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

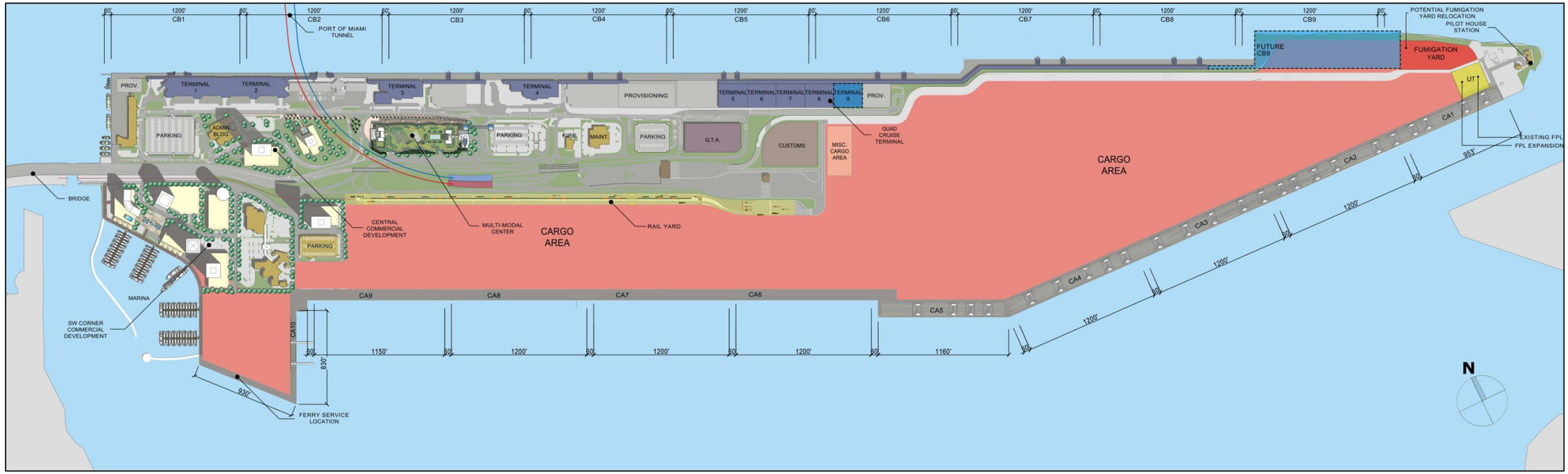
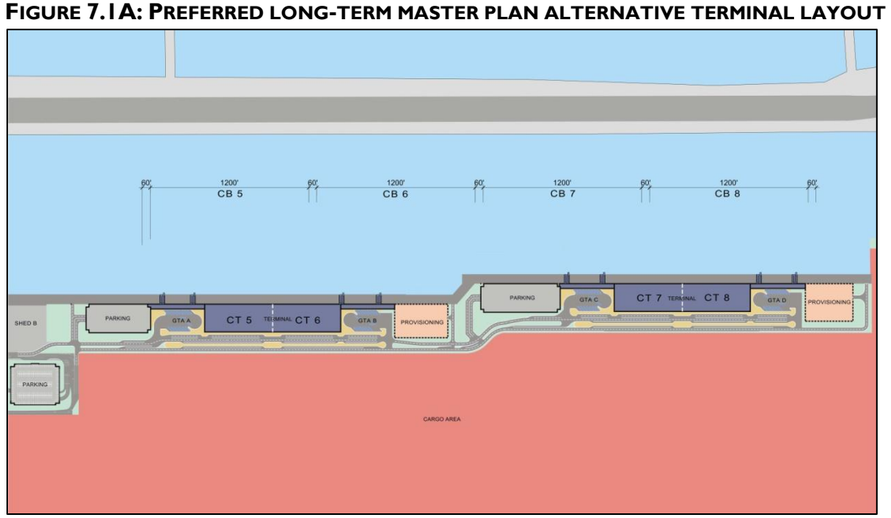


