALTERNATIVE B NEW QUAD TERMINAL

This is a new quad-terminal (4 berths) facility positioned to accommodate cruise traffic from berths 5 through 8. Parking currently exists to service berths 5 and 6. New parking would be required for the two new terminal structures. This approach limits the additional cargo area required to service the cruise vessels along the North Channel and impacts cruise operations and passenger issues relative to walking distances for berths 7 and 8. The basic terminal package includes terminal, GTA, and a large provisioning area for each vessel with a shared parking and GTA. See Figure 4.19. This alternative would also provide for a variation on the berth configuration

FIGURE 4.19: ALTERNATIVE B NEW QUAD TERMINAL

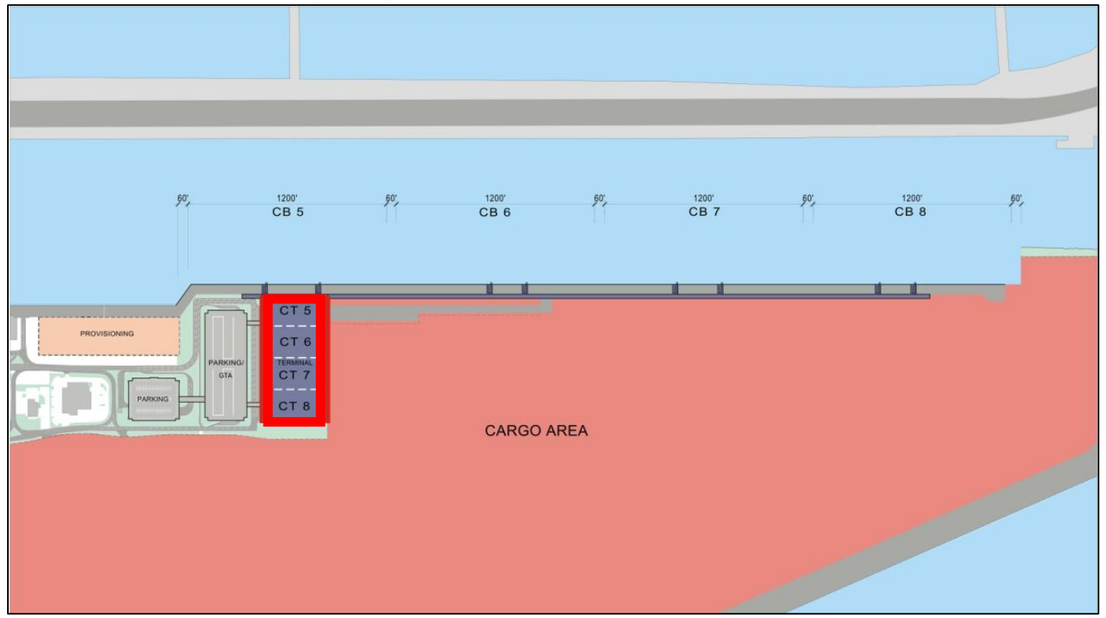


Table 4.7 provides the overall costs for this terminal alternative. As shown, parking is not required for the first CT 5 and CT 6 terminal as existing parking is available to provide adequate spaces. The addition of the CT 7 and CT 8 cruise complex does require a new parking structure to accommodate approximately 1,400 vehicles at a cost of $15.4 million per terminal.

The cost for each terminal, inclusive of terminal structure, GTA, circulation, and provisioning area is $53 million for terminals 5 and 6 and $60 million for CT 7 and 8. The total for the alternative is $30.8 million for parking structures and $233 million for the new terminals.

Table 4.7: Alternative B New Quad Terminal Cost Estimate	
Parking for Cruise Terminals (CT)	
CT 5	Existing
CT 6	Existing
CT 7	$ 15,400,000
CT 8	$ 15,400,000
TOTAL	$ 30,800,000
Cruise Terminals (CT)	
CT 5	$ 53,000,000
CT 6	$ 53,000,000
CT 7	$ 60,000,000
CT 8	$ 60,000,000
TOTAL	$ 233,000,000

4.5.3.4. ALTERNATIVE E LINEAL QUAD TERMINAL

This alternative is similar to that of alternative B. It is a new quad terminal facility positioned to accommodate cruise traffic from berths 5 through 8. Parking currently exists to service berths 5 and 6. However, new parking would be required for the two new terminal structures. This approach limits the additional cargo area required to service the cruise vessels along the North Channel, but does impact cruise operations and passenger issues relative to walking distances for berths 7 and 8. The basic terminal package includes terminal, GTA, and a large provisioning area for each vessel with a shared parking and GTA. See Figure 4.20. This alternative would also provide for a variation on the berth configuration.

FIGURE 4.20: ALTERNATIVE E LINEAL QUAD TERMINAL

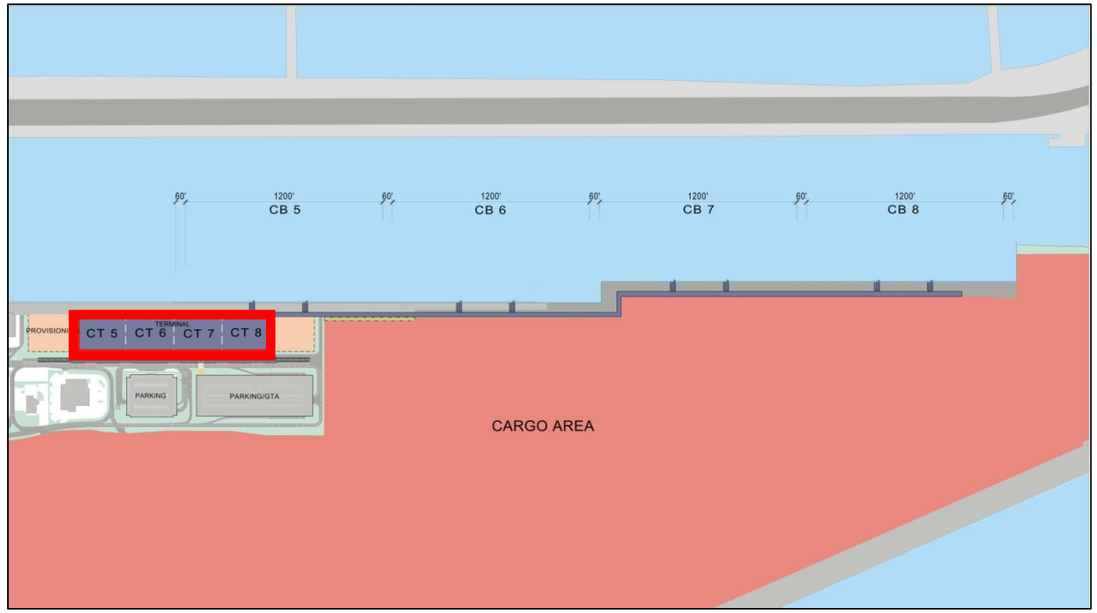


Table 4.8 provides the overall costs for this terminal alternative. As shown, parking is not required for the first CT 5 and CT 6 terminal as existing parking is available to provide adequate spaces. The addition of the CT 7 and CT 8 cruise complex requires a new parking structure to accommodate approximately 1,400 vehicles at a cost of $15.4 million per terminal.

Table 4.8: Alternative E Lineal Quad Terminal Cost Estimate	
Parking for Cruise Terminals (CT)	
CT 5	Existing
CT 6	Existing
CT 7	$ 15,400,000
CT 8	$ 15,400,000
TOTAL	$ 30,800,000
Cruise Terminals (CT)	
CT 5	$ 45,700,000
CT 6	$ 65,300,000
CT 7	$ 65,300,000
CT 8	$ 65,300,000
TOTAL	$ 241,600,000

The cost for each terminal, inclusive of terminal structure, GTA, circulation, and provisioning area is $45.7 million for CT 5, as this is a partial renovation of the existing Terminal B and C complex, and $65.3 million for the other three terminals (5 through 8). The total for the alternative is $30.8 million for parking structures and $241.6 million for the new terminals.

4.6 CRUISE LAYOUT EVALUATIONS

4.6.1 RECOMMENDATION

The alternatives shown in Section 4.5 were evaluated through a process that looked at cost, implementation, areas impacted, and the theoretical **internal rate of return (IRR)** which compares the revenue generated per square foot of land for each competing land uses. The results are summarized in Table 4.9.

Alternative A2 is preferred in the short-term for development at a total cost of approximately $241million. Both A1 and A2 provided for substantial land impacts on the cargo zone of some 45 acres, thus providing for a high cost to replace the land lost for this use. The IRR for alternatives B and E are substantial. However, the cost per square foot for construction offsets much of this gain. All of the Alternatives require similar environmental permitting for construction. There was also a substantial cost differential from the lowest A2 Alternative as shown.

Table 4.9: Evaluation Matrix of Cruise Facilities Options				
	A1	A2	B	E
Cost	$208	$156	$233	$242
Encroachment into cargo	45.57	45.57	16.13	16.14
Difference from lowest	0	0	29.44	29.43
Environmental	same	same	same	same
Cost differential from lowest	$52	0	$77	$86
Land cost - $ / ft²	0	0	$60.04	$67.06
Potential IRR as cargo			7.08%	6.9%
Potential IRR as cruise			25.4%	23.3%
Cost to replace land	$85	$85	$27	$27
Total cost	$293	$241	$260	$271
Recommendation		Short-term	Long Term	

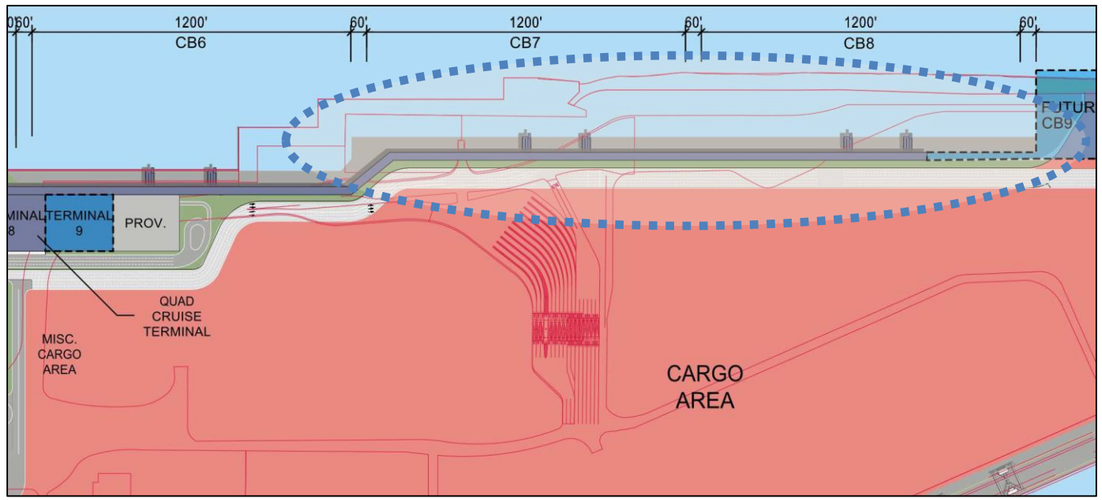
In the mid-term, the addition of a 7th and 8th berth would provide the required cruise capacity for approximately the next 20 years based upon forecasts. Additional dollars would be required if a 9th berth and terminal were included in the long-term.

The addition of these cruise berths impacts the cargo areas immediately adjacent to them. As shown in Figure 4.21 with the addition of these berths, there is substantial infrastructure that has been developed by the current cargo yard operators that will need to be revised to allow for the new cruise berths and uplands and provide for the necessary gate complexes to operate the cargo yards.

Providing for a continued linear berth pattern that works along the edge of the Main Channel and minimizes the impacts to the cargo yards adjacent to the cruise facilities will assist the Port in achieving its long-term goals. Based upon the recommended option A2, a mid-term and long-term master plan layout for the cruise terminal facilities has been developed as illustrated in Figures 4.22 (and 4.22a) and the long-term Figure 4.23, respectively.

Based upon feedback from the cruise line users, the separation of cruise tourism and cargo activities is a positive impact on the Port.

FIGURE 4.21: CRUISE BERTH IMPACTS ON CARGO FACILITIES



Within the overall cruise zone of the Port, it is envisioned in the mid to long-term that a centralized multimodal center could be developed to serve as a transportation hub for the Port, provide additional commercial (hotel, retail, entertainment), and allow for the opportunity to serve as a link to the Miami International Airport. The multimodal center would also provide green spaces for activities such as tennis, jogging, swimming, and other outdoor activities that could accommodate port staff, crew, and other community activities. This site would primarily serve the cruise terminals from CB 1 to CB 4 with additional parking and support services.

The Port's central corridor is highly impacted by roads and the upcoming tunnel portal. Thus, it seems fitting to dedicate these parcels for commercial activities. However, because of their central nature and adjacency to the cruise terminals, this site can be also programmed in the long-term master plan as part of the development of a centralized intermodal complex and parking. The adjacent facilities presently occupied by the Port of Miami and leaseholders of office spaces may also be redeveloped to provide government and corporate office space and other amenities. The photo illustrates the area in Figure 4.22.

The sustainable development in this central area of the Port can be done in conjunction with the development of the intermodal center. See Figure 4.23. As shown, this area encompasses new buildings adjacent to the existing Port of Miami offices and Miami World Trade Center as well as development within the proposed multimodal center and a replacement park on the roof.

FIGURE 4.22: PROPOSED CENTRAL PORT COMMERCIAL AREA AERIAL

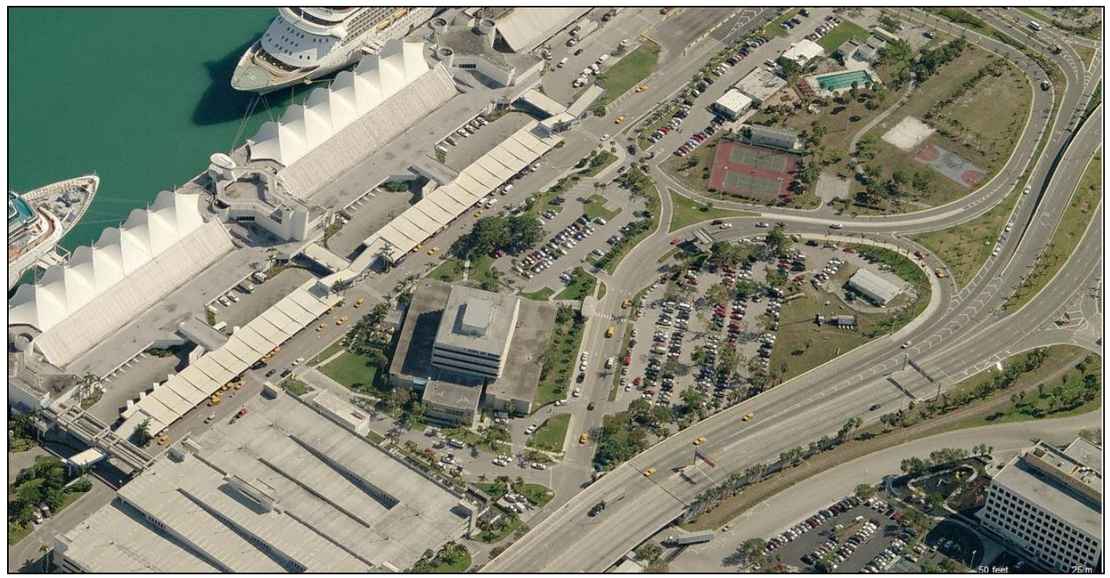


FIGURE 4.23: CENTRAL INTERMODAL CENTER AND CAMPUS COMMERCIAL ZONE

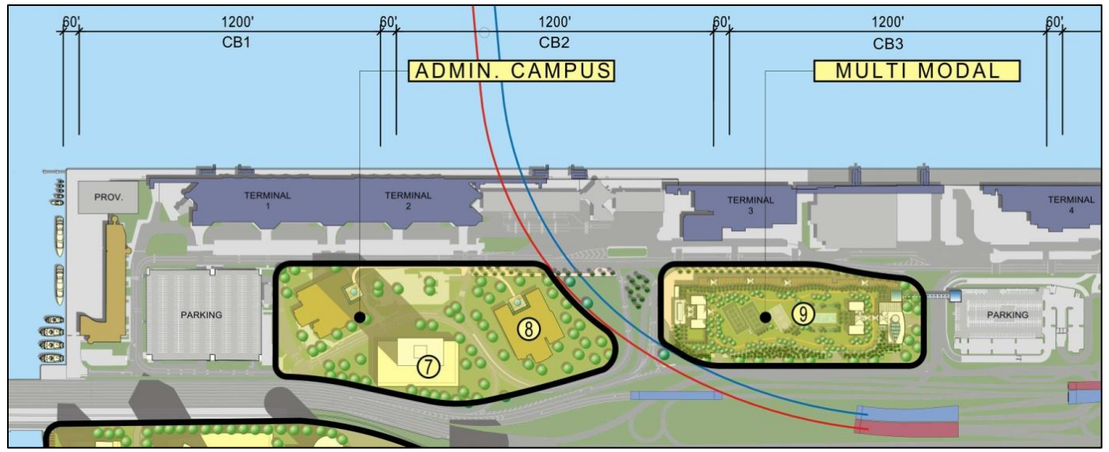


Table 4.10: Central Intermodal and Campus Commercial Development Zone					
BUILDING ID	**USE**	**BUILDING FOOTPRINT**	**BUILDING AREA PER FLOOR (sf)**	**NUMBER OF FLOORS**	**PARKING PODIUM PER FLOOR**
ADMINISTRATION CAMPUS					
7	OFFICE	120X120	14400	VARIES BETWEEN 6 and 30	MIN. 180'X300'= 54,000SF ~150 SPACES PER FLOOR
8	OFFICE	120X120	14400		
MULTI MODAL					
9	MULTI MODAL	-	230,000	3 to 7	WITHIN BUILDING ENVELOPE

Table 4.10 shows the potential building area per floor for the additional office space in these two sites. The multimodal center is approximately 230,000 SF per floor and a total of 3 to 7 stories. This dimension provides numerous internal uses and a rooftop green space. Uses may include parking, GTA, hotel, retail, entertainment, and others as required to support cruise functional operations and Port-specific needs.

A second multimodal center made up of parking, ground transportation area for bus, taxis, and private cars, potential baggage drop off, and other operational support elements would also be established to serve cruise terminals CB 5 to CB 8 (CB 9 long-term).

Additionally, to allow for financially viable cruise facilities growth of the Port, the next generation terminal complex at the Port would provide for the consolidation of services allowing for better management of operations and security (entryways to the terminal complex may be a shared security zone) where passengers would then move to individual halls from a series of main entryways and corridors for check-in processing.

Based upon the long-term vision of security, this system could also be set up to provide for a public space for check-in and waiting areas in the terminal complex prior to security clearance allowing for some commercial elements. Other aspects of the terminal complex that may share operations are CBP, and possibly baggage and storing movements to and from the cruise vessels based upon which a line or group of lines is using the terminal spaces. Overlapping these operations will be cost effective and still provide the passenger with a consistent level of service.

4.6.2 FUTURE CRUISE OPERATIONS

With the development of the 2035 Port Master Plan there are significant operational issues related to the planned development approach that must be resolved through further review and specific master planning of the multimodal centers, terminals, walkways, berths, and roadway systems servicing the cruise area. There are substantial operational challenges with the development of a terminal complex that may provide for up to five individual terminal spaces to service berths CB 5 through CB 9.

Cruise line users will need to be involved in the planning process to ensure that the adopted development pattern is consistent with how future cruise operations can be effectively and efficiently managed. Specific items of concern are the movement of baggage to and from cruise vessels berthed at a distance from the cruise terminal structure (such as CB 7 through CB 9). Alternative methods of moving baggage utilizing improved logistics and technologies will need to be explored. The current method of transporting baggage via forklift and cages to the individual vessels at this distance will certainly multiply substantially the total labor and equipment required. Thus, movement via green trolley trains or more

likely via a beltway system linked to dispatch baggage from and to the terminals to each individual vessel would be used. This baggage system would be built as part of the walkway system that would provide access to the cruise vessel gangway systems for passengers moving to and from the cruise terminals.

The walkways, which may range from approximately 1,200 to 4,000 feet, would be equipped with an interior clearance space to allowing for two-way travelators (moving walkways), shell door / gangway accessibility, movement via walking (if desired), and for trolley carts to provide transportation for disabled passengers along this core. The space would be air-conditioned and planning of the space should also consider the distance and time passengers will be in the space. Provisioning the individual vessels must also be considered. Pre-clearance of goods and service vehicles by CBP, stage areas for trucks, apron access, and an apron area wide enough to allow for these operations to function efficiently will need to be considered when master planning these sites.

The use of a terminal complex, instead of the traditional approach of one berth/one terminal, saves substantial real estate utilization at the Port and lessens the overall impact on cargo operations. However, this is a "visionary" master plan for the next 25-years and is meant to be utilized as a baseline for growth and improvement at the Port of Miami. Specific development will need to be driven by User need with a clear focus on operational costs, passenger services, and cost of the facilities. This set of factors may, over time, provide for a modified master plan development.

The current terminals (1 through 6) as numbered in the layouts below will continue to function as they are at present with potential improvements to these facilities to provide for increased passenger capacities, enhancement of GTA's, and any modifications to security, baggage, or CBP processes. Once the life expectancy of these terminal structures nears major modifications or replacement, there is adequate space adjacent to each to allow for additional or new green terminal development while servicing existing traffic. Based on the decision to demark the berths along the North Channel at approximately 1,200 ft. (the Port of Miami has a permit to move the existing western most berthing dolphin to the west an additional 116 feet into the channel – expired in Nov. 2010), over time, it may require some maneuvering of gangways and walkways to allow access to cruise vessels berthed in these positions.

Working with the cruise line users and involving them in the decision-making process will not only improve the operational successes of the master plan development but also allow for enhanced relationship development between the Port and cruise line users. It is imperative that the Port continue to work with its cruise line partners as this master plan development moves forward through the sustainable planning of individual berth and terminal projects as well as upland support areas.

Additionally, it is noted within the mid and long-term master plan that Terminal "J", the small ship cruise terminal facility located on the southwest corner, would be demolished to provide for new cargo capacity and be replaced through the addition of a new berth and green terminal on the North Channel in coordination with future need overall. The decision on when to do this will not be necessary at this time as it is based upon the Port's business plan.

The southwest corner of the Port would also provide a future development area for mixed-use cargo, Ro/Ro and Ro-Pax ferry operations as may be dictated by future opportunities in the Caribbean, specifically Cuba. The timing and opportunity associated with this Ro-Pax development will require continuous monitoring of the situation in the region and a short-term reaction time to assemble the development and operational strategy for the site.

Finally, based upon green logistics of cruise operations, the Port may choose to implement the A1 option and provide for two additional designated cruise terminal facilities to service the new berths into the long-term. The decision-making process for choosing which option to implement should be a combination of cruise facility cost, return on investment analysis, cruise line input in terms of preferred mode of terminal and operational requirements, together with an understanding of the impacts to the adjacent cargo areas. The dual terminal approach is shown adjacent for reference.

FIGURE 4.24: MID-TERM PREFERRED CRUISE PLAN ALTERNATIVE

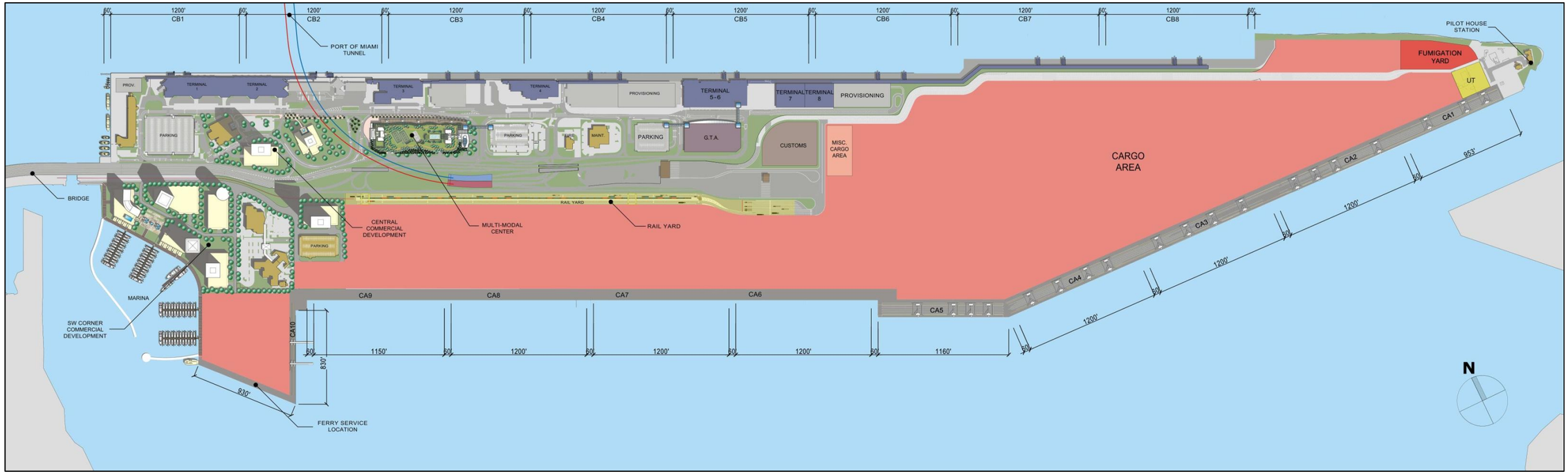


FIGURE 4.24A: ALTERNATIVE CRUISE TERMINAL PLAN

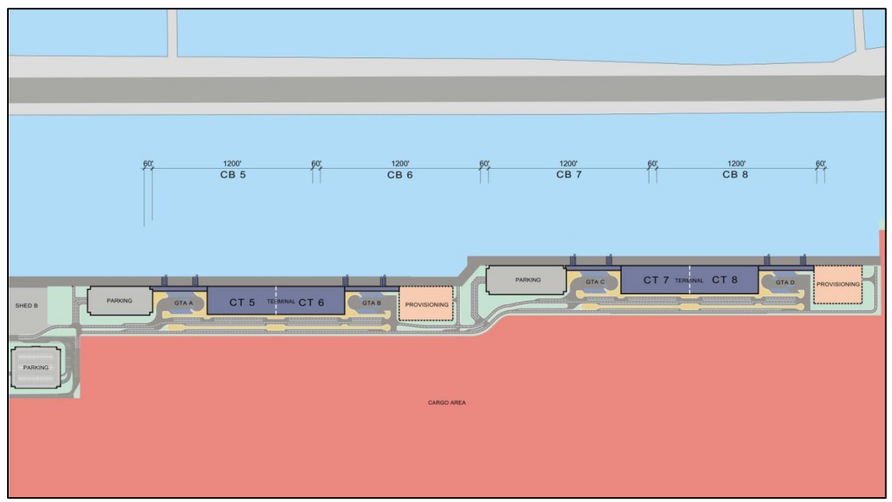
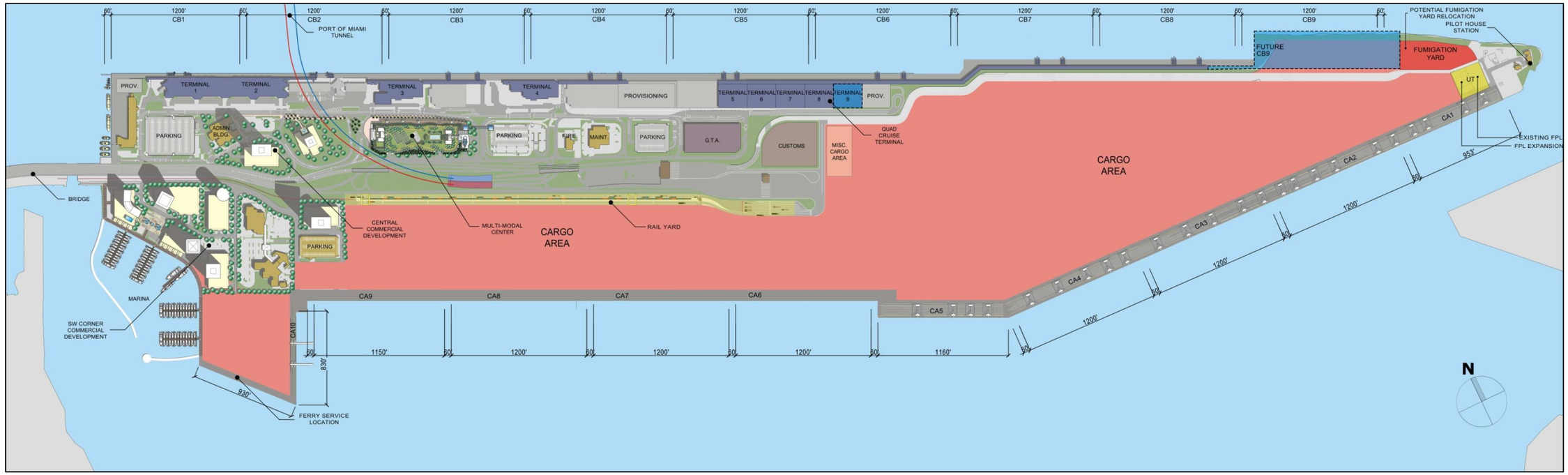


FIGURE 4.25: LONG-TERM PREFERRED CRUISE PLAN ALTERNATIVE



SECTION 5

CARGO

5.1 OVERVIEW

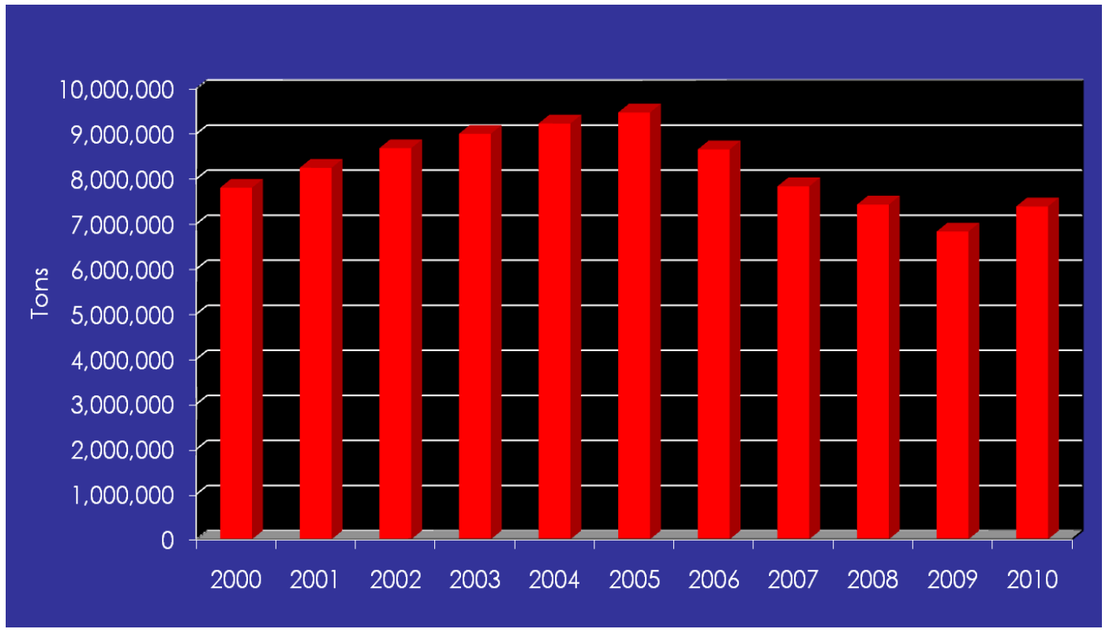
This section provides a summary of the projected containerized cargo throughput through 2035.

These forecasts are used as the baseline for the business plan and physical master plan efforts for the Port to determine future annual throughput capacities and facility demand.

5.2 CARGO FORECAST

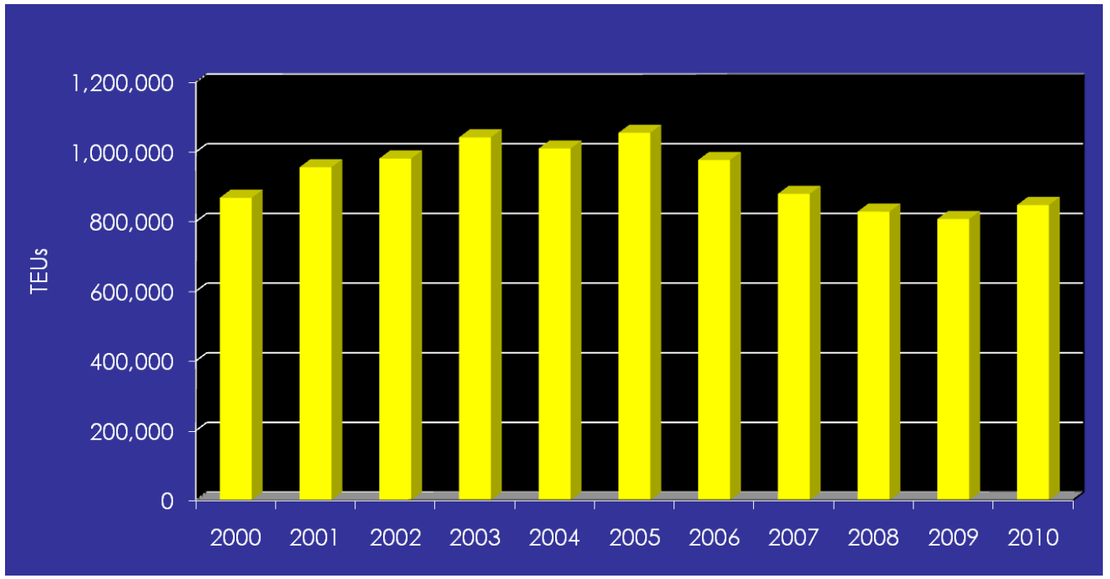
The Port of Miami handles over seven million tons of waterborne containerized cargo annually. Figure 5.1 graphically depicts the historical annual tonnage handled at the Port's public terminals since 2000. From 2000 through 2005, the Port's tonnage increased steadily, growing at an average rate of about 4% per annum.

FIGURE 5.1: HISTORICAL CARGO TONS HANDLED AT THE PORT OF MIAMI



After peaking at nearly 9.5 million tons in 2005, market conditions and economic factors, including the US and global recession have adversely affected container growth. Similarly, total TEUs handled at the Port of Miami peaked at just over 1 million in 2005 and have since declined. The relocation of carriers to competing ports, specifically MSC's relocation to Port Everglades, have contributed to this decline. Fiscal Year (FY) 2010 demonstrated a nearly 5% increase over 2009, the first year-to-year cargo increase five years. Figures 5.1 and 5.2 show the historical tonnage and TEUs (Twenty-foot Equivalent Unit) handled at the Port since 2000.

FIGURE 5.2: HISTORICAL TEUS HANDLED AT THE PORT OF MIAMI



The containerized cargo activity handled at the Port is handled by three individual terminals occupying approximately 268 acres: Seaboard Marine, South Florida Container Terminal/Terminal Link (formerly APM Terminals), and Port of Miami Terminal Operating Company, LLC (POMTOC).

- **SEABOARD MARINE:** Seaboard Marine operates on 76.69 acres and provides weekly service to Central American, Caribbean and South American destinations. Seaboard Marine has exhibited the strongest growth at the Port as container throughput has grown from 250,000 TEUs in 2000 to about 350,000 TEUs in 2008. The Seaboard Terminal accounts for over 70 vessel calls per month at the Port of Miami.

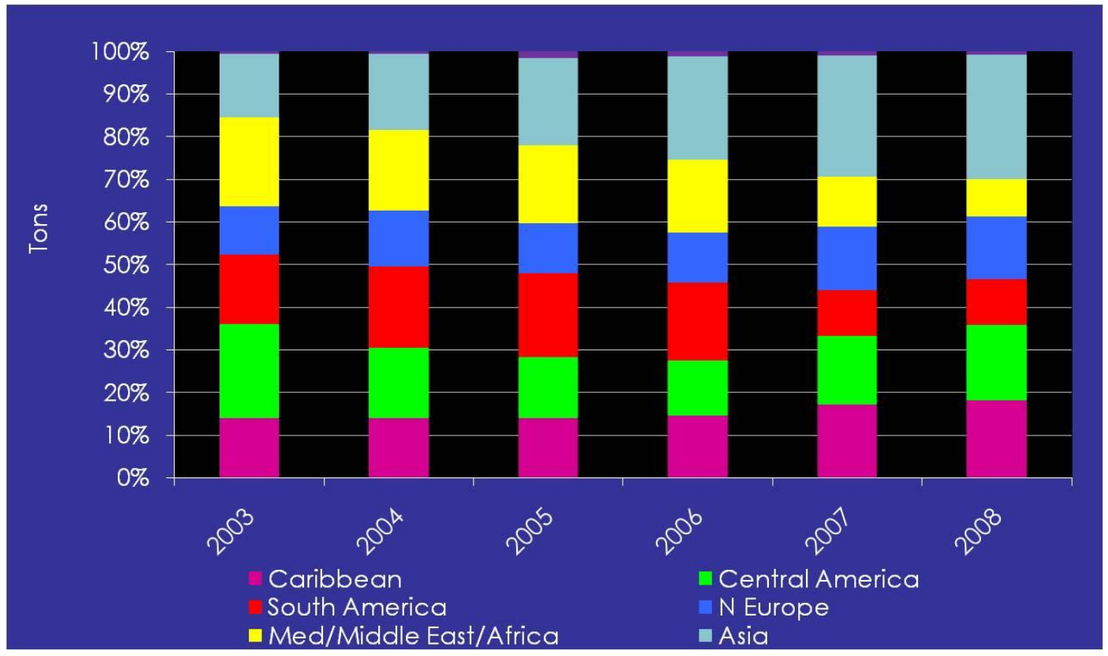
- **SOUTH FLORIDA CONTAINER TERMINAL/TERMINAL LINK:** Formerly APM Terminals, this 71.32-acre facility has recently been realigned as part of a joint venture agreement with Terminal Link, a subsidiary of CMA-CGM Group (51% ownership) and APM Terminals (holding 49%). APM Terminals has historically handled over 200,000 TEUs annually. Throughput is expected to grow as new accounts are secured.

- **POMTOC:** Operates on 120 acres and is the Port of Miami's only non-carrier owned terminal operator. Through 2007, POMTOC was the Port of Miami's largest terminal operator handling over 400,000 TEUs annually. In 2006, a key customer (MSC) relocated operations to Port Everglades, affecting cargo volumes.

POMTOC was the dominant terminal at the Port through 2007 handling over 400,000 TEUs annually and accounting for about 45% of the Port's total throughput. However, the terminal's volume has declined steadily since the mid 2000's due to the loss of MSC to Port Everglades. Conversely, Seaboard Marine has been increasing throughput since 2001. In fact, in 2008, Seaboard Marine handled the most TEUs at the Port, accounting for about 40% of the Port's total TEU throughput. APM Terminals handled over 200,000 TEUs per annum through 2005 but has been relatively unstable since, reflecting a port share decline from 30% in 2000 to 20% in 2005 figures that have remained relatively constant through present day. In FY 2009, the distribution is expected to shift considerably since the APM Terminal has been realigned as part of a joint venture agreement by Terminal Link, a subsidiary of CM-CGM Group.

