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:

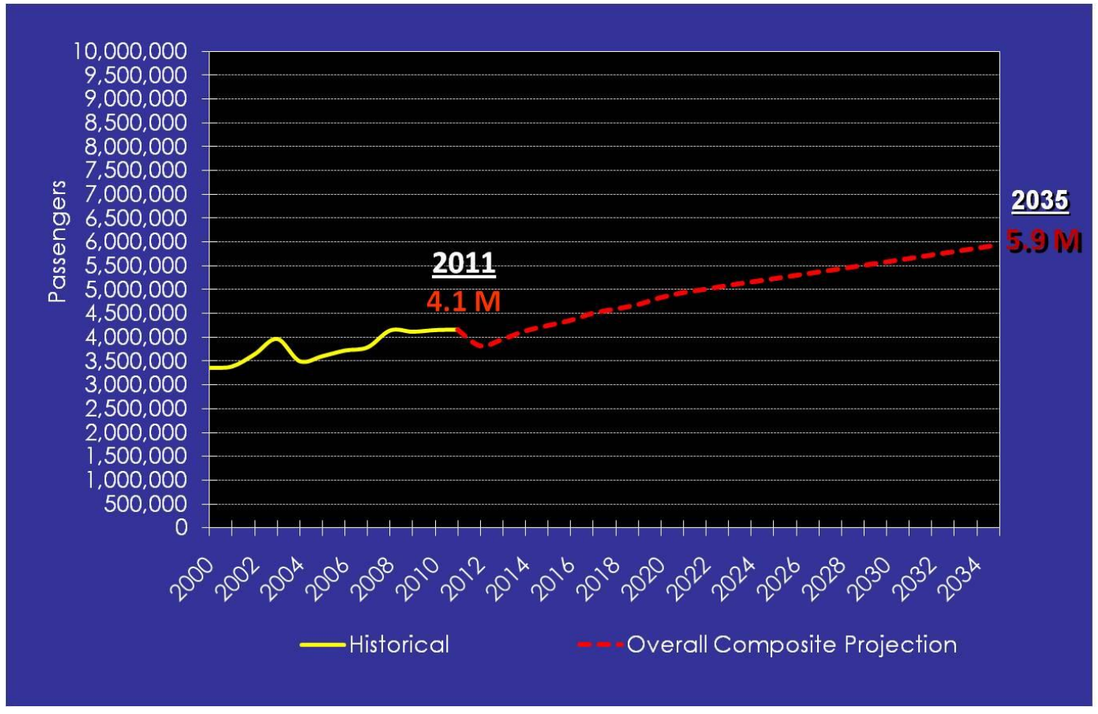
- Despite recent (and potential future) major events in world affairs, projections anticipate that the cruise industry will continue to follow fundamental positive trends.
- The forecast methods and various assumptions inherent in each incorporate the Consultant Team's best interpretation of demand and 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

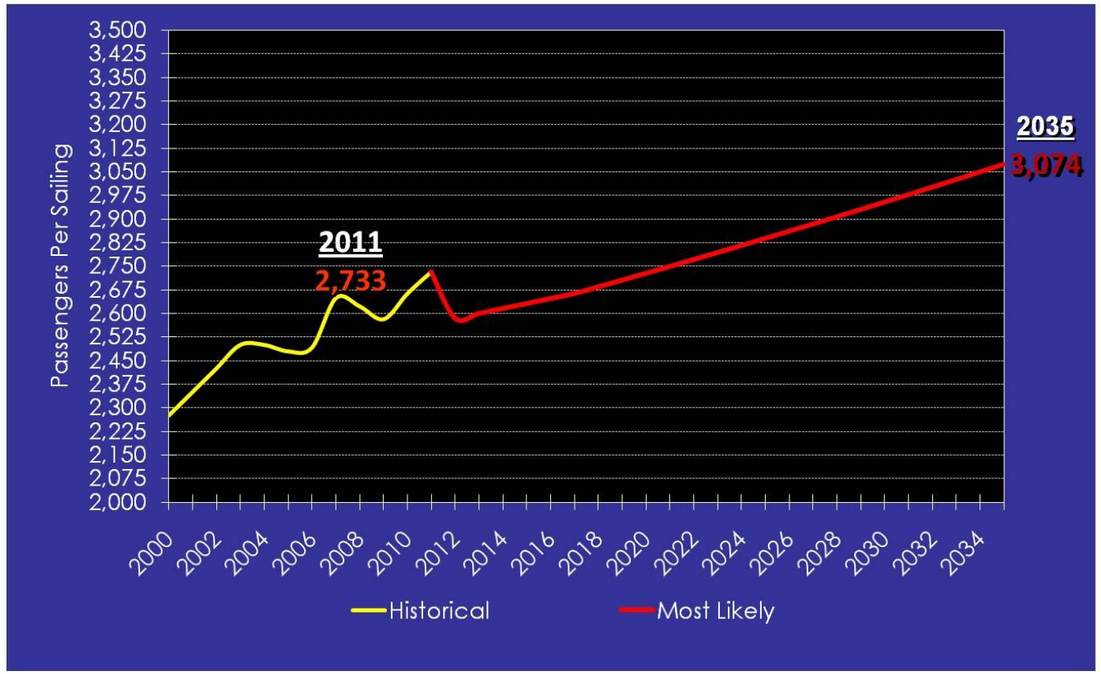
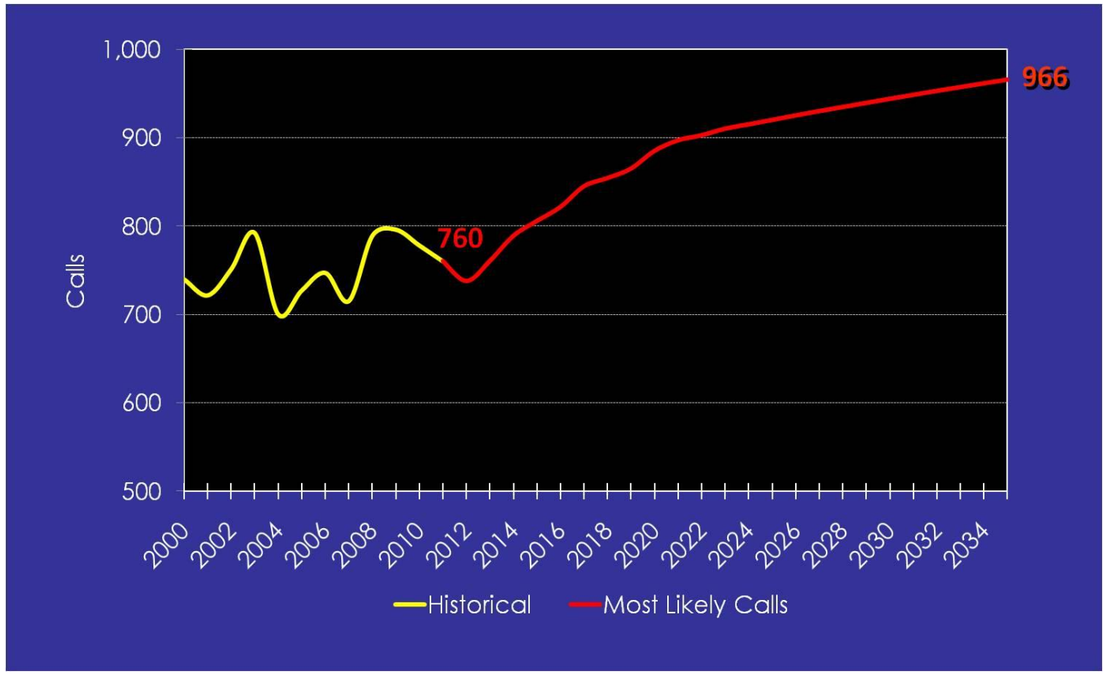