FIGURE 7.1A: PREFERRED LONG-TERM MASTER PLAN ALTERNATIVE TERMINAL LAYOUT



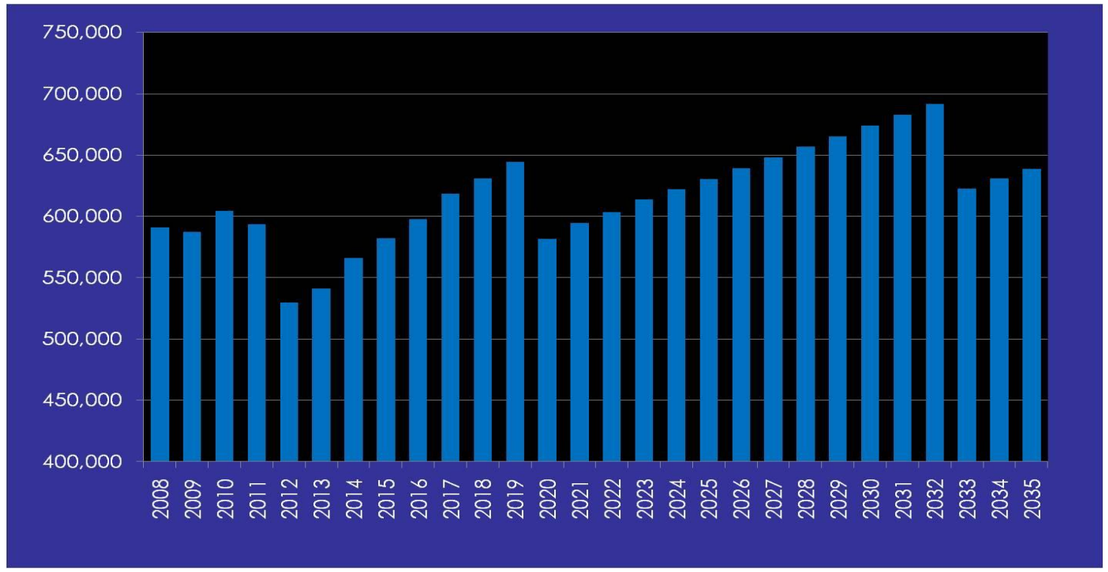
7.2 METRICS

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

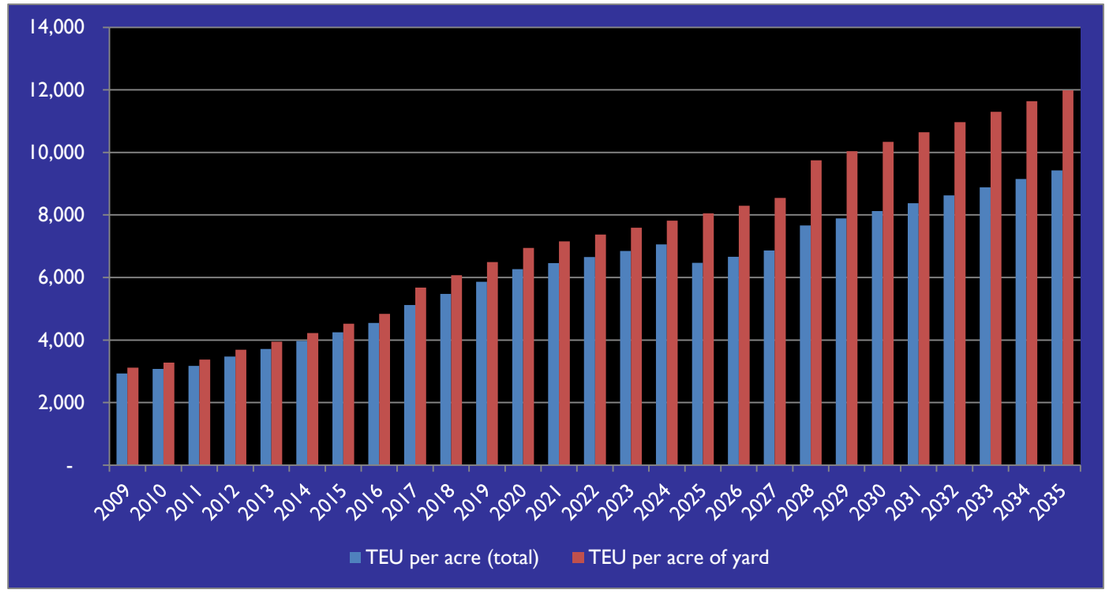
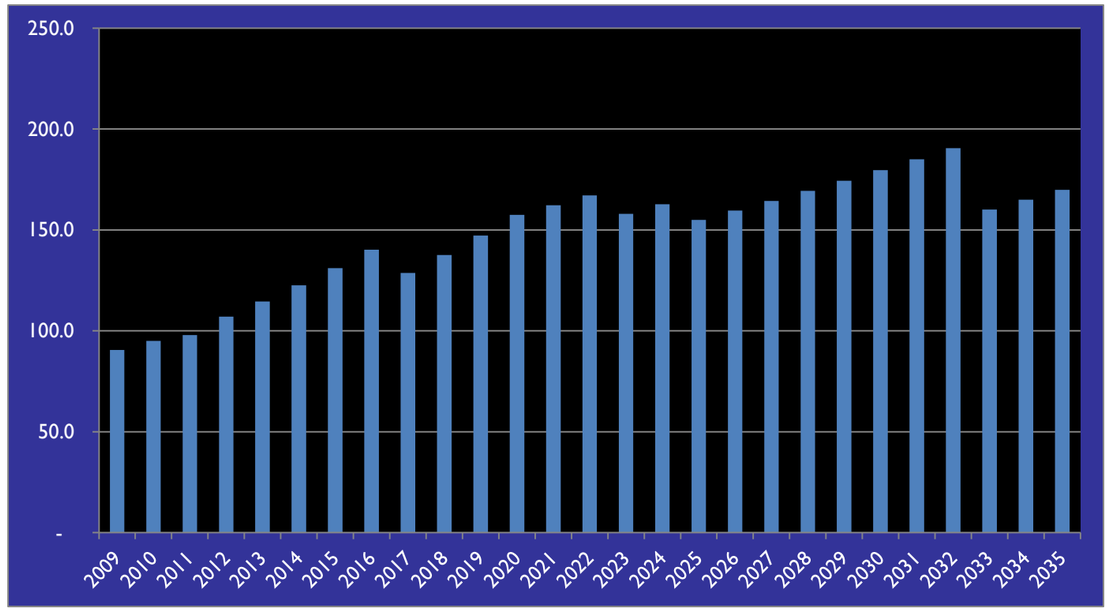