Latin American cargoes have typically accounted for about 45-50% of the Port of Miami's total tonnage. Northern European cargoes have remained relatively constant at about 10-15% of the total, while Asian cargoes have increased from 15% in 2003 to nearly 30% in 2008. Conversely, Mediterranean, Middle East, and African cargoes share have been declining to less than 10%. It is anticipated that, as more direct, all-water services call the Port, the share of Asian cargoes will continue to grow. Figure 5.3 demonstrates the distribution of tonnage by trade lane.

FIGURE 5.3: SHARE OF PORT OF MIAMI TONNAGE BY TRADE LANE



Based on the previous competitive analysis, low, medium and high container forecasts have been developed. The forecasts are based on the following assumptions:

- The forecast base year is a FY2010;
- All current terminal/liner services are incorporated;
- The forecasts incorporate both full and empty TEUs;
- The forecasts represent unconstrained growth; and,
- The forecasts factor in potential new tenants/services under contract or being pursued by the Port or carriers/terminal operators.

Sources included in developing the forecasts include:

- Historical container throughput data from AAPA;
- Published Florida population data;
- Published data from the International Monetary Fund (IMF); and,
- Carrier/terminal operator interviews.

Historically, growth at South Florida ports – Miami and Port Everglades – has averaged a modest 1.2% annually over the past ten years; however the 20-year containerized growth for these ports has been 5.4%. Specifically, since 1991, the Port of Miami has averaged 3.9% per annum.

Based on data from Moody's economy.com, US real GDP likely to grow between 2-4 % annually over next 5 years. Based on the 1.5X future growth rate, this equates to a 3% to 6% baseline growth rate in TEUS at US ports. Some ports will experience greater growth, as the result of shifting trade patterns, while other ports are likely to grow at lower rates. Similarly, Florida GDP is expected to remain between 2% and 4% through 2020.

It is anticipated that over time more Asian service will be introduced on all-water Suez and Panama Canal routings however, the Port of Miami will still remain heavily vested in an export market that serves Latin American and Caribbean countries with consumer goods and supplies that replenish the cruise and tourism industries. Historical and projected near-term growth was also examined in terms of gross domestic product (GDP) in the Latin American and Caribbean countries. According to the International Monetary Fund (IMF)'s World Economic Outlook (April 2011) the Latin American and Caribbean region's GDP has experienced average annual growth rate of 3.4% over the past ten years. GDP growth rates for 2011 through 2016 are expected to average 4.1%.

Based on the estimated FY 2010 containerized volume handled at the Port of Miami, interviews of Port terminal operators and carriers and future growth factors, a range of containerized forecasts were developed:

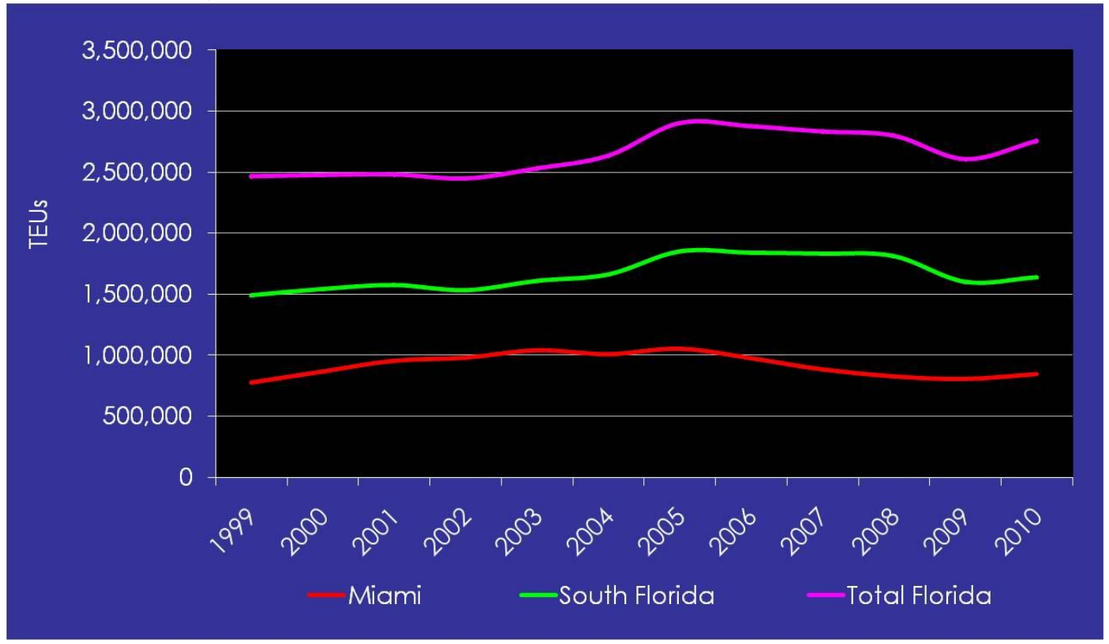
- Low scenario container forecast, with no new market penetration, assumes a 3 percent growth of FY2010 base cargo.
- The moderate growth penetration scenario incorporates the estimated 500,000 potential TEU market that the Port of Miami can capture; 50% of the local truck hinterland market and 25% of the Central Florida market by 2020, with a 3% growth thereafter.
- The aggressive market penetration scenario assumes the same 500,000 potential TEU market is captured by 2016, with a 4.5% growth through 2025 and 3% thereafter.

- The aggressive market penetration plus intermodal scenario assumes the same rate of capture of the local truck hinterland and Central Florida market as described in the aggressive scenario as well as a 18% intermodal share, assuming the Port deepens the channel to -50', allowing for the ability to market to global carriers and handle a fully-laden first-inbound call.

Figure 5.4 shows the historical combined container throughput of Miami, South Florida and Florida since 1999.

FIGURE 5.4: PORT OF MIAMI, SOUTH FLORIDA AND FLORIDA COMBINED HISTORICAL CONTAINER THROUGHPUT (TEUS)

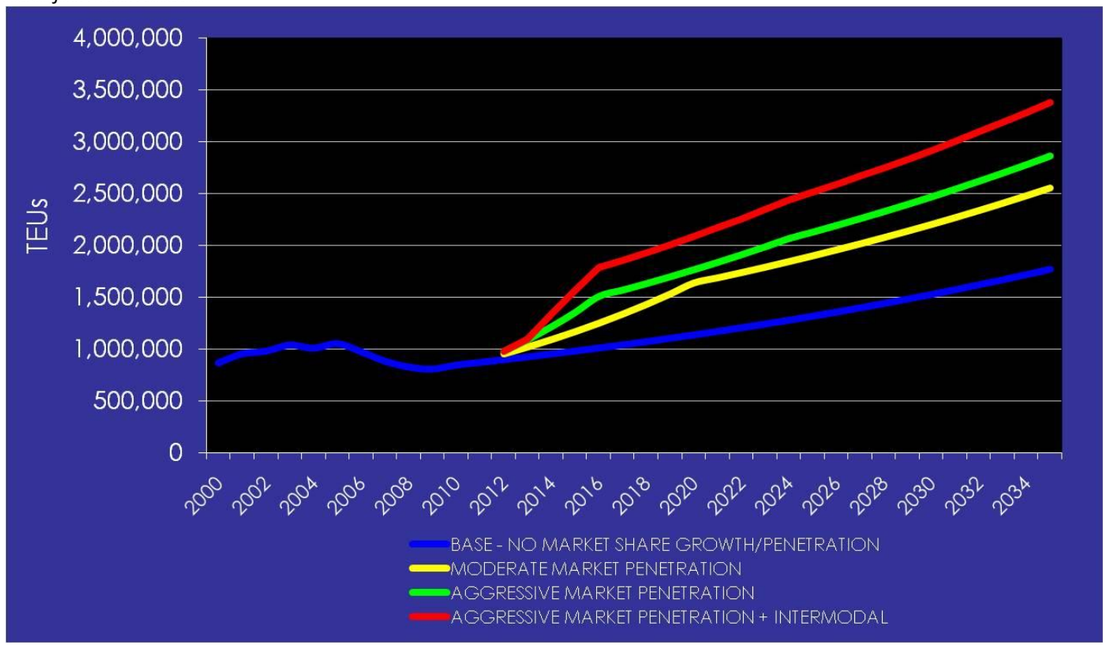
Source: American Association of Port Authorities



By 2035, the unconstrained container throughput at Port of Miami is projected to range between 1.77 million and 3.38 million TEUs. The long-term growth rates of these scenarios range between 3% and 5.8%. The low/base, moderate, aggressive and aggressive plus intermodal container forecasts are graphically depicted in Figure 5.5.

FIGURE 5.5: PORT OF MIAMI LOW AND HIGH UNCONSTRAINED CONTAINER FORECASTS

Source: John Martin Associates



5.3 ON-PORT CARGO FACILITY DEMAND

In terms of current terminal capacity, the 828,349 TEUs handled over 259 terminal acres at the Port of Miami yielded about 3,200 TEUs per acre. This figure incorporates total gross acreage for all three cargo terminals. This TEU per acre figure is fairly consistent with the East Coast average of 3,257 TEU per acre. Other Florida ports of Port Everglades and JAXPORT reflect similar densities under current configurations. The Port of Palm Beach boasts the highest TEU per acre ratio given the fact that the majority of the cargo arrives the day of the vessel sailing and therefore reduces dwell time. Conversely, the ports of Philadelphia, Baltimore and Wilmington (NC) operate less efficiently as the TEU per acre ratio is below 2,000. Table 5.1 illustrates the TEU per acre averages for all East Coast (US and Canadian) ports.

TABLE 5.1: EAST COAST TEU PER ACRE (BASED ON GROSS ACREAGE)
Source: American Association of Port Authorities and public port data

PORT	2008 TEU's	ACREAGE	TEU PER ACRE
MONTREAL	1,473,914	185	7,967
HALIFAX	387,347	162	2,391
BOSTON	211,085	101	2,090
NEW YORK / NEW JERSEY	5,265,059	1,261	4,175
PHILADELPHIA	255,994	228	1,123
BALTIMORE	612,877	354	1,731
NORFOLK	2,083,278	619	3,366
WILMINGTON, NC	196,040	100	1,960
CHARLESTON	1,635,537	395	4,141
SAVANNAH	2,616,185	1,200	2,180
JACKSONVILLE	718,467	215	3,342
PALM BEACH	249,931	30	8,331
PORT EVERGLADES	985,095	270	3,649
MIAMI	828,349	259	3,198
TOTAL EAST COAST	**17,519,158**	**5,379**	**3,257**

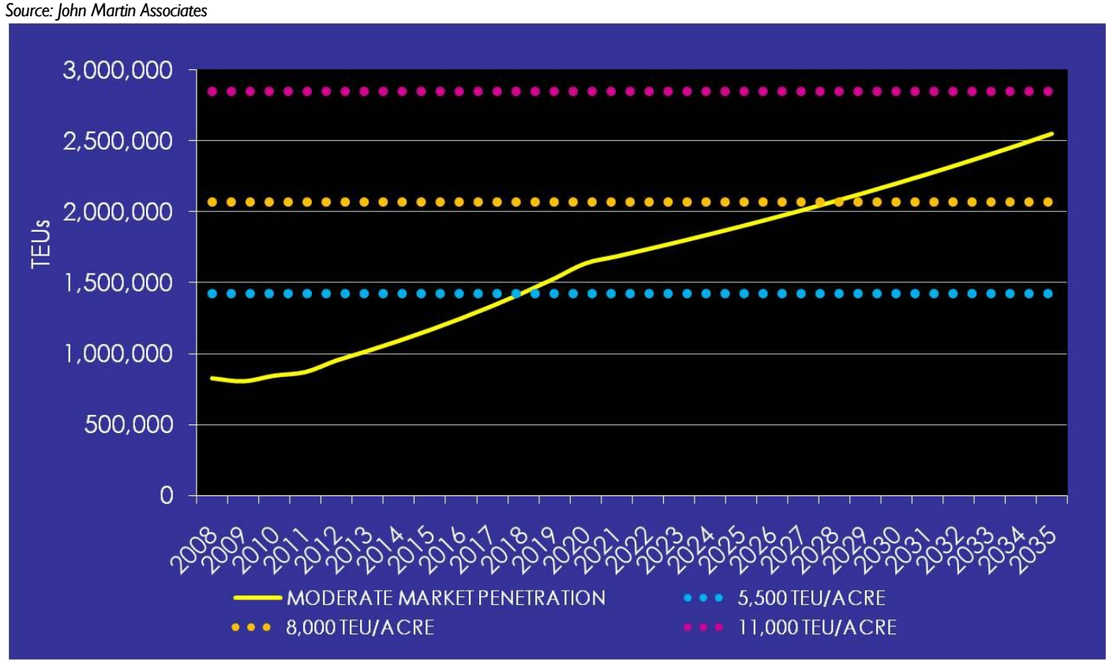
The terminal operating characteristics on the East Coast have historically differed from West Coast operations. The West Coast operating structure averages about 5,000-5,500 TEUs per acre. This is evident by the fact that the terminals are typically operated by a single carrier, who has ultimate control of yard operations. As more terminals on the East Coast shift toward single-carrier and/or terminal operator operations, TEU per acre averages will increase. For example, the APM Terminal in Portsmouth, VA is capable of handling 12,000-13,000 TEU per acre at full automated build-out. The MOL/TraPac terminal in Jacksonville is targeted to handle up to 8,000 TEUs per acre provided adequate berth and gate capacity.

5.3.1 FUTURE ON-PORT CARGO TERMINAL CAPACITY

Based on the mid potential cargo projection scenario, the Port of Miami will be required to handle nearly 2.7 million TEUs in 2035. Using the current configuration of approximately 260 acres of gross cargo terminal area, this equates to about 10,350 TEUs per acre. Industry studies indicate that terminal density can increase to 11,000 TEU's / acre and eventually to 15,000 TEU's / acre without full terminal automation. However, to reach this level of densification, significant amounts of investment, including rail mounted gantry cranes (RMG), and other technology to minimize dwell times will be required.

Figure 5.6 illustrates the thresholds of capacity under various densification scenarios. This analysis suggests that, under the medium projection scenario, Port of Miami will approach densification of 8,000 TEU per acre in 2028. Assuming an 11,000 TEU per acre densification, the Port will not reach capacity in the planning period under the medium growth scenario.

FIGURE 5.6: TEU PER ACRE PROJECTED CAPACITY THRESHOLDS
Source: John Martin Associates



Given these scenarios, the Port's terminals will need to densify in order to meet future long-term demand. This can be accomplished by:

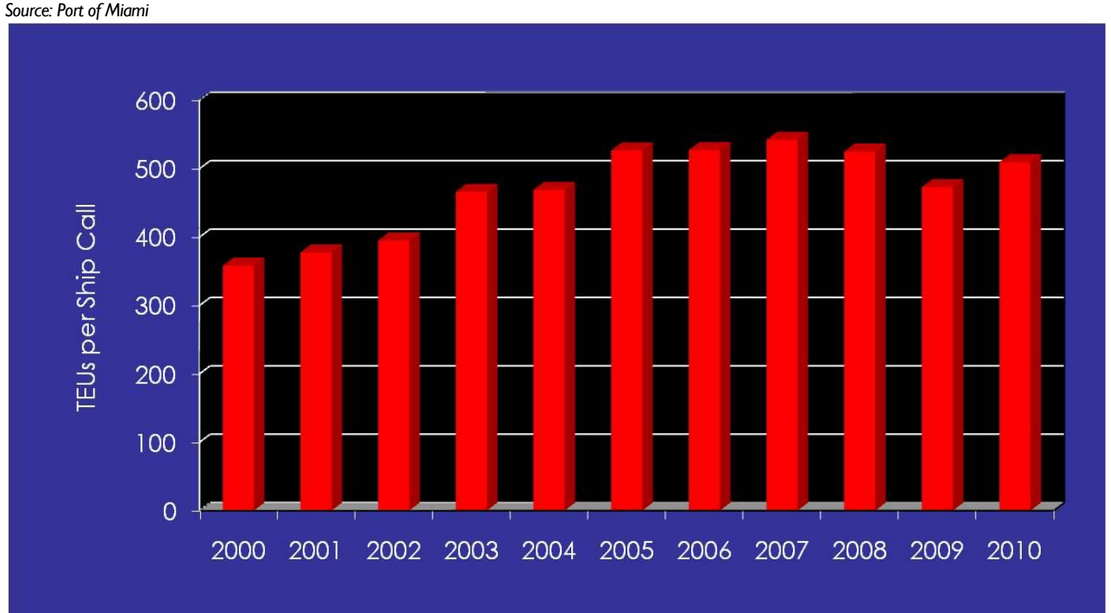
- Reducing on-dock dwell times;
- Moving toward RTG and RMG operations;
- Improving gate efficiencies; and,
- Managing off-dock overflow yards, if necessary.

The levels of investment required to achieve this level of densification could result in higher operating costs per unit. It is imperative that there is a balance of maintaining reasonable cost per unit while gaining terminal efficiencies.

5.3.2 FUTURE BERTH CAPACITY

In addition to the landside constraints, future berth capacity must be taken into consideration. Figure 5.7 illustrates that the average TEU per ship call has increased from about 350 to 510 since 2000.

FIGURE 5.7: HISTORICAL TEU PER SHIP CALL AT THE PORT OF MIAMI
Source: Port of Miami



The average number of TEUs per call will most likely continue to increase. For example, similar sized vessels to those currently calling the Port can discharge and load more units per call in the future.

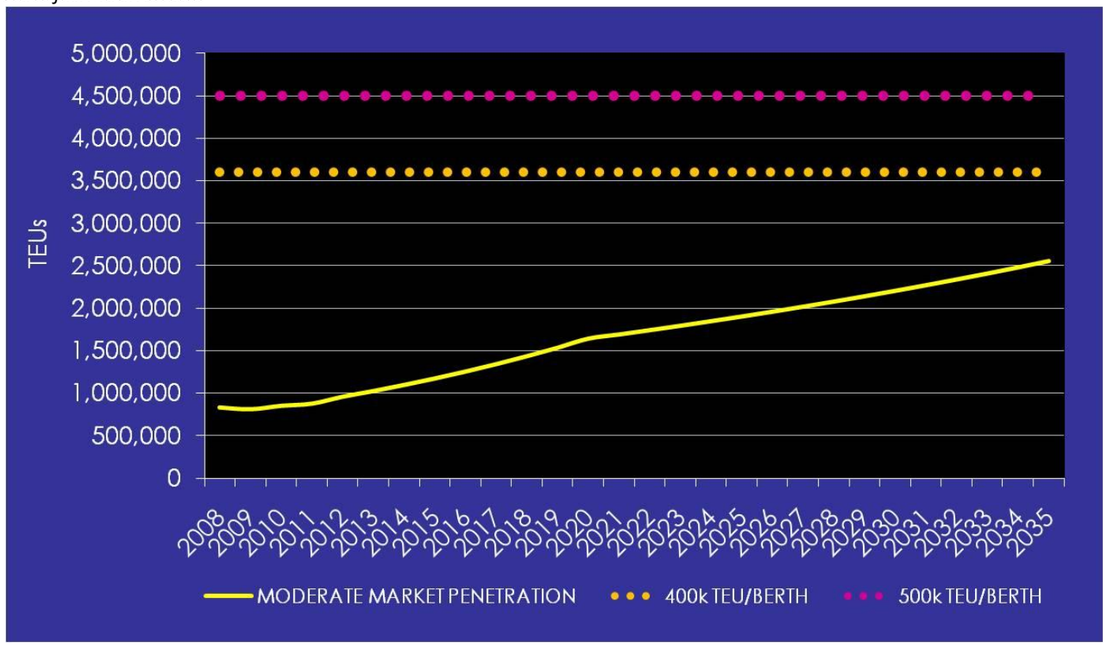
Table 5.2: Current and Future Fleets by Key Carrier
Source: AXS Alphaliner, Aug. 2009

CARRIER	CURRENTLY			ON ORDER		
	TEU CAPACITY	# VESSELS	AVG. TEU'S PER VESSEL	TEU CAPACITY	# VESSELS	AVG. TEU'S PER VESSEL
MAERSK	2,022,675	537	3,767	371,351	71	5,230
MSC SHIPPING	1,518,803	409	3,713	623,793	54	11,552
CMA-CGM	1,025,839	366	2,803	505,688	60	8,428
EVERGREEN	594,154	162	3,668			
APL	531,865	135	3,940	155,210	21	7,391
HAPAG-LLOYD	482,943	125	3,864	122,500	14	8,750
COSCO	467,909	145	3,227	425,102	56	7,591
CHINA SHIPPING	451,921	140	3,228	146,544	17	8,620
NYK LINE	412,711	109	3,786	112,600	20	5,630
HANJIN	407,013	90	4,522	270,488	30	9,016
TOTAL TOP TEN	**7,915,833**	**2,218**	**3,569**	**2,733,276**	**343**	**7,969**

Also, as larger vessel deployments occur on direct all-water routings, these vessels will discharge and load more units per call to ensure economies of scale of these larger ships. The trend toward larger vessels is evidenced by Table 2.13 which details the top carriers' order books. Currently the top 10 global carriers' fleets average about 3,600 TEU capacity per vessel. The order book for these same carriers reflects an increase in average vessel capacity to nearly 8,000 TEU per ship.

Based on industry standards it is estimated that berth capacity can handle between 400,000 and 500,000 TEUs annually. The berth capacity analysis is based on 10,000 LF of berth – 6,700 of container crane and 3,300 of mobile crane berth operations. Assuming an average of 1,100 linear feet per berth, the analysis generates the need for 9 berths.

FIGURE 5.8: PROJECTED BERTHING CAPACITY THRESHOLDS
Source: John Martin Associates



Based on the growth of the global carriers, Figure 5.8 demonstrates the capacity based on these assumptions. It appears, based on industry standard, that the mid potential scenario is capable of handling future throughput. It is important to emphasize that this is based on TEU throughput, and vessel calls will not reflect linear growth. The vessel calls will follow step-wise increases as more services are put in place at the Port.

5.4 OFF-PORT CARGO FACILITY DEMAND

5.4.1 OFF-PORT DISTRIBUTION CENTER OPPORTUNITY

The potential for the Port of Miami to compete for distribution centers (DCs) to serve the Florida wholesale and retail markets is assessed in this section. This is due to the anticipated growth in Asian imports to the East Coast ports from

increases in all-water direct services via the Panama and Suez Canals, and the accompanying growth in distribution centers near East Coast ports.

The Port of Miami finds itself in a unique situation by virtue of the fact that there is a significant parcel of land adjacent to the Hialeah intermodal yard that may be available for DC operations. The Flagler Property is approximately 400 acres and can be used for both intermodal and distribution opportunities. The following analysis focuses on this potential opportunity.

Fueling the growth in the all-water services is the fact that the major importers are developing distribution centers at East Coast and Gulf Coast ports. The leader in terms of DC marketing and development on the East Coast is clearly Savannah. Since the early 1980's, the Georgia Ports Authority has attracted 19 near-port distribution centers totaling 15 million square feet. The success of attracting these DCs is evident by the TEU volume in recent years as well as the percentage of those TEUs that are imported from Asia.

The Virginia Port Authority has also been aggressively pursuing the development of distribution centers and has experienced success at the Port Authority's inland port in Front Royal. In terms of Florida, specifically Jacksonville, there has been significant development and interest in the creation of distribution centers in the region. Currently wholesale stores such as BJ's and Wal-Mart have distribution centers near the port that are primarily used for export activity to the Caribbean. The Westside Industrial Park consists of a 960-acre master planned development with 4 million square feet of space. The Northside consists of three primary business parks: North Point Industrial Park, Imeson and Jacksonville Tradeport. The North Point Industrial Park is located about 4 miles from the Port and consists of 350 acres of build-to-suit lease or sale sites from 10 to 150 acres. The City of Jacksonville is also pursuing a distribution center development strategy and is in full support of JAXPORT's growth.

Similar distribution center development is also occurring in Houston, accompanying growth in Asian cargo imports at the Port of Houston. These developments include the Cedar Crossing area site of a 4 million-SF distribution center for Wal-Mart and 8,000 acres of land available for DC and industrial development.

Other ports, including Charleston, Wilmington (NC), and New York, are also aggressively pursuing distribution center development. The property previously occupied by General Motors, and now owned by Duke Realty, is currently the only "near port" location for distribution center development at the Port of Baltimore, but with the potential development of property in the Cox Creek area, a significant opportunity for distribution center development near the Seagirt Marine Terminal could be provided.

5.4.2 OVERVIEW OF FLORIDA CURRENT DISTRIBUTION CENTER (DC) MARKET

The Distribution Center (DC) and warehousing market in Florida has historically served not only retail and wholesale industries that serve the key consumption markets throughout the State with import and domestic shipments, but also the freight consolidators primarily located in South Florida and Jacksonville to serve the export Caribbean Island and Latin American trade as well as supply cruise vessels calling the Florida ports. The majority of DC growth in Florida has occurred in three regions:

- **MIAMI-DADE/BROWARD COUNTIES**: Serves the South Florida retail and wholesale markets; food wholesalers near the Port of Palm Beach, Port of Miami, and Port Everglades infrastructure serve cruise and island export markets; consolidators focus on near-airport facilities to also serve the air cargo market at Miami International Airport (MIA). There are also major highway and rail corridors linking the major cores of these areas.

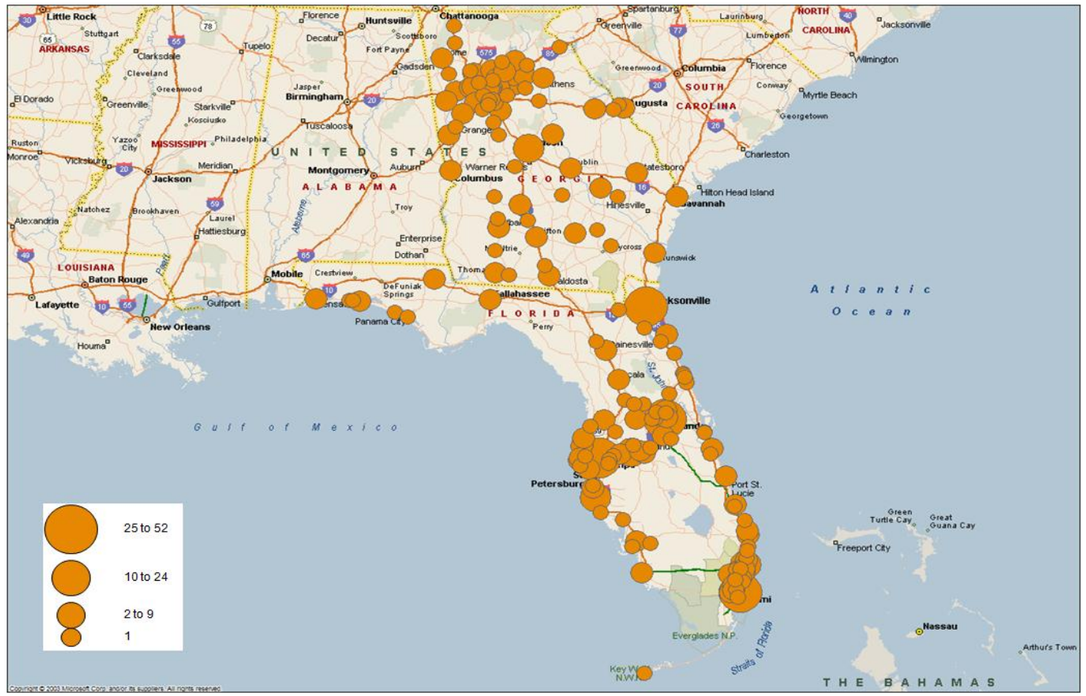
- **I-4 CORRIDOR (TAMPA-LAKELAND-ORLANDO)**: Serve growing population and tourism in Central Florida. Also ability to serve South Florida retail and wholesale markets; excellent highway and rail access from hinterland.

- **GREATER JACKSONVILLE AREA**: Increasing market share; ability to serve into North/Central Florida as well as westbound; inexpensive land, low congestion; excellent highway and rail access that can also access South Florida; high interest by Asian steamship lines to develop container terminals in JAXPORT.

Figure 5.9 illustrates the location of DCs in Florida and Georgia, as identified by the Chain Store Guide. The map legend identifies the range of the number of DCs for a specific location. The DCs listed in this exhibit represent eight different commodity sectors including: apparel, chain restaurant, department store, discount/general merchandise, drug store, home center/hardware, home furnishings, and supermarket/grocery/convenience store. The map shows the dense concentration of DCs in South Florida and Central Florida's I-4 Corridor. The growing Jacksonville market is also represented. The concentration of DCs in Georgia, specifically Atlanta due to the activity at the Port of Savannah, is evident.

FIGURE 5.9: LOCATION OF FLORIDA AND GEORGIA DCS

Source: Chain Store Guide



Historically, the South Florida markets of Palm Beach, Broward, and Miami-Dade Counties have been significantly more expensive in terms of lease rates and operating costs than Central and Northern Florida.

Asking rates have been falling and vacancy rates have been on the rise due to the global recession. In most markets net absorption has been negative, suggesting that supply is outpacing demand and, therefore, most key markets are showing

little or no new construction starts. Most of these six markets in Florida have witnessed a decline of 10% - 20% in asking rates since Q3 2007. Only the Orlando market has increased asking rates for bulk distribution space over the same period (from $5.49 to $5.66/square foot).

Miami-Dade County's current industrial gross (IG) asking rate is $7.48 per square foot. Industrial gross differs from triple net (NNN) leases in that in a NNN agreement, the lease pays for rent and absorbs the costs of utilities, building insurance, and taxes. In an industrial gross arrangement, these costs are included in the rent. The differential from NNN to industrial gross is about $1.50 per square foot. Current NNN asking lease rates in Palm Beach and Broward Counties are $ 6.71 and $7.37, respectively. In contrast, NNN rates in Central Florida market of Tampa and Orlando range from $5.27 to $5.66 per foot. Furthermore, the Jacksonville area boasts a NNN asking rate of $3.86 per square foot.

5.4.3 PORT OF MIAMI DISTRIBUTION CENTER SITE ANALYSIS

In order to assess if a Miami DC can serve the Florida retail/wholesale market the following methodology was used.

First, ocean voyage costs were developed for an Asian trade lane to the ports of Miami, Port Everglades, Tampa, Jacksonville, and Savannah. A voyage cost model was used to estimate the voyage costs of calling each port. The voyage costing model for a 4,800 TEU vessel was calibrated for each port and each trade lane. It was assumed that the vessel was deployed on a direct routing, and further that 800 containers were discharged at each port. Productivity and vessel turn time was assumed equal at each port. The cost analysis included voyage costs by trade lane, terminal costs, and port costs via each port.

The voyage costing model has been used to estimate the national economic benefits of channel deepening and maintenance dredging projects for approval by the US Army Corps of Engineers, to evaluate fleet deployment and equipment utilization strategies for ocean carriers, to develop and define competitive market strategies for public port authorities, and to assess the impact on transportation costs of the use of larger vessels by specific trade lanes.

The key inputs into the voyage costing model are:

- Vessel type;
- Vessel flag of registry;
- Vessel speed (knots):
- Design speed;
- Operating speed;
- Design draft;
- Constrained draft;
- TPI (tons per inch of dispersion) due to draft constraints;
- Load port;
- Mileage for entire route;
- Port days (based on vessel load/discharge rate and ports of call on a voyage);
- Use of Panama, Suez Canal;
- Canal fees;
- Vessel capital costs:
- Capital repayment;
- Vessel operating costs:
- Crew wages;
- Maintenance and repair;
- Insurance;
- Stores/supplies; and,
- Miscellaneous.

The values of the inputs are derived from several sources. The deadweight tonnage and flag of registry are first developed. On average, a 4,800 TEU container ship represents the type of vessels currently deployed on the East Coast and Gulf Coast routings. These vessels are typically foreign flag vessels since the operating costs, particularly crew costs, are significantly less than the crew costs on US flag vessels. A 4,800-TEU vessel typically has a design draft of -43 feet which is consistent with most container ports on the East and Gulf coasts and is compatible with the current depth dimension of the Panama Canal. It is to be emphasized that, with an expanded Panama Canal (as well as increased Suez routings) and the ability of vessels in excess of 7,000 TEUs to transit the Canal, a -50-foot channel depth will be necessary to accommodate these vessels at first-inbound ports. Furthermore, the ability to use a larger vessel – 7,000+ TEU vessels versus a 4,800-TEU vessel will provide cost savings per container.

The values for operating costs and capital costs, as well as design speed, TPI, design draft, etc., are obtained from the US Army Corps of Engineers Deep Draft Self Propelled Vessel Cost Database while current bunker fuel prices are from Bunker World. For each port, the stevedoring costs, terminal costs, port charges as well as pilotage and towing costs were identified by Martin Associates.

Next, potential DC locations were identified. The DC locations included in this analysis are Hialeah, Medley, Orlando, and Jacksonville. The corresponding lease rate information was obtained from CBRE MarketView reports Q2 2009. Separate annual lease rates per square foot were then developed for 250,000, 500,000 and 1million square foot facilities. Adjustments were made to account for inconsistencies between NNN and industrial gross lease rates. These annual lease rates for each size DC were divided by the average number of inbound and outbound loads for each respective DC size. The average number of inbound and outbound loads was based on interviews conducted with DC operators as well as Martin Associates in-house databases. The resulting figure provides a lease rate per container/load for each of the three (250,000, 500,000 and 1 million square feet) DC sizes.

Next, drayage and trucking rates were developed for each port-DC location pairing. Weighted cost per-mile truck rates (with current fuel surcharges) were developed from interviews with trucking companies and Martin Associates' in-house database. Mileages from Port to DC locations were developed from PC Miler. Intermodal rates used in this analysis (where applicable) were developed from averages of data collected from various sources including the Surface Transportation Board (STB) 1 Percent Waybill Sample, Intermodal Department of Ocean Carriers, and Martin Associates' in-house databases. Intermodal lift charges and drayage rates were applied to ports that do not have on-dock rail access.

The final step in developing the location and sensitivity analysis includes the development of a weighted average truck distance (again based on PC Miler) to serve retail/wholesale markets from each DC location – Hialeah, Medley, Orlando, and Jacksonville.

A Hialeah DC location with the cargo moving via the Port of Miami offers the total logistics least cost routing per box to serve the Florida retail and wholesale market - $3,014 on a 500,000 square foot DC and $2,963 on a 250,000 Square foot DC. Other port-DC location pairings that fall within $50 per box are Hialeah through Port Everglades, Medley through Miami, and Orlando via the Port of Tampa.

An analysis for the 1 million square foot facility yields similar results; however, given the size of the available parcel and the shift toward smaller DCs, the 500,000- and 250,000-SF facilities are more suitable to the current market situation. It should be noted that these costs are extremely competitive, with the top port-location parings separated by less than $60 per box. A number of different factors including truck rates due to backhaul availability, loading charges, and incentives to DC operators could narrow the cost gap.

Given these results, it appears that the Port of Miami can compete with the Central and Northern Florida locations to serve the Florida consumption market with DC operations in Hialeah or Medley. The Flagler Property, which provides significant industrial acreage and intermodal access, exists and is available for development. The size of the parcel, coupled with the fact that smaller to mid-size DCs are becoming the trend, allows the site to pose as a potential multi-tenant complex. It is recommended that the Port continue to work in conjunction with Flagler and other involved parties including the Florida East Coast Railroad (FEC) to market this site to carriers, developers, and DC operators (shippers/consignees).

5.5 CARGO LAYOUT ALTERNATIVES

5.5.1 OVERVIEW

The options for providing for the cargo needs at the Port are affected by the cargo projections, input from the current leaseholders of the cargo terminals, and the longevity of the leases that the Port has over the current Port lands.

Figure 5.10 illustrates the current lease structure of the Port cargo territory. These leases are currently held by POMTOC (117 acres per lease agreement), Seaboard (76.1 acres per lease agreement), and South Florida Container Terminal - Terminal Link- (71.8 acres per lease agreement), .44 acres used by Fisher Island for the movement of commercial vehicles to and from the island, and approximately 7.55 acres leased to third parties. This is a generalized drawing, which shows the location and sizes of the leases. However, it should not be used for specific property definition.

Since the cruise plan calls for the extension of cruise berths along the north shore of the container yard, the main component of the plan is to reroute the main access road to all of the container terminals on Lummus Island from that location. Figure 5.11 illustrates the proposed new cargo access roadway allowing for the expansion of the cruise berths CB 7 to CB 9, and the access to each yard, fumigation yard, pilot station, and the utilities zone at the far eastern end of the Port.

To provide the Port and Users with future sustainable yard flexibility, the approach to flow cargo traffic from the main gate complexes to the north along the cargo/cruise boundary and into the cargo yards has been taken. The specific gates for each yard, configuration and acreage of each, layout of support facilities, and containers is then only dictated by the available space within the yard and not affected by outside issues. As noted in the cruise section above, the addition of the new cruise berths on the North Channel impacts the cargo yard acreage in that area. Access to the Seaboard cargo yard will continue to be organized in a similar fashion as today following the implementation of their master plan and gate complex.

The proposed cargo right-of-way is a total area of 457, 681 square feet (10.5 acres) and is 7,232 linear feet (1.37 miles). This is a four-lane, paved roadway tapering at the fumigation yard to two-lane traffic flow.