FIGURE 4.3: MOST LIKELY CRUISE CALLS PROJECTION, 2011 – 2035



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:

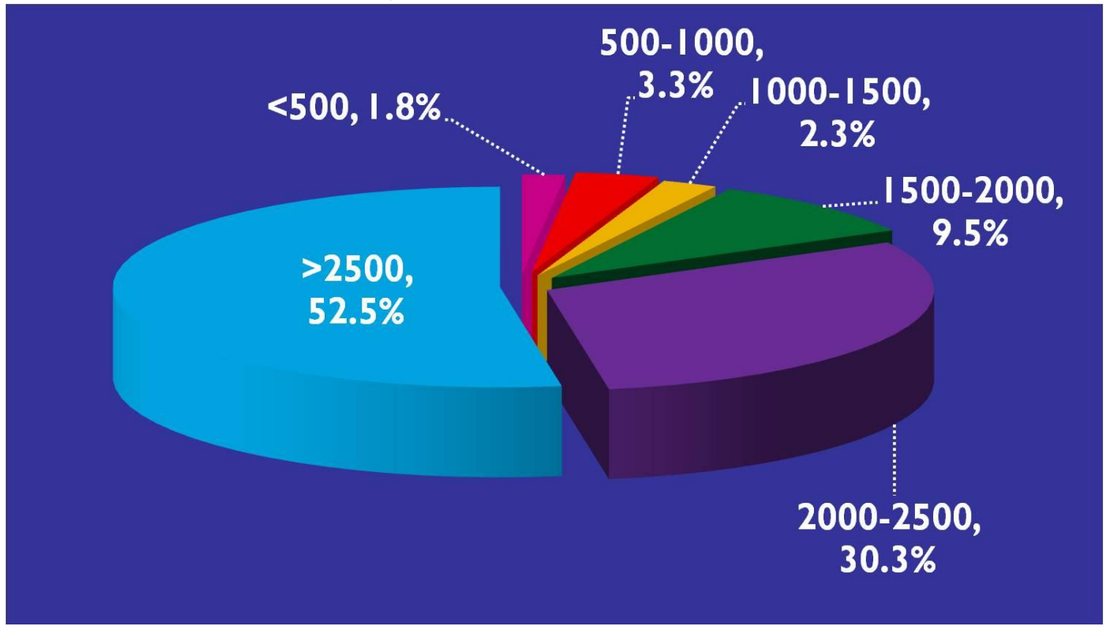
- Berth: 1,200-foot LOA plus approx. 60-ft. berth separation (1,260-ft. operational berth)
- Draft: 32-foot (excludes the Queen Mary 2 which requires 37 feet)
- Apron: 60 - 75 foot width
- Pier: 150- to 250-ton bollards
- Utilities: Water, telecommunications, power (alternative marine power assessment)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

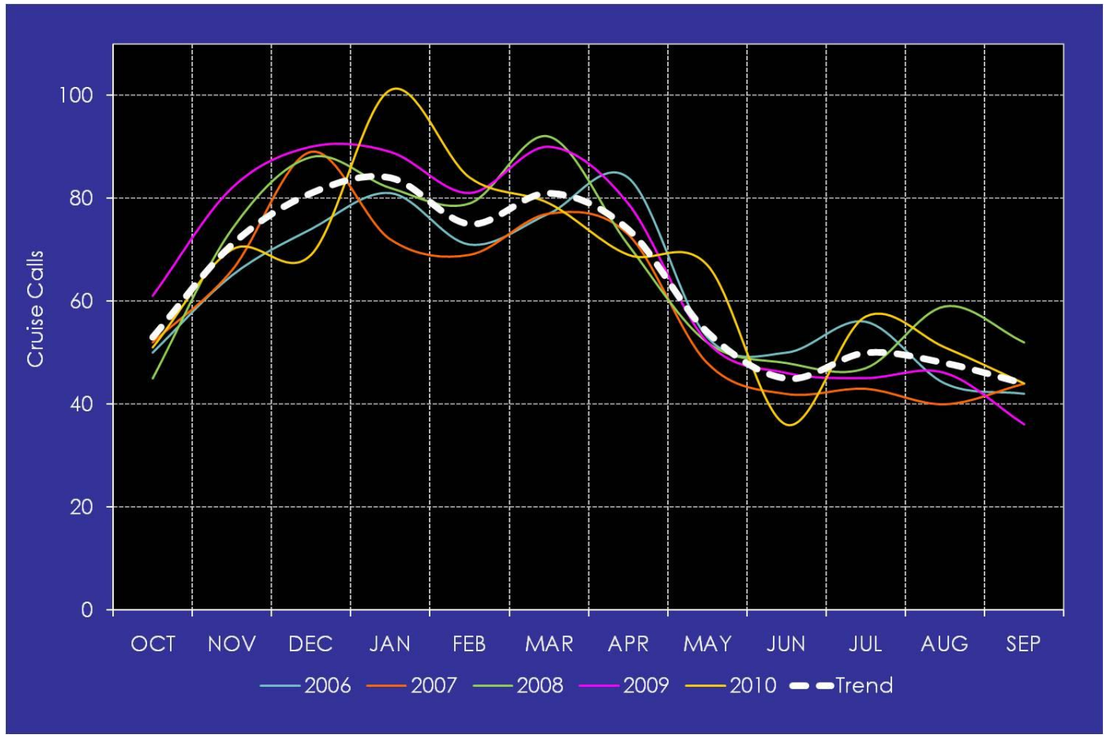
- The peak day for traffic over the period was Sunday. However, in 2009 there was a shift to more capacity sailings on Friday and Monday. That was somewhat offset in 2010.