FIGURE 7.4: CARGO METRIC - TEU'S PER LINEAL FEET OF BERTH



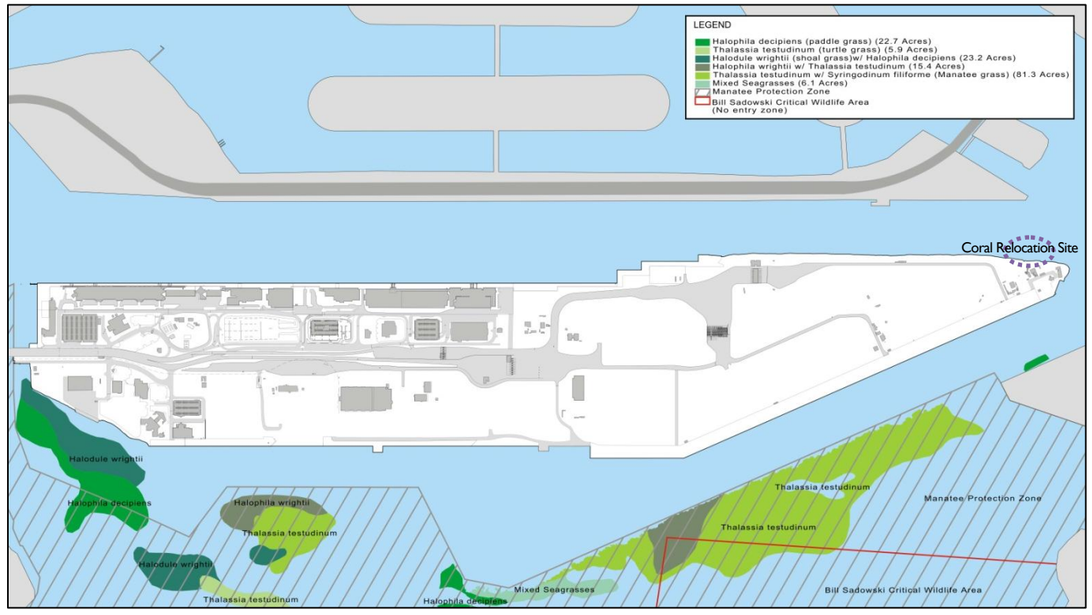
As with the cruise metric, the stair-step pattern shown in Figure 7.4 reflects the justification for the addition of land to the cargo area when the program begins to near the 8,000 TEU's-per-acre thresholds. In the Plan, the Southwest corner land reclamation is scheduled for approximately 2023.

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

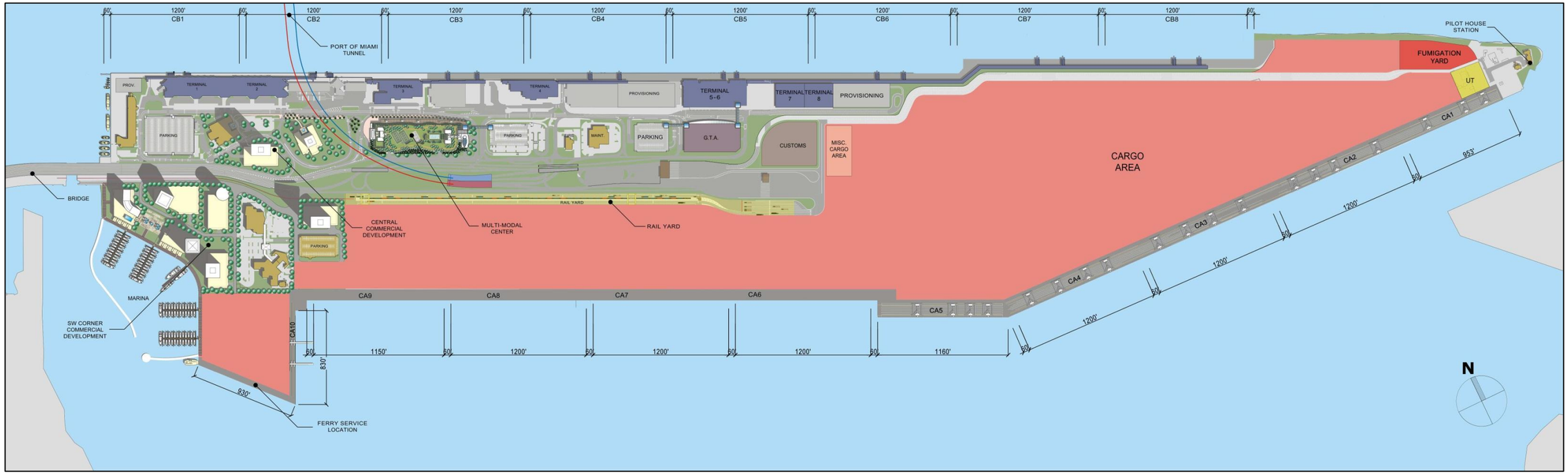
[3] Environmental Assessment (EA) for Port of Miami Tunnel. 2008. Florida Department of Transportation