FIGURE 5.10: CURRENT CARGO LEASES

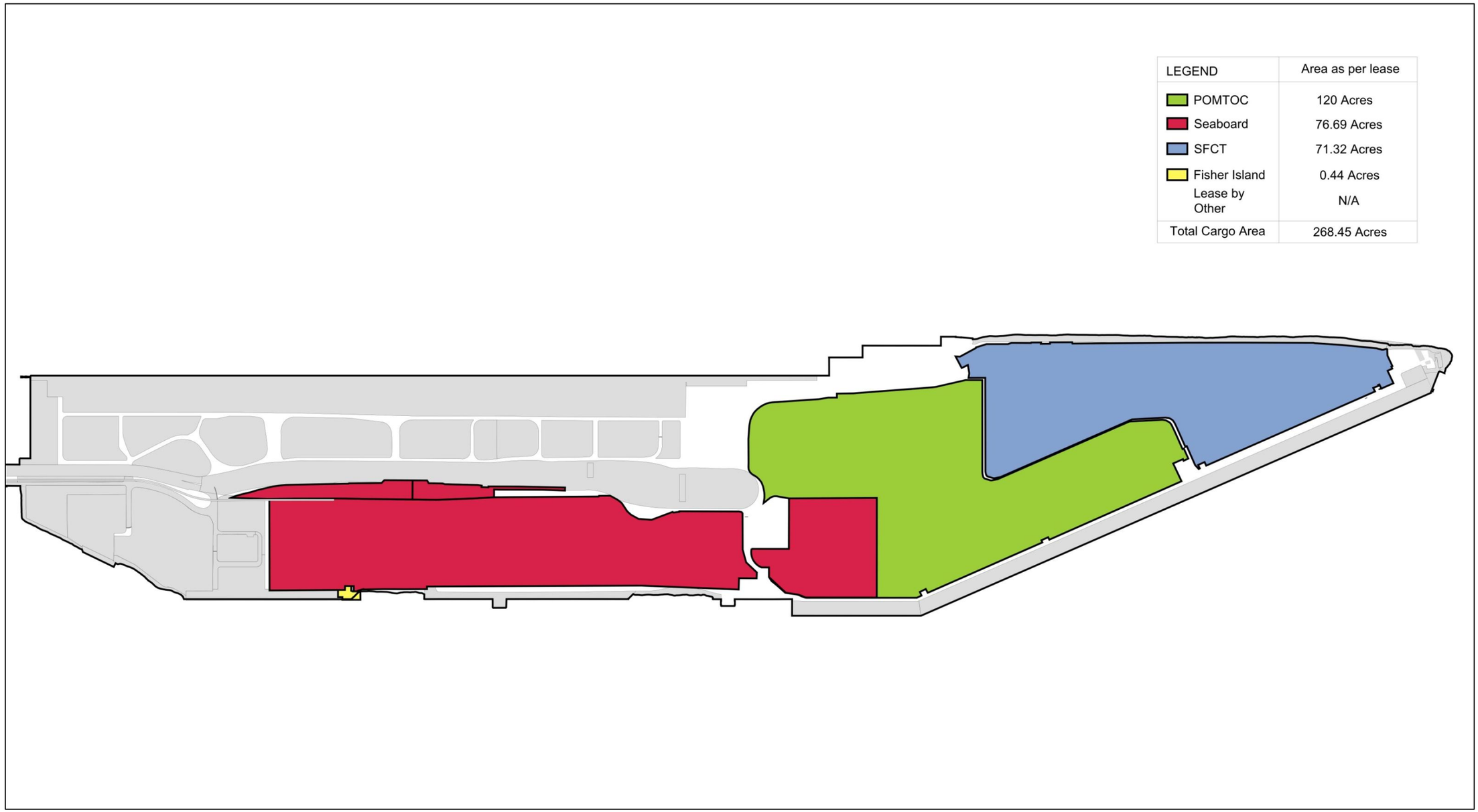


FIGURE 5.11: IMPLEMENTATION OF PROPOSED CARGO ACCESS ROADWAY

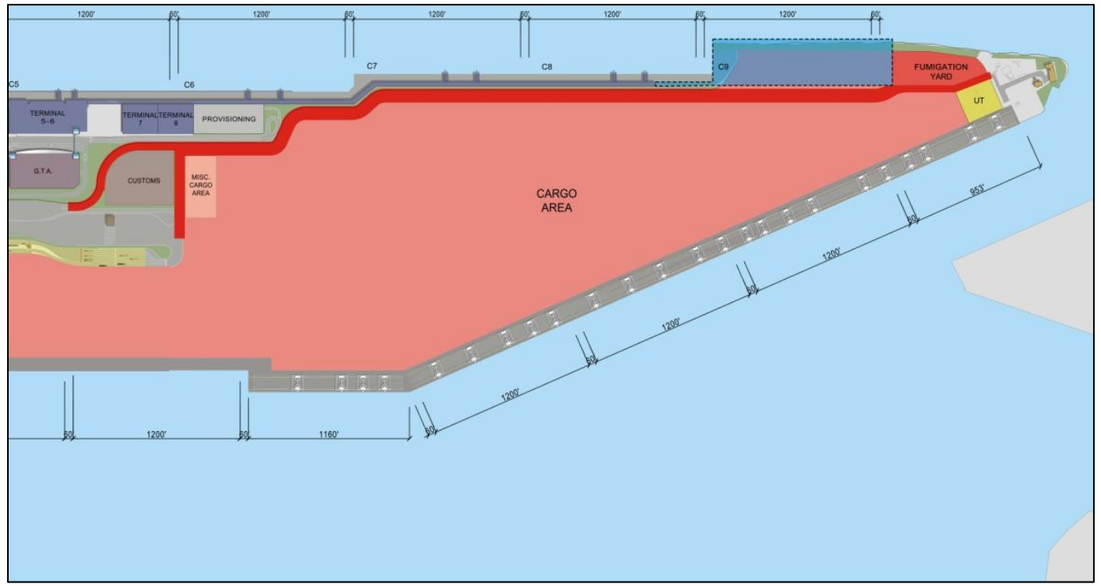
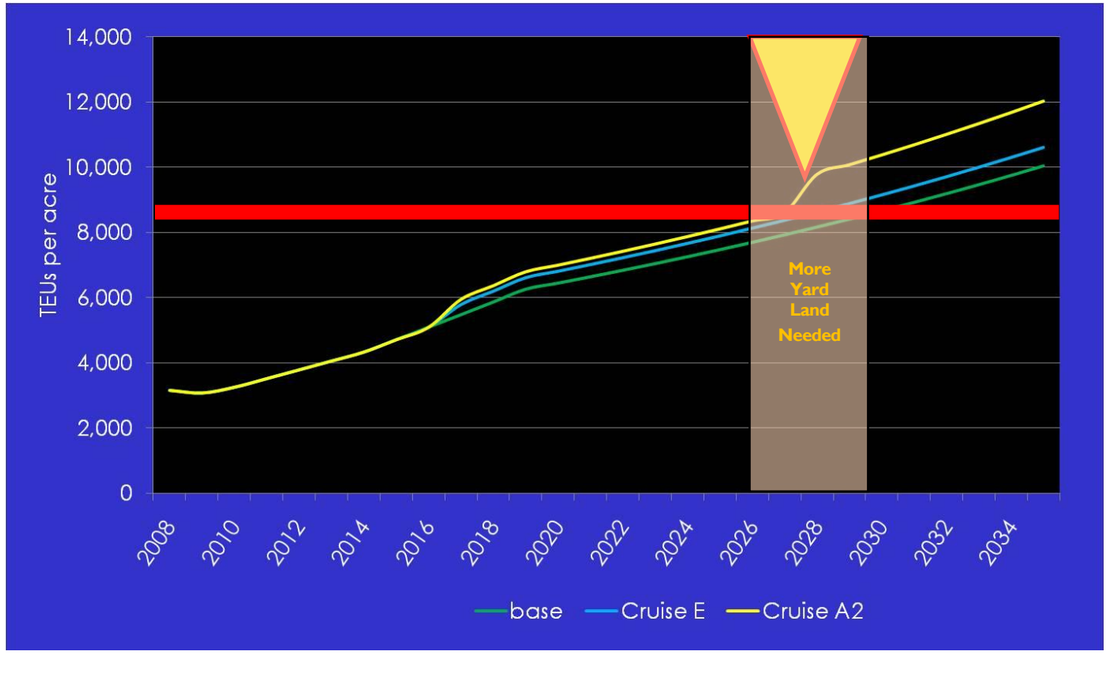


FIGURE 5.12: TEU'S PER ACRE FORECAST



5.5.2 ADDITIONAL LAND

Based on the analysis shown in the previous section, the plan will be to optimize the use of the current land within the port for cargo operations. However, at some point in the future additional land will be required. Figure 5.12 shows the need for additional cargo acreage to support the TEU projections for the Port based upon the land requirements of the different cruise development options outlined in the master plan (They are the current cruise base, E and A 2). As such, in a range from 2027 to 2029 more space will be required. It is possible that some of this need may be offset by increases in overall yard efficiencies and new technologies related to the improved handling and movement of boxes to and from the Port and yards.

Impacts on Port of Miami cargo operations will be seen in two specific upcoming projects: The Port of Miami tunnel project which has started construction as of May 2010 and is scheduled for completion in 2014. The new deep dredge project on the South Channel will allow for 50+ feet of draft for larger cargo vessels to enter and use the Port of Miami facilities. These projects together will assist in positioning the Port for the widening of the Panama Canal and the opportunity to service these large vessels capable of transiting from the Pacific to Atlantic once the canal project is completed in 2014. The development of these projects will serve as a new opportunity for the Port to expand its cargo operations to the outlying regions of the southern U.S.

Additionally, planning and design enhancements to the Port security cargo gate complex have also started and will provide for further efficiencies to cargo movements. Although this was not a key part of the master plan project, it is evident that this is a key barrier to the cargo yard efficiencies. The operations of each cargo operator are different and it is not an easy task to facilitate changes that impact each user. However, improvements to allow for faster movement in and out, box scanning capabilities, pre-clearance of trucks, and other related gate issues should be further explored as part of the overall tunnel and master plan.

5.6 CARGO LAYOUT

5.6.1 OVERVIEW

Most of the cargo operations are consolidated in Lummus Island and the south side of Dodge Island. However, transit shed B is an isolated building still handling cargo while adjacent to cruise terminals. This creates operational issues and does not allow for efficient use of space; customs is in a tight space for access.

The recommended cargo master plan layout provides for consolidation of cargo yards and supporting functions and the ability for future expansion to coincide with projected TEU throughput demand and reconfiguration of the cruise area. In doing so, a separation of cruise and cargo will occur.

A new space for the transit shed B to allow for continued use of these facilities for bulk commodities will be provided. The Customs area will be expanded and moved to a location adjacent to the gate complexes that can also serve to support cruise operations functions as necessary and the present fumigation yard will be relocated to allow for the safe distance required for use, placing it in an area where it will not impact future cruise and cargo area development.

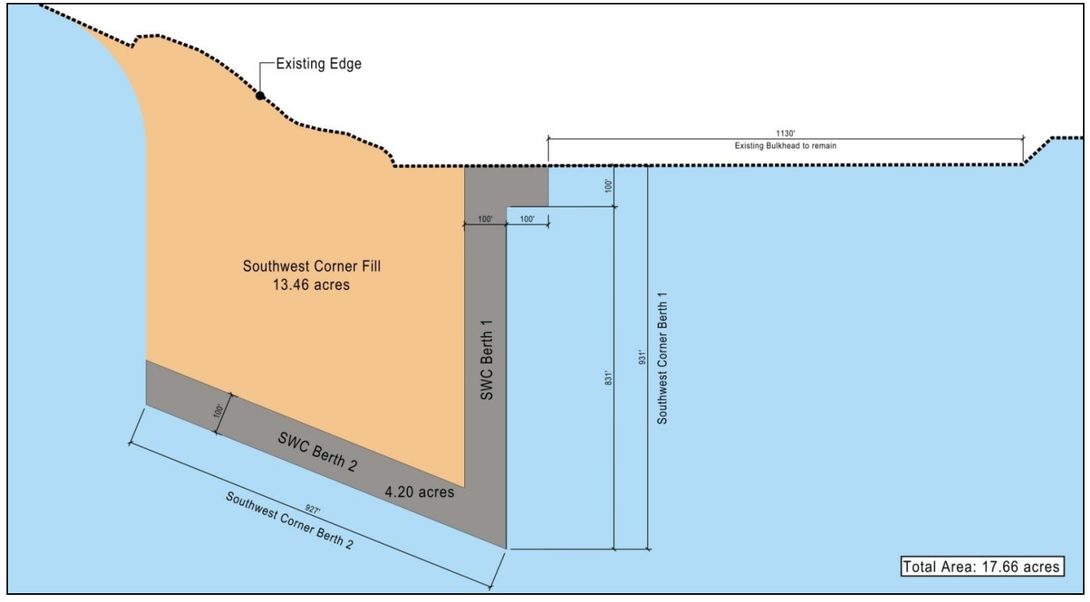
The master plan also takes into consideration current actions by Seaboard to develop their yard plan. South Florida Container Terminals is most impacted by the reconfiguration of the cruise and cargo areas due to the location of the yard gate complex. This will likely need to be relocated to provide for the completion of the master plan as presented.

To offset the potential loss of cargo yard as land is reallocated to cruise, it is recommended to expand the cargo area along the southwest corner edge by some 13.46 acres to provide a platform for future cargo operations.

Figure 5.13 shows this expansion program that would cost the Port an estimated $111,800,000 including the addition of two 830- to 927- linear foot berths with an area of 4.20 acres as illustrated in Table 5.3. This area would provide for potential river traffic interaction, Ro-Pax and Ro/Ro services. Total area is 17.66 acres.

Table 5.3: Southwest Corner Cargo Expansion Cost Estimate	
Southwest Corner Cargo Expansion	
Berth 1	$ 15,100,000
Berth 2	$ 11,300,000
Sub Total Berths	$ 26,400,000
Fill Area (13.46 acres)	$ 85,400,000
TOTAL	$ 111,800,000

FIGURE 5.13: PROPOSED LONG-TERM SOUTHWEST CORNER CARGO EXPANSION



The current cargo berthing layout shown in Figure 5.14 provides for some 10,681- linear feet of combined cargo berthing along the South Channel of the Port to sufficiently allow for small- to mid-size container and Ro/Ro vessels; these berths (99 – 182) are adjacent to the main cargo yards of POMTOC and South Florida Container Terminal and are serviced by gantry cranes. Presently, Seaboard's berths adjacent to their yard use Ro/Ro and mobile cranes to move cargo and containers.

FIGURE 5.14: EXISTING CARGO BERTHING LAYOUT

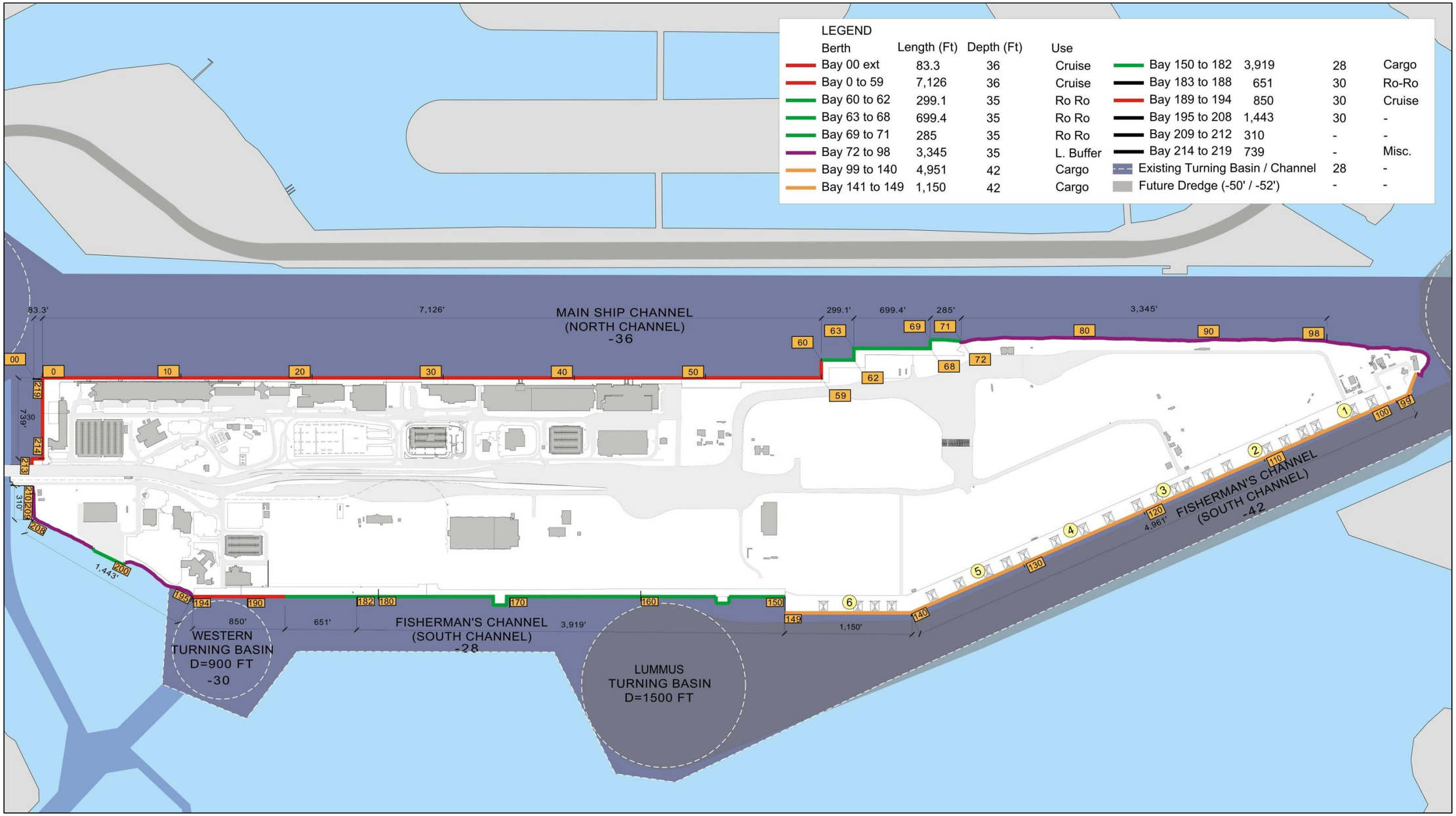
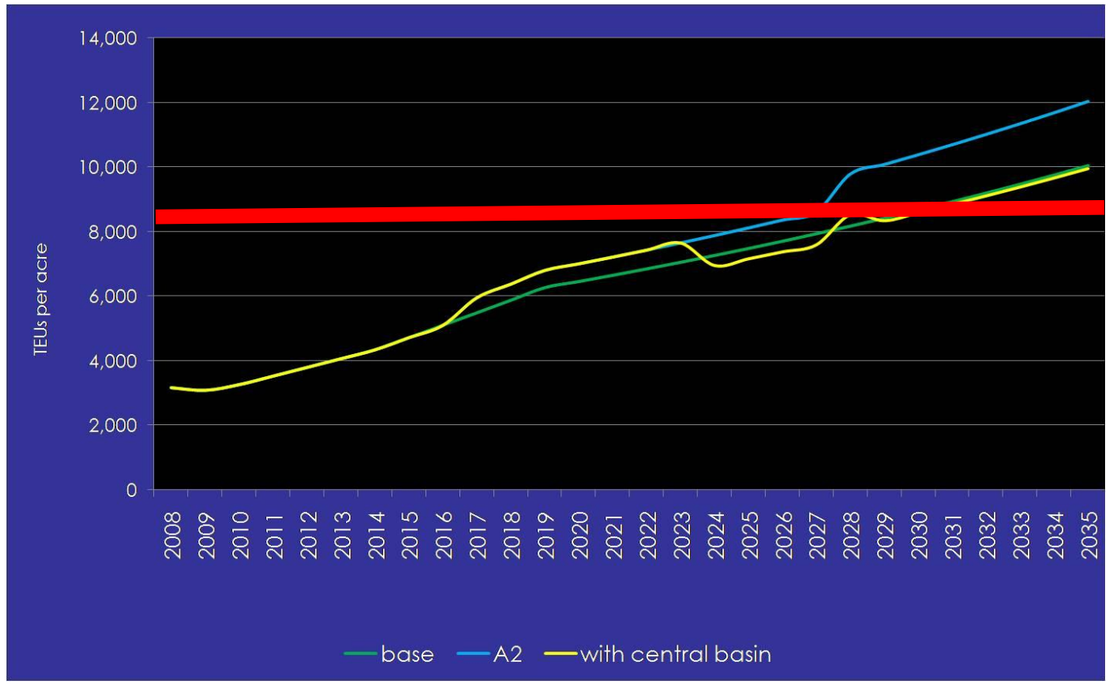


Figure 5.15 provides an overview of the projected requirements of TEU's per acre. This forecast was used as a baseline for the cargo master plan development. As shown, when levels reach approximately 8,000 TEU's per acre, there is a need for additional land area to meet the projection demands.

FIGURE 5.15: TEU'S PER ACRE FORECAST WITH CENTRAL TERMINAL



The proposed long-term master plan as illustrated in Figure 5.16 provides for 13,252 linear feet of berth. Existing bulkheads along the channel will remain and current Port plans will further enhance these areas. These projects will be done in conjunction with the deepwater channel dredge project. The transit shed B has also been moved from its present location and centralized to provide more convenient access, separating it from cruise activities. Customs has also been provided an area for centralized processing and support functions for cargo activities. With the development of the Southwest Corner and the adjacent commercial area there is also an opportunity for cargo users such as Seaboard to move their office / administrative functions from the cargo yards to allow for increased space and efficiencies.

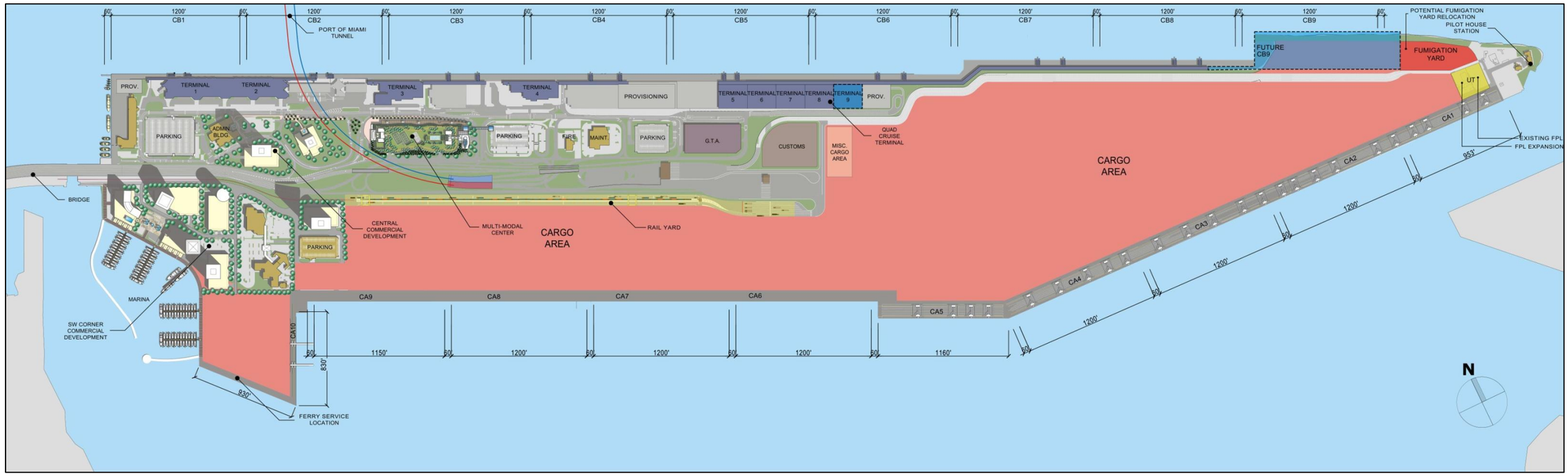
Based upon the cargo market demand projections, the Port of Miami will require additional cargo land in:

- 2023 with cruise Alternative A1; or,
- 2030 with cruise Alternative A2.

This assessment takes into consideration the acreage lost to cruise development and the addition of land with the new southwest infill.

There will be a need for further detailed operational modeling prior to the sustainable development of any new cargo land areas to ensure there is adequate need based upon the TEU per acre metrics. New berths for cargo will be required in 2029.

FIGURE 5.16: PROPOSED LONG-TERM MASTER PLAN



As part of the Master Plan, the fumigation yard will need to be relocated to the northeast corner to allow for the 200-ft. stand-off operational radius requirement and provide its present location for future development. The new location provides some challenges for users but it is a good location overall for this service. The cost of relocating the fumigation yard is approximately $856,295. See Figure 5.17 and 5.18 for a detailed view of the yard area.

FIGURE 5.17: FUMIGATION YARD RELOCATION OVERVIEW

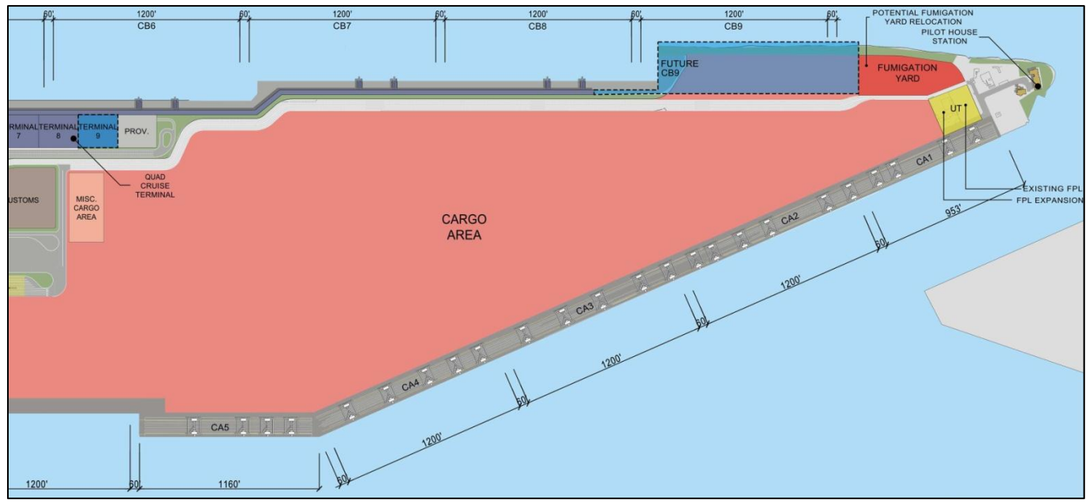


FIGURE 5.18: FUMIGATION YARD RELOCATION WITH 200 YARD RADIUS SHOWN

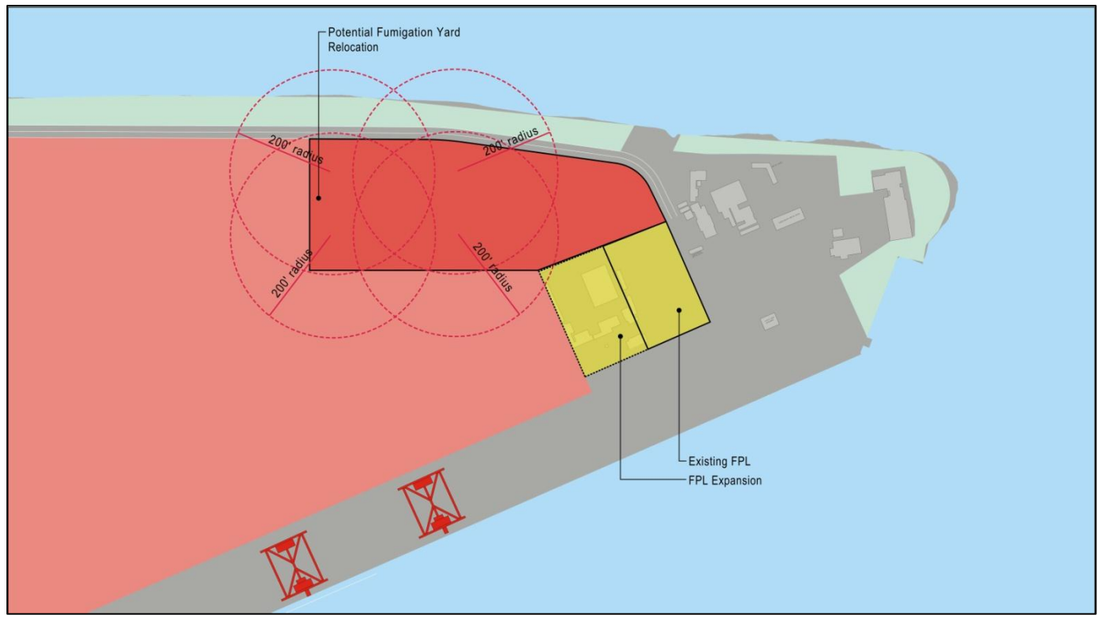
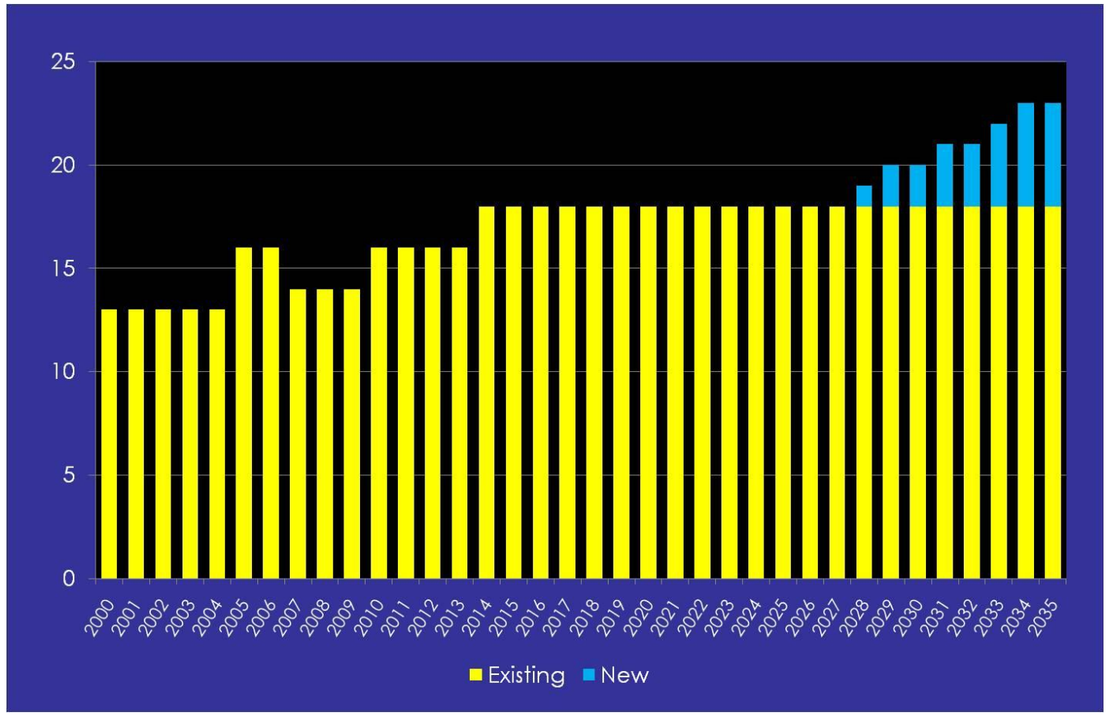


Figure 5.19 illustrates the long-term projections for gantry crane requirements to meet the container forecasts and user requirements. A total of 23 cranes by 2034 to meet the cargo market demand based upon the forecast are required for the Port of Miami. There are currently 16 operational cranes at the Port of Miami (including 5 operated by Seaboard). Four additional cranes are currently on order and will be placed at the Port as required to meet the operational needs of the Users with these additional cranes being planned for 2014 to coincide with the opening of the widening of the Panama Canal and new Port channel dredge efforts. Three existing gantry cranes (two of which are in use) will then be decommissioned. They have already been sold to another port in the region. Additional units would be added as the vessel sizes expand and new berth area is needed with the first of the master plan cranes being required in 2028 based upon projections. The projections include the entire cargo yard throughput inclusive of the Seaboard Marine facility that currently does not use the large mobile gantry container cranes for the movement of its cargo from ship to shore. See ES5.5 for the Cargo Long-Term Master Plan.

The additional cranes are projected based upon a productivity rate of 40 TEUS per hour and an overall maximum utilization rate of 2,000 hours per year per crane. The actual deployment of new gantry cranes may fluctuate based upon peaking factors, yard and gate efficiencies and other factors. As such the Port of Miami will need to monitor the overall yard effort to accurately time the purchase and deployment of new cranes, as is the case with the deployment of four new cranes to coincide with the completion of the widening of the Panama Canal and dredge project. Thus, actual implementation is a combination of operational needs, financial assessment and throughput over the next 25 years.

FIGURE 5.19: GANTRY CRANE PROJECTIONS



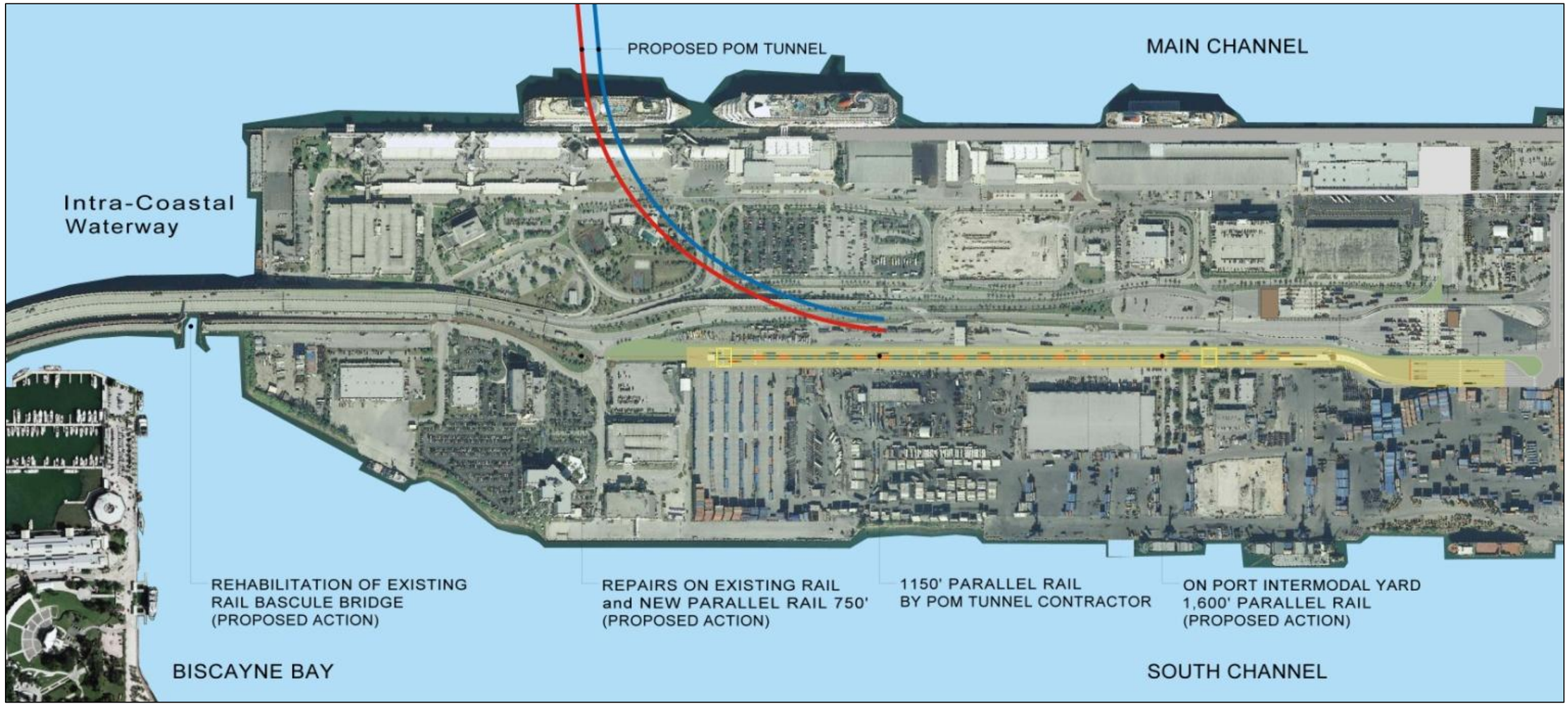
5.7 ON-PORT RAIL AND OFF-PORT CARGO OPERATIONS

5.7.1 OVERVIEW

The Port of Miami currently has an existing rail spur of approximately .57 miles in the Port. To provide for the reduced cost benefits associated with an intermodal link, a new on-port rail yard is planned for better accessibility for container movements from and to the Port. The rail yard will be incorporated into the long-term master plan. See Figure 5.20 for an example of the rail yard's position within the Port. The yard would use the existing corridor and linkages to the Hialeah FEC yard as its base. The layout of the off-site rail yard is a separate master plan element. It is envisioned that the yard would be accessed by container haulers via a security gate system, assigned a train unit, and then off-loaded by a picker system onto double-stacked trains. The rail reduces truck trips by several hundred thousand trips per year. This will improve road safety, while reducing fuel consumption, oil dependence green house gas emissions and road degradation.

The total yard area would be approximately 9.5 acres and reside adjacent to the tunnel access to the Port and Seaboard Marine yard. The total length of the intermodal rail yard is approximately 2,750-feet. The cost for the on-port rail portion and bascule bridge component of the project is approximately $22.7 million plus an additional $2.3 million for RTG equipment.

FIGURE 5.20: PORT OF MIAMI ON-PORT RAIL



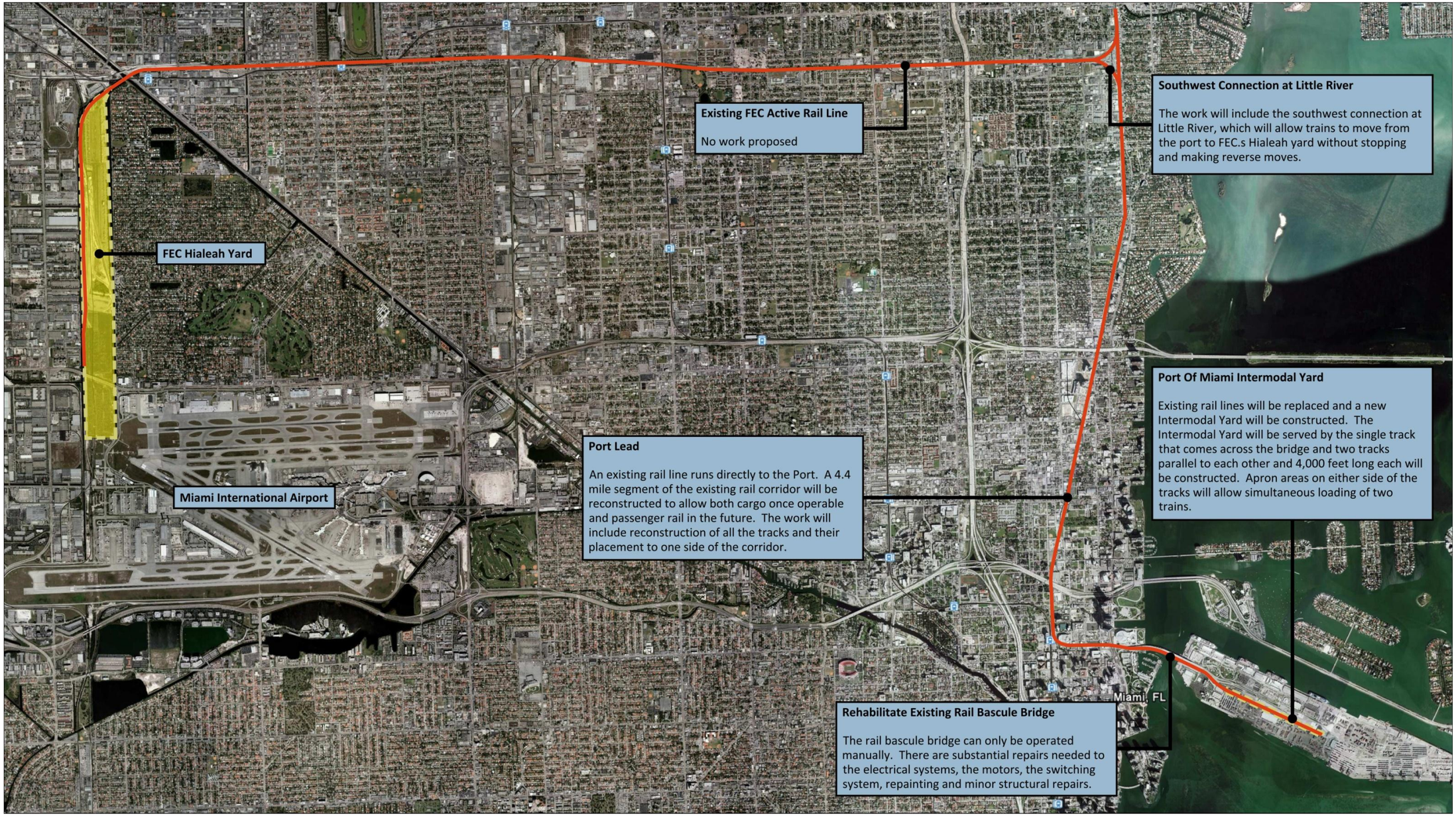
This rail yard would be used to stack and unload boxes from trains arriving and departing in the nighttime hours, thus not impacting downtown Miami traffic along Biscayne Boulevard. Aprons on either side would allow for loading/off-loading to occur. The existing bascule bridge would require substantial retrofitting prior to use. This is shown in the adjacent photo – Figure 5.21.