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

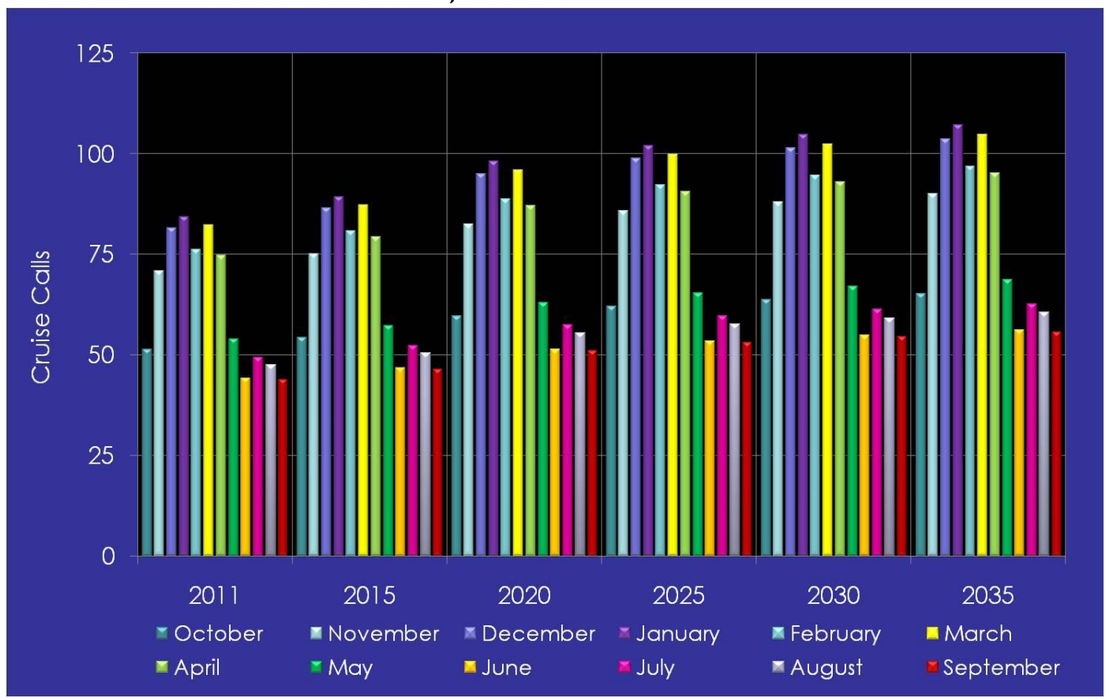
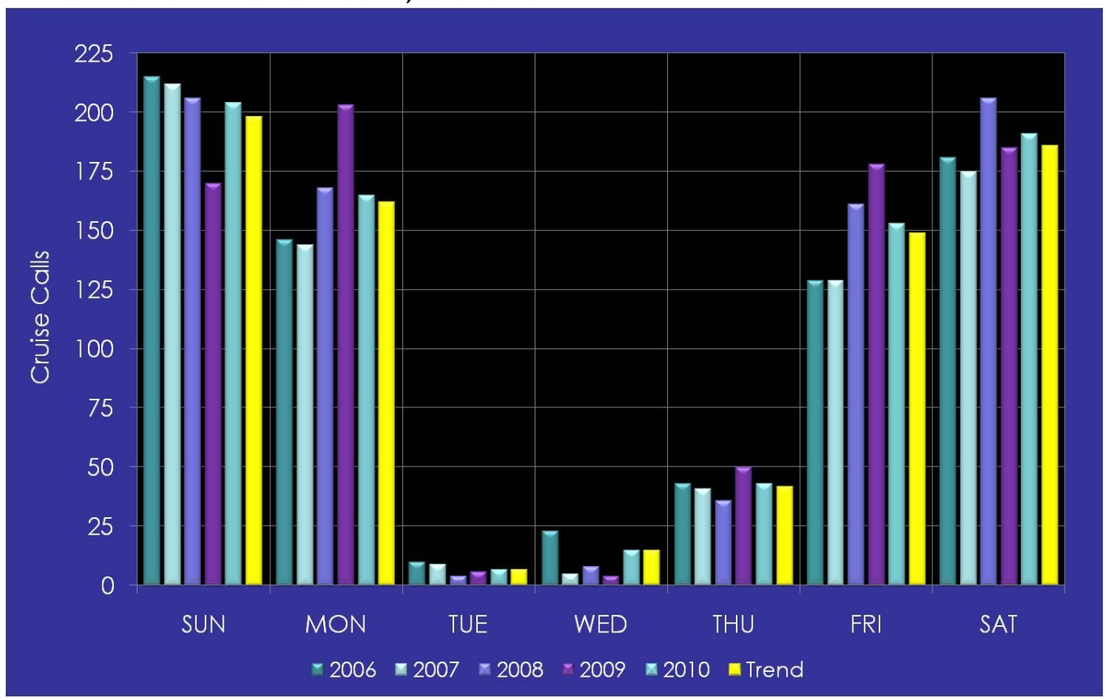