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.

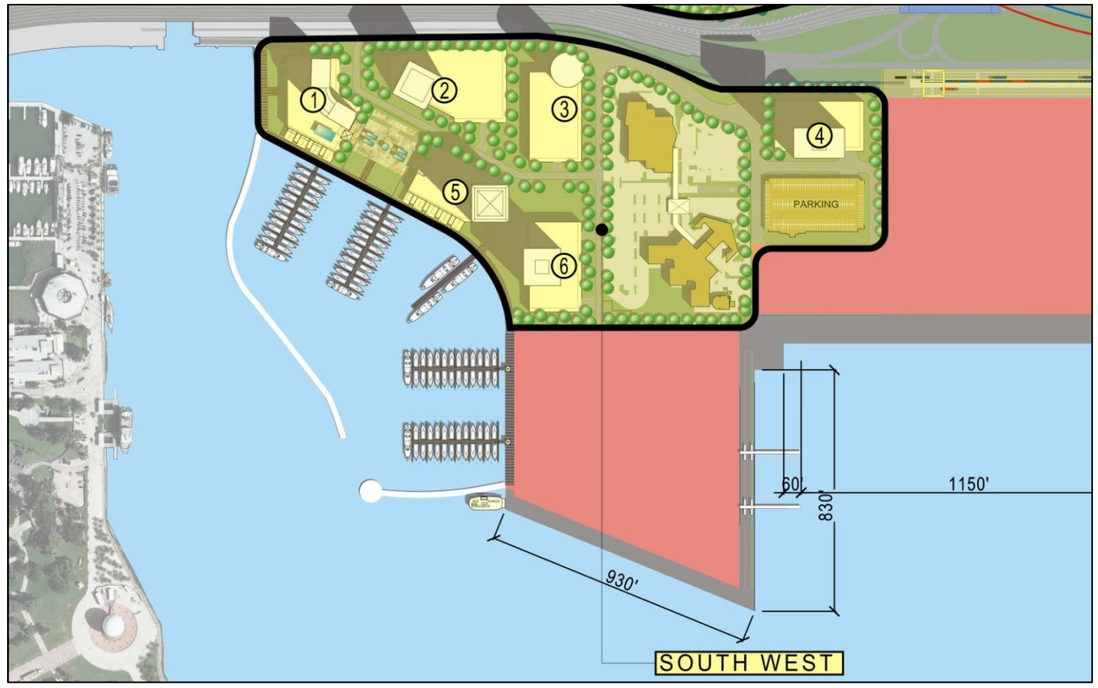
The North Channel is currently at a depth of 36 feet below sea level which does not provide the proper environment for sea-grass to thrive due to the lack of sunlight. In the barren soft bottom communities that dominate the Port, wildlife is limited to a few burrowing animals and a few other burrowing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

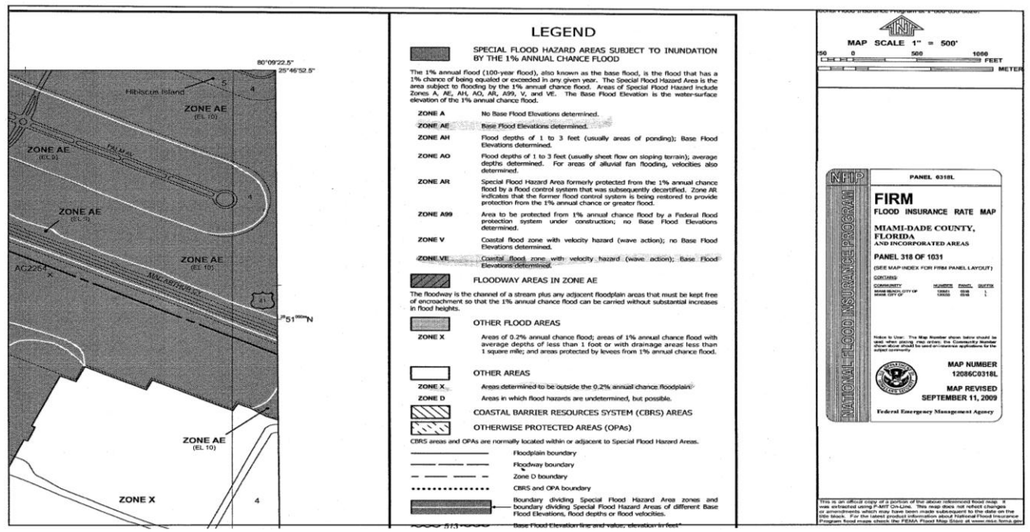
[5] Miami-Dade County, FL Comprehensive Emergency Management Plan. June 2008. Miami-Dade County Department of Emergency Management and Homeland Security Plan