FIGURE 5.21: EXISTING ROADWAY AND BASCULE BRIDGE

Figure 5.22 illustrates a potential development of the Hialeah rail yard to act as an inland transshipment point for the Port. The train could either be used for direct service or interim service to a multi-modal transshipment yard close to the Miami International Airport. This provision provides another tool for marketing the Port and allowing the cargo yard users to compete in the Florida and Southeast U.S. market. It also establishes a sustainable cost effective direct rail service to and from the Port of Miami to lower transportation costs for shippers.

Additional upland work on track and yard is planned to finalize the use of this rail system. It would reduce traffic in downtown Miami while providing economic and environmental benefits to the County and surrounding municipalities.

FIGURE 5.22: PORT OF MIAMI OFF-PORT RAIL AND FEC CARGO



SECTION 6

COMMERCIAL

6.1 OVERVIEW

One of the new strategic elements of the Port of Miami will be the introduction of commercial aspects to the business portfolio. The sustainable development will provide the Port with another avenue for generating revenues from the Port's land resource. In many ports throughout the U.S., commercial real estate income is one of the largest revenue figures for the business. Examples include the Port of San Diego and Port of Seattle, among others. The Port of Miami has spare land assets that allow for commercial development opportunities. The Port of Miami's weakness as a Central Business District "downtown" port can be exploited as a major strength in this regard. Furthermore, this allows the Port to develop a much needed "third leg" of the financial stool to provide additional strength to its portfolio of assets and earnings potential. The three "C's" include:

- Cargo;
- Cruise; and,
- Commercial.

Land and waterfront surrounding and adjacent to the existing southwest corner can be used to create a commercial complex for future port development opportunities.

The Master Plan focused on existing properties within the Port which could be developed or redeveloped without impacting the primary business of the Port or requiring land fill. The Port contains some parcels which have been isolated due to the roadway network, or which now have poor waterborne access and can no longer fulfill a maritime mission.

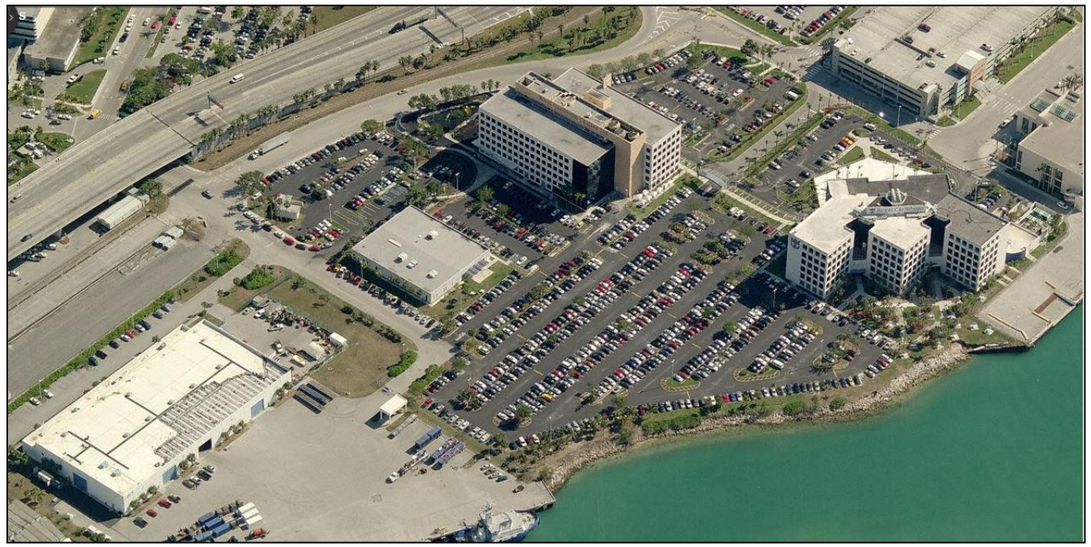
6.2 SOUTHWEST CORNER COMMERCIAL DEVELOPMENT

The primary area for port commercial development is the Southwest Corner (See Figure 6.1). Lying adjacent to a newly created cargo expansion area, the introduction of new commercial opportunities for the Port will strengthen its financial position and provide growth options into the future. Development of this area will be further defined in the phasing and implementation sections of the master plan report.

This site in particular is adjacent to an area which cannot be enlarged for navigation due to its surroundings or adjacent pipelines. Thus, the property cannot be efficiently used as a berth; it does not have deep water adjacent, though it does have water depths suitable for recreational boating.

The key element of the Southwest Corner is the introduction of a mega-yacht marina complex that would anchor the surrounding commercial development and provide for an active area. This would provide a mirror for Bayside and may enhance development opportunities on the mainland as well over the master plan period. Immediately adjacent to the marina would be a waterfront promenade with retail and restaurant areas. This development would ideally work in conjunction with the cruise area to provide early arriving passengers the opportunity to spend quality time in Miami prior to their cruise. Arrangements could be made to allow cruise passengers easy transportation options to and from the cruise terminals or intermodal facilities for this purpose via electric shuttle buses. See Figure 6.2.

FIGURE 6.1: SOUTHWEST CORNER AERIAL



The remaining functional commercial area could be developed into office and hotel complex that would be supported by adequate parking for each parcel. Lots are currently split into six office development sites of approximately 23.3 acres in total, 1 hotel lot of 2.6 acres, open space of 1.1 acres, and additional existing RCCL office, parking, and terminal. The density of each parcel would be determined during the development phase. Stories may range from 6 to 30 per site. Site Development Parcel Building 4 could be used in conjunction with maritime office for Seaboard Marine and other Port users. Table 6.1 provides an outline of the development potential of this zone.

FIGURE 6.2: SOUTHWEST CORNER COMMERCIAL DEVELOPMENT ZONE

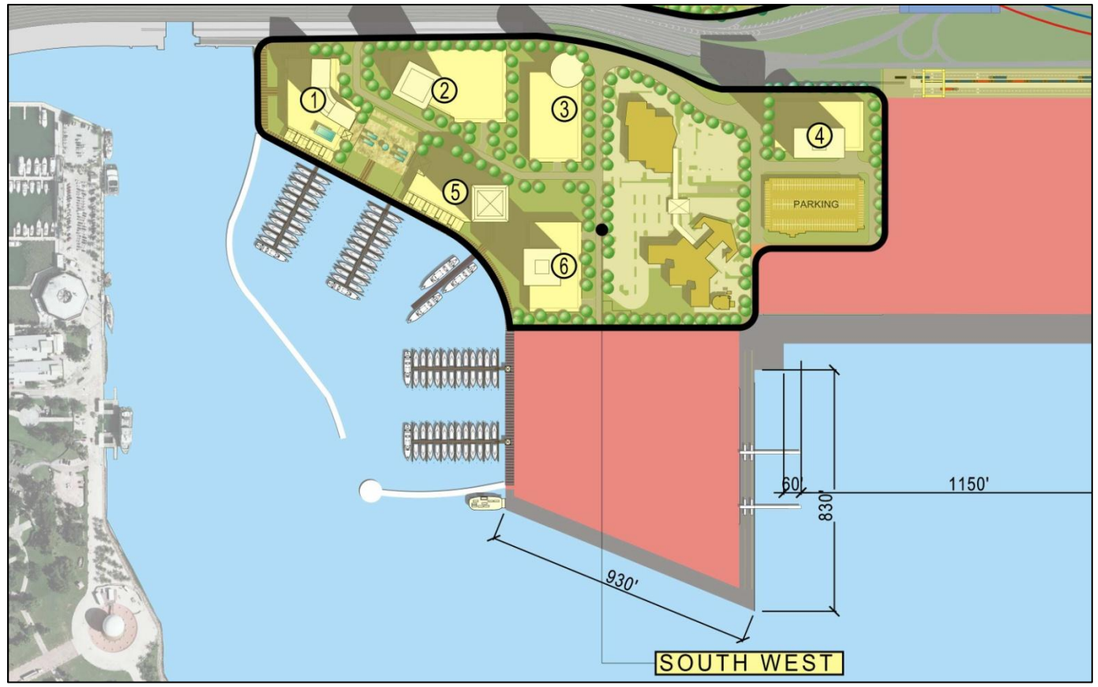


Table 6.1: Southwest Corner Commercial land parcels					
BUILDING ID	USE	BUILDING FOOTPRINT	BUILDING AREA PER FLOOR (sf)	NUMBER OF FLOORS	PARKING PODIUM PER FLOOR
1	HOTEL	120X120	14400	VARIES BETWEEN 6 and 30	MIN. 180'X300'= 54,000SF ~150 SPACES PER FLOOR
2	OFFICE	120X120	14400		
3	OFFICE	120X120	14400		
4	OFFICE	120X120	14400		
5	OFFICE	120X120	14400		
6	OFFICE	120X120	14400		

Adequate parking would also be included in the development of each parcel at approximately 150 spaces per floor.

6.3 ZONING AND ADVERTISING

The Port of Miami is a community landmark that generates billions of dollars and thousands of jobs for the community; it promotes and attracts local and international tourism to the area. The Port needs to diversify its business stream to support its maritime operations. By introducing Wayfinding and Advertising, and also developing a commercial area along the southwest corner of the island which is closest to downtown, the Port will integrate even more with the city and will fill a source of well needed revenue for the area.

Rezoning

Dodge and Lummus Island were originally zoned Government/Institution (G/I) by the City of Miami and lie within its municipal boundary. When the County purchased the land it did not rezone it to one of its Zoning Districts. Therefore the land remains with the City's zoning designation. For permitting purposes the Port has been operating with an Industrial classification, but it needs to rezone in order to prepare for the implementation of several components of this Master Plan. It is recommended that the Port rezone the Island to a zoning district which will allow it to continue to operate its maritime related uses, such as Industrial, while also allowing for Business and Office uses in the areas designated as commercial in this master plan. Rezoning of the Port will provide flexibility in planning, design and development for an efficient use of land.

Port Wayfinding and Advertising

The Port of Miami functions as a regional tourist attraction. To better address the needs of its tourist, the Port must develop a comprehensive Wayfinding and Advertising Signage Program. Both Wayfinding and Advertising are consistent with this Master Plan's concept to further explore commercial development on-port. By creating a comprehensive Signage Master Plan the Port will create a more efficient flow of traffic and people on the island while advertising will increase revenue with minimal costs.

Sign Types

- **Wayfinding**
  The Port's current Wayfinding follows a non-standard method, which due to operational and functional changes now make the existing signage ineffective. This is detailed more thoroughly in the Wayfinding / Signage Analysis created as part of this Master Plan.

- **Class B Signs**
  Class B signs, or Point of Sale Signs, are any signs advertising or designating the use, occupant of a premises, or merchandise and products sold on a premises, and shall be located on the same premises whereon such is situated or the products sold.

- **Class C Signs**
  Class C signs, or Commercial Advertising Signs, are any signs which are used for any purpose other than that of advertising the name of a business, service, product or other activity carried on the premises. Class C signs may be in the form of a billboard, bulletin board, mural, or poster board, or may be affixed flat to a building or painted thereon. Class C signs also include Entrance Features: Any combination of decorative structures and landscape elements located at the entrance to a

development, which identifies or draws attention to the development and/or exercises control of ingress and egress to the development.

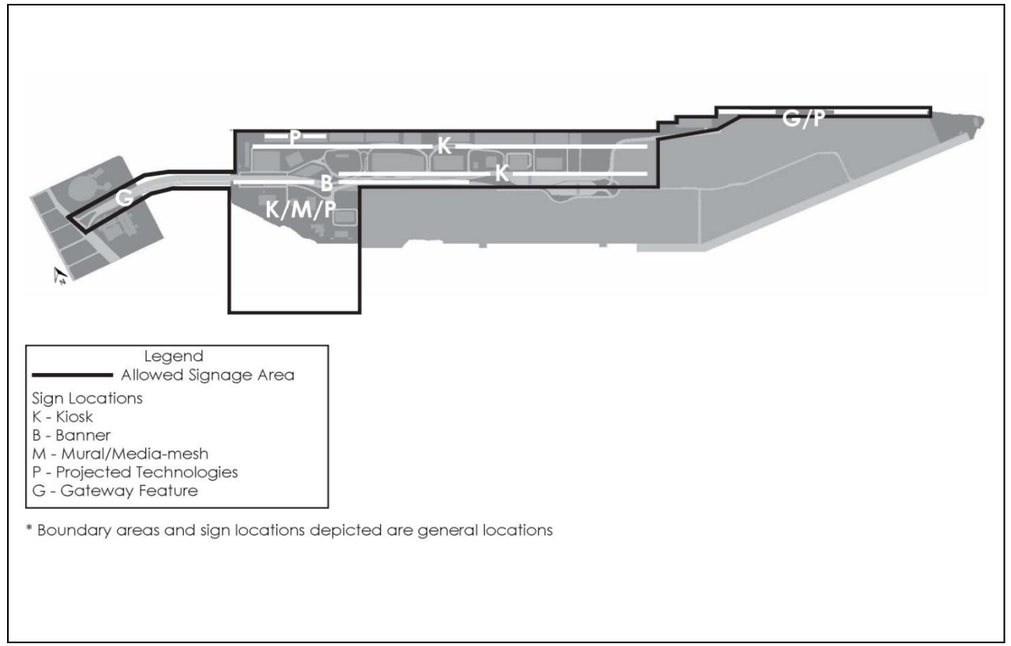
- **Alternative Sign Types**
  Traditionally tourist attractions have a large range of signage options, including signs that stem from state of the art technology. If these are to be adopted into the County's Sign Ordinance, the Port should look to incorporate attractive signage Port-wide. The following alternative signs will allow for the Port, which acts as a campus upon itself as well as a regional tourist attraction, to benefit from the highest and best use of advertising: Banner: A banner sign, similar to a digital billboard, should be allowed on interior streets of the Port; Kiosk: A Kiosk is a free-standing, 2-faced sign, similar to a bus-shelter sign; Mural: A mural is an advertising painted on, or affixed or secured flat to the facade of a building; Gateway: A Gateway sign is similar to an entrance feature but allow for advertising; Projected Technologies: Projected technologies are the projection of three-dimensional artistic images on any building or structure.

- **Implementation**
  In order to implement the Wayfinding and Advertising Signage Program, the Port will need to execute the recommendations outlined in the Wayfinding /Signage Analysis, which include the development of a comprehensive signage master plan and it will also need to rezone to a designation which will allow commercial signage for advertising. The site lines around the Port are not very numerous and are of a great distance, therefore creating the need for larger signs. The Port must do a thorough analysis of alternative types of signs that can be installed which will not compromise the aesthetic integrity of the surrounding community. In addition, the Port should look at designs which integrate architectural and artistic components.

Placement

Figure 6.3 depicts where these alternative sign types should be located.

FIGURE 6.3: PORT OF MIAMI SIGNAGE MAP



PREFERRED PLAN

7.1 OVERVIEW

As outlined in the previous sections, the preferred 2035 Plan for the Port of Miami encompasses elements of cruise, cargo, and commercial. The preferred plan is generated through the cruise and cargo 2035 projections, feedback from Port Users and Port of Miami staff, and a review of associated issues and sustainable opportunities over the long-term. The assembly of the plan followed a logical order in the development of cruise and cargo market assessments, definition and assembly of cruise and cargo design vessels and future berth demand requirements, financial and physical analysis of the Port properties, recognition of the role of future technological and operational advancements in the cruise and cargo sectors enhancing operations, needs of the surrounding communities and environment and the development of a third financial leg for the Port with the addition of a commercial component.

The plan is shown in Figure 7.1. The inset (Figure 7.1A) shows the alternative cruise terminal configuration.

FIGURE 7.1: PREFERRED LONG-TERM MASTER PLAN

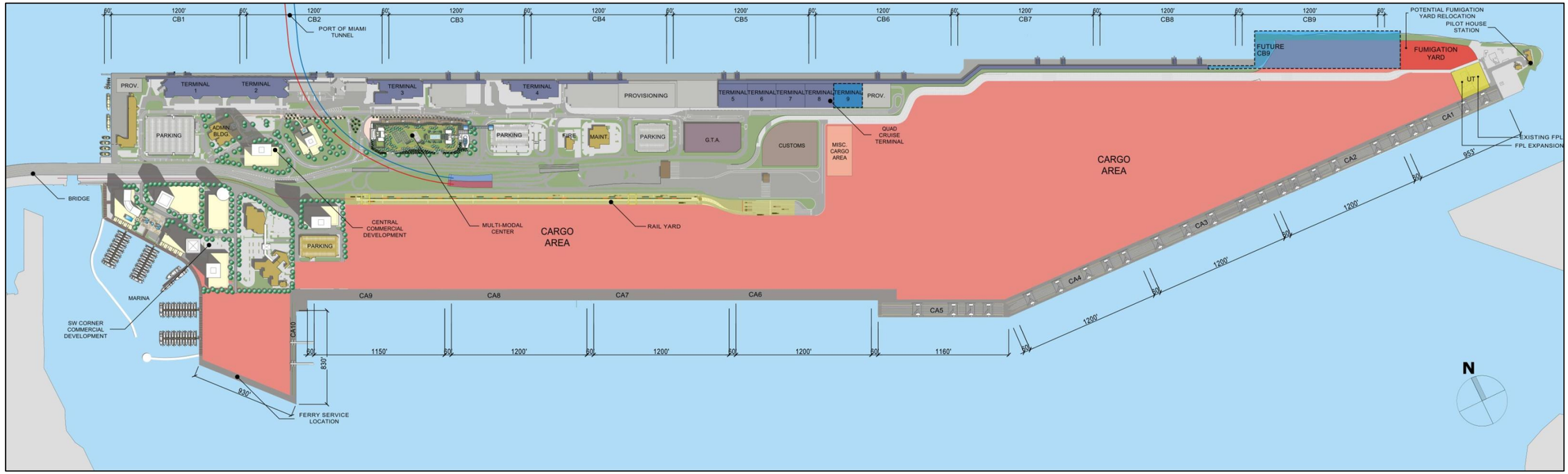
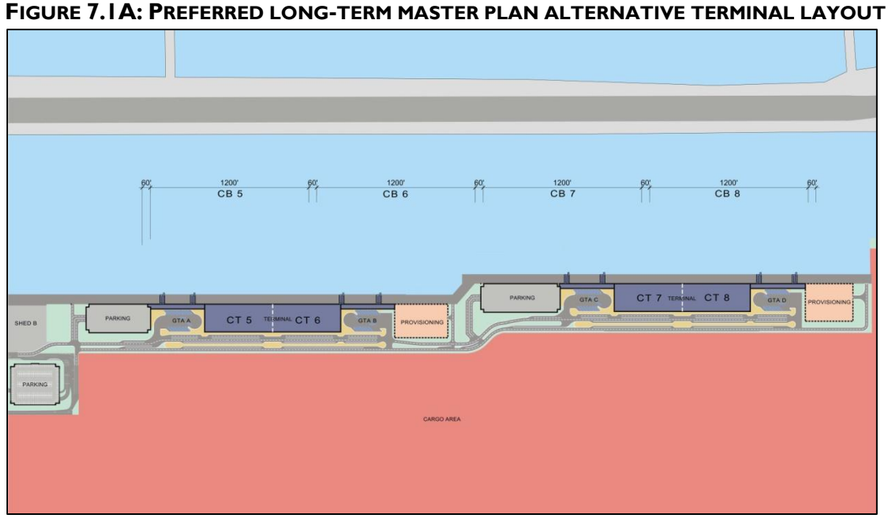


FIGURE 7.1A: PREFERRED LONG-TERM MASTER PLAN ALTERNATIVE TERMINAL LAYOUT



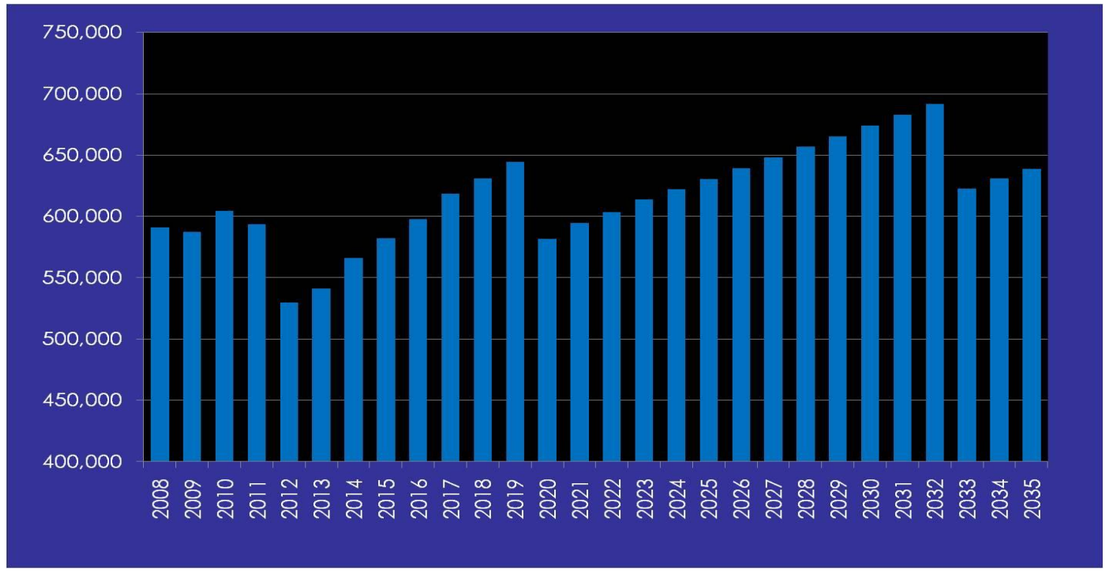
7.2 METRICS

To measure the effectiveness of the plan, a number of parameters were reviewed that allow continuous tracking to make sure that the plan is as efficient as possible. Subsequently, in the financial section of this Master Plan, the financial performance metrics are included that allow comparisons of the multiple uses within the Port. If implemented in concert with the anticipated traffic, the Plan will perform with the following operational performance metrics in cruise and cargo:

7.2.1 CRUISE

Since cruise is berth-intensive, the best metric is the cruise passengers per berth that is shown in Figure 7.2. This metric is the best indicator of efficiency. Currently the Port is operating with less than 600,000 passengers per berth.

FIGURE 7.2: CRUISE METRIC - PASSENGERS PER BERTH



Although this is at the top of the industry, as cruise ships increase in size, these numbers should go up. The chart reflects a stair step pattern which is due to the introduction of new berths on a particular year, and thus reducing the overall averages. Should the Port exceed the 700,000 passenger per terminal, the facility should be generating sufficient revenues to support its costs.

7.2.2 CARGO

For cargo, being both berth- and land-intensive, two metrics are the most indicative of efficiency: TEU's per acre as shown in Figure 7.3 and TEU's per lineal feet of berth as illustrated in Figure 7.4. The first shows TEU's per acre for the gross area allocated to cargo and also the net acres allocated to the terminal yards. This excludes the roadways and gate complex. The throughput of containers per berth fluctuates as the business evolves and new berths are constructed at the Port.

FIGURE 7.3: CARGO METRIC - TEU'S PER ACRE

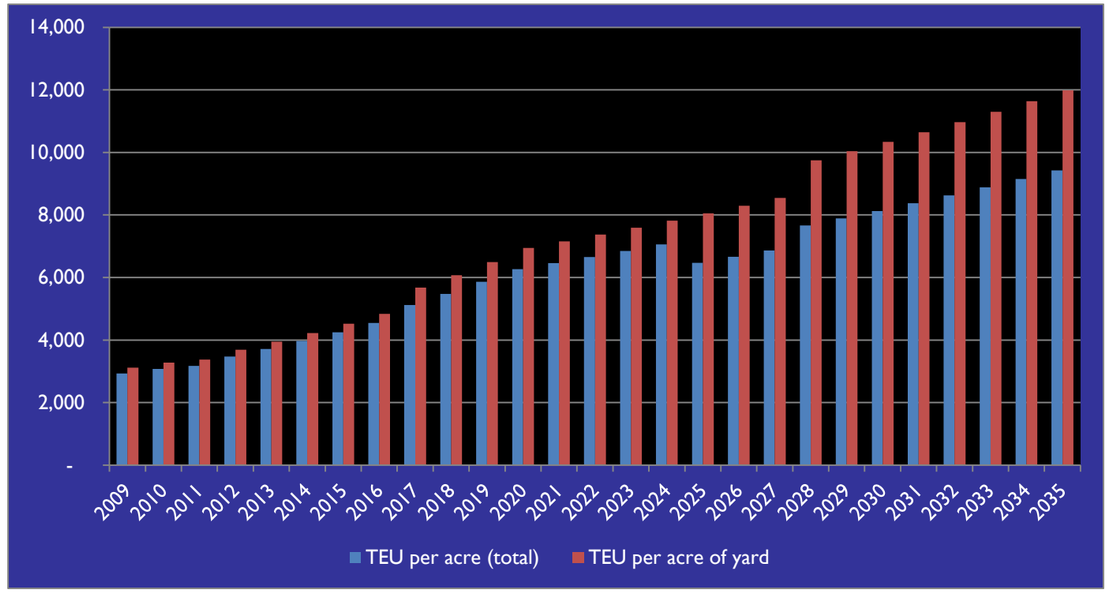
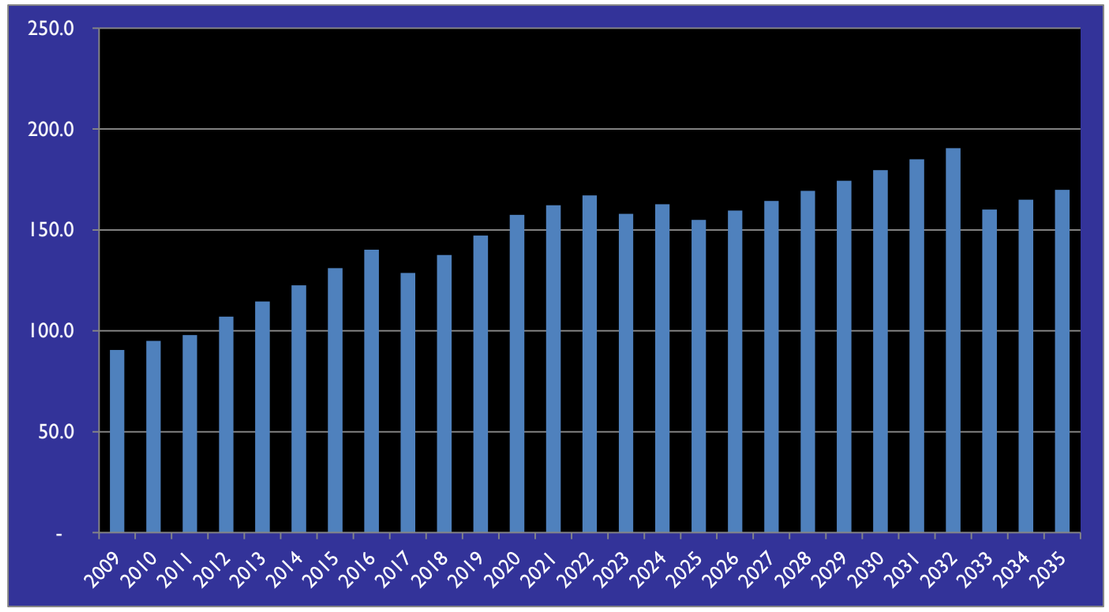


FIGURE 7.4: CARGO METRIC - TEU'S PER LINEAL FEET OF BERTH



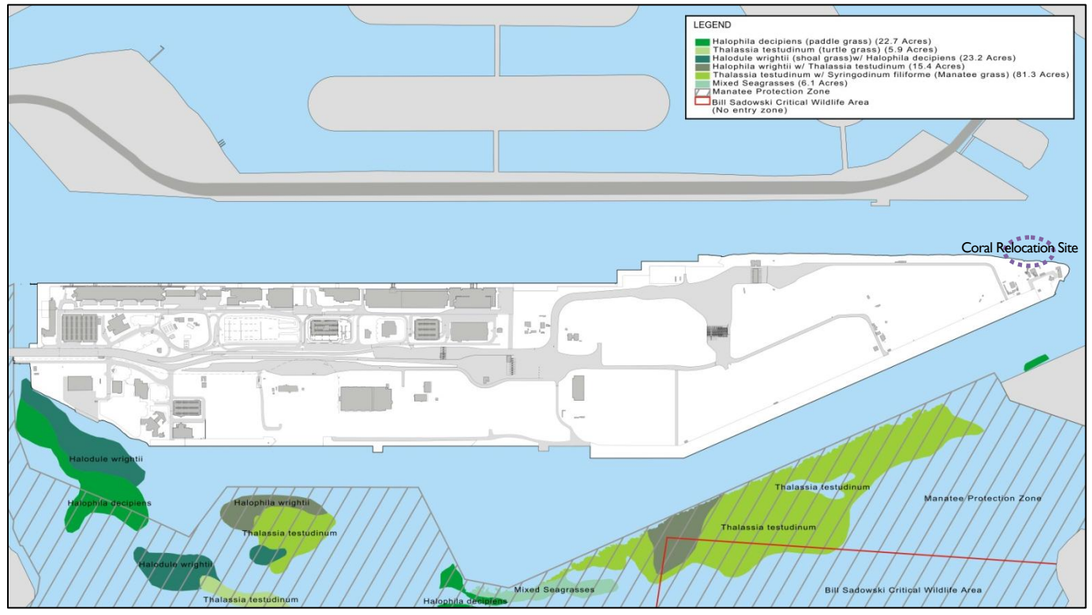
As with the cruise metric, the stair-step pattern shown in Figure 7.4 reflects the justification for the addition of land to the cargo area when the program begins to near the 8,000 TEU's-per-acre thresholds. In the Plan, the Southwest corner land reclamation is scheduled for approximately 2023.

7.3 ENVIRONMENTAL

Located within the Biscayne Bay Aquatic Preserve, an area designated by the State of Florida for special environmental protection, the Port of Miami is a manmade land structure formed through beneficial land reuse of three spoil islands (see Figure 7.5). The Port also provides for a coral relocation site along the northeast corner of the port boundary to assist in mitigation tied to port sustainable development projects.

FIGURE 7.5: EXISTING ENVIRONMENTAL MAPPING, PORT OF MIAMI AND SURROUNDS

Source: Westhorp & Associates and B&A



Although estuarine conditions (i.e., water quality and movement) in the vicinity of the Port are generally good, human-influenced changes have resulted in increased overall turbidity and water quality awareness due to input from industrialized canals (e.g., the Miami River). The Port is well flushed by tidal action and Port-related activities are unlikely to impact natural environments outside the Port vicinity.

BISCAYNE BAY AQUATIC PRESERVE, A CLASS III OUTSTANDING FLORIDA WATER

The Biscayne Bay Aquatic Preserve, established in 1980 under Chapter 18-18, Florida Administrative Code (F.A.C.), which consists primarily of 69,000 acres of state-owned submerged lands and the water column over such lands as well as publicly owned islands, is under jurisdiction of the Florida Department of Environmental Protection (FDEP).[1] The Biscayne Bay Aquatic Preserve is also designated as a Class III (recreation, fish, and wildlife) Outstanding Florida Water (OFW), a designation intended to prevent the lowering of existing water quality which is managed by the FDEP, Office of Coastal and Aquatic Managed Areas. Development activities in the Biscayne Bay Aquatic Preserve are subject to more stringent environmental regulations than marine developments in other areas of South Florida because water quality at the Port is governed by the water quality standards for OFWs set by the FDEP. There are no allowances for any turbidity above ambient conditions in OFWs and, as a result, a turbidity monitoring plan should be in place to prevent adverse impacts to the Biscayne Bay Aquatic Preserve. Because all Aquatic Preserves in Florida are designated OFWs, new construction or other marine activities cannot result in degradation of water quality outside of specially designated mixing zones. Although there is no existing management plan for the Biscayne Bay Aquatic Preserve, one is likely to be created soon. Future Port expansion activities will need to be appraised in relation to the requirements of the management plan.

MANATEE PROTECTION ZONES

Surrounding the Port is an area designated as a Manatee Protection Zone by the Miami-Dade County Manatee Protection Plan and enforced by Florida Fish and Wildlife Conservation Commission (FWC) under the Manatee Sanctuary Act, 379.2431(2), Florida Statutes to protect the endangered West Indian manatee. These zones are established by FWC to restrict the speed and operation of vessels, where necessary, to protect manatees from harmful collisions with vessels and from harassment. In areas that are especially important to manatees, the rules can prohibit or limit entry into an area as well as restrict what activities can be performed in the area. This area is State-designated with physical and/or biological features essential to the propagation of manatees. The West Indian Manatee, also protected by federal law, is protected under the Endangered Species Act of 1973 by the U.S. Fish and Wildlife Service (FWS) and the Marine Mammal Protection Act of 1972 by the National Marine Fisheries Service.

ESSENTIAL FISH HABITAT

The Essential Fish Habitat (EFH) is a designation given to the waters of the Biscayne Bay Aquatic Preserve and is defined by the Sustainable Fisheries Act of 1996 as "waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." The purpose of this designation is to minimize the impact of activities on land and in the water that threaten to alter, damage, or destroy the habitat necessary for the survival of marine fish.[2] An assessment of this area is required by the Magnuson-Stevens Fishery Conservation and Management Act of 1976, as amended through 1996, for each Port project that has the likelihood to negatively impact fish habitat. In the most recent EFH report submitted in October 2006 for the proposed Port of Miami Tunnel Project, management plans were provided for the red drum, penaeid shrimp, golden crab, and snapper/grouper. It was concluded that these EFH species utilize estuarine bays and sea-grass beds as juveniles while the snapper and grouper utilize the hard bottom habitat as juveniles.[3]

BILL SADOWSKI CRITICAL WILDLIFE AREA

The Port is located just north of the Bill Sadowski Critical Wildlife Area (CWA). The Bill Sadowski CWA is approximately 700 acres and was established by the FWC under Ch. 39-19.005 F.A.C. to prohibit human disturbance of wading birds and other wildlife during critical roosting, feeding, or nesting periods. This area provides the most valuable wildlife habitat in the

[1] Florida Statute Chapter 258.397 (2)(b) Biscayne Bay Aquatic Preserve. 2009. Florida Statutes
[2] "Office of Habitat Protection Division." NOAA: National Marine Fisheries Service. http://www.nmfs.noaa.gov/habitat/habitatprotection/efh/index.htm

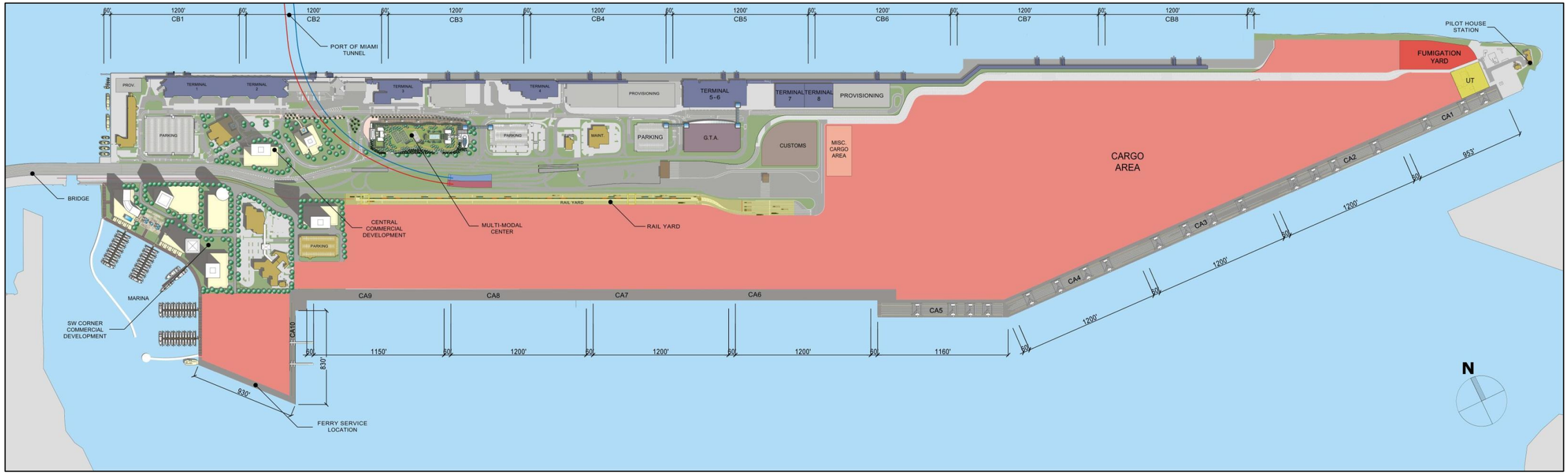
[3] Environmental Assessment (EA) for Port of Miami Tunnel. 2008. Florida Department of Transportation

Port's vicinity. Unauthorized access is prohibited year round and, in addition, this area has been designated a boat exclusion zone for the protection of manatees.[4]

7.3.1 NORTH CHANNEL CRUISE BERTH AND TERMINAL EXPANSION

The proposed North Channel Cruise Terminal Expansion has been designed to accommodate more berthing area for cruise lines. The development of this expansion will involve new bulkhead construction along the seawall eastwardly adjacent to the current cruise line berthing area (see Figure 7.6).

FIGURE 7.6: PREFERRED NORTH CHANNEL BERTH AND TERMINAL EXPANSION PROGRAM



This concept would decrease the overall capacity of the existing cargo facilities; however, the overall cruise line berthing area would increase. Environmental impacts to the Port and its proximity are minimal for this project since it is located in an already much disturbed and altered area. Natural upland of shoreline communities do not occur in the immediate vicinity of the proposed project site, therefore, expansion is not expected to impact mangroves or any other natural vegetative communities.

It is expected that the Port will conduct mitigation measures for this project type. The normal mitigation is to create one cubic yard of rip-rap for each linear foot of new berth or most likely the establishment of an artificial reef based upon this formula plus dredging of 1 cubic yard of rip rap for every 100 cubic yards of dredged bottom material. The Port will also relocate any existing corals to its established coral relocation site.