FIGURE 4.7: DAILY PASSENGER TRAFFIC, 2006 - 2010



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

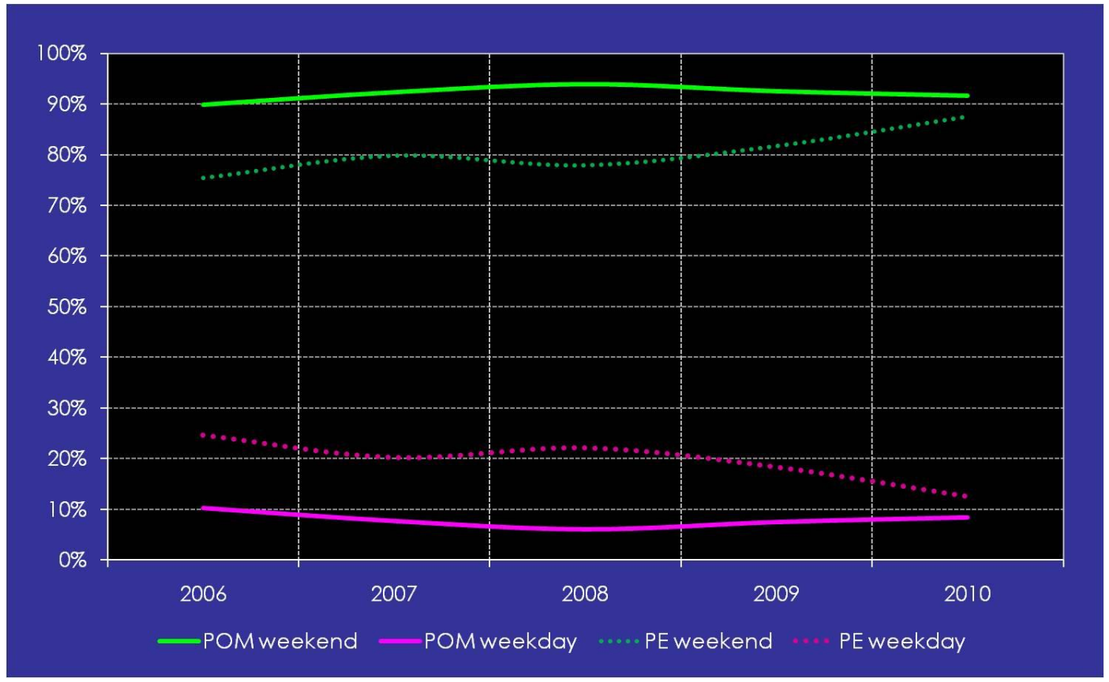
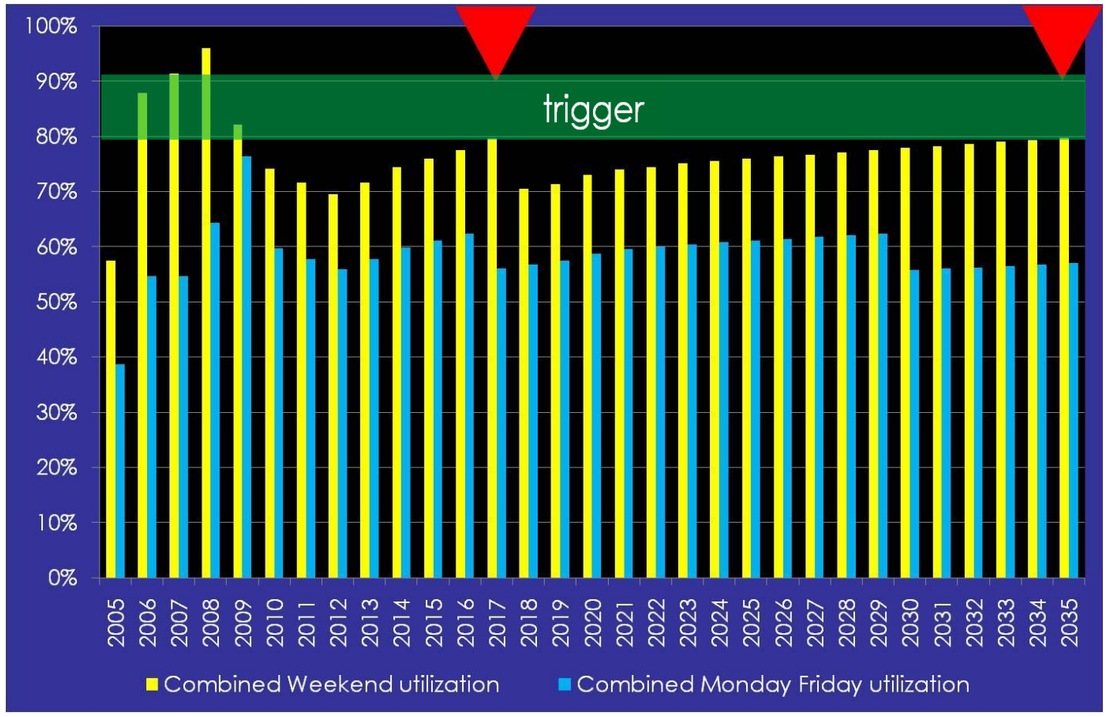


FIGURE 4.9: BERTH DEMAND, 2010 - 2035



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.

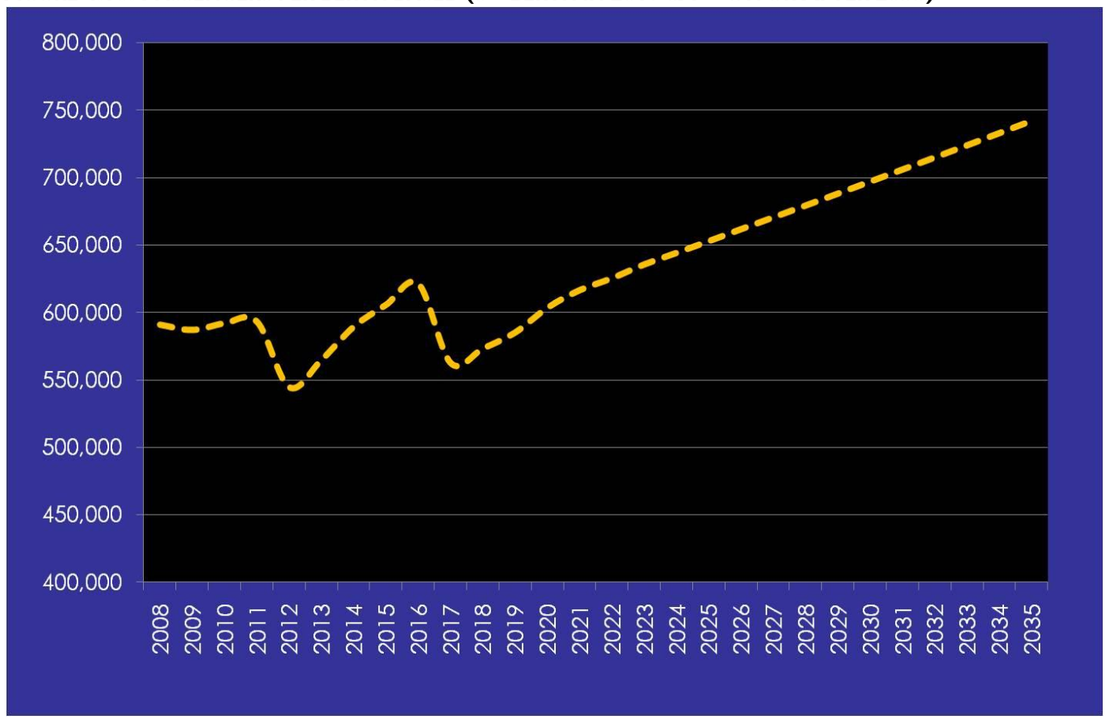
4.3.3 FACILITY DEMAND

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.