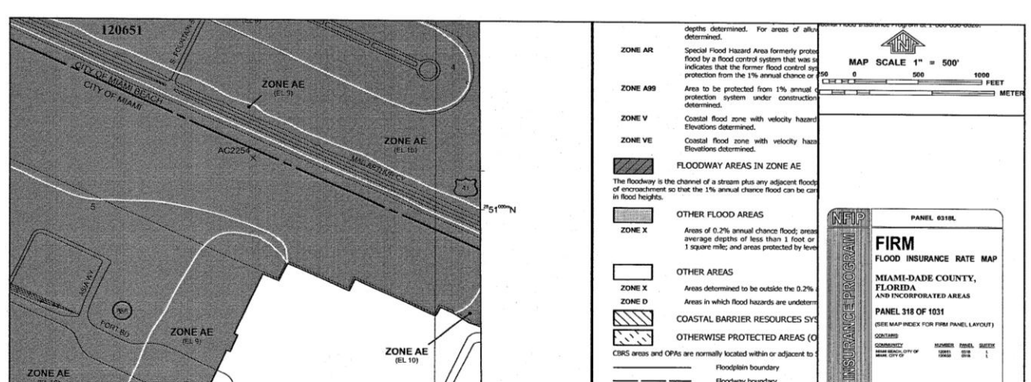
to torrential rainfall or a rise in sea level poses a serious threat to portions of Miami-Dade County, specifically in low lying areas such as Dodge Island (Port of Miami).

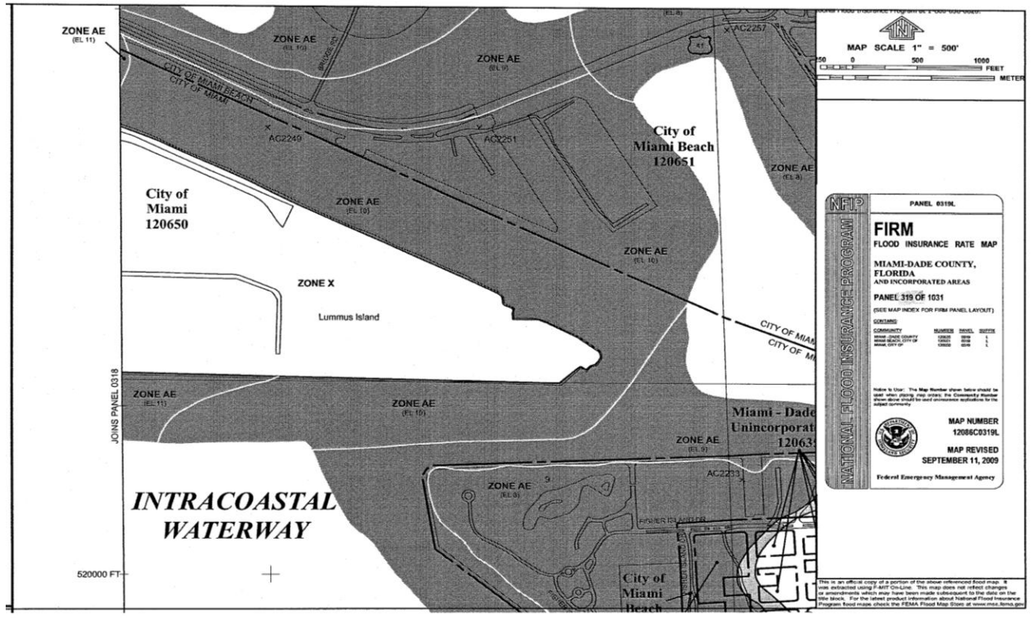
FLOOD ELEVATIONS

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.