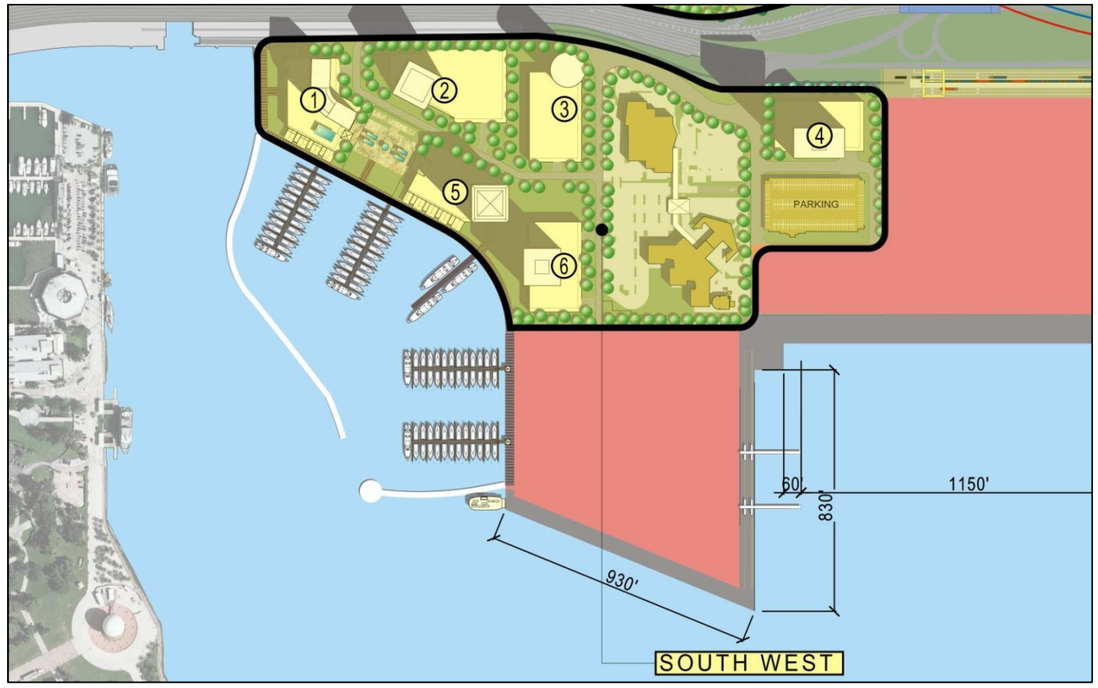
The North Channel is currently at a depth of 36 feet below sea level which does not provide the proper environment for sea-grass to thrive due to the lack of sunlight. In the barren soft bottom communities that dominate the Port, wildlife is limited to a few burrowing animals and a few other burrowing invertebrates.

7.3.2 SOUTHWEST CORNER COMMERCIAL PORT EXPANSION

The Southwest expansion, located in the southwestern corner of the Port adjacent to the current Western Turning Basin, is designed to potentially accommodate a marina for vessels, a ferry, and a transshipment area. Although the exact layout of the expansion has not yet been determined, filling will be required and will consist of approximately 17.51 acres, as shown in Figure 7.7.

[4] DERM Manatee Protection Plan. 1995. DERM

FIGURE 7.7: PREFERRED SOUTHWEST CORNER COMMERCIAL EXPANSION PROGRAM



The chief environmental concern associated with this project is the unavoidable removal of sea-grass in the area. According to a study conducted by Dial Cordy and Associates, Inc. (Dial Cordy) in 2006, there is a total of 24.3 acres of shoal grass (*Halodule wrightii*) and paddle grass (*Halophila decipiens*). These sea-grass beds provide low-to-moderate quality habitat for some juvenile fish and invertebrates and are also a staple to the endangered West Indian manatee. Due to the proposed marina on the southwestern side of Dodge Island, the Port will need to conduct mitigation activities for the sea-grass that will be displaced. Providing for marina in an existing marine environment with the Port of Miami will mitigate other potential impacts into the future that may occur if such a marina facility would be placed in another location outside of the traditional port area. In 2007 CH2M Hill, Inc. conducted a study that concluded the most feasible mitigation area would be located just north of the northernmost part of the Rickenbacker Causeway and would amount to approximately 35 acres, as shown in Figure 7.8.

FIGURE 7.8: SOUTHWEST CORNER SEA-GRASS MITIGATION OPTIONS

Source: Westhorp & Associates

7.3.3 GLOBAL CLIMATE CHANGE AND NATURAL DISASTER PLANNING

Southeast Florida has experienced 34 hurricanes between 1994 and 2007 of which nine were a Category 3 or above. During Hurricane Andrew in 1992, record high flooding occurred due to 17 feet of storm surge.[5] In addition, flooding due

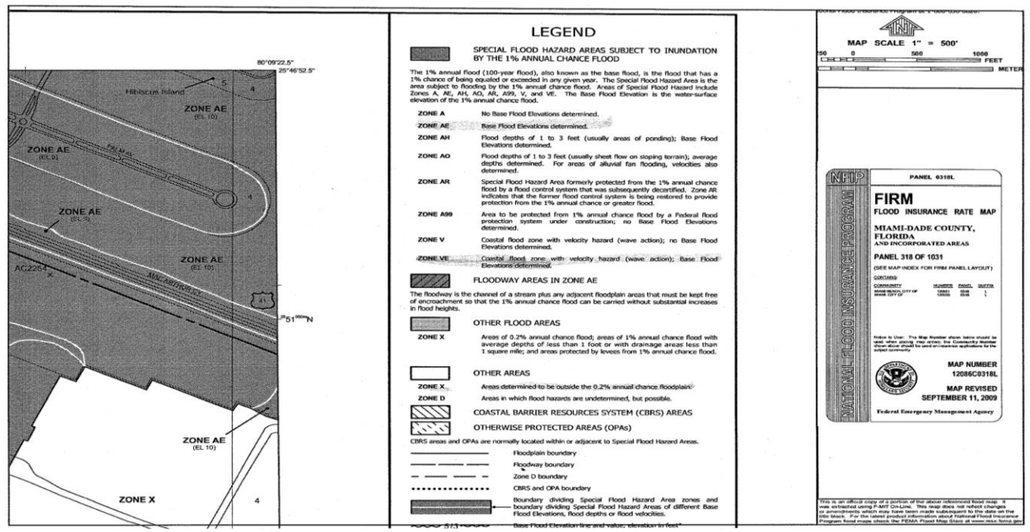
[5] Miami-Dade County, FL Comprehensive Emergency Management Plan. June 2008. Miami-Dade County Department of Emergency Management and Homeland Security Plan

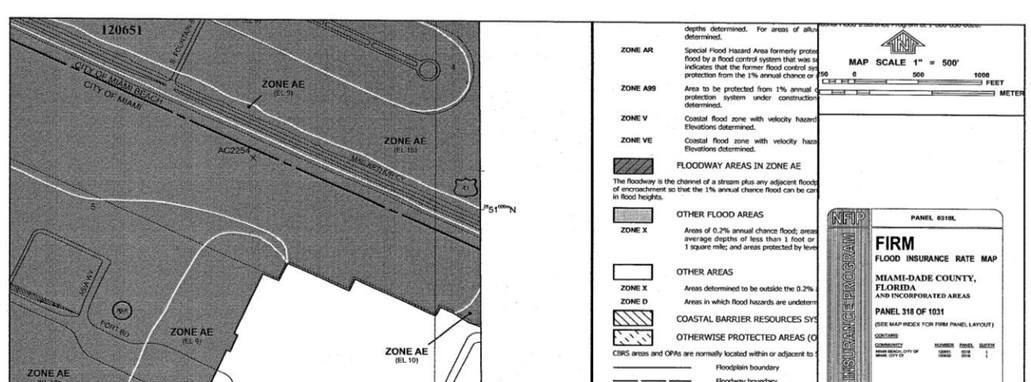
to torrential rainfall or a rise in sea level poses a serious threat to portions of Miami-Dade County, specifically in low lying areas such as Dodge Island (Port of Miami).

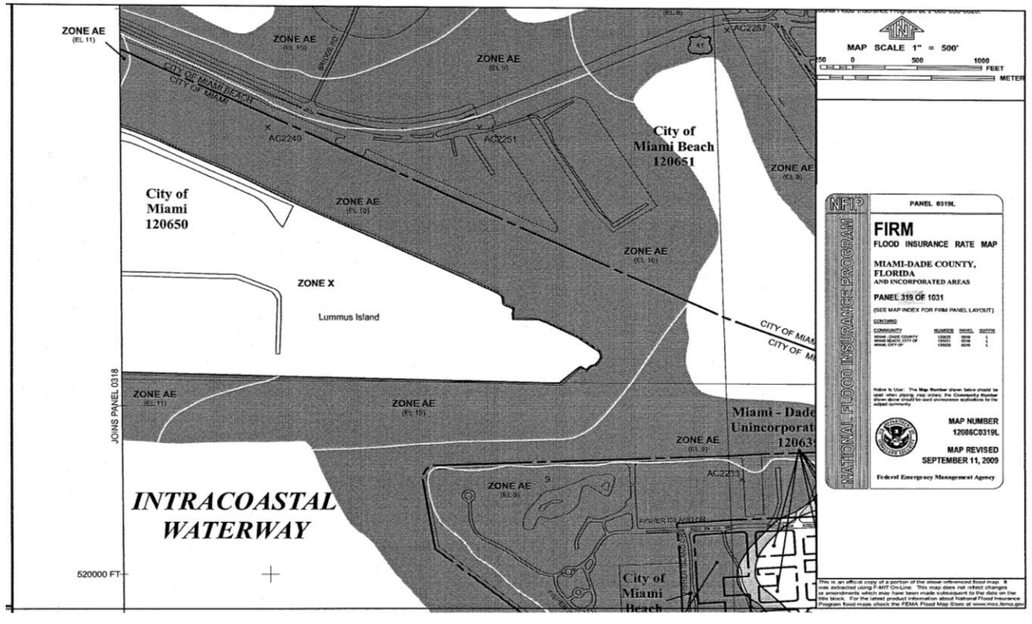
FLOOD ELEVATIONS

The coastal flooding of the Port is reflected on the Miami-Dade County Insurance Rate Maps prepared by the Federal Emergency Management Agency (FEMA) last revised September 2009. Panels 318 and 319 of the latest FEMA maps outline the various flood zones of the Port (see Figure 7.9). Currently, the elevation of Dodge Island is 7.5 feet National Geodetic Vertical Datum (NGVD) while the elevation of Lummus Island is 11.5 feet NGVD. According to the FEMA flood zone map, Lummus Island is categorized as Zone X, which signifies it is outside of the 0.2% annual chance flood while Dodge Island is categorized as Zone AE, designated as a Special Flood Hazard Area subject to inundation by the 1% annual chance flood with a base flood elevation of 10 feet. Base flood elevations represent the elevation to which floodwater is anticipated to rise during the 1% annual chance flood. The land that connects the two islands is also categorized as Zone AE, designated as a Special Flood Hazard Area subject to inundation by the 1% annual chance flood with a Base Flood Elevation of 9 feet. The FEMA zones do not incorporate the risks that are involved with coastal erosion due to sea level rise; however, it has been recommended to the U.S. Congress to incorporate these risks on the maps.

FIGURE 7.9: FEDERAL EMERGENCY MANAGEMENT AGENCY INSURANCE RATE MAPS, PANELS 318 & 319







CLIMATE CHANGE AFFECTING THE PORT OF MIAMI

One of the biggest concerns involving the future of the Port of Miami is global climate change and the threat of sea level rise. Sea level rise, one of the likely effects of global warming, is a major threat to all coastal communities and infrastructure. Along much of the Florida coast, sea level has been rising at a rate of 7 to 9 inches per century.[6] In response to this matter, the Miami-Dade Board of County Commissioners passed an ordinance to establish the Miami-Dade Climate Change Advisory Task Force (CCATF) to provide technical assistance and advice on mitigation and adaptation with regard to global climate change. The scientists on the CCATF predict a rise in sea level of at least 1.5 feet in the next 50 years as reported in their Second Report and Initial Recommendations approved in March 2008. A 2-foot rise in sea level would result in spring tides at 4.5 to 5 feet higher than present mean sea level.[7] This would cause frequent flooding of barrier islands, fill islands, and low-lying mainland areas as the Port is classified.

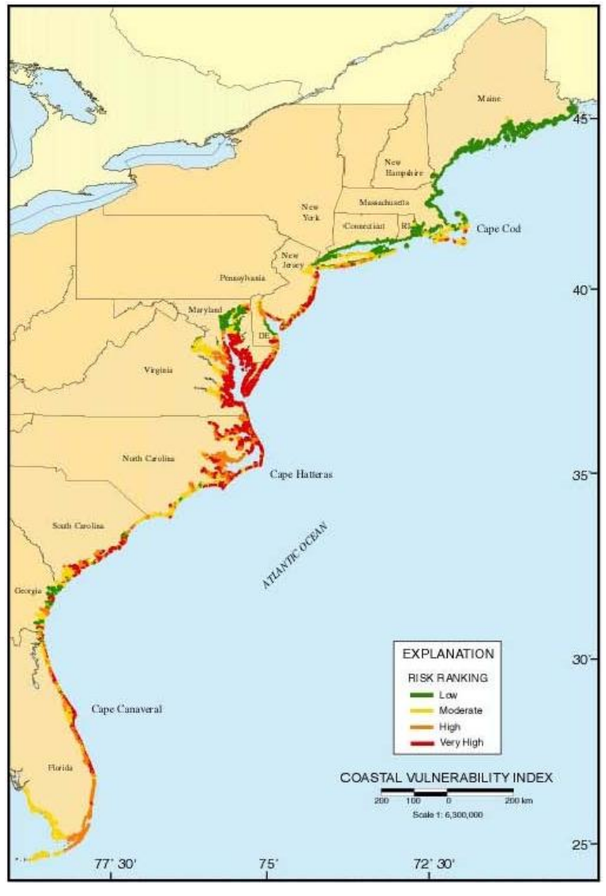
The South Florida Water Management District (SFWMD) is also actively investigating the effects of sea level rise on Southeast Florida. In their efforts, they have modified their South Florida Water Management Model, a regional-scale computer model that simulates the hydrology and the management of the South Florida water resources, to re-simulate a rise in sea level of 0.5 feet by 2050.[8] (The 0.5-foot increase in sea level was assumed because it is the estimate of the EPA. However this estimate is a global estimate and does not include local effects). This model indicated that significant infrastructure changes would need to take place, especially along coastlines, as sea levels rise. Coastline effects may be greater with global sea level rise due to land subsidence and geological instabilities.

[6] *Climate Change and Florida,* September 1997, EPA.
[7] *Second Report and Initial Recommendations,* April 2008, Miami-Dade County Climate Change Advisory Task Force.
[8] Estimated Impacts of Sea Level Rise on Florida's Lower East Coast.

The U.S. Geological Survey (USGS) has conducted numerous studies on coastal communities and their relative risks due to future sea-level rise. To aid in determining how coastal environments might physically change due to sea-level rise, the USGS is creating a Coastal Vulnerability Index (CVI).[9] This CVI is based on tidal range, wave height, coastal slope, shoreline change, geomorphology, and historical rate of relative sea-level rise.[10] Areas along the coast are assigned a ranking from low to very high risk, and the Southeastern Coast of Florida is considered at high risk. A view of a map with the rankings is included as Figure 7.10. This CVI yields a relative measure of the system's natural vulnerability to the effects of sea level rise[11]. The CVI shows the relative vulnerability of the coast to changes due to future rise in sea-level. Areas along the coast are assigned a ranking from low to high risk, based on the analysis of physical variables that contribute to coastal change. This map was taken from the USGS website.

FIGURE 7.10: MAP OF THE COASTAL VULNERABILITY INDEX (CVI) FOR THE U.S. ATLANTIC COAST

Source: United States Geological Survey, 2010



[9] A Report on Sea Level Rise Preparedness.
[10] National Assessment of Coastal Vulnerability to Sea-Level Rise.

Of major concern is Dodge Island whose elevation is approximately 7.5 feet NGVD with a base flood elevation of 10 feet NGVD, while the elevation of Lummus Island is approximately 11.5 feet NGVD. During Hurricane Wilma in 2005, Dodge Island experienced severe flooding and minor damage while Lummus Island did not experience effects to the same degree. Dodge Island may be more susceptible to damage and flooding due to sea level rise and storm surge than Lummus Island. Dodge Island's elevation should be raised to a minimum of 10 feet NGVD, which is the FEMA base flood elevation. The Port must also consider future project modifications that may reduce or eliminate the adverse impacts from sea level rise and evaluate the structural integrity of structures near the ocean that are subject to potential hazards caused by sea level rise.

7.3.4 PERMITS

In the past 30 years, the Port has completed several expansion and improvement projects. All of these projects are examined on a project-by-project basis in reference to mitigation and permitting requirements. In the past, large improvement projects were permitted under the Port's former Department of the Army (DOA) and FDEP master permits, but as of 2006, the Port has obtained individual permits for each project.[11] A list of permits that would be required for future permitting of dredge and fill projects is provided in Table 7.1.

Table 7.1: Permits Required for Port of Miami Expansion Projects
Source: Westhorp & Associates

Permit Name	Permitting Agency	Description
DERM Class I Coastal Construction	DERM	This permit be obtained prior to performing any work in, on, over, or upon tidal waters or coastal wetlands in all of Miami-Dade County
DERM Class II Stormwater Construction	DERM	This permit be obtained prior to performing any work for the discharge of storm water runoff for any drainage system where the design includes discharges to a surface water in Miami-Dade County
USACE Section 404 Individual Dredge and Fill	USACE and FDEP	This permit is required for dredging of more than five feet; it will be reviewed by the USACE
Environmental Resource	FDEP	This permit must be obtained before beginning activity that could affect wetlands, alter surface water flows, or contribute to water pollution; a pre-application meeting is recommended to determine which agency would take the lead
ODMDS	USEPA	The ODMDS site will be used to dispose of dredged material
NPDES	FDEP	Required for storm water discharge of large and small construction activities

It is likely that any future dredge and fill projects will be overseen primarily by the USACE. Due to the scale of the proposed projects, several other agencies would likely also be involved, including the FDEP, Miami-Dade County Department of Environmental Resources Management (DERM), the United States Coast Guard (USCG), the FWS and National Marine Fisheries Service (NMFS).[12]

The Port may also need to involve the Miami-Dade Water and Sewer Department (WASD) due to the close proximity of an existing force main to the Southwest Corner Expansion project.

It is important to mention that, although an Ocean Dredged Material Disposal Site is already in place, its capacity may not be sufficient to contain the footprint of dredged material from future projects beyond the already approved – 50 ft. dredge. In keeping with the Port's Sustainability Committee's initiatives to reduce waste during construction, the Port should decant the water at a permitted location and coordinate possible beneficial uses of the remaining material for future projects that require fill, if possible.

7.3.5 SUSTAINABILITY

The Port of Miami is located within the Biscayne Bay Aquatic Preserve, surrounded by the natural environment: sea grass, marine life, etc., as well as the human environment: downtown Miami and the beaches bustling with commercial and residential activities. Protecting both the environment and future generations of South Floridians is a major factor in planning for future Port of Miami growth. The Master Plan is underpinned by thoughtful consideration of future sustainable development in environmental, social and economic terms. This process considers the surrounding areas and outlines projects that will help preserve and improve conditions. Some of those projects include:

- **Shore Power:** Also known as cold ironing in the industry, this is when vessels at berth plug into the Port's electrical grid and turnoff their engines, therefore reducing emission levels in the immediate surrounds.
- **Crane Electrification:** The Port is in the process of retrofitting its existing cranes to allow them to operate on the Port's electrical grid instead of using diesel fuel. This reduces fuel and noise emissions.
- **LEED Buildings:** All new buildings constructed on the Port must meet the County's minimum requirement of LEED certification.
- **Green Energy Initiatives:** These include sustainable projects such as the Port of Miami Tunnel, rail yard, cargo gate consolidation, wind farm implementation, photovoltaic, quad cruise terminal and the multi-modal center. All projects which assist to integrate the Port with the City and reduce congestion and emissions are included in this category.

7.4 TRANSPORTATION

Port traffic is generated from cargo, cruise and other commercial operations within the Port. Historically, the peak-hour traffic demand related to Port activities occurred from 11:00 A.M. thru 2:00 P.M. For disembarkation cruise traffic typically occurs between 7:00 A.M. and 11:00 A.M.; and peak inbound embarkation traffic occurs from approximately 10:30 A.M. to 3:00 P.M. Most of the cruise traffic occurs on peak weekend days from Friday thru Monday. Cruise ships typically arrive between 6:00 A.M. and 8:00 A.M. and depart between 4:00 P.M. and 6:00 P.M. Peak hours for cargo vary, but are typically most active in the A.M. hours and early P.M., dependent upon vessel schedules, etc. Cargo traffic occurs during the mid-week from Monday through Friday dependent upon cargo vessel schedules. Commercial (office and tenant) traffic for the Port occurs Monday thru Friday from the hours of 8:00 A.M. and 9:30 A.M. and from 4:30 P.M. and 6:30 P.M. Most of the

[11] Email correspondence with Becky Hope 11/12/09

[12] Email correspondence with Audrey Siu of USACE 11/3/09

Port generated peak demand traffic does not coincide with the peak of adjacent roadways with the exception of the commercial traffic of which the largest portion is driven by the RCCL offices. The adjacent roadways' peak traffic demand occurs typically between 4:00 P.M. and 6:00 P.M., Friday through Monday.

7.4.1 TRAFFIC IMPACTS

Determining traffic impacts that may occur to the adjacent roadways based upon the 2035 Master Plan projects shown within the preferred plan, and the anticipated Capital Improvements Projects (CIP) already planned for by the Port, is required to understand the overall impacts these future expansion efforts play for the Port of Miami and downtown core. Additionally, the creation of another access way to and from the Port of Miami via tunnel also provides for a different level of impacts to the surrounding roadway system. The traffic impacts were determined based on the following preferred plan program elements[13]:

- A composite projection of 3,911,204 total passengers in 2009 moving to 5,821,46 in 2035;
- Cargo terminal mid-level summary of twenty-foot equivalent units (TEU) projection of 828,349 TEUs in 2009 to 2,682,545 TEUs in 2035; and,
- Commercial development in the southwest corner of the Port of Miami with a potential of approximately 600,000 square feet (SF) of office and other space, as well as marina.

7.4.2 STUDY AREA

Currently the only point for vehicular access to the Port of Miami is from Biscayne Boulevard / NE 5 Street and egress at Biscayne Boulevard / NE 6 Street, both of which are signalized intersections. To access the preferred plan development projects, vehicles travel through the un-signalized intersection of Caribbean Way West / Caribbean Way South. Therefore, the traffic analysis was performed for the following intersections during A.M. and P.M. peak hour conditions:

- Biscayne Boulevard / NE 6 Street;
- Biscayne Boulevard / NE 5 Street; and,
- Port Boulevard / Caribbean Way West / Caribbean Way South.

See Figure 7.11 for an overview of the adjacent roadway locations impacted by the Port of Miami expansion.

[13] Figures used for the traffic projections were not updated as part of the 2011 Master Plan Forecast Update.

FIGURE 7.11: MAJOR ROADWAY LOCATION REFERENCE MAP

Source: David Plummer & Associates

7.4.3 EXISTING TRAFFIC CONDITIONS

7.4.3.1 DATA COLLECTION AND ROADWAY CHARACTERISTICS

Data collection and establishing existing conditions for this study included researching previously approved studies conducted for the Port of Miami or the proposed Port of Miami Tunnel project. Data was obtained from these documents in order to determine roadway characteristics, intersection data, intersection volumes, and signal timing.[14]

BISCAYNE BOULEVARD

Biscayne Boulevard (US-1) is a major arterial that provides north/south access throughout the City of Miami from the downtown Central Business District (CBD) north to the Broward County line. Between I-395 and NE 6 Street, Biscayne Boulevard is a two-way, six-lane divided roadway. Exclusive left turn lanes are provided at major intersections. On-street parking is prohibited. The posted speed limit is 30-mph. FDOT has jurisdiction over Biscayne Boulevard.

NE 6 STREET

NE 6 Street between NE 1 Avenue and Biscayne Boulevard is a three lane, one-way westbound roadway with no on-street parking. West of NE 1 Avenue, NE 6 Street is a two-lane, one-way westbound roadway with on-street parking on both sides of the roadway. The posted speed limit is 35-mph.

[14] All data used for the study is included in the Report Appendix.

NE 5 STREET

NE 5 Street between NE 1 Avenue and Biscayne Boulevard is a three lane, one-way eastbound roadway with no on-street parking. The posted speed limit is 25-mph.

CARIBBEAN WAY

Caribbean Way is a two lane, two-way local roadway. Caribbean Way has a south leg that provides north/south access from Port Boulevard to the southwestern portion of Dodge Island and a west leg providing east/west access. On-street parking is not permitted. The posted speed limit is 40-mph.

7.4.3.2 TRAFFIC VOLUME DATA

Intersection volumes were obtained from the *Port of Miami Tunnel Existing Conditions Traffic Analysis Report*, June 2009, prepared by Parsons Brinckerhoff (PB) Americas, Inc. The counts were collected in 2007 and a growth determined to forecast these volumes to year 2009.

Average Daily Traffic counts published by the Miami-Dade Public Works Department and the FDOT were reviewed to determine historic growth in the area. This analysis indicated that traffic has been decreasing in the past years. Traffic counts were not decreased to reflect the current trend.[15] The 2009 intersection volumes are shown in Figure 7.12.

Existing signal timing data was obtained from Miami-Dade County for the analyzed intersections.[16] This information provided the signal phasing and timing used in the intersection capacity analysis.

FIGURE 7.12: ROADWAY INTERSECTION VOLUMES, 2009

Source: Miami-Dade Public Works Department, FDOT and David Plummer & Associates

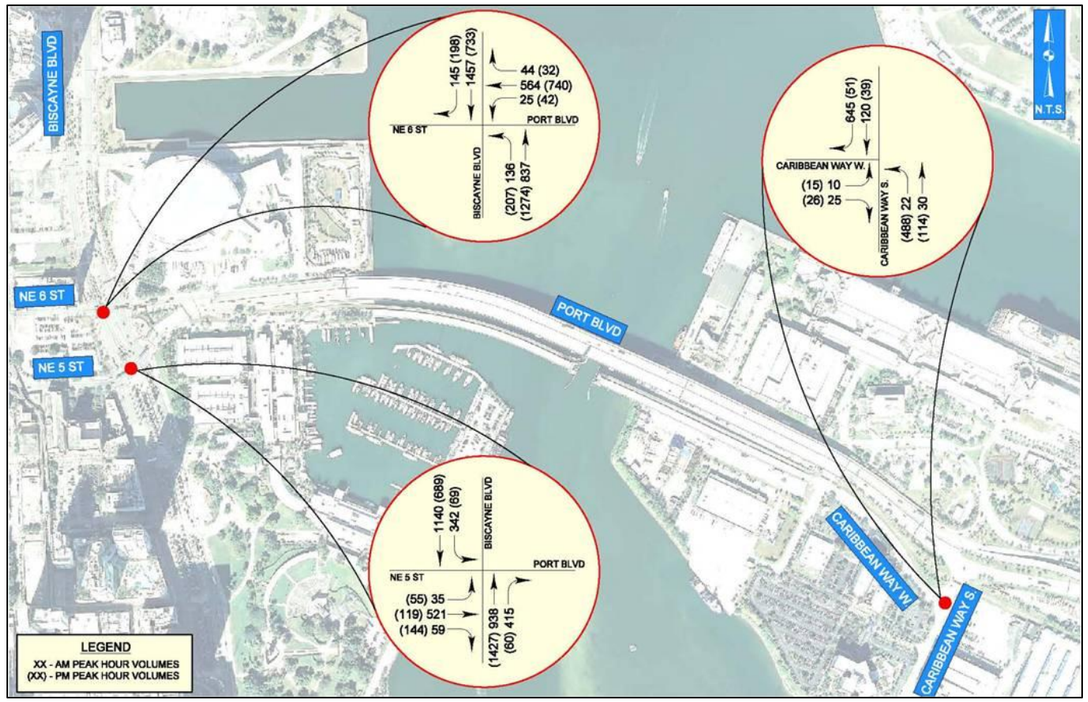


Figure 7.13 shows the existing lane configurations for the analyzed intersections.

[15] All data used for the study is included in the Report Appendix.
[16] All data used for the study is included in the Report Appendix.

FIGURE 7.13: EXISTING LANE CONFIGURATIONS, 2009

Source: Miami-Dade Public Works Department, FDOT and David Plummer & Associates

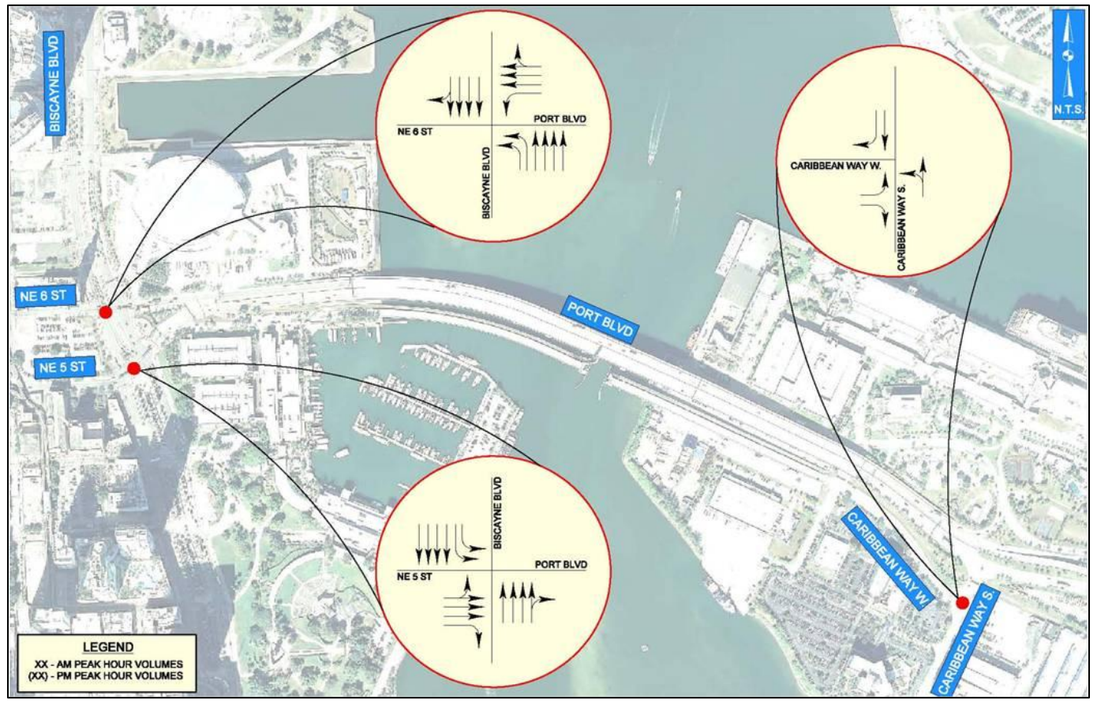
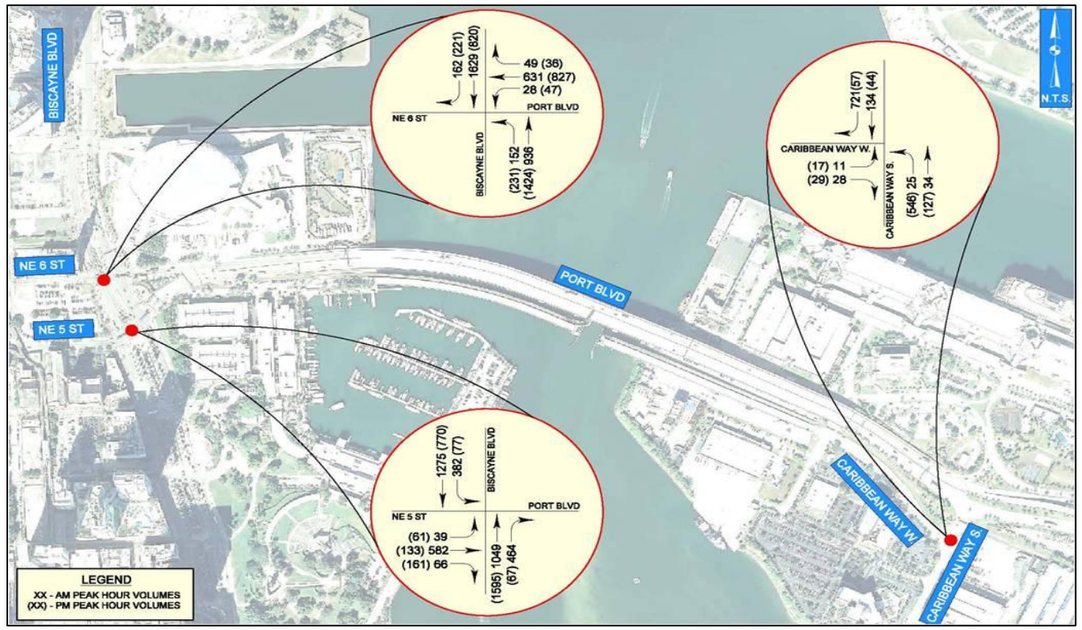


FIGURE 7.14: PROJECTED INTERSECTION VOLUMES, 2035

Source: Miami-Dade Public Works Department, FDOT and David Plummer & Associates



7.4.4 FUTURE TRAFFIC CONDITIONS

The Port of Miami Master Plan has an established build-out year of 2035. Future traffic is established as described in the following sections.

7.4.4.1 BACKGROUND TRAFFIC

An annual growth rate was determined to forecast traffic volumes from 2009 through to 2035. Miami-Dade County FSUTMS Model traffic volumes were extracted for years 2000 and 2030 on Port Boulevard. These volumes were then used to determine an overall growth and an annual growth in order to forecast to 2035. The intersection volumes are provided in Figure 7.14.

The calculation is summarized in Table 7.2.

Table 7.2: Port Boulevard Volumes Background Traffic Projections
Source: MPO 2030 FSUTMS Model

	2000	2030
Port Boulevard Volumes from Miami-Dade Model	21,515	24,468
Overall Growth		**13.73 %**
Annual Growth		**0.43 %**

The intersections were analyzed under this condition and the results have been summarized in Table 7.3.

Table 7.3: Future Traffic Intersection Model LOS without Projects
Source: David Plummer & Associates

	S / U	AM	PM
Biscayne Boulevard / NE 6 Street	S	B	B
Biscayne Boulevard / NE 5 Street	S	B	B
Port Boulevard / Caribbean Way	U[17]	A / A	A / C

[17] Major / Minor Approach

7.4.4.2 PORT TRAFFIC DISTRIBUTION

Traffic traveling to and from the Port is destined for one of three main areas inclusive of cruise terminal / parking facilities, cargo gates / terminals, or to the various offices / support facilities within the Port. The distribution of this traffic was obtained from the *Port of Miami 2020 Master Implementation Plan, 2002* and is summarized in Table 7.4.

Table 7.4: Future Traffic Intersection Model LOS without Tunnel Project
Source: Port of Miami 2020 Master Plan, 2002

TRIP TYPE	PERCENT OF TOTAL TRAFFIC
Cruise	60 %
Cargo	32 %
Other	8 %
TOTAL	100 %

7.4.5 PROPOSED DEVELOPMENT TRAFFIC PROJECTIONS

Traffic volumes based upon the preferred plan for the cruise, cargo, and commercial facilities were established based on data provided. The calculations for each use are described and summarized below.

CRUISE TERMINAL TRAFFIC PROJECTIONS

The increase of vehicular traffic generated by the cruise terminal / berth expansion projects over the time period was based on the overall composite projection scenario. This data was used to determine the annual growth rate of the cruise related traffic projections provided in Table 7.5.

Table 7.5: Overall Composite Cruise Passenger Projections, 2009 and 2035

	2009	2035
Total Cruise Passenger Throughput	4,110,000	5,923,107
Overall Growth		**44.1 %**
Annual Growth		**1.70 %**

CARGO TERMINAL TRAFFIC PROJECTIONS

Various levels of expansion for the cargo terminals were provided; a base/low, mid and high for each year from 2009 to 2035. Cargo volume growth is provided in twenty-foot equivalent units or TEUs. For the analysis, the mid-level summary of projections was used to determine the corresponding increase in vehicular traffic. The annual growth rate calculations are provided in Table 7.6.

Table 7.6: Mid-Level Cargo Projections in TEU's, 2009 and 2035
Source: John Martin Associates

	2009	2035
Base / Low	828,350	1,786,412
	Overall Growth	**115.66 %**
	Annual Growth	**3.00 %**
Mid	828,350	2,682,545
	Overall Growth	**223.84 %**
	Annual Growth	**4.62 %**
High	828,350	3,257,376
	Overall Growth	**293.24 %**
	Annual Growth	**5.41**

7.4.6 PROPOSED DEVELOPMENT TRIP GENERATION

Trip generation for the proposed Port of Miami Commercial development was estimated using the *Institute of Transportation Engineers (ITE) Trip Generation Manual, Eighth Edition*. This manual provides gross trip generation rates and/or equations by land use type. These rates and equations estimate vehicle trip ends at a free-standing site's driveways. A development program has not been set for this component. However, the development has a potential maximum of 600,000 SF of office space and the traffic analysis is based on this land use. Traffic for the expansion of the proposed development on the southwest portion of Dodge Island is summarized in Table 7.7.

Table 7.7: Proposed Development Trip Generation Summary
Source: David Plummer & Associates

ITE Land Use[1]	Units	AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
General Office Land Use 730	**600,000 SF**	**692**	**94**	**786**	**128**	**623**	**751**

1. Based on the ITE Trip Generation, 8th edition.

7.4.7 PROJECT TRIP ASSIGNMENT

The traffic generated for the office component was distributed and assigned to the study area using the Cardinal Distribution for TAZ 521, shown in Table 7.8. The Cardinal Distribution gives a generalized distribution of trips from a TAZ to other parts of Miami-Dade County. For estimating the trip distribution for the project location, consideration was given to conditions such as the roadway network accessed by the project, roadways available to travel in the desired direction, and attractiveness of traveling on a specific roadway.

Table 7.8: Cardinal Distribution of Trips *Source: David Plummer & Associates*	
Direction	**TAZ 521 (PCT %)**
NNE	8.03 %
ENE	3.90 %
ESE	0.42 %
SSE	0.26 %
SSW	1.69 %
WSW	30.63 %
WNW	32.12 %
NNW	22.95 %
TOTAL	100.00 %

7.4.8 FUTURE INTERSECTION CAPACITY ANALYSIS

The traffic assigned to the roadway network for the expansion of all proposed project components were added to the 2035 background traffic volumes to obtain 2035 future traffic within the project conditions.

The Port of Miami Tunnel Project is underway and will provide direct access between the Seaport, I-395 and I-95. This will relieve congested downtown Miami streets of Port passenger and cargo traffic, improving safety and circulation. The change in traffic patterns for vehicular access to the Port of Miami via the tunnel was also considered for the traffic analysis. The amount of diverted traffic was based on the *POM 2020 Master Implementation Plan.* Calculations have been summarized in Table 7.9. The intersections were analyzed and the results have been summarized in Table 7.10.