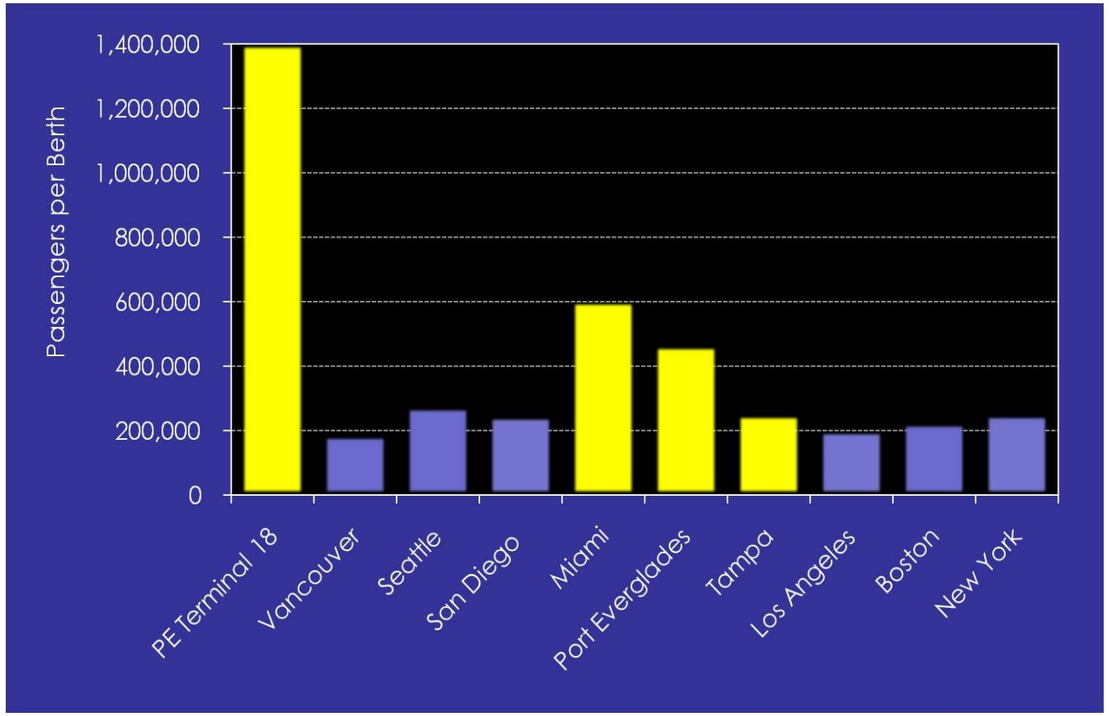
Figure 4.9 illustrates the anticipated demand for berths in the upcoming years based upon the triggers. As shown there is a total demand for up to 9 berths during the projection period with an extension of berth 6 and a seventh now; an 8th berth in 2017; and, a 9th berth in approximately 2035. As presented 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.