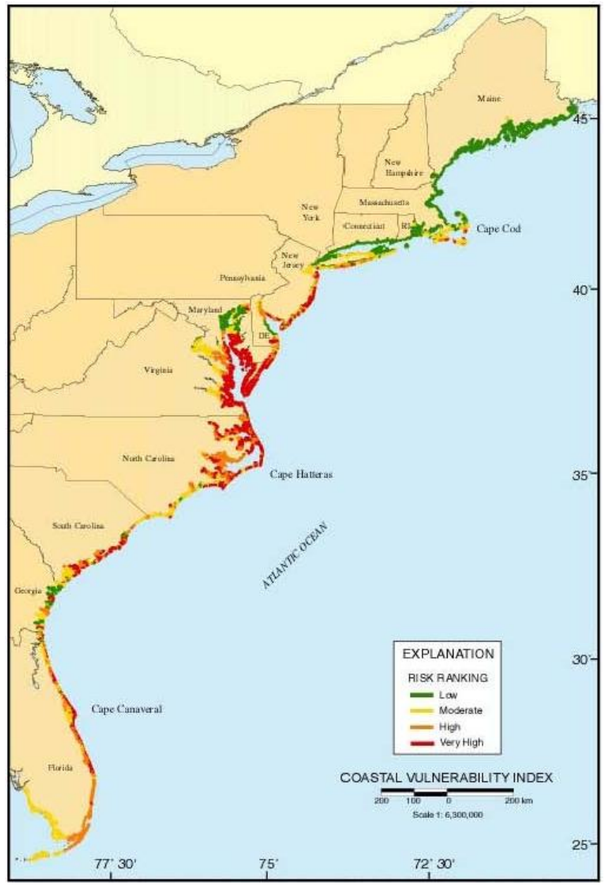
The South Florida Water Management District (SFWMD) is also actively investigating the effects of sea level rise on Southeast Florida. In their efforts, they have modified their South Florida Water Management Model, a regional-scale computer model that simulates the hydrology and the management of the 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

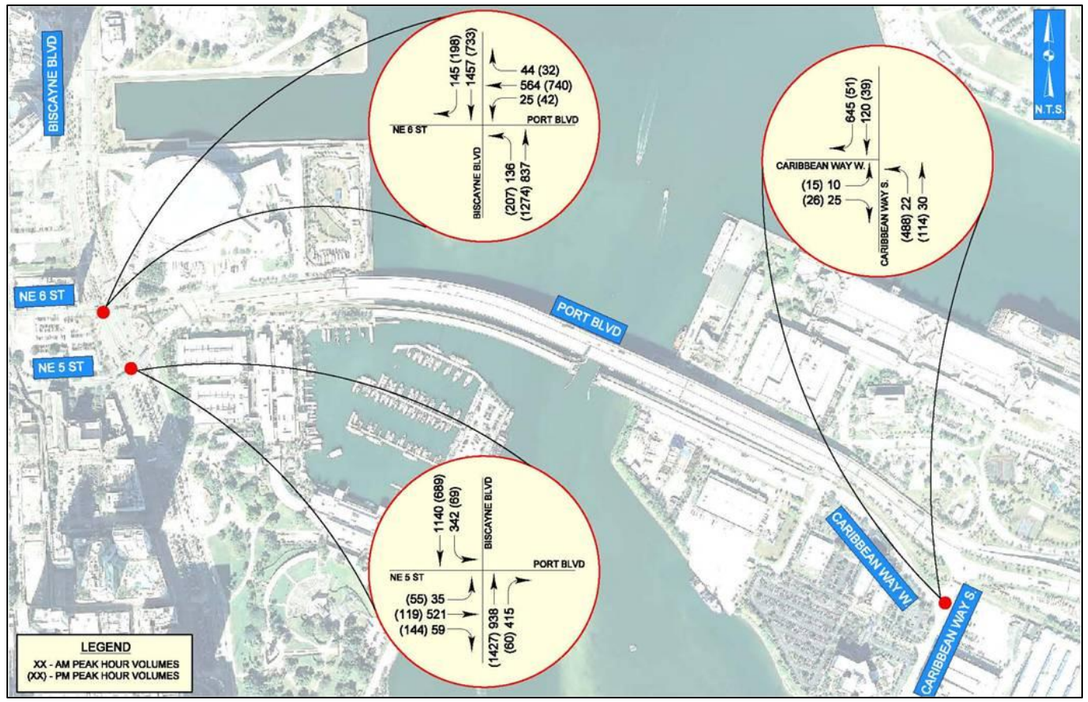


Figure 7.13 shows the existing lane configurations for the analyzed intersections.