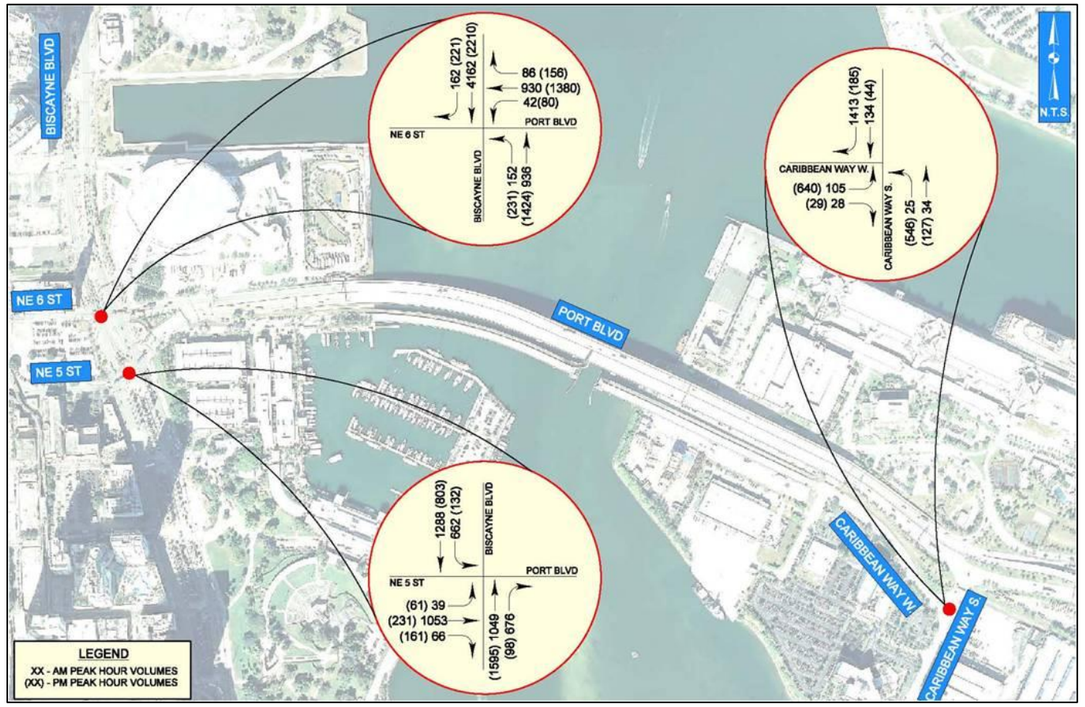
Table 7.9: Traffic Diversions to the Tunnel *Source: POM 2020 Master Plan, 2002 and David Plummer & Associates*		
	Trucks and Buses	**Automobiles**
% of All Traffic	34 %	66 %
% in Tunnel	90 %	27 %
% on Port Boulevard	10 %	73 %
Tunnel Traffic Diversions (all port traffic)	31 %	18 %
Total Traffic Diversions %	49 %	

Table 7.10: Future Traffic with the Tunnel, Intersection LOS (49% Tunnel/51% Blvd) *Source: David Plummer & Associates*			
Intersection	**S / U**	**AM**	**PM**
Biscayne Blvd. / NE 6th Street	S	E[2]	D
Biscayne Blvd. / NE 6th Street	S	C	B
Port Boulevard / Caribbean Way	U[1]	A / B	A / F
1. Major / Minor Approach. 2. With signal timing improvements.			

The trips diverted to the tunnel were removed from the traffic volumes and are provided for in Figure 7.15.

FIGURE 7.15: FUTURE TRAFFIC WITH THE TUNNEL, INTERSECTION VOLUMES (49/51 APPROACH)

Source: Miami-Dade Public Works Department, FDOT and David Plummer & Associates

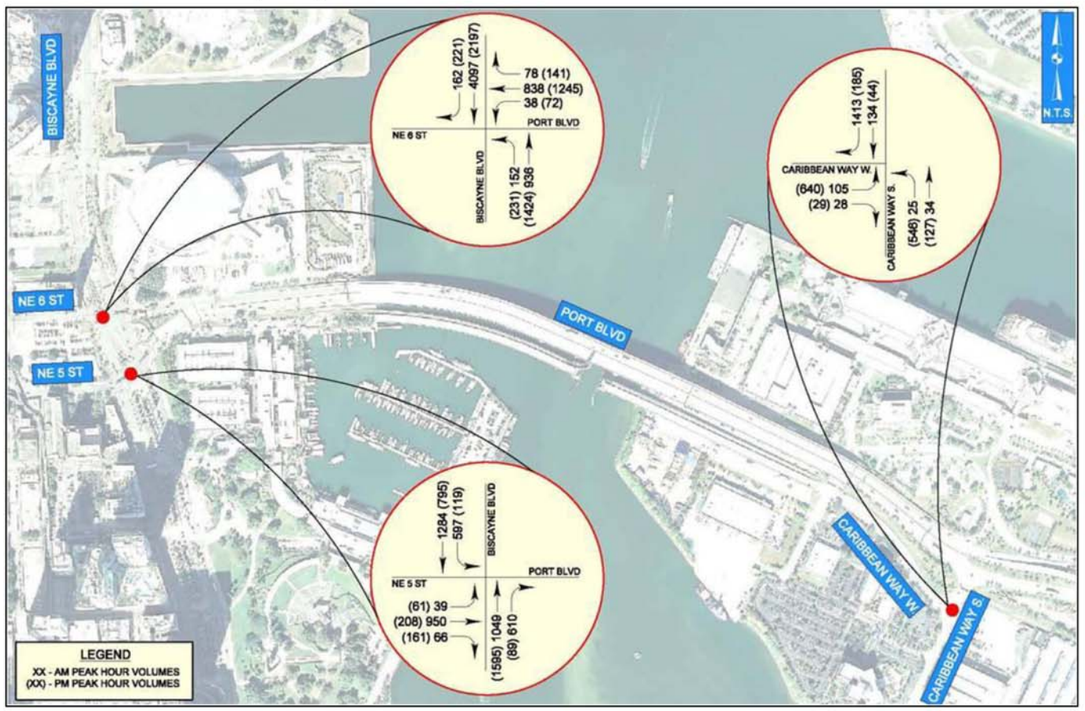


The Traffic Operational Evaluation Report (December 2004) prepared by the Florida Turnpike Enterprise assumes that in 2030, 46% of the Port generated traffic will use Port Boulevard and the remaining 54% will use the tunnel to access the Port of Miami. Although the previous diversion provides a more conservative analysis by placing more traffic on Port Boulevard, this scenario was also analyzed. Levels of Service results for this scenario are provided in Table 7.11 and traffic volumes are presented in Figure 7.16.

Table 7.11: Future Traffic with the Tunnel, Intersection LOS (54% Tunnel/46% Blvd) *Source: David Plummer & Associates*			
Intersection	**S / U**	**AM**	**PM**
Biscayne Blvd. / NE 6th Street	S	E[2]	D
Biscayne Blvd. / NE 6th Street	S	C	B
Port Boulevard / Caribbean Way	U[1]	A / B	A / F
1. Major / Minor Approach. 2. With signal timing improvements.			

FIGURE 7.16: FUTURE TRAFFIC WITH THE TUNNEL, INTERSECTION VOLUMES (54/46 APPROACH)

Source: Miami-Dade Public Works Department, FDOT and David Plummer & Associates



7.5 UTILITIES

The objective of the Port of Miami Utilities Plan is to identify future utility facilities required to meet future added consumption demands by the Port of Miami users. Adding new facilities and/or upgrading existing utility facilities to meet this added consumption demand is considered under the project study area. Replacement of major facilities due to aging, ware, and adequacy to meet future demands is considered.

7.5.1 ELECTRICAL

The electrical loads at the Port of Miami have been divided into four types to describe the future electrical facilities and components required to meet demands. It is also anticipated that a new FPL substation will be developed on-port within the next 4 to 5-years that will assist in providing the necessary electrical loads. These types of electrical loading, both at the Port and for vessel electrical demands, are listed below:

- **OUTDOOR LIGHTING:** The Port is presently illuminated utilizing a combination of 400 Watts Cobra Heads for Roadways and High Mast 1000 Watts High pressure Sodium Vapor Luminaries for Container Storage Areas. The number of luminaries varies from 6 to 12 Luminaries per High Mast Structure, which are spaced 300 to 500 feet apart by providing 5-foot candles of illumination on these areas. This load is a small portion of the total load for the Port and it is included as part of the existing load of 72 MWD provided by FPL.

- **SHORE POWER:** Providing shore power will enable ships to turn off their engines when they dock and plug into electrical power provided at the dock via a step-down transformer served by FPL distribution feeders from the FPL substation at the Port. This electrical service at the Port is new since no provisions exist to serve the ships for this purpose. Cost estimates for shore power are provided within the phasing and cost elements of the Plan. However, there is currently no requirement for implementation of shore power units for the Port.

  Assuming Oasis-class cruise vessels using 18 megawatts of power per ship are docked at all 8 berths on the north side of the Port, we estimate 144 additional megawatts of power will be required to serve all ships simultaneously docked. Two 23-KV duct banks with 6-6" ducts each will come out of the substation and run thru the utility corridor to serve 8 shore power locations on the north side for cruise ships. Each location will be served individually by one 23-KV feeder in a duct and four spare ducts available; one could be utilized to serve a new terminal on the north side and three ducts will remain as future spares. Customer-owned 23-KV switchgear and 18 MVA pad-mount step-down transformers will be located at dockside by the Port and it will store the necessary conductors to connect the transformer to the ships' electrical facilities. The 18-MVA transformer size is based on 18 megawatts of maximum power required by the Oasis-class types. No frequency converters are anticipated since most of the ships operate at 60 Hertz.

  Five locations at 1.5 megawatts each will provide shore power to cargo vessels on the south side of the Port for a total of 7.5 additional megawatts of power. One 23-KV feeder bank using 6-6" ducts will come out of the substation to serve 5 shore power locations for cargo ships on the south channel.

- **CRANE ELECTRIFICATION:** Since 8 of these cranes are presently operating, they are included as part of the 72 megawatts demand provided by FPL. Considering each crane will require approximately 1.5 megawatts of power, it is estimated that 24 additional megawatts will be required to electrify a total of 24 super post-Panamax cranes in operation by 2035.

  As of the report date there were 8 cranes presently operating with electrical power including three cranes that have already been sold. Two of these cranes are the super post-Panamax types that are already electrified. Four additional cranes will be operating on electrical power in 2010 / 2011. Two additional cranes are scheduled to be purchased within the next two years. The existing electrical facilities will be able to serve these cranes assuming super post-Panamax types are purchased. Once the sold cranes leave the Port, there will be a total of 11 cranes working on electrical power. No major changes involving the existing vault are anticipated during this time since the vault has the switchgear capability to serve 16 cranes. Additional switchgear will have to be accommodated at the existing vault or a new vault would have to be built to accommodate an additional 9 cranes.

- **TERMINALS AND MISCELLANEOUS:** Provisions to serve a new terminal on the north side of the Port and new water pumps are not included as part of this estimate.

Section 8

PHASING AND COSTS

8.1 PHASING

The phasing of the Master Plan is predicated on three major drivers:

- The demand by business users;
- The availability of funding; and,
- Contractual commitments.

Irrespective of the schedule shown in the Master Plan, it is set up to be able to adjust to these three main factors. It is important for the Port to keep pace with growth while avoiding overbuilding as it does not have the financial wherewithal to do so.

Phasing decisions will be driven by the five-year capital program that needs to be reviewed annually. In this way, the Port can stretch its resources to meet its most pressing needs. However, it is also noteworthy that, as the Port matures, the costs for renewal, replacement, and maintenance become a larger part of the overall budget.

Of particular challenge is the fact that the Port has some major short-term upcoming costs which are investments for the future. They are namely the deepening of the South Channel to allow for Super post-Panamax cargo vessels to use the cargo port facilities and the implementation of the Port access tunnel that will provide for cargo and cruise traffic efficiencies and lessen traffic impacts on the downtown Miami core. Both of these projects will consume large amounts of funds. This may have the potential effect of using all resources and prevent further development of the Port. This needs to be carefully reviewed in order to mitigate any potential financial challenges associated with future development programs.

8.2 CAPITAL PROGRAM

As part of the Master Plan, new projects that have been identified and combined with the projects that the Port already has in its current Capital Program. Figure 8.1 illustrates the totality of the many different projects. The number assigned to the project reflects the source of each. If it is a numerical code, it is from the Port's current CIP. The new projects identified as part of the Master Plan begin with MP as their code.

The projects have been divided into each of the Port's current business units in order to be able to measure the eventual return generated by each investment. These have been further segregated by business type:

- Figure 8.2 shows the capital improvements associated with cruise investments;
- Figure 8.3 shows the cargo development plan and investments;
- Figure 8.4 shows the commercial development plan and investments;
- Figure 8.5 shows the rail program; and,
- Figure 8.6 shows the transportation improvements and plan.

Furthermore, the phasing plans below are coordinated with the cost section. Each plan element is tied directly to this chart financially (cost is indicated for each project) and by phasing timeline (start and end dates for each project are identified) on the phasing plan list for each business unit.

While the Master Plan does tie dates to plan items, each should be reviewed by the Port in terms of need based upon commercial aspects such as cruise throughput demand and cargo capacity requirements, amongst others, in order to accurately identify the required timing. Additionally, each major capital program project will require planning by the Port and master planning to reflect the user requirements and current standards associated with government, security, and other needs.

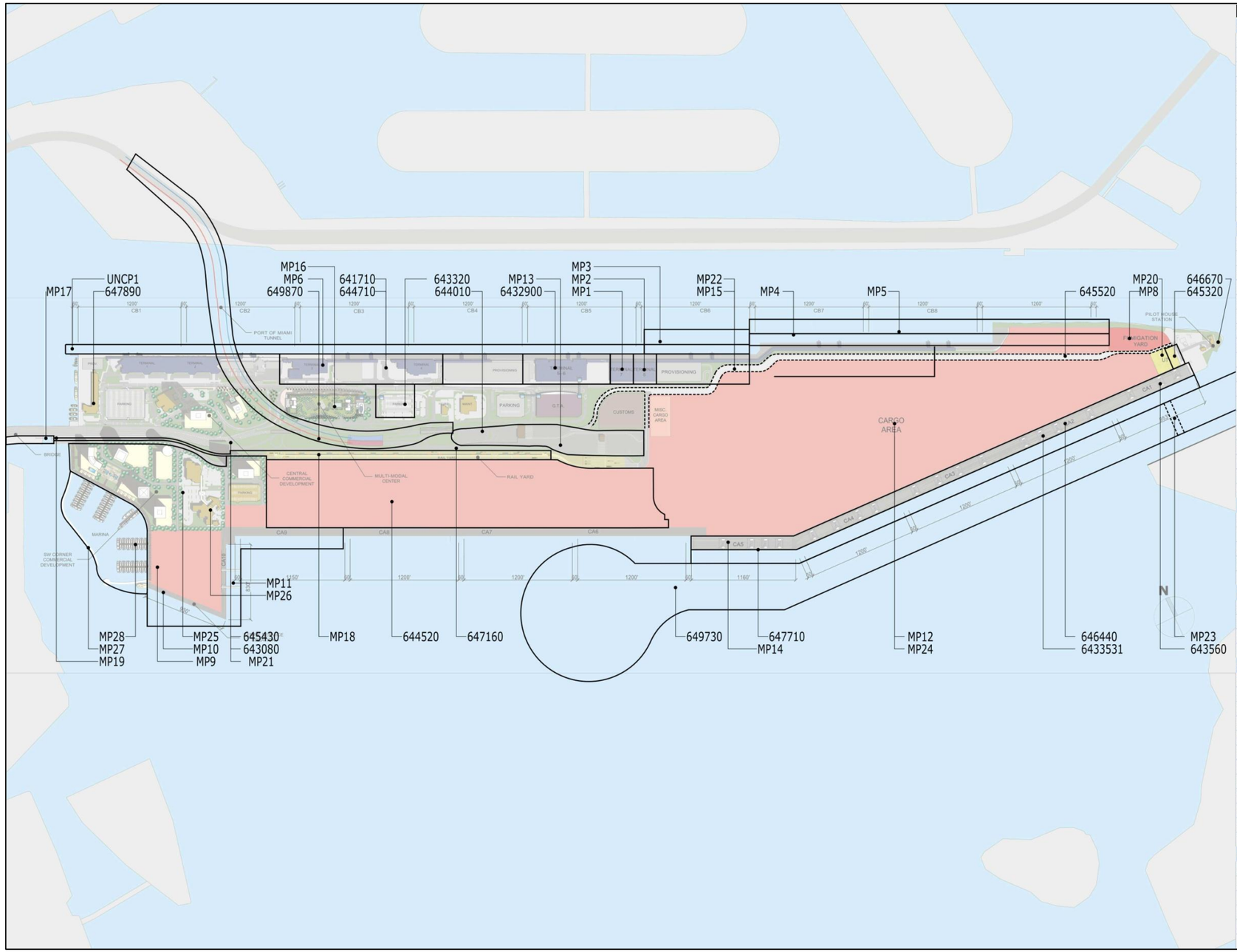
As a reference to the below overall and individual phasing plans shown the following notes are applicable and labeled accordingly on the corresponding plan:

1) **SHORE POWER FOR CRUISE SHIPS (CRUISE) UNCP1:** These items happen over the course of the master planning period with investments in 2010, 2020, 2023, 2028 and 2033.

2) **GANTRY CRANES (CARGO) MP14:** Over the master planning period, gantry cranes are added to support the anticipated increase in container capacity. The dates range from 2014 (4 gantry cranes purchased by POM – not included in the Master Plan budget) 2028, 2029, 2031, 2033, and 2034. Gantry crane additions are based upon the container volume and not all depicted on the master plan phasing program.

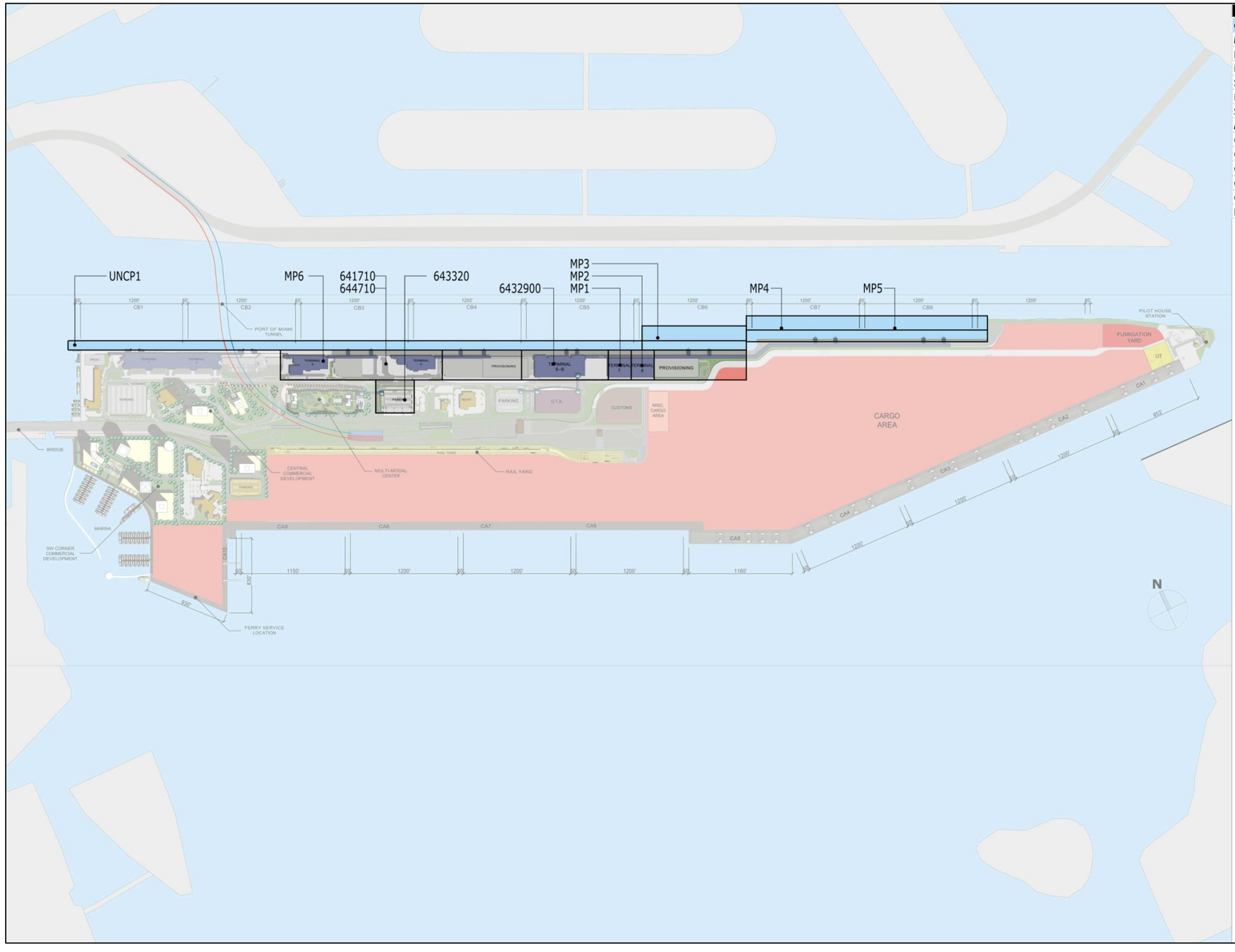
3) **MISCELLANEOUS DEVELOPMENT COSTS (COMMERCIAL REAL ESTATE) MP25:** These items are incurred in 2010 and 2018 for the southwest corner primarily for master planning aspects of the projects.

FIGURE 8.1: OVERALL PHASING PLAN



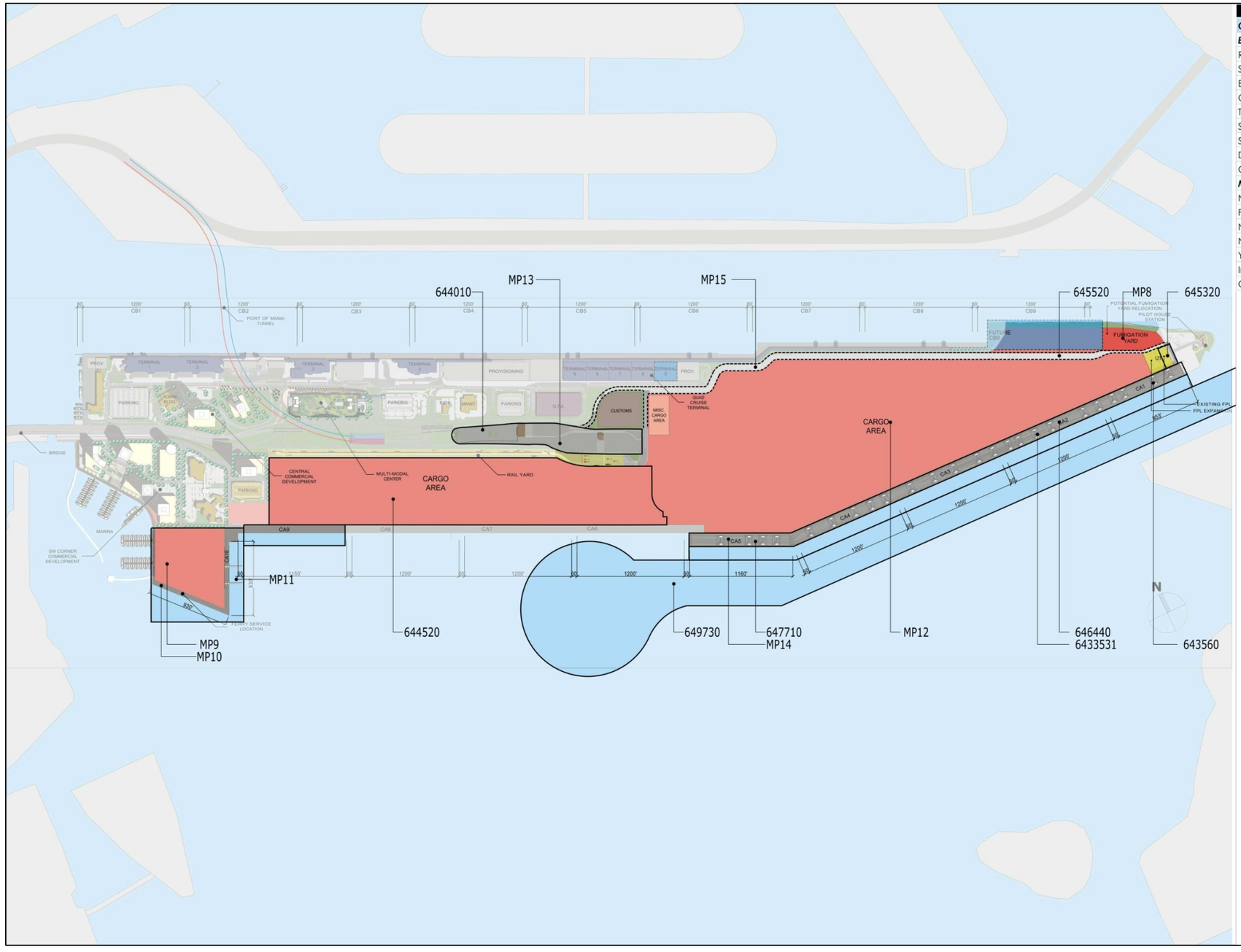
Project	ID	Start	End
Cruise			
Existing capital plan			
Improvements to Terminals B & C	6432900	2010	2010
Improvements to Terminals D & E	644710	2010	2010
Security upgrades to Terminals D & E	641710	2010	2010
Parking garage D	643320	2010	2010
Shore power for cruise ships (1)	UNCP1	2010	2033
Master plan projects			
Cruise Terminal 7	MP1	2017	2018
Cruise Terminal 8	MP2	2017	2018
Cruise berth 6	MP3	2013	2014
Cruise berth 7	MP4	2013	2014
Cruise berth 8	MP5	2017	2018
Improvements to terminals D & E	MP6	2016	2017
Cargo			
Existing capital plan			
Reinforce gantry crane area	643560	2010	2011
Security improvements	644010	2010	2010
Electrification of cranes	645320	2010	2013
Gantry crane refurbishment	646440	2010	2010
TLM improvements	645520	2010	2015
Seaboard improvements	644520	2010	2014
Strengthen bulkheads for deepening	647710	2010	2013
Deepening south channel	649730	2010	2015
Gantry cranes	6433531	2014	2016
Master plan projects			
New fumigation yard	MP8	2021	2021
Fill southwest corner	MP9	2021	2022
New berth sw corner 1	MP10	2023	2023
New berth sw corner 2	MP11	2025	2025
Yard improvements	MP12	2021	2022
Improvements to gate complex	MP13	2017	2017
Gantry cranes (2)	MP14	2028	2033
Transportation			
Existing capital plan			
Tunnel	649870	2014	2014
Master plan projects			
New cargo road	MP15	2021	2022
Central multimodal	MP16	-	-
Rail			
Master plan projects			
Bascule Bridge	MP17	2011	2012
On-port rail yard	MP18	2011	2012
On-port rail improvments	MP19	2011	2012
General			
Existing capital plan			
General infrastructure improvements	645430	2010	2016
Electrical feeder upgrades	643080	2011	2011
Central communication center	647890	2010	2010
Upgrade water and sewer	647160	2010	2014
Riprap around pilot house	646670	2010	2010
Master plan projects			
New electrical transformer substation	MP20	2017	2017
Wastewater upgrades	MP21	2017	2017
Water upgrades for new roadway	MP22	2017	2017
New water main crossing	MP23	2018	2018
Drainage	MP24	2018	2018
Real estate			
Master plan projects			
Civil work southwest corner	MP25	2018	2018
Miscellaneous development costs (3)	MP26	2010	2018
Marina bulkhead	MP27	-	-
Marina slips	MP28	-	-

FIGURE 8.2: CRUISE DEVELOPMENT PHASING PLAN



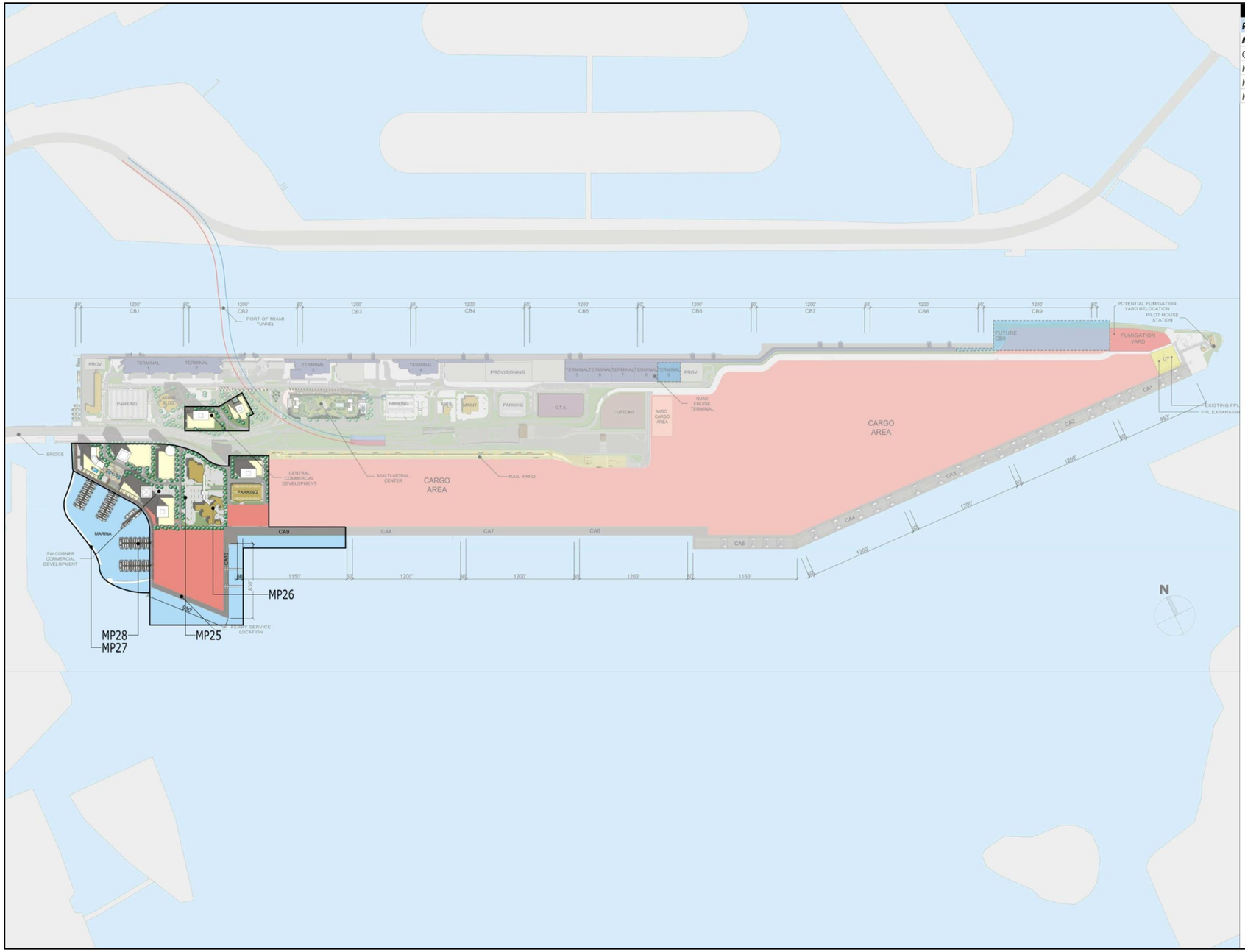
Project	ID	Start	End
Cruise			
Existing capital plan			
Improvements to Terminals B & C	6432900	2010	2010
Improvements to Terminals D & E	644710	2010	2010
Security upgrades to Terminals D & E	641710	2010	2010
Parking garage D	643320	2010	2010
Shore power for cruise ships (1)	UNCP1	2010	2033
Master plan projects			
Cruise Terminal 7	MP1	2017	2018
Cruise Terminal 8	MP2	2017	2018
Cruise berth 6	MP3	2013	2014
Cruise berth 7	MP4	2013	2014
Cruise berth 8	MP5	2017	2018
Improvements to terminals D & E	MP6	2016	2017

FIGURE 8.3: CARGO DEVELOPMENT PHASING PLAN



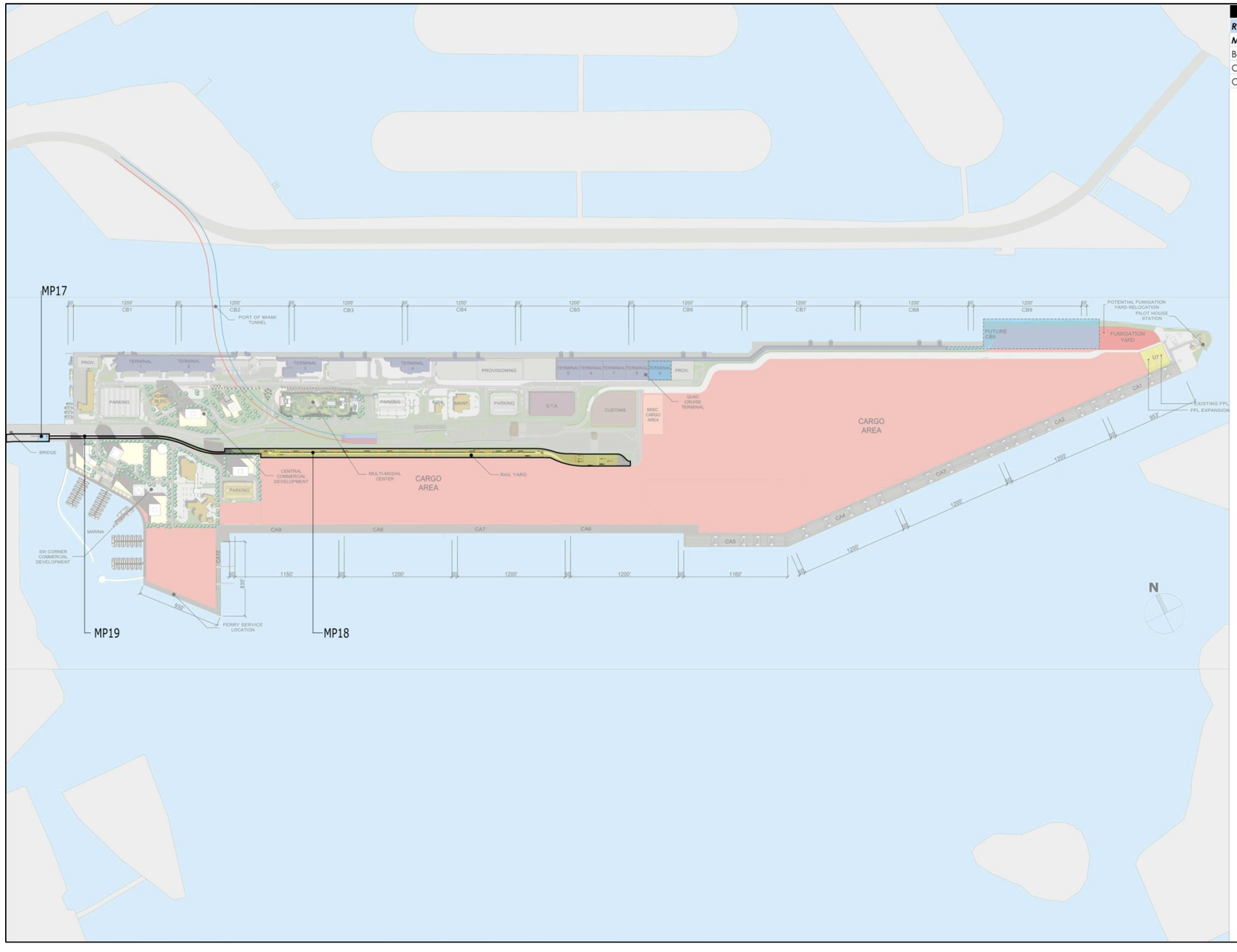
Project	ID	Start	End
Cargo			
Existing capital plan			
Reinforce gantry crane area	643560	2010	2011
Security improvements	644010	2010	2010
Electrification of cranes	645320	2010	2013
Gantry crane refurbishment	646440	2010	2010
TLM improvements	645520	2010	2015
Seaboard improvements	644520	2010	2014
Strengthen bulkheads for deepening	647710	2010	2013
Deepening south channel	649730	2010	2015
Gantry cranes	6433531	2014	2016
Master plan projects			
New fumigation yard	MP8	2021	2021
Fill southwest corner	MP9	2021	2022
New berth sw corner 1	MP10	2023	2023
New berth sw corner 2	MP11	2025	2025
Yard improvements	MP12	2021	2022
Improvements to gate complex	MP13	2017	2017
Gantry cranes (2)	MP14	2017	2017

FIGURE 8.4: COMMERCIAL DEVELOPMENT PHASING PLAN



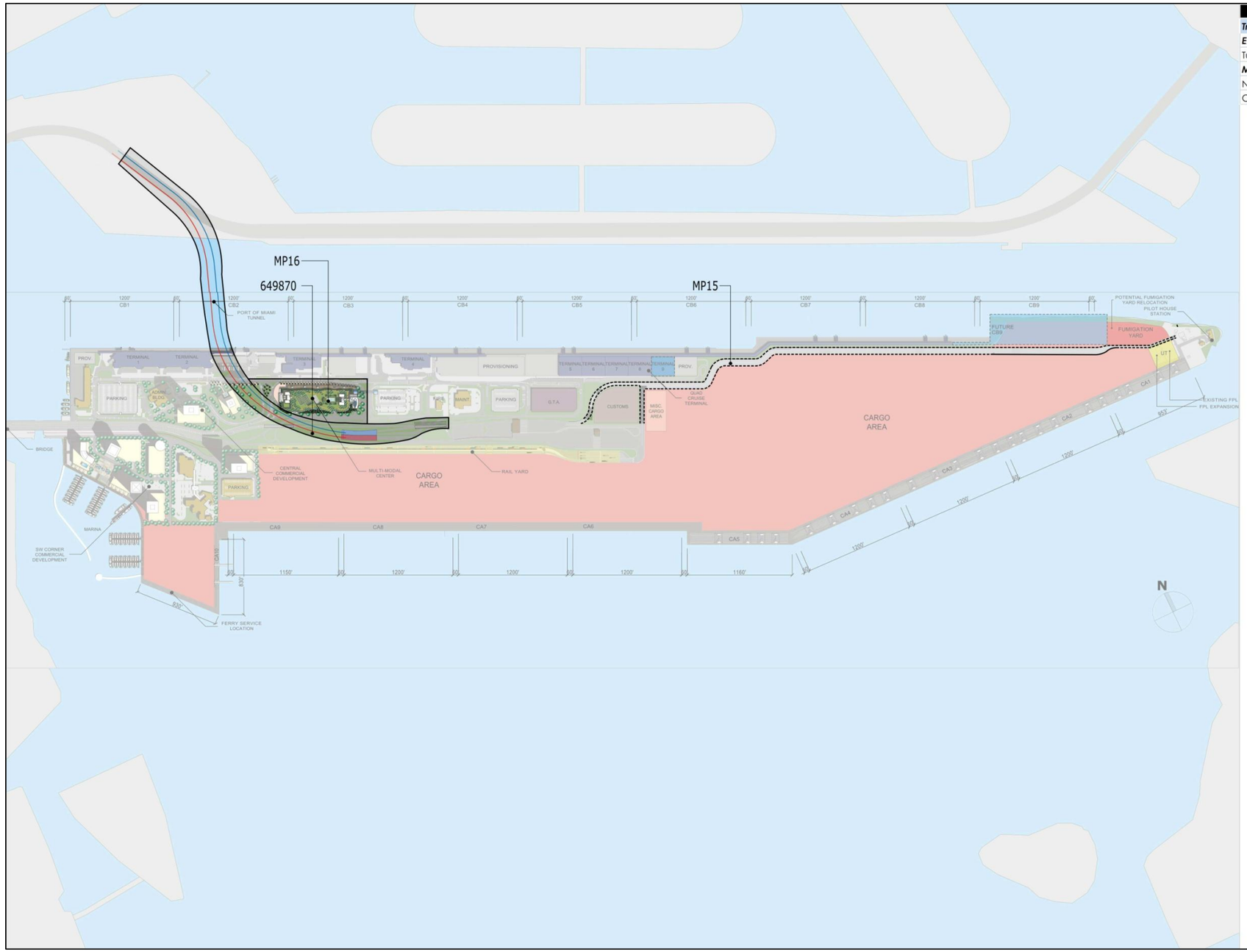
Project	ID	Start	End
Real estate			
Master plan projects			
Civil work southwest corner	MP25	2018	2018
Miscellaneous development costs (3)	MP26	2010	2018
Marina bulkhead	MP27	-	-
Marina slips	MP28	-	-

FIGURE 8.5: RAIL DEVELOPMENT PHASING PLAN



Project	ID	Start	End
Rail			
Master plan projects			
Bascule Bridge	MP17	2011	2012
On-port rail yard	MP18	2011	2012
On-port rail improvments	MP19	2011	2012

FIGURE 8.6: TRANSPORTATION DEVELOPMENT PHASING PLAN



Project	ID	Start	End
Transportation			
Existing capital plan			
Tunnel	649870	2014	2014
Master plan projects			
New cargo road	MP15	2021	2022
Central multimodal	MP16	-	-

8.3 COSTS

Costs for the implementation of the Preferred Master Plan are shown in Table 8.1. All costs are in 2010 dollars.