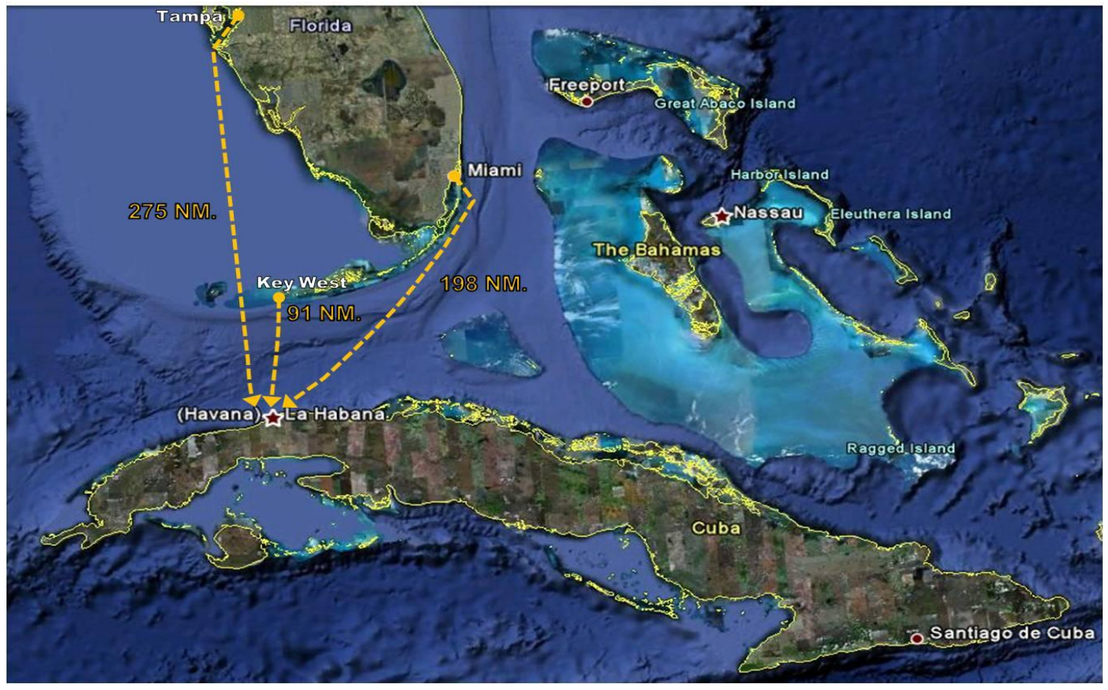
4.4 FERRY

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

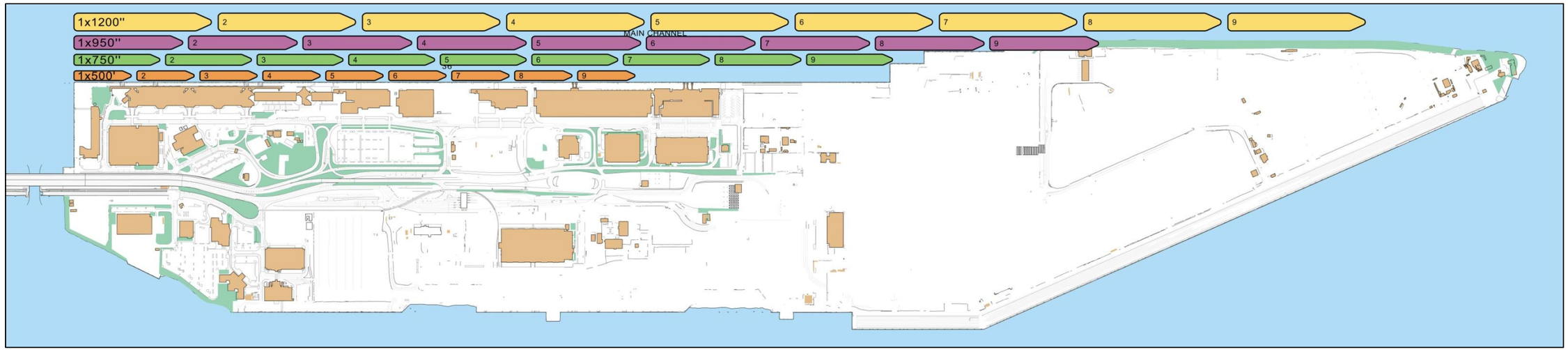
Historically, the Port of Miami has grown its cruise facilities organically as the need has arisen. This means that, as cruise vessel volumes (numbers of total vessels needing to be accommodated) as well as the vessel size (increases in vessel length, tonnage and passenger capacity) have increased, the 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.

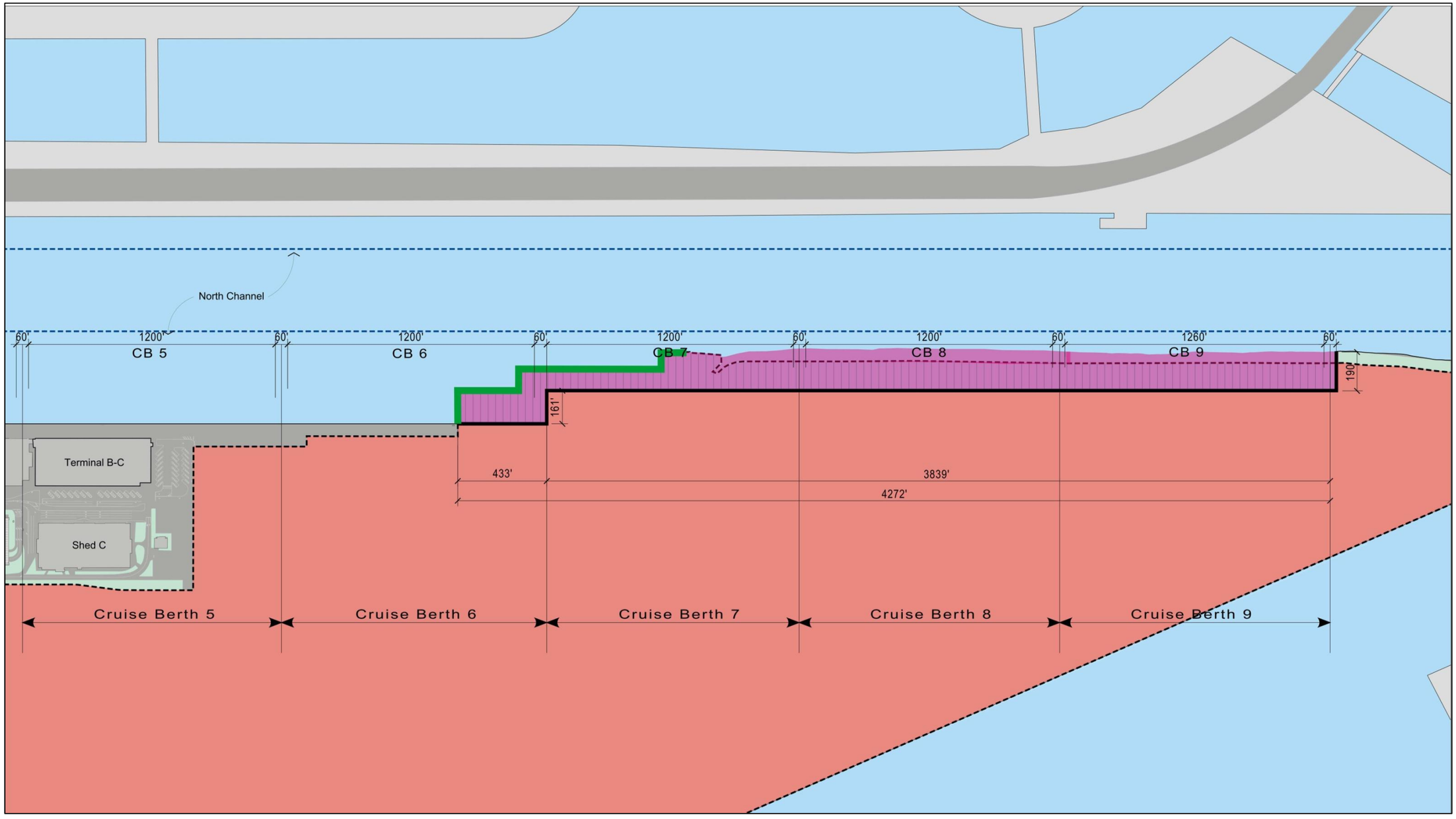
In order to accommodate the requirements for up to 9 – 1,200-ft. berths along the North Channel of the Port, an analysis was done as to the most viable approach to add these berths to the channel.

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.