[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

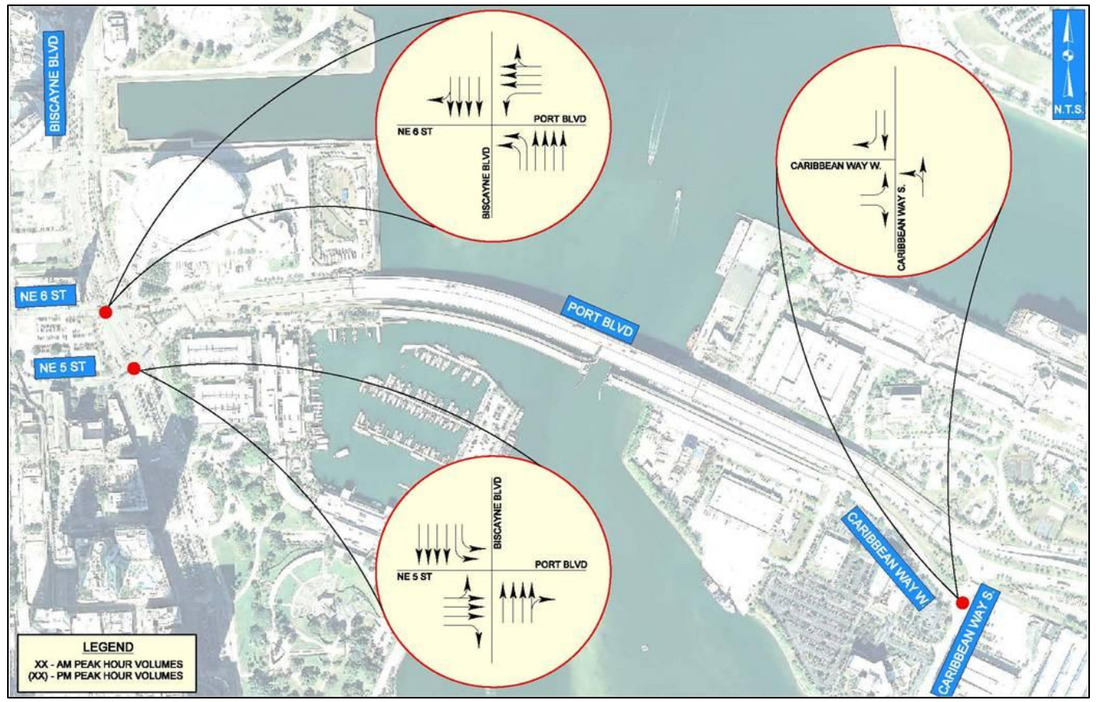
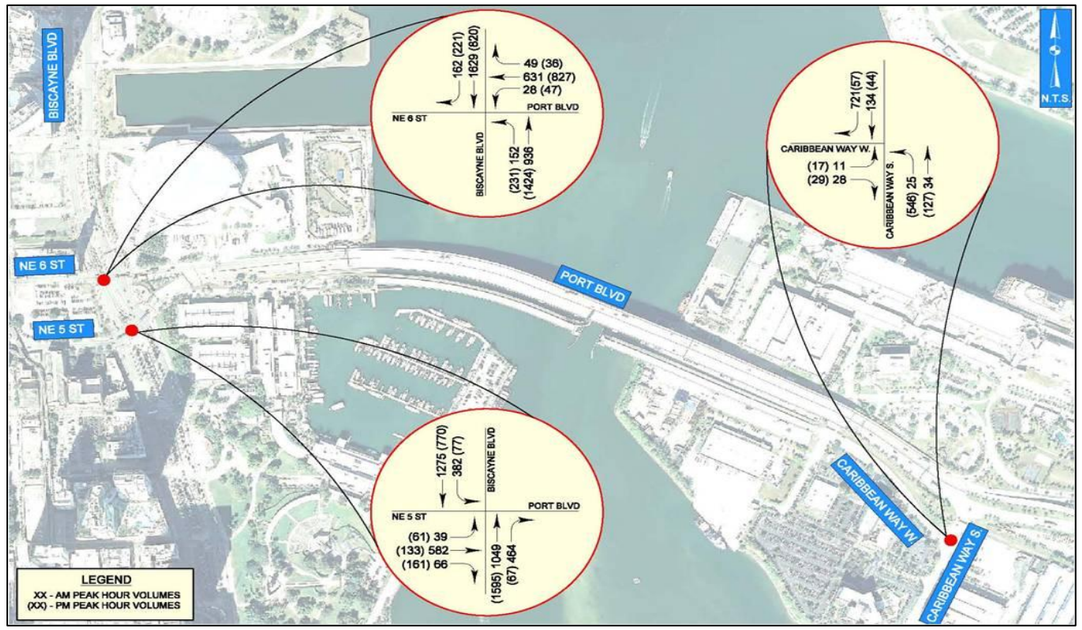


FIGURE 7.14: PROJECTED INTERSECTION VOLUMES, 2035

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.