These costs are a combination of figures provided by the Port in its current funded and unfunded Capital Work Program and TIP, as well as the new estimates performed for new works as part of the Master Plan.

TABLE 8.1: PREFERRED PLAN CAPITAL COSTS, 2010 - 2017

Project	Total capital cost	2010	2011	2012	2013	2014	2015	2016	2017
Cruise									
Improvements to Terminals B & C	$ 1,434,000	$ 1,434,000							
Improvements to Terminals D & E	$ 4,704,000	$ 4,704,000							
Security upgrades to Terminals D & E	$ 1,807,000	$ 1,807,000							
Parking garage D	$ 1,538,000	$ 1,538,000							
Shore power for cruise ships	$ 2,000,000								$ 2,000,000
Cruise Terminal 7	$ 52,000,000						$ 4,000,000	$ 24,000,000	$ 24,000,000
Cruise Terminal 8	$ 52,000,000						$ 4,000,000	$ 24,000,000	$ 24,000,000
Cruise berth 6	$ 11,600,000						$ 5,800,000	$ 5,800,000	
Cruise berth 7	$ 26,600,000						$ 13,300,000	$ 13,300,000	
Cruise berth 8	$ 27,800,000						$ 13,900,000	$ 13,900,000	
Cruise berth 9	$ -								
Improvements to terminals D & E	$ 52,000,000							$ 26,000,000	$ 26,000,000
Parking	$ -								
Cargo									
Reinforce gantry crane area	$ 6,000,000	$ 1,000,000	$ 5,000,000						
Security improvements	$ 500,000	$ 500,000							
Electrification of cranes	$ 5,296,000	$ 1,324,000	$ 1,324,000	$ 1,324,000	$ 1,324,000				
Gantry crane refurbishment	$ 1,000,000	$ 1,000,000							
TLM improvements	$ 16,000,000	$ 1,000,000	$ 3,000,000	$ 3,000,000	$ 3,000,000	$ 3,000,000	$ 3,000,000		
Seaboard improvements	$ 22,235,000	$ 6,715,000	$ 2,920,000	$ 2,960,000	$ 4,820,000	$ 4,820,000			
Seaboard improvements	$ 7,040,000	$ 3,300,000	$ 1,900,000	$ 1,840,000					
Strengthen bulkheads for deepening	$ 23,720,000	$ 1,520,000		$ 12,100,000	$ 10,100,000				
Strengthen bulkheads for deepening	$ 2,390,000	$ 550,000			$ 1,840,000				
Deepening south channel	$ 78,624,000		$ 1,428,000	$ 19,299,000	$ 19,299,000	$ 19,299,000	$ 19,299,000		
Deepening south channel	$ 3,680,000					$ 1,840,000	$ 1,840,000		
Deepening south channel	$ 70,081,000		$ 2,142,000	$ 16,372,000	$ 16,372,000	$ 17,598,000	$ 17,597,000		
Crane Maintenance facility	$ 1,000,000								$ 1,000,000
CIPS facility	$ 1,020,000								$ 1,020,000
Yard Stacker cranes	$ 22,000,000			$ 11,000,000	$ 11,000,000				
Gantry cranes	$ 33,000,000	$ -	$ -	$ -	$ -	$ 11,000,000	$ 11,000,000	$ 11,000,000	
New fumigation yard	$ -								
Central basin yard expansion	$ -								
New cargo berth 5	$ -								
New cargo berth 6	$ -								
New cargo berth 7	$ -								
Fill southwest corner	$ -								
New berth sw corner	$ -								
New berth sw corner	$ -								
Yard improvements	$ -								
Improvements to gate complex	$ 2,500,000								$ 2,500,000
Gantry cranes	$ 11,000,000								$ 11,000,000
Transportation									
Tunnel	$ 43,500,000					$ 43,500,000			
New cargo road	$ -								
Central multimodal	$ -								
Rail									
Bascule Bridge	$ 3,900,000		$ 1,950,000	$ 1,950,000					
On-port rail yard	$ 20,084,000		$ 10,042,000	$ 10,042,000					
On-port rail improvments	$ 3,983,000		$ 1,991,500	$ 1,991,500					
Port lead improvements	$ 23,173,000		$ 11,586,500	$ 11,586,500					
Off-site improvements	$ -		$ -	$ -					
General									
General infrastructure improvements	$ 8,500,000	$ 2,500,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	
Electrical feeder upgrades	$ 3,000,000		$ 3,000,000						
Central communication center	$ 3,168,000	$ 3,168,000							
Upgrade water and sewer	$ 14,000,000	$ 500,000	$ 2,500,000	$ 6,000,000	$ 2,000,000	$ 3,000,000			
Riprap around pilot house	$ 1,758,000	$ 1,758,000							
Command and Control Phase 4 & 5	$ -								
Command and Control remodel	$ -								
Green energy innitiaves	$ 4,000,000					$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000
New electrical transformer substation	$ 608,000								$ 608,000
Wastewater upgrades	$ 960,000								$ 960,000
Water upgrades for new roadway	$ 1,700,000								$ 1,700,000
New water main crossing	$ -								
Drainage	$ -								
Real estate									
Civil work southwest corner	$ -								
Miscellaneous development costs	$ 200,000	$ 200,000							
Marina bulkhead	$ -								
Marina slips									
Totals (without escalation)	**$ 673,103,000**	**$ 34,518,000**	**$ 49,784,000**	**$ 100,465,000**	**$ 70,755,000**	**$ 106,057,000**	**$ 95,736,000**	**$ 120,000,000**	**$ 95,788,000**

TABLE 8.1 CONTINUED: PREFERRED PLAN CAPITAL COSTS, 2018 – 2025

Project	Total capital cost	2018	2019	2020	2021	2022	2023	2024	2025
Cruise									
Improvements to Terminals B & C	$ -								
Improvements to Terminals D & E	$ -								
Security upgrades to Terminals D & E	$ -								
Parking garage D	$ -								
Shore power for cruise ships	$ 4,000,000			$ 2,000,000			$ 2,000,000		
Cruise Terminal 7	$ 24,000,000	$ 24,000,000							
Cruise Terminal 8	$ 24,000,000	$ 24,000,000							
Cruise berth 6	$ -								
Cruise berth 7	$ -								
Cruise berth 8	$ 13,900,000	$ 13,900,000							
Improvements to terminals D & E	$ 52,000,000			$ 26,000,000	$ 26,000,000				
Parking	$ -								
Cargo									
Reinforce gantry crane area	$ -								
Security improvements	$ -								
Electrification of cranes	$ -								
Gantry crane refurbishment	$ -								
TLM improvements	$ -								
Seaboard improvements	$ -								
Seaboard improvements	$ -								
Strengthen bulkheads for deepening	$ -								
Strengthen bulkheads for deepening	$ -								
Deepening south channel	$ -								
Deepening south channel	$ -								
Deepening south channel	$ -								
Crane Maintenance facility	$ -								
CIPS facility	$ -								
Yard Stacker cranes	$ -								
Gantry cranes	$ -								
New fumigation yard	$ 600,000				$ 600,000				
Central basin yard expansion	$ -								
New cargo berth 5	$ -								
New cargo berth 6	$ -								
New cargo berth 7	$ -								
Fill southwest corner	$ 27,000,000				$ 13,500,000	$ 13,500,000			
New berth sw corner	$ 15,100,000						$ 15,100,000		
New berth sw corner	$ 11,300,000								$ 11,300,000
Yard improvements	$ 12,000,000				$ 6,000,000	$ 6,000,000			
Improvements to gate complex	$ -								
Gantry cranes	$ -								
Transportation									
Tunnel	$ -								
New cargo road	$ 5,400,000				$ 2,700,000	$ 2,700,000			
Central multimodal	$ -								
Rail									
Bascule Bridge	$ -								
On-port rail yard	$ -								
On-port rail improvments	$ -								
Port lead improvements	$ -								
Off-site improvements	$ -								
General									
General infrastructure improvements	$ -								
Electrical feeder upgrades	$ -								
Central communication center	$ -								
Upgrade water and sewer	$ -								
Riprap around pilot house	$ -								
Command and Control Phase 4 & 5	$ 4,900,000	$ 4,900,000							
Command and Control remodel	$ 5,520,000	$ 5,520,000							
Green energy innitiaves	$ 16,000,000	$ 2,000,000	$ 2,000,000	$ 2,000,000	$ 2,000,000	$ 2,000,000	$ 2,000,000	$ 2,000,000	$ 2,000,000
New electrical transformer substation	$ 608,000		$ 608,000						
Wastewater upgrades	$ 960,000		$ 960,000						
Water upgrades for new roadway	$ 1,700,000		$ 1,700,000						
New water main crossing	$ 632,000	$ 632,000							
Drainage	$ 1,100,000	$ 1,100,000							
Real estate									
Civil work southwest corner	$ 1,100,000	$ 1,100,000							
Miscellaneous development costs	$ 5,000,000	$ 5,000,000							
Marina bulkhead	$ -								
Marina slips									
Totals (without escalation)	**$ 226,820,000**	**$ 82,152,000**	**$ 5,268,000**	**$ 30,000,000**	**$ 50,800,000**	**$ 24,200,000**	**$ 19,100,000**	**$ 2,000,000**	**$ 13,300,000**

TABLE 8.1 CONTINUED: PREFERRED PLAN CAPITAL COSTS, 2026 - 2035

Project	Total capital cost	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Cruise											
Improvements to Terminals B & C	$ -										
Improvements to Terminals D & E	$ -										
Security upgrades to Terminals D & E	$ -										
Parking garage D	$ -										
Shore power for cruise ships	$ 4,000,000			$ 2,000,000					$ 2,000,000		
Cruise Terminal 7	$ -										
Cruise Terminal 8	$ -										
Cruise berth 6	$ -										
Cruise berth 7	$ -										
Cruise berth 8	$ -										
Improvements to terminals D & E	$ -										
Parking	$ -										
Cargo											
Reinforce gantry crane area	$ -										
Security improvements	$ -										
Electrification of cranes	$ -										
Gantry crane refurbishment	$ -										
TLM improvements	$ -										
Seaboard improvements	$ -										
Seaboard improvements	$ -										
Strengthen bulkheads for deepening	$ -										
Strengthen bulkheads for deepening	$ -										
Deepening south channel	$ -										
Deepening south channel	$ -										
Deepening south channel	$ -										
Crane Maintenance facility	$ -										
CIPS facility	$ -										
Yard Stacker cranes	$ -										
Gantry cranes	$ -										
New fumigation yard	$ -										
Central basin yard expansion	$ 85,400,000					$ 42,700,000	$ 42,700,000				
New cargo berth 5	$ 18,000,000								$ 9,000,000	$ 9,000,000	
New cargo berth 6	$ 19,400,000								$ 9,700,000	$ 9,700,000	
New cargo berth 7	$ 19,800,000									$ 9,900,000	$ 9,900,000
Fill southwest corner	$ -										
New berth sw corner	$ -										
New berth sw corner	$ -										
Yard improvements	$ -										
Improvements to gate complex	$ -										
Gantry cranes	$ 55,000,000			$ 11,000,000	$ 11,000,000		$ 11,000,000		$ 11,000,000	$ 11,000,000	
Transportation											
Tunnel	$ -										
New cargo road	$ -										
Central multimodal	$ -										
Rail											
Bascule Bridge	$ -										
On-port rail yard	$ -										
On-port rail improvments	$ -										
Port lead improvements	$ -										
Off-site improvements	$ -										
General											
General infrastructure improvements	$ -										
Electrical feeder upgrades	$ -										
Central communication center	$ -										
Upgrade water and sewer	$ -										
Riprap around pilot house	$ -										
Command and Control Phase 4 & 5	$ -										
Command and Control remodel	$ -										
Green energy innitiaves	$ 11,000,000	$ 2,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000
New electrical transformer substation	$ -										
Wastewater upgrades	$ -										
Water upgrades for new roadway	$ -										
New water main crossing	$ -										
Drainage	$ -										
Real estate											
Civil work southwest corner	$ -										
Miscellaneous development costs	$ -										
Marina bulkhead	$ -										
Marina slips											
Totals (without escalation)	**$ 212,600,000**	**$ 2,000,000**	**$ 1,000,000**	**$ 14,000,000**	**$ 12,000,000**	**$ 43,700,000**	**$ 54,700,000**	**$ 1,000,000**	**$ 32,700,000**	**$ 40,600,000**	**$ 10,900,000**

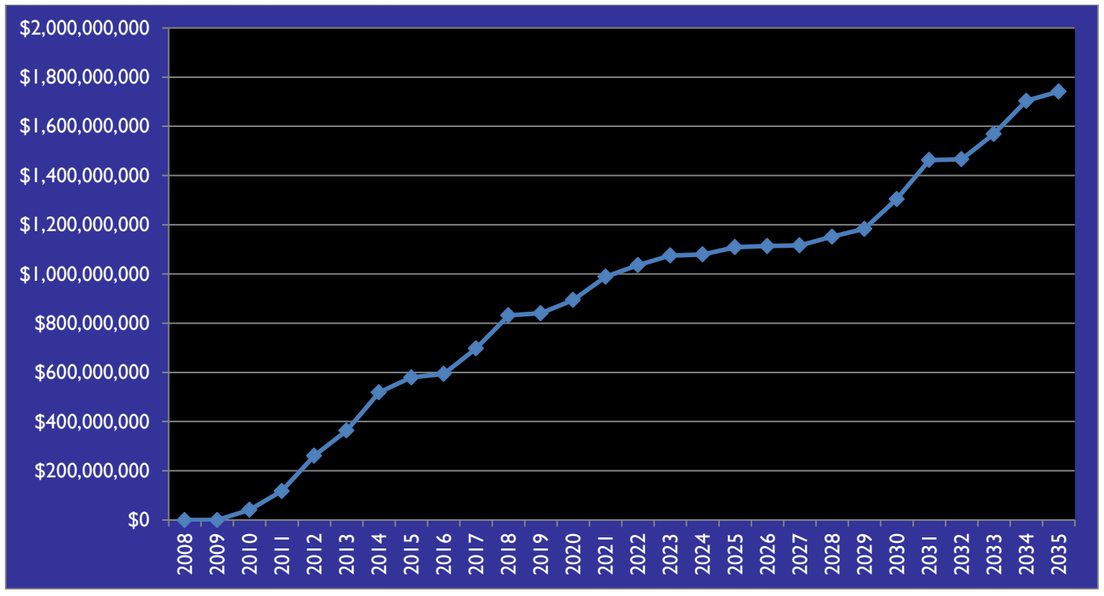
8.4 SCHEDULE AND CAPITAL PROGRAM

The Figures below show the allocation of cost for all of the improvements described above and have been scheduled in accordance to need without any capital capacity constraints. For those projects which had flexibility, they have been delayed since it is recognized that availability of capital will be controlling the pace of expenditures.

8.4.1 CAPITAL PROGRAM

The master plan carries a total cumulative price tag of slightly less than $1.8 billion over the 25-year period. This number includes an annual escalation of 3% which accounts for a total of $682 million. Totals are shown in Figure 8.7.

FIGURE 8.7: CUMULATIVE CAPITAL PROGRAM

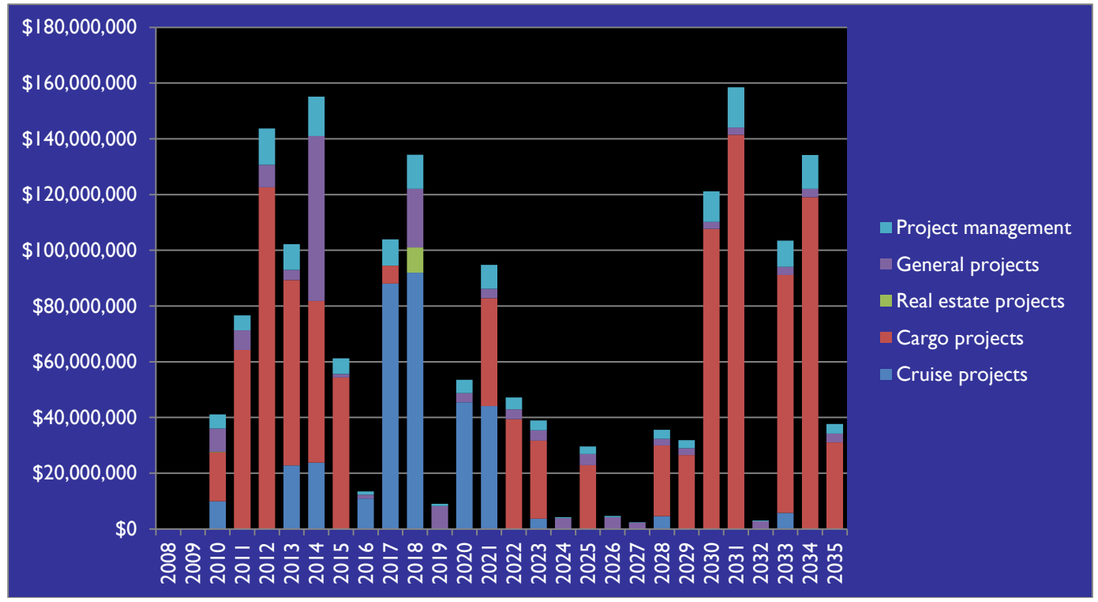


The capital program is divided into three periods: The immediate one from 2010 to 2016 is (large and expensive) to complete the major projects currently underway. The second cycle begins in 2017 thru 2026 and mainly accounts for additional cruise terminals and facilities. The final cycle is 2027 thru 2035 which will deal with the major expansion needs for cargo at that time, as well as a potential 9th cruise berth.

8.4.2 CAPITAL EXPENDITURES BY PROGRAM

Figure 8.8 shows the total annual capital demand by business unit. In this case, both the channel deepening and tunnel have been assigned to the cargo unit as they will be the recipients of the benefits. However, it is assumed that both cruise and cargo will benefit from the tunnel project during the lifetime due to the ability to directly access the Port from the main highway corridors.

FIGURE 8.8: ANNUAL CAPITAL NEEDS BY BUSINESS UNIT



The Figure 8.8 shows a few interesting trends:

- There is an initial period from 2010 to 2016 during which capital is needed to support mostly cargo, due to the channel deepening and tunnel construction.
- In 2018 there is a very modest investment in the commercial sector to prepare properties for leasing.
- Between 2016 and 2021 there are several important investments in cruise to reflect the anticipated growth forecasts and cruise line needs.
- Finally, in the outer years of 2030 more cargo improvements are also required.

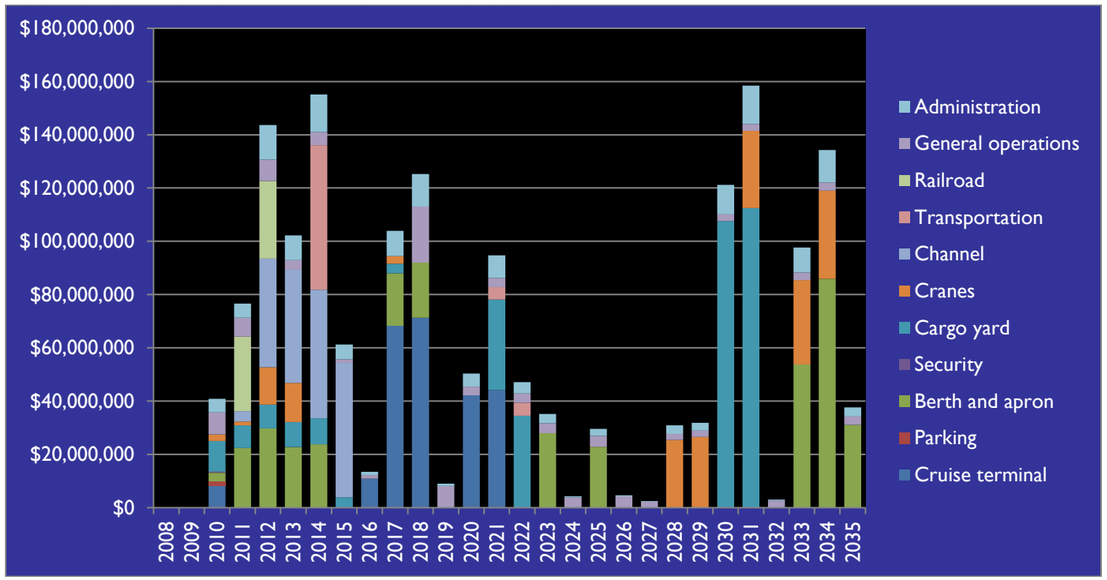
The Table below reflects the balance at the Port and the need to have a business plan where each business unit contributes to the bottom line. Some years, the income from the whole will be needed for one particular use. In other years the trend will be reversed. The total expenditures for each business unit are shown in Table 8.2 below.

Table 8.2 – Capital Expenditures by Business Unit	
Business Unit	**Total Capital Costs**
Cruise	$350,997,568
Cargo	$1,055,091,978
Real Estate	$9,274,180
General	$167,899,626
Management	$158,068,766
Total	**$1,741,332,118**

8.4.3 CAPITAL EXPENDITURES BY CONSTRUCTION TYPE

Figure 8.9 shows the same expenditures classified by the type of work that will be needed.

FIGURE 8.9: ANNUAL CAPITAL NEEDS BY TYPE OF WORKS



The Figure above shows that the initial monies will go towards transportation and channel improvements. The second cycle will be mostly for cruise terminals and berths. The final Plan cycle will be the additional cargo yards and berths needed for the expansion of the cargo forecast for the Port of Miami.

SECTION 9

FINANCIAL PLAN

9.1 OVERVIEW

The Port of Miami operates as a Miami-Dade County Government enterprise. As such, the Port is viewed as a self-funding, sustainable entity that should pay for its operating and capital costs. In fact, the Port is required to pay other County Departments for services they provide to the Port. This includes Fire and Police and others that have collected fees from the Port over time.

The current Port of Miami is built on reclaimed land. This means that the Port must bear the costs of even its most basic asset - raw land. With few exceptions, and with the assistance of federal dredging programs, the Port was able to establish a foothold on the new Dodge Island with sufficient land and berths to allow it to begin operations.

Since the adoption of the 1979 Port of Miami Master Plan, the County adopted a policy to grow the Port to meet the needs of the fast-growing cargo and cruise business sectors. The 1980's promised, and delivered, on rapid expansion as the cruise business began to mature and Latin America's trade increased dramatically. Due to the fast-paced nature of this growth, the Port and County resorted to the only available financing scheme - revenue supported debt.

The Port used multiple issuances of revenue bonds as vehicles to improve marketability and, in one instance, was able to issue revenue bonds with GOB backing. Following this rapid growth period of the 1980's, the Port transformed itself into the largest container terminal in the South Atlantic, and also allowed the cruise business to quadruple over the period.

This growth and business model came at a cost: the Port became one of the most indebted ports in the U.S. Other ports did not suffer from debt load as many had, and currently have, a business model whereby they receive funding from other sources. For example, during this period, Port Everglades was a Port Authority which, at times, exercised its ad-valorem powers to obtain tax support. Today, many ports in the U.S. have such broad powers. Other ports have been given other assets which are exploited to generate revenues. These assets may come with a broader mission or large real estate holdings that generate lease revenues.

The dependence on debt for the Port also means that all revenues are coming directly from user fees. However, when those same users are also attracted to other ports which do not rely entirely on fees, the business model for the Port of Miami, once competition drives fees downward, becomes unsustainable.

In the end the Port, some 30 years after its major expansion, has much more modest debt capacity, and ever-growing capital needs. In summary, the Port's major financial challenges are as follows:

- The Port is predominately a self-funding enterprise with revenues coming from user fees;
- The Port, in general, does not receive any financial support other than:
    - Grants; and,
    - Credit enhancements / loans.
- 100% of the facilities of the Port are newly built since 1960;
- 100% of the Port is reclaimed new land (no inexpensive land was used to start the port); and,
- It is hard to spend for the future when using historical revenues to sell bonds.

The current situation is as follows:

- The Port is the most (or one of the most) indebted ports in the country;
- Other ports have diversified funding sources;
- Tariffs are very competitive; and,
- Tariffs are a major issue with cruise lines and other port tenants.

Thus, the conclusion reached through examination of the 2035 Master Plan is that one of the most important elements is the reengineering of the Port's business model to diversify revenues in order to allow for a competitive fee structure and to increase revenues to pay for the overall capital program.

9.2 TARIFFS

The Port's revenues are as a result of three major activities:

- **MOVEMENT OF GOODS AND PEOPLE** – the Port charges a tariff for the "wharfage" or a fee measured by a unit of measurement of the goods and people moving across the docks. In the case of cruise, wharfage is a head tax. In the case of cargo, it is charged on a per-ton or TEU basis. Other multiple wharfage charges are in the Port's portfolio to account for other types of goods such as vehicles.
- **DOCKING OF SHIPS** – the Port has a berthing charge for the use of the docks (typically based upon a 24-hour period).
- **RENTALS** – the Port charges for a multitude of activities such as leasing space, gantry cranes, land rentals, offices, etc.

The charges above that are applied to the volumes of traffic that the Port handles make up its revenue base.

Tariffs are approved by the Board of County Commissioners and are filed with the appropriate federal agencies. Tariffs are reviewed periodically to determine their applicability and competitiveness. In addition, due to changes in the port industry, tariffs are dramatically transformed to reflect current business practices.

The cargo industry went through several changes as they moved from break bulk to containers.

Presently, the cruise industry is requesting that tariffs be changed to reflect a "bundled" wharfage rate for all services provided.

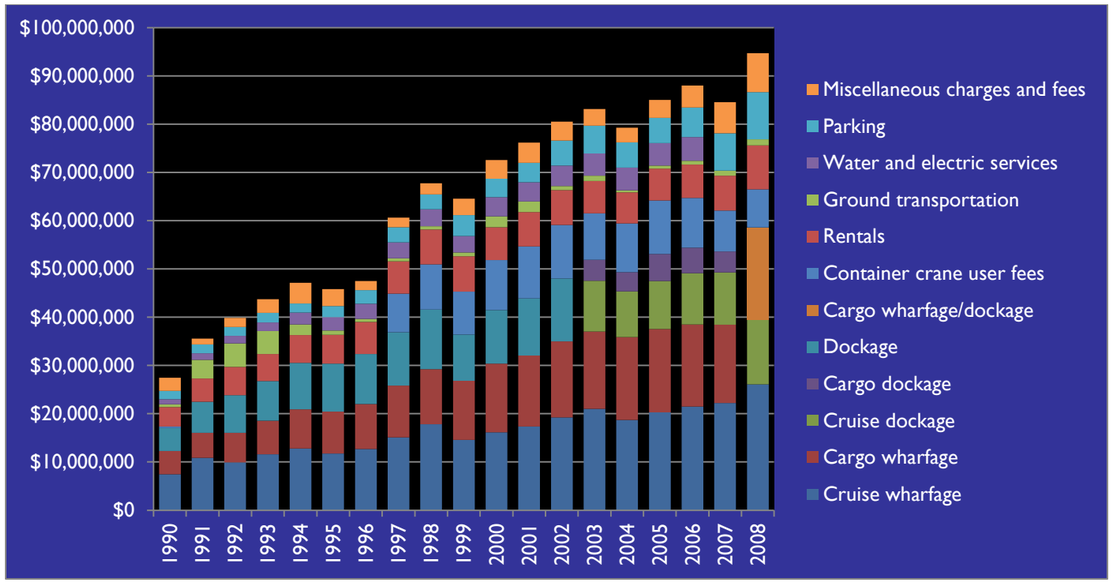
9.3 GROSS REVENUES

The application of tariffs to the traffic of the Port has yielded significant growth in the Port's gross revenues. Figure 9.1 shows the historical growth since 1990. Over the years, the Port has changed the classification of certain revenues and/or provided more specificity. Among the changes are:

- Dockage fees up to 2002 were reported as a single line item. Since then, they have been reported as cruise dockage and cargo dockage.
- Cargo charges were consolidated into one line item in 2008.

In the future, there will be further changes that will reflect the new reporting regime.

FIGURE 9.1: HISTORICAL PORT GROSS REVENUES



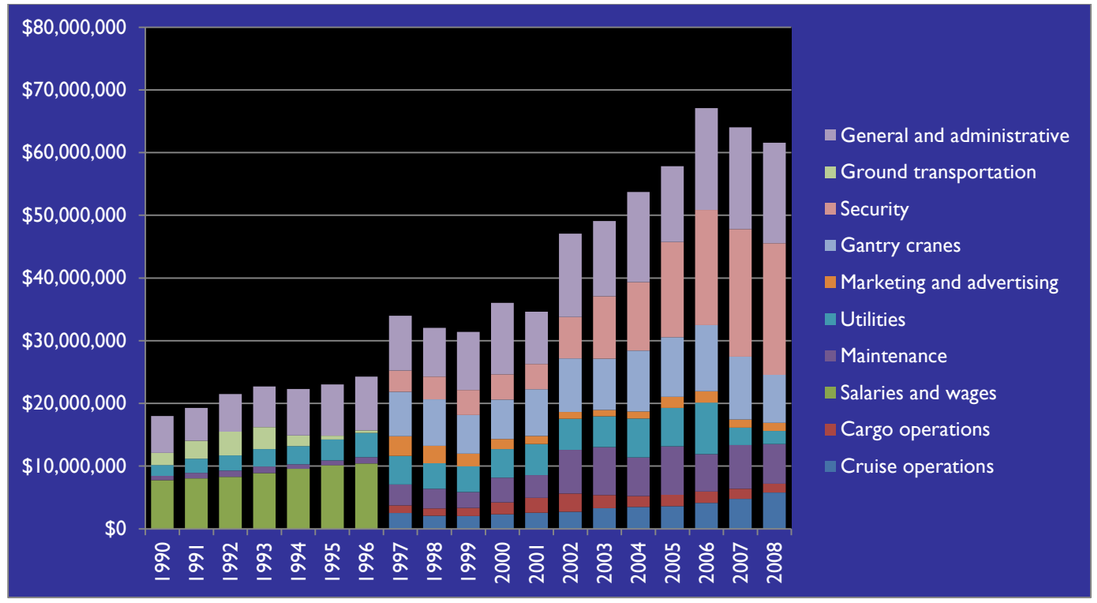
The record reflects a very impressive growth in the Port's revenues over the past two decades and confirms that the Port's strategy to "build to grow" has worked. Were it not for this strategy, the Port of Miami would not have the thriving cruise and cargo industry that it has today.

9.4 EXPENSES

The Port's net revenues are generated after paying for all expenses; this has been a challenging area for ports in general. Since 2001, security has been a major issue for the Port and its users. The ability to respond to security standards being established by third parties without revenues has created major financial challenges.

Figure 9.2 shows the overall expenses for the Port during the past two decades. As with the gross revenues, the method and form of reporting expenses has changed. For example, from 1997, more specificity was assigned to each cost reflecting the different businesses of the Port. In some cases, such as utilities in 2007, the Port eliminated the utility sales as an income line item and now reflects the net utility bill after it receives the revenues from charges.

FIGURE 9.2: HISTORICAL PORT EXPENSES

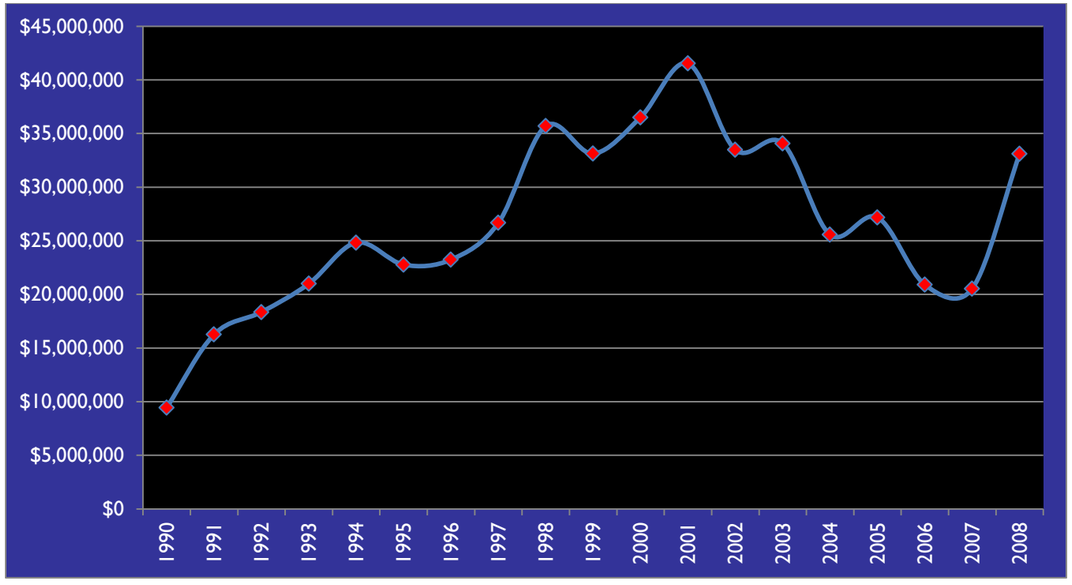


This figure clearly shows the impact of security costs on the Port's financials which began to increase dramatically after 2001. After a large ramp-up period that began from 1997 to 2002 and peaked in 2006, expenses are now being better controlled. This is critical as the Port is relying on the net revenues to fund improvements.

9.5 NET REVENUES

The net revenues of the Port have been its most valuable asset. They have been used to pay for improvements, either from cash and/or from the issuance of debt. Figure 9.3 shows the net revenues before depreciation, interest or other payments below the operating line. It does not contain any non-operating income from interest gains, grants, or other sources.

FIGURE 9.3: HISTORICAL NET REVENUES



The result of these trends is that, despite significant revenue gains during this period, expenses far outstripped the Port's gains and resulted in a decrease from the peak of approximately $41 million in net revenues in 2001 to a low of $20 million in 2007. Since then, the Port has bounced back to recover most of the loss.

Based upon this historical review, the Port's revenue stream has significant fluctuations and is not a stable funding source for future growth.

In 2009, the Port's debt service was approximately $32 million with a coverage requirement in total net revenues of $35 million. This alone should be indicative of the business model of the Port; it commits its resources to build for the future.

9.6 STRATEGIES

In order to create a sustainable financial program for the Port, several strategies should be considered that will achieve the following:

- Provide a diversified income stream;
- Look for revenues from non-tariff items to allow the Port to maintain competitiveness, in particular, this Master Plan has identified the use of commercial real estate as an asset;
- Establish longer term agreements with customers to reduce revenue fluctuations;
- Establish business units at the Port that have responsibility over profitability for each in lieu of just operating responsibility; and,
- Control costs and look for other revenue sources from ancillary uses such as retail, advertising, etc.

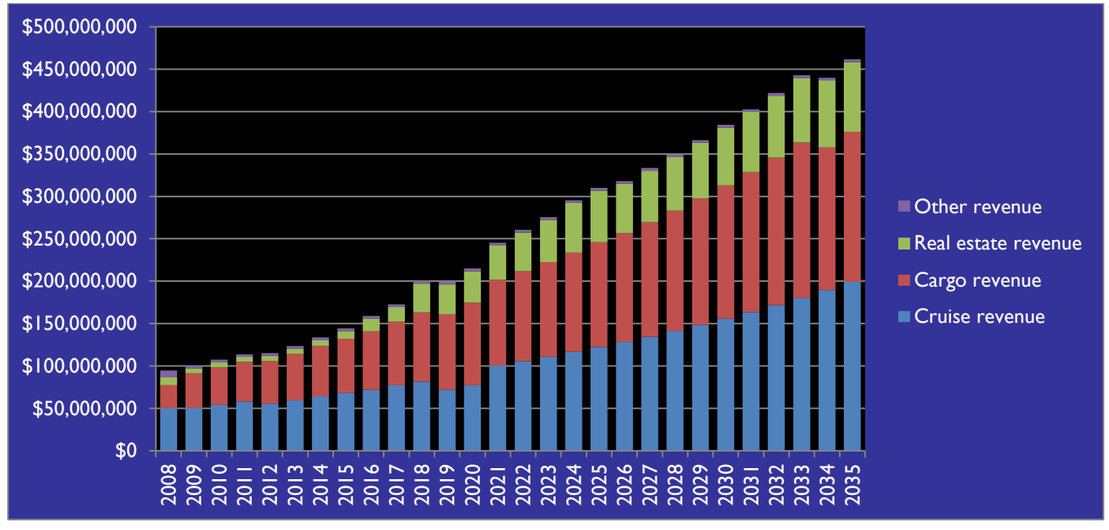
9.7 FUTURE REVENUES

Projections have been done for the future traffic based on the cargo and cruise forecasts, as well as the introduction of the strategies mentioned above. Figure 9.4 shows the projected gross revenue forecasts for the Port. The forecasts take into account all contract commitments from users and tenants which will be further described in the section below.

The forecasts have been combined into the three major business units. Cargo and cruise are the predominant units. However, the master plan shows that by 2018, the Port will be in a position to begin to leverage its real estate assets. This is dependent on the real estate cycle.

The forecasts grow due to a built-in 3% escalator for non-contract revenues. Contract revenues are escalated in accordance with the terms of the contracts.