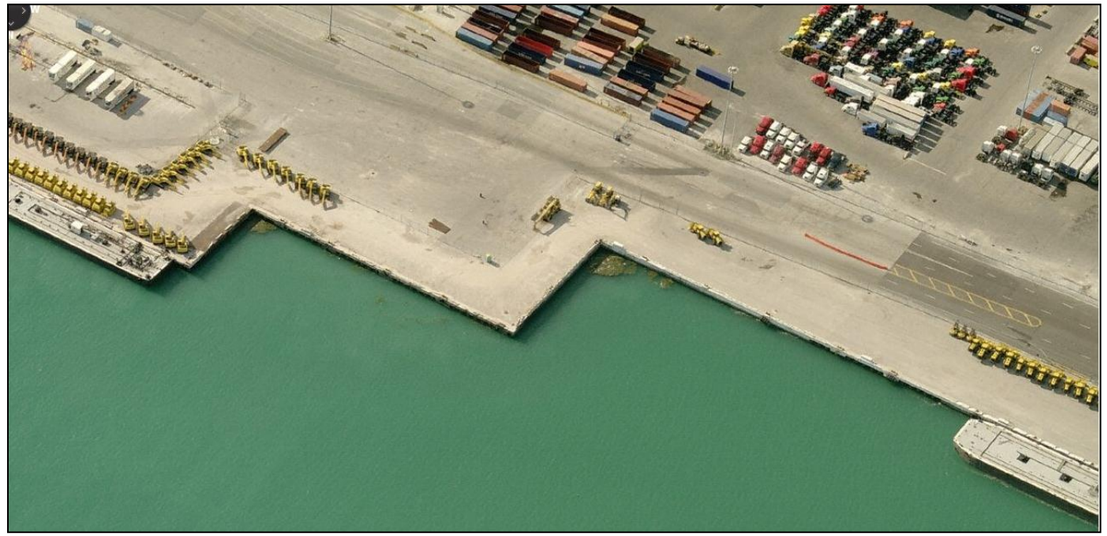
Approximately 12.1-acres of cargo area would be needed in order to develop this new cruise berth area and uplands support areas. The 9th berth would require an additional approximate 6 acres of cargo space. To fully implement the plan additional cargo area of more than the acreage needed for the berths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

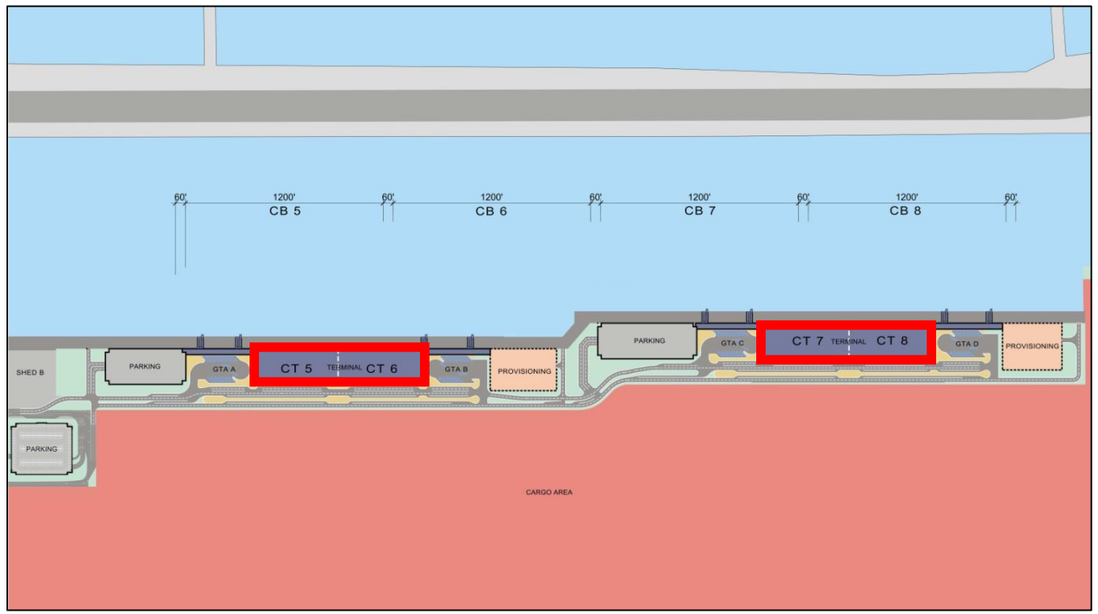


Table 4.5 provides the overall costs for this terminal alternative. As shown, parking is not required for the first CT 5 and CT 6 terminal as existing parking is available to provide adequate spaces. The addition of the CT 7 and CT 8 cruise complex does require an additional parking structure to accommodate 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

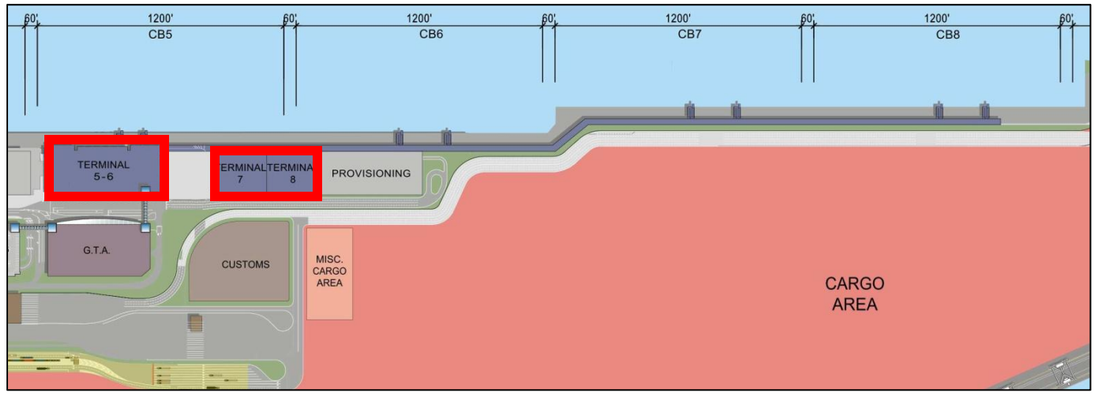


Table 4.6 provides the overall costs for this terminal alternative. As shown, parking is not required for the first CT 5 and CT 6 terminals as existing parking is available to provide adequate spaces for Terminals B and C. The addition of the CT 7 and CT 8 cruise complex does require an additional parking 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