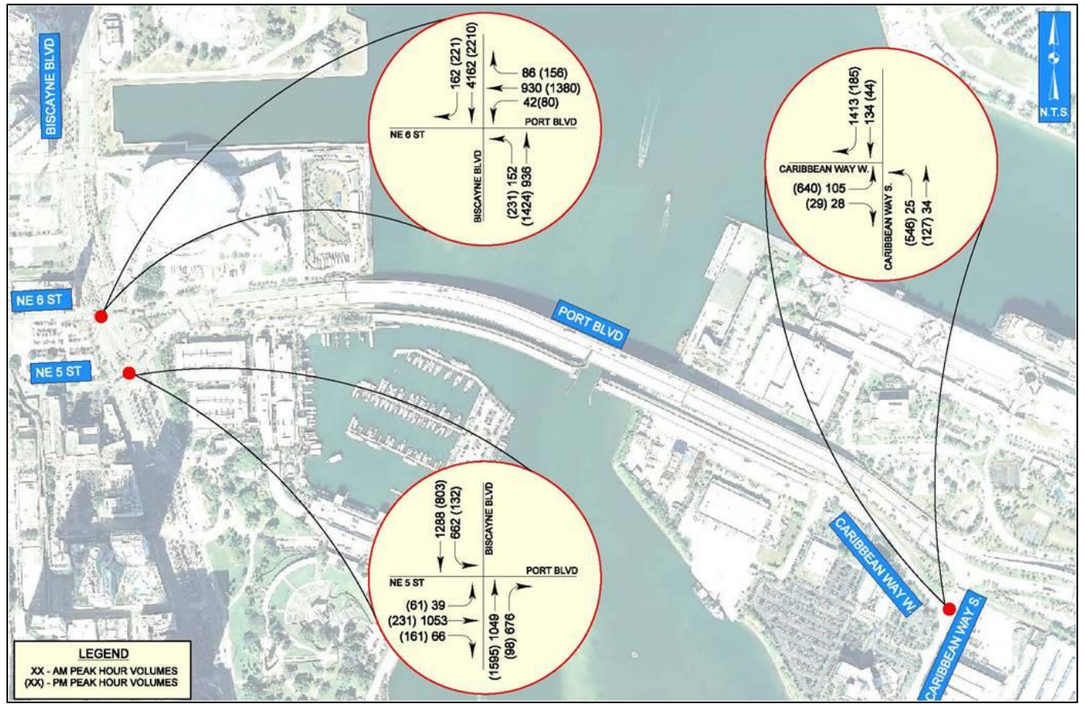
Table 7.9: Traffic Diversions to the Tunnel *Source: POM 2020 Master Plan, 2002 and David Plummer & Associates*		
	Trucks and Buses	**Automobiles**
% of All Traffic	34 %	66 %
% in Tunnel	90 %	27 %
% on Port Boulevard	10 %	73 %
Tunnel Traffic Diversions (all port traffic)	31 %	18 %
Total Traffic Diversions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

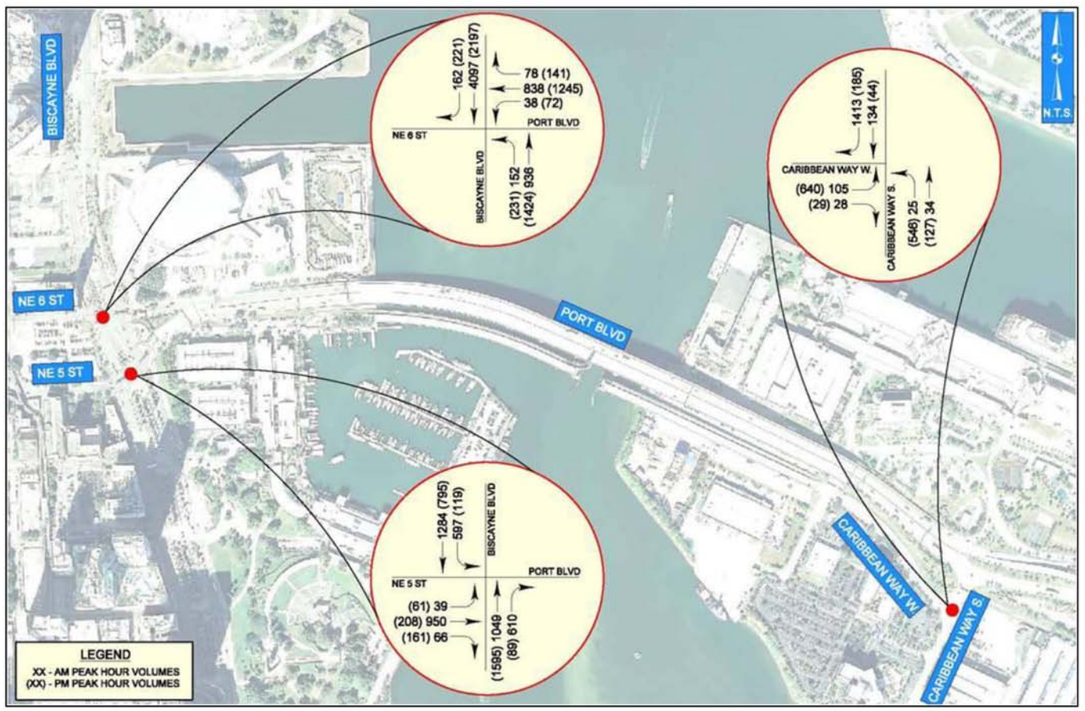


The Traffic Operational Evaluation Report (December 2004) prepared by the Florida Turnpike Enterprise assumes that in 2030, 46% of the Port generated traffic will use Port Boulevard and the remaining 54% will use the tunnel to access the Port of Miami. Although the previous diversion provides a more 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.