FIGURE 9.4: GROSS REVENUE PROJECTIONS



9.8 CONTRACTS

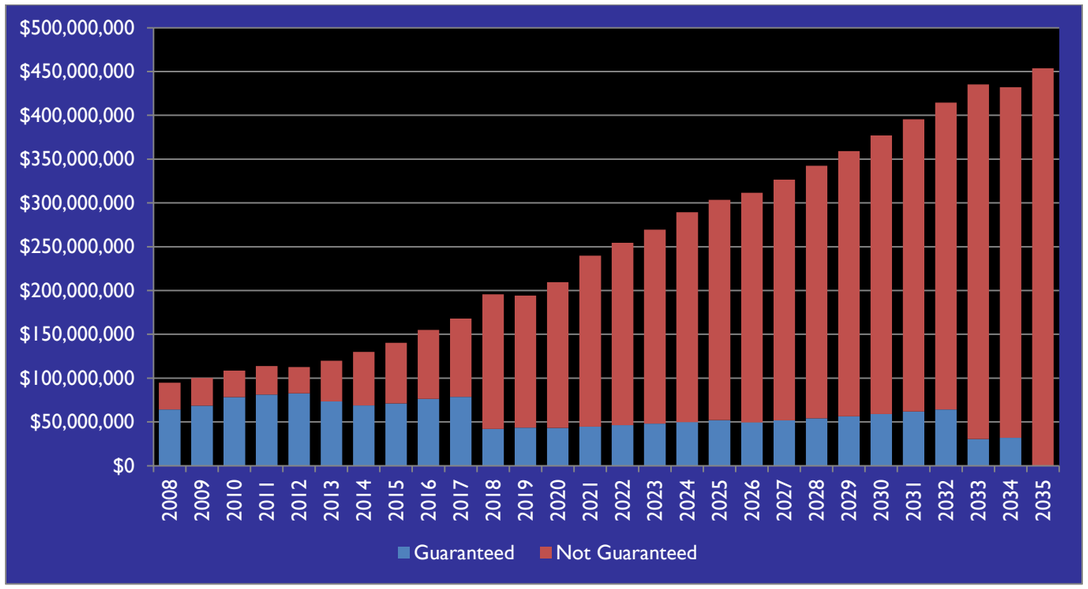
One major change is the prevalence of long-term contracts from Port users. There was a time when all of the traffic at the Port paid tariffs without any long-term contracts or commitments. During the past two years, this trend has totally reversed. Long-term in the industry means contracts over 5 to 10 years in duration.

In the case of the cargo industry, long-term contracts have been used by the Port to allow the tenants to invest their own funds in the improvements they require. Thus, this method relieves the Port from having to pay 100% of the capital for the improvements. In the case of the cruise industry, the lines have been motivated to enter into such agreements as a way of limiting port costs or - at best - making them more predictable in the future.

As with any other business, whether cargo or cruise, when a contract is entered into, the Port will receive assurances of payments and or traffic. It also means that revenues are adjusted to compensate for the transfer of risk. Figure 9.5 shows the percent of the Port's total revenue that is under contract. In this table, guarantees are defined as long-term agreements with cruise lines, cargo lines, or leases with tenants.

This method of contracting for future uses is consistent with the strategies envisioned in this master plan in order to level off fluctuations in income for the future.

FIGURE 9.5: GUARANTEED REVENUES

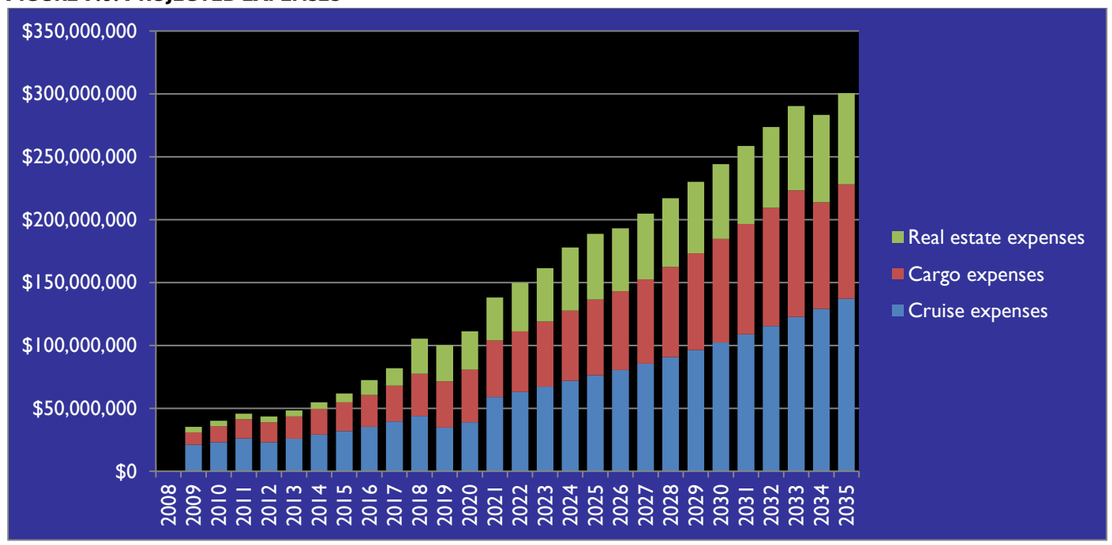


9.9 PROJECTED NET REVENUES

Based on the above review, projections have been made for the Port's net revenues. At the request of the Port, expenses have been calculated using a 4.5% annual escalator which far outstrips the 3% tariff escalation. The expense projections are shown in Figure 9.6. The expenses have been allocated to each business unit using the following general guidelines:

- Each business unit carries its direct costs;
- The general overhead of the Port is divided between the units as a proportion of their gross revenues;
- Security costs are split 50/50 between cruise and cargo; and,
- Real estate expenses are based on a model of the Port leasing the land and not owning the real assets.

FIGURE 9.6: PROJECTED EXPENSES



The results shown above reflect the low levels of costs associated with leasing real estate and the higher costs of cargo operations, most of which are due to the costs of the gantry cranes.

The projected net revenues for the Port have been calculated and are shown in Figure 9.7. The numbers shown are operating net revenues before depreciation, interest expenses, debt service, and/or non-operating income. The net revenues of the Port will grow over time from $42.5 million in 2010 to $303 million in 2035, should the business meet the market projections.

Thus, the Port has a very promising future. However, the short-term capital needs are much larger than the Port can handle based on a pure revenue / debt formula.

FIGURE 9.7: PROJECTED NET REVENUES

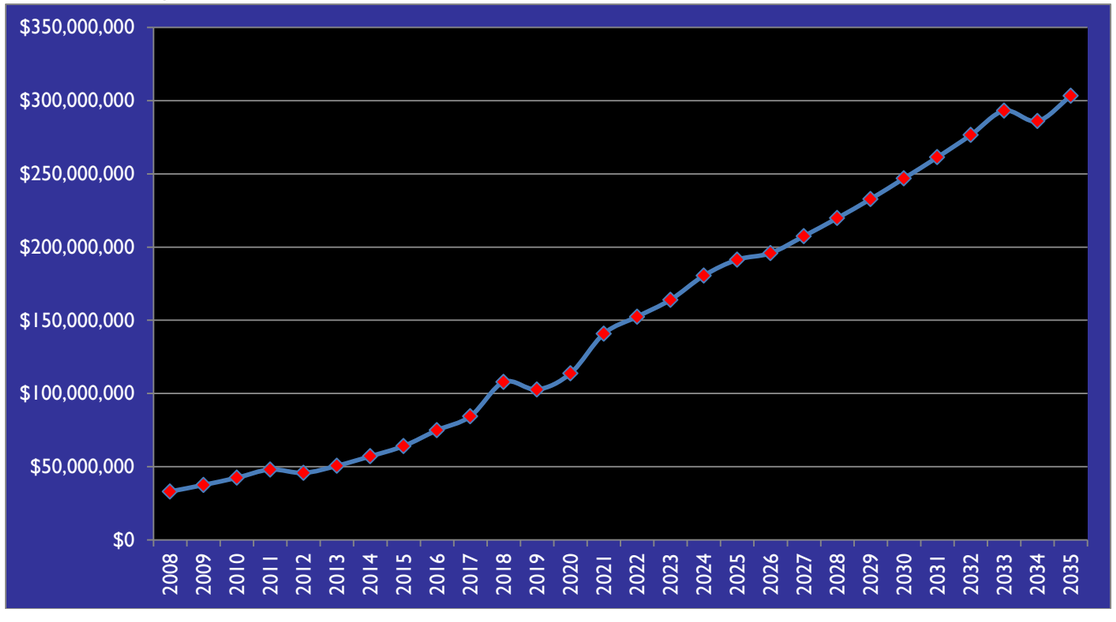
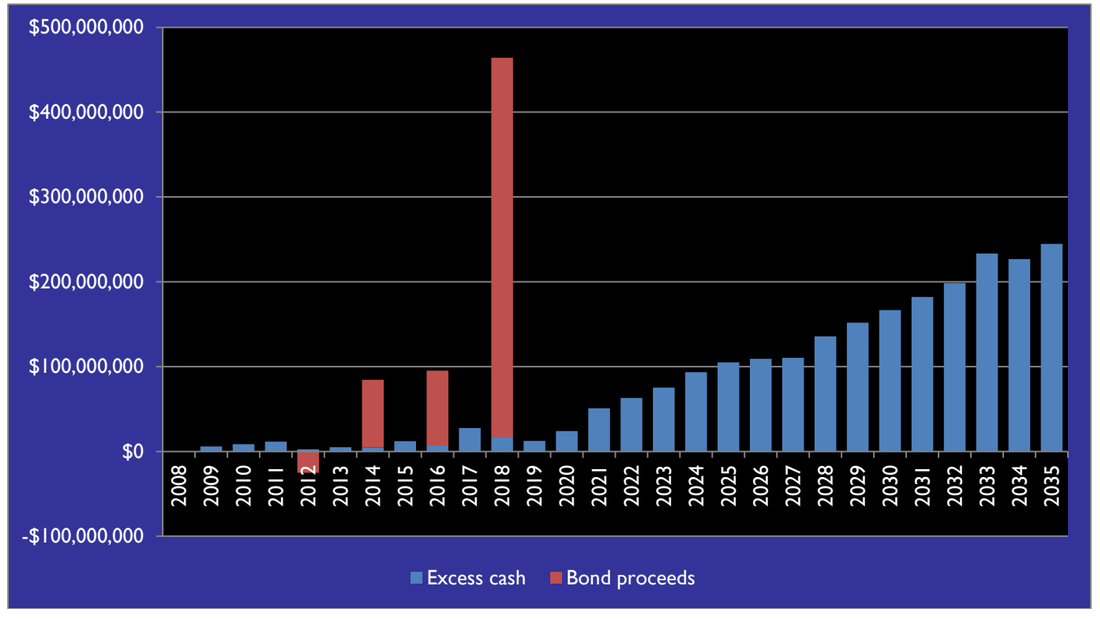


FIGURE 9.8: AVAILABLE REVENUES FOR CAPITAL



9.10 REVENUES AVAILABLE FOR CAPITAL IMPROVEMENTS

From the net revenues, the Port will need to pay the current debt service, other expenses and, subsequently, meet the coverage imposed by each of the covenants on the existing debt before it can look to issue new debt. However, as a result of this process, the Port will also generate excess cash that can also be used for the capital program.

Figure 9.8 shows the availability of revenues for capital. This is a combination of annual surplus cash and new debt issued once the Port's periodic debt capacity increases. In general, this tends to occur every two to three years. The chart shows that approximately every two years, the Port will have the ability to raise between $50 to $100 million in new revenues. In 2018, should the Port wish to renegotiate certain leases, revenues could substantially increase.

It is unlikely that the Port will be able to increase lease costs much in 2018 as these new leases will need to be renegotiated with existing customers that will not want to increase rentals to such a high degree. However, there is a potential upside to these leases and it may provide a boost to Port revenues in that year.

9.11 COMPARISON OF FUNDING NEEDS VS. AVAILABILITY

Not all of the Port's capital needs are funded from operations. Historically, the Port has been able to get a number of grants or contributions from partners to support its capital needs. In particular, the deepening of the channels is being paid-for through funding from the Federal Water Resources Act. The tunnel project has contributions from the State and City governments.

The Port is also the recipient of grants. Some are from the State FSTED program which has annual allocations of modest sums, and from time to time, the Port is funded by Federal Security Grants.

Figure 9.9 shows the sources of funding. The majority of funding falls in the Unfunded or Seaport categories, both of which will need to receive funding from the Port's revenues.

Both the categories shown as Seaport Funds and Unfunded require allocation of Seaport Resources or an unidentified source. These continue to be the predominant sources. FDOT and city funding is not reflected as the total cost of the tunnel is not in the capital program. This is not an FDOT project.

FIGURE 9.9: ANNUAL CAPITAL PROGRAM EXPENDITURES BY SOURCE OF FUNDING

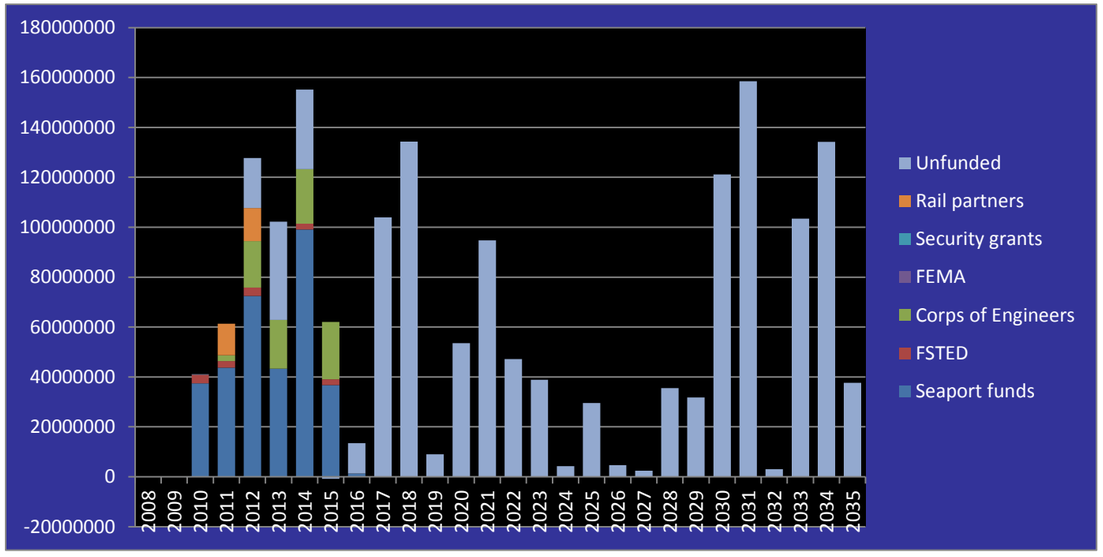
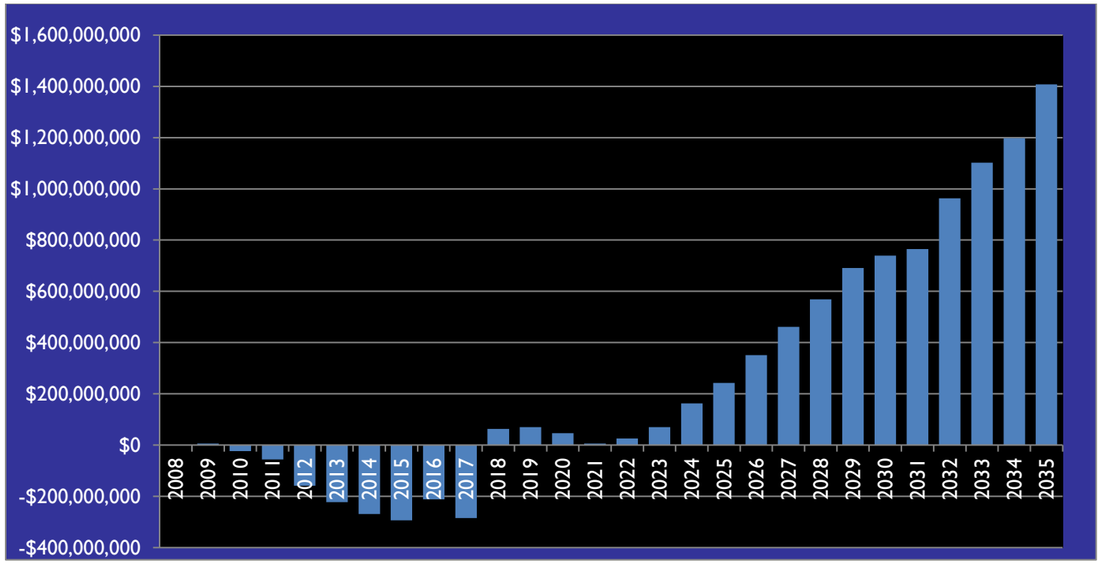


FIGURE 9.10: ANNUAL CAPITAL SURPLUS / DEFICIT



The resulting funding surpluses or shortfalls are shown in Figure 9.10. The next ten years calls for a major reconsideration of programs, conservation of capital and potential for deferring certain programs in order to balance these resources. Once the Port's income stream is more diversified, the financial picture will improve to the point whereby the County can strategically decide on how best to spend these funds.

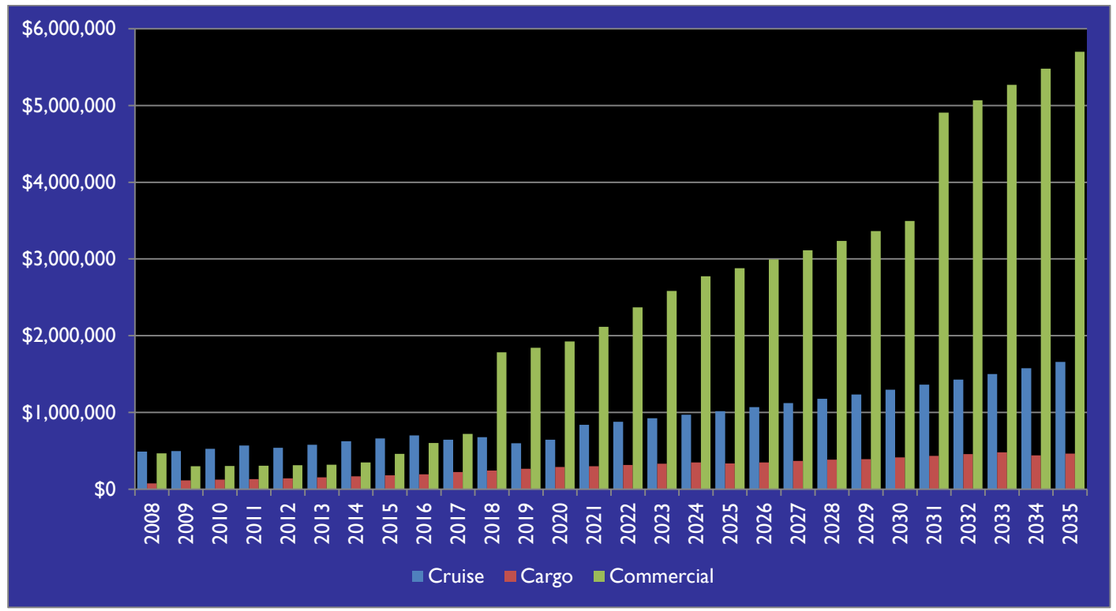
9.12 FINANCIAL METRICS

There are several important financial metrics that can assist the Port in making investment decisions. These metrics are also important in future negotiations, allocation of resources, and prioritization. The metrics are:

- Cruise:
  - Gross revenue per terminal;
  - Gross revenue per acre; and,
  - Revenue per lineal feet of berth.
- Cargo:
  - Gross revenue per acre; and,
  - Gross revenue per lineal feet of berth.
- Commercial:
  - Gross revenue per acre.

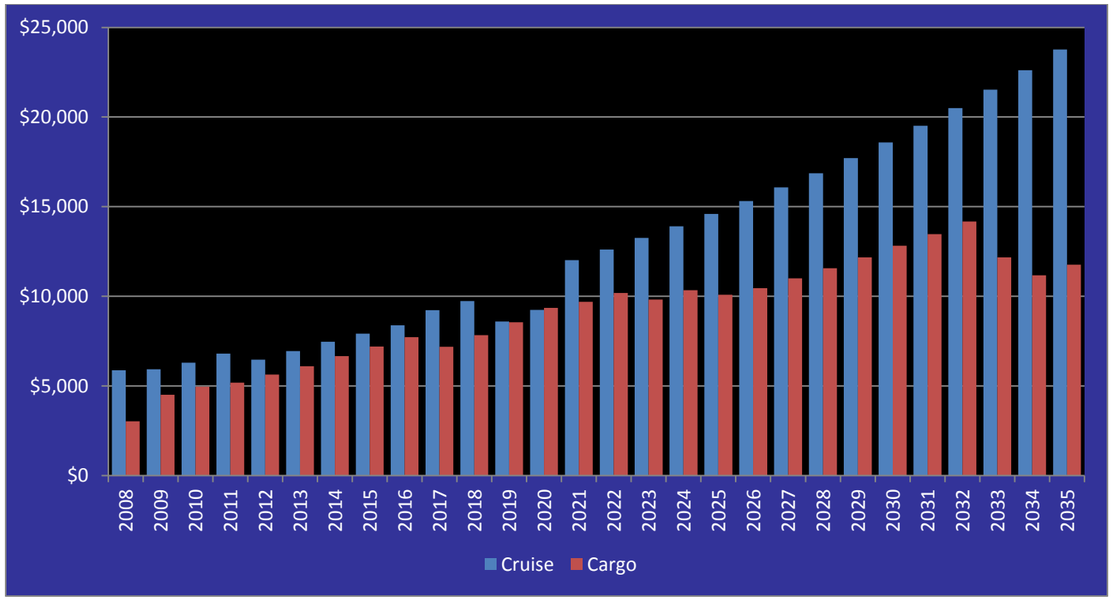
Because of the commonality in all of the per-acre measurements, or per-lineal feet for cargo and cruise, these can be compared to yield an index of effectiveness of uses from a financial return point of view.

FIGURE 9.11: GROSS REVENUES PER ACRE BY USE



Figures 9.11 show the comparative yield per acre of the three uses. Figure 9.12 shows the comparison of yield per lineal feet of berth. This latter chart shows the lucrative nature of the Port's real estate assets and the compelling case to put them to work. It also shows that, per acre, cruise, which has a more intensive use of the land, is more efficient.

FIGURE 9.12: GROSS REVENUES PER LINEAL FEET OF BERTH PER USE



The conclusions of this analysis show that the Port is yielding better results from cruise activities. However, that is not sufficient to sustain long-term growth of the Port. The Commercial assets of the Port should be put to work to generate new revenues.

Further, when the yields are compared with the investments, the individual IRR of each use varies dramatically, with cargo being the lowest performing sector.

9.13 DECISIONS ON FUTURE INVESTMENTS

The decision to make an investment at the Port of Miami has predominately been driven by the economic impact that such uses will have on the community. Over the years the Port has prided itself on the jobs it has created and the economic impacts it has produced. The primary goal of the master plan is job creation.

However, it is also important to make decisions on the financial sustainability of the Port. The need to generate revenues is also paramount if the Port is going to continue to achieve its mission. This Master Plan, along with the 2008 *Local and Regional Economic Impacts of the Port of Miami Study*, provides the tools required for the Port to develop a revised investment policy that weighs both of these primary factors in its decision-making and outlines a priority for future investments.

SECTION 10

IMPLEMENTATION PLAN

10.1 FOREWORD

The contents, forecast, and projections of this Master Plan are not a foregone conclusion but rather they are a prediction of what could occur if Port Management makes key decisions on how to move the Port forward. The projections are also subject to many factors for which the Port, consultants, and others have no control over. Some changes will occur. Events such as economic downturn, war, terrorism, permitting issues, labor strife, trade policies, and accidents are among many factors that will likely affect the Plan in the long-term. As such, this Master Plan should be viewed as a guiding tool that should be continuously updated and reviewed.

The Plan is set up for such eventualities. It will also allow the Port Managers to make sequential decisions at the appropriate time in order to respond to circumstances that arise.

However, the Plan does point out a series of significant and strategic moves that the Port should take today in order to move the implementation in the direction shown. These strategies are listed below and divided into the most critical functional themes for the future.

10.2 IMPLEMENTATION STRATEGIES

10.2.1 FINANCIAL STRATEGIES

The Port needs to continue to improve its financial position and improve the net revenues from operations. In this regard, the Port must improve both the gross revenues and expenses. To achieve this result the Port should:

- Maximize revenues:
    - The Port should immediately develop a plan for exploiting its real estate assets, developing implementation strategies and deciding on timing and partners, if any:
- Control expenses:
    - The Port should consider changing its management structure around the business units and assigning profit and loss responsibility to each unit; and,
    - The Port should also implement better cost control systems to maximize profit from several major line items, including parking and gantry cranes.
- Investment strategies:
    - The Port should review any investment decision to be weighed and decisions made with the combined analysis of economic impact on the community of the investment and the potential revenues to the Port.
- Diversification of revenues:
    - The Port should develop a plan that will create a "third leg" to the financial stool including the previously recommended commercial assets; and,
    - The Port should also review partnerships with the county's Tourism and Economic Development Group to find ways to maximize resources during the next decade.

10.2.2 PERMITTING STRATEGIES

To implement the longer-term improvements of this Master Plan, the Port needs to develop a partnership with all of the environmental agencies with a goal to develop a long-term view of development and operations for the Port. The Plan purposely has delayed implementation of any major "in-water" improvements to allow the proper time for studies and discussions to occur. However, the Port should begin to address these development issues immediately as the direction that such discussions take will shape future decision-making on many aspects of the future port development. In particular:

- Review the recommended actions in this Master Plan and begin the environmental vetting process for each; and,
- Consider developing an environmental footprint or zone which will permanently mark the Port zone. Hence, define all of the protected areas and create strategies to maximize dredging and filling within the zone.

10.2.3 COMMERCIAL STRATEGIES

The future potential of this item is very important. This master plan has identified areas that can be assigned for such uses. It is also recognized that, as of the writing of the Master Plan, the commercial real estate market in the United States is poor. However, it is also recognized that this action item will take time to implement. Thus, it is best to move forward now. In particular it is recommended that:

- The Port should move forward with the commercial master plan of the southwest corner of the Port of Miami that will allow for key commercial revenue opportunities for the Port with minimal capital outlay;
- The Port should obtain all necessary entitlements for development;
- The Port should evaluate the permitting of a marina in the southwest corner; and,
- In the future, the Port should consider strategic off-site land acquisitions consistent with the development of distribution centers as outlined in the cargo strategies below.

10.2.4 CARGO STRATEGIES

Cargo growth is contingent on the Port enhancing its marine and intermodal assets. Both must be accomplished to get the full benefit of the strategy. It is recommended that:

- The Port should complete the harbor deepening project;
- Build the on-port intermodal rail facility to enhance the operational options and efficiencies of the Port for the users. There are numerous operational and logistic issues to be reviewed and defined for this to be successful;

- Connect the rail with both rail providers and develop policies to promote the private development of distribution centers in Miami-Dade and the region;

- Continue with the tunnel implementation to provide interstate access for trucks; and,

- Build the new cargo road taking into consideration the future expansion of the North Channel cruise berths and potential realignment of the current yard gate structures. This will define future cargo yard development.

10.2.5 CRUISE STRATEGIES

The master plan indicates very modest growth at the Port that takes into consideration the current state of capacity at both South Florida ports and the contractual arrangements. The Port will need to develop new business in a different method:

- Develop a new marketing strategy focusing on lines not in South Florida currently that may be growing their presence in the Caribbean region; and,

- Develop a detailed Master Plan for the new Cruise Terminal Complex at the existing B and C terminals to meet the future needs of the cruise industry. There are multiple operational challenges to be defined and planned for in this scheme. Additionally, this will allow for the required time and cruise line interaction to create a future comfort level for this approach.

10.2.6 TRANSPORTATION STRATEGIES

Transportation improvement to the Port is critical. The previous strategies already list the tunnel and rail improvements as key elements. In addition the Port should:

- Master Plan the central multi-modal facility which can integrate local and port access, parking, capture potential commercial components, enhance the cruise area experience, and set the stage for potential funding through state and federal programs for intermodal facilities.

TERMINOLOGY USED IN THIS REPORT ANNEX I

Several definitions, cruise industry terms and acronyms used throughout this report may not be familiar to the reader. We define several of these terms in the following annex section.[1]

1) **Adequacy.** Sufficient to satisfy a requirement or meet a need. Barely satisfactory or sufficient.[2]

2) **Air Draft.** The maximum height of a vessel above the waterline.

3) **Ambient Conditions**. Common, prevailing, and uncontrolled atmospheric and weather conditions in a place.

4) **Apron.** Area immediately adjacent to the vessel berth where vessels' lines, provisioning, gangway and other operations occur.

5) **Anchorage.** Location where a vessel may anchor. 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.

6) **Barrier Island**. Long, narrow strips of sand forming islands that protect inland areas from ocean waves and storms.

7) **Baseline**. An initial set of critical observations or data used for comparison or a control.

8) **Beam.** The width of the cruise vessel at its widest part. *Panamax Vessels* refer to vessels with beams than can transit the Panama Canal (beam is equal to 36m or less). *Post-Panamax Vessels* and *Super-post Panamax* have beams that exceed the width of the Panama Canal, or greater than 36m.

9) **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 normal passenger capacity) times nights of operation in a region.

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

11) **Berthing Area**. The place where a ship lies when at anchor or at a wharf.

12) **Bottom Vegetation**. The vegetation found on the surface on which a body of water lies.

13) **Bulkhead**. A retaining wall made of metal along a waterfront.

14) **Bunkers.** Marine fuel used for propulsion.

15) **Cabotage Laws** (also referred to as *coastwise cruise vessel laws*). Relates 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 cruise vessel industries.

16) **CCATF**. Miami-Dade Climate Change Advisory Task Force – a group of advisors that provide technical assistance and advice on mitigation and adaptation with regard to global climate change in Miami-Dade County.

17) **Conventional cruises (homeport cruises with destination and port-of-call cruises).** Leisure oriented voyages on deep-water, ocean-going cruise vessels of two-or-more nights often to a variety of destinations. Conventional cruises are offered either by regional or international operators marketing to a variety of consumer sectors and nationalities.

18) **Crane.** Used to move containers from and to cargo vessels. They can be electrified or diesel powered and be either panama or super-Post panama in their configuration in order to reach across the beam of a vessel.

19) **Cruises-to-Nowhere (homeport cruises without destination).** Generally geared toward a local consumer market (within a one-hour drive) with the mainstay of the cruise experience is focused around on-board gaming, food and entertainment.

20) **CVI**. Coastal Vulnerability Index – the relative risk that physical changes will occur as sea-level rises according to the United States Geological Survey.

21) **CWA**. Critical Wildlife Area – designated wildlife refuges in Florida.

22) **Deadweight Tonnage**. Refers to the actual weight of cargo, fuel and stores required to bring the vessel down to her load-line marks.

23) **DERM**. Miami-Dade County Department of Environmental Resources Management – regulates and manages activities that have an impact on the County's natural resources.

24) **Displacement Tonnage.** The amount of water displaced by the vessel or the actual weight of the vessel. (This measure is not often used to describe cruise vessels, but it is meaningful in describing military vessels and the structural capacity of port and terminal facilities. It is typically applied to a vessel in normal operating state i.e. with fuel and stores on board).

25) **DOA**. Department of the Army – The executive branch of the U.S. Army.

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

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

28) **Drayage.** Charge incurred to move cargo.

29) **Dredge**. To deepen a waterway with a dredging machine.

[1] Bermello, Ajamil & Partners, Inc. 2005, and Israel, Giora and Laurence Miller, Dictionary of the Cruise Industry, Seatrade Cruise Academy, 1999.
[2] The American Heritage Dictionary of the English Language, Fourth Edition by Houghton Mifflin Company, 2000.

30) EFH. Essential Fish Habitat – those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity as stated by the Magnuson-Stevens Fishery Conservation and Management Act of 1976.

31) Estuarine. A body of water formed where freshwater from rivers and streams flows into the ocean, mixing with the seawater.

32) FAC. Florida Administrative Code – the official compilation of the Rules and Regulations of Florida Regulatory Agencies filed with the Department of State under the Provisions of Chapter 120, Florida Statutes.

33) FDEP. Florida Department of Environmental Protection – the lead agency in the Florida state government for environmental management and stewardship.

34) FEMA. Federal Emergency Management Agency – coordinates the federal government's role in preparing for, preventing, mitigating the effects of, responding to, and recovering from all domestic disasters, whether natural or man-made, including acts of terror.

35) Ferry. Term usually applied to a vessel transporting passengers and vehicles from point to point. The key difference between these operations and conventional cruises is that ferry operations have as their primary business focus offering transportation services, not a travel and leisure experience.

36) FWC. Florida Fish and Wildlife Conservation Commission – a state agency whose mission is managing fish and wildlife resources for their long-term well-being and the benefit of people.

37) Geomorphology. The branch of geology that examines the formation and structure of the features of the surface of the Earth or of another planet.

38) 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.

39) 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.

40) Hard Bottom Habitat. Habitat characterized as mixed communities of algae, sponges, octocorals and stony corals.

41) Homeport (also referred to as *baseport*, *port of embarkation*, *turnaround port*). A marine facility and destination city that serves as the base of operations from which the cruise begins and/or terminates.

42) Itinerary. Ports visited on a given cruise. Two itinerary types are generally observed. *Open-jaw itineraries* refer to those deployments where the cruise begins at one homeport and end at another. *Closed-jaw itineraries*—the more common type observed—begins and end from the same homeport.

43) Length Overall (LOA). Total length of a cruise vessel, including any incidental structure that may extend this dimension.

44) Lower Berth Capacity. The number of beds of standard height on a cruise vessel. The number of lower berths determines the vessel's normal passenger capacity. *Maximum Passenger Capacity* refers to the total number of passengers that can be accommodated on the cruise vessel in lower berths and other flexible berths (also referred to as *upper berths).*

45) Mixed-Use Facility. Refers to facility or complex with more than one type of real estate or operational use. Mixed-use facilities are generally: (1) Contiguous in nature; (2) Developed within a broader master plan constructed at one time or in phases; and, (3) Provide for a symbiotic vessel 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.

46) Mixing Zone. An area of a lake, river, stream, or ocean where pollutants from a point source discharge are mixed, usually by natural means, with cleaner water.

47) Need. A condition or situation in which something is required or wanted. Necessity; obligation. To be necessary.[3]

48) NGVD. National Geodetic Vertical Datum – a fixed reference adopted as a standard geodetic datum for elevations determined by leveling. The geodetic datum is fixed and does not take into account the changing stands of sea level. Because there are many variables affecting sea level, and because the geodetic datum represents a best fit over a broad area, the relationship between the geodetic datum and local mean sea level is not consistent from one location to another in either time or space. For this reason, the National Geodetic Vertical Datum should not be confused with mean sea level.

49) NMFS. National Marine Fisheries Service – the federal agency, a division of the Department of Commerce, responsible for the stewardship of the nation's living marine resources and their habitat.

50) OFW. Outstanding Florida Water – a water designated worthy of special protection because of its natural attributes.

51) Panamax vessel. Size standard that equals the largest vessel dimension capable of transiting the Panama Canal. Generally based on the beam of the vessel. Vessels classified as Panamax are of the maximum dimensions that will fit through the locks of the Panama Canal, each of which is 304-m long by 33.5-m wide and 25.9-m deep. Thus a Panamax vessel will usually have dimension of close to 965 ft. long (294m), 106 ft. wide (32.3m) and a draft of not more than 39.5 ft. (12.04m). See Beam.

52) Passenger Tax (also referred to as a *head tax*). Port charge assessed against each passenger aboard the vessel. Generally the principal income stream to ports and destinations for accommodating cruise activities.

53) Port-of-call (also referred to as a *way-port*). One of several destinations visited as part of the 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.

54) Post-Panamax vessel. Size standard that exceeds the largest vessel dimension capable of transiting the Panama Canal. Generally based on the beam and length of the vessel. These vessels have dimensions that are wider than longer than Panama Canal locks – such as a beam of 36-m. and length of 311-meters. See Beam.

[3] The American Heritage Dictionary of the English Language, Fourth Edition by Houghton Mifflin Company, 2000.

55) Revenue Passenger. This generally refers to a homeport passenger or in some very limited cases port-of-call passengers (Vancouver where all passengers are charged for on/off the vessel), whereby passenger counts reflects 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 boarding and disembarking the vessel at a set fee.

56) ROI. Return on Investment.

57) RTG. Rubber tired gantry crane used for moving container boxes to and from the cargo yard to a vessel, truck or rail position.

58) Seawall. A wall or embankment to protect the shore from erosion or to act as a breakwater.

59) Sedimentation. The action or process of forming or depositing sediment.

60) SFWMD. South Florida Water Management District – a regional governmental agency that oversees the water resources in the southern half of the state, covering 16 counties from Orlando to the Florida Keys and serving a population of 7.5 million residents.

61) Soft Bottom Habitat. Habitat characterized as unconsolidated, soft sediment (sand, silt, and clay).

62) Spawning. To produce offspring in large numbers.

63) Storm Surge. An abnormal rise in sea level accompanying a hurricane or other intense storm, and whose height is the difference between the observed level of the sea surface and the level that would have occurred in the absence of the cyclone.

64) Subsidence (Land). A gradual settling or sudden sinking of the Earth's surface owing to subsurface movement of earth materials; occurs when large amounts of ground water have been withdrawn from certain types of rocks, such as fine-grained sediments causing the rocks to fall in on themselves.

65) Super-Post Panamax vessel. Generally refers to the largest cruise vessels in existence today. This is also a general term for the largest cargo vessels in existence today. These vessels are defined not only by their dimensions, but also their carrying capacity of more than 3,000 + passengers and GT approaching and exceeding 150,000.

66) Terminal. Building where cruise passengers embark and/or disembark in a homeport destination.

67) TEU. The **twenty-foot equivalent unit** is an inexact unit of cargo capacity often used to describe the capacity of container ships and container terminals. It is based on the volume of a 20-foot-long (6.1 m) intermodal container, a standard-sized metal box which can be easily transferred between different modes of transportation, such as ships, trains and trucks.

68) Throughput Passenger (also referred to as a *revenue passenger*). Total number of passengers arriving and/or processed at a cruise homeport and port-of-call.

69) Tidal Range. The vertical difference between the high tide and the succeeding low tide.

70) Transshipment Area. The area used as an intermediate destination in the shipment of goods or containers.

71) Transit Passengers. By literal definition, the status of cruise passengers at a port-of-call.

72) Turbidity. The amount of particulate matter suspended in water that affects the degree to which light traveling through water.

73) Turning Basin. An open area at the end of a canal or in a narrow waterway to allow boats to turn.

74) USCG. United States Coast Guard; a military, multi-mission, maritime service within the Department of Homeland Security and one of the nation's five armed services. Its core roles are to protect the public, the environment, and U.S. economic and security interests in any maritime region in which those interests may be at risk, including international waters and America's coasts, ports, and inland waterways.

75) USGS. United States Geological Survey; the sole science agency for the Department of the Interior whom provides reliable scientific information to describe and understand the Earth; minimize loss of life and property from natural disasters; manage water, biological, energy, and mineral resources; and enhance and protect our quality of life.

76) Wading Bird. Any of various large birds having long legs, long necks, and long bills, that are adapted for wading in shallow waters and living on fish, frogs, etc., as the crane, heron, stork, shoebill, ibis, and flamingo.

77) WASD. Miami-Dade Water and Sewer Department; provides drinking water and wastewater disposal services for the residents, visitors, and businesses of Miami-Dade County.

78) Water Column. A conceptual column of water from surface to bottom sediments.

79) Wharfage. Charge incurred for a passenger tax or cargo.

GRAPHIC MATERIALS

Intersection Turning Movement Counts
(Port of Miami Tunnel Existing Conditions Traffic Analysis Report, June 2009)

Port Boulevard Historic Traffic Count Data
(FDOT Traffic Count Station Data)

Way finding / Signage Analysis Final Report
(Labozan Associates and Valencourt International, LLC.)

The Local and Regional Economic Impacts of the Port of Miami
(Martin Associates, Sept. 2008)

PORTMIAMI

2035 MASTER PLAN

NOVEMBER 2011

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