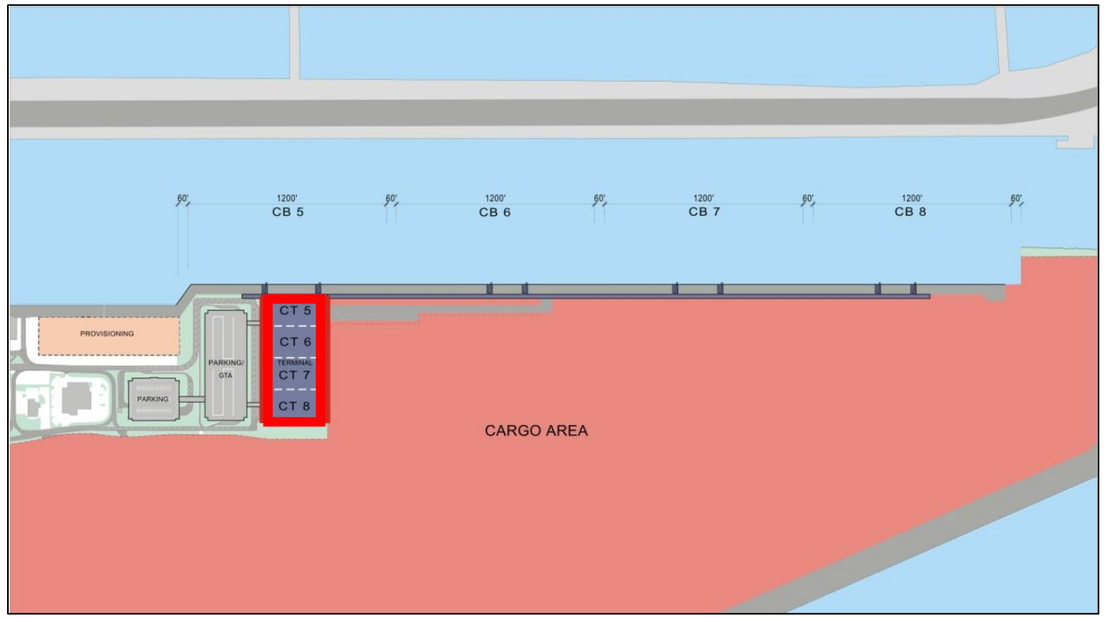


Table 4.7 provides the overall costs for this terminal alternative. As shown, parking is not required for the first CT 5 and CT 6 terminal as existing parking is available to provide adequate spaces. The addition of the CT 7 and CT 8 cruise complex does require a new parking structure to accommodate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

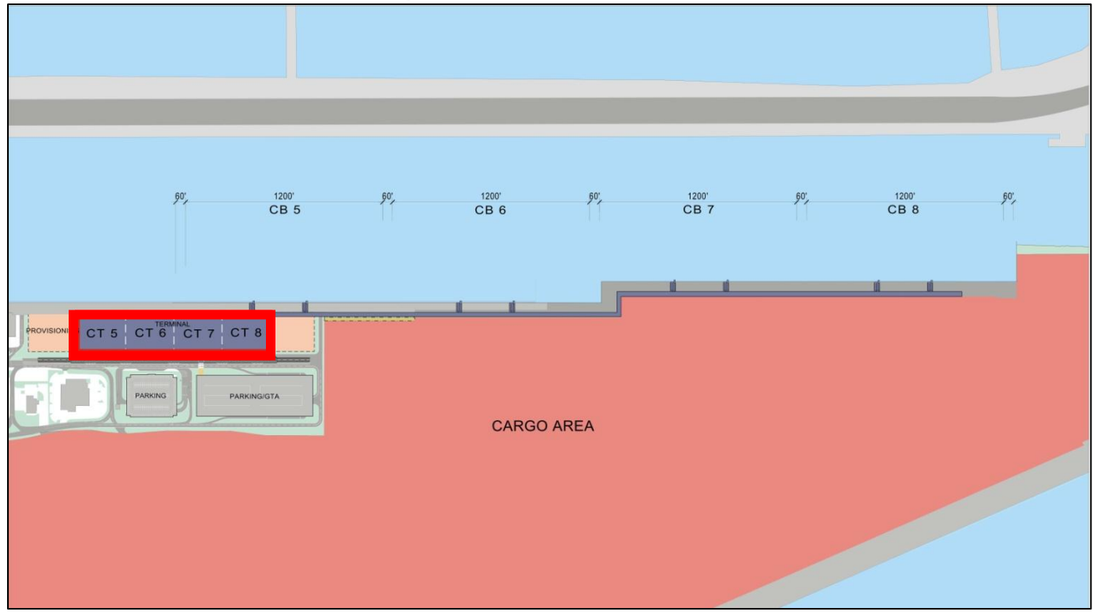


Table 4.8 provides the overall costs for this terminal alternative. As shown, parking is not required for the first CT 5 and CT 6 terminal as existing parking is available to provide adequate spaces. The addition of the CT 7 and CT 8 cruise complex requires a new parking structure to accommodate approximately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

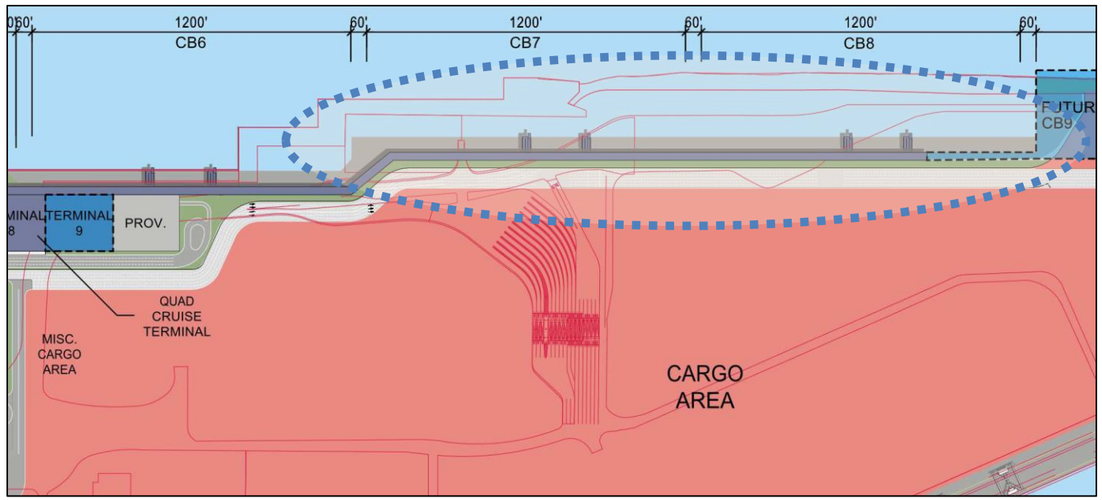
In the mid-term, the addition of a 7th and 8th berth would provide the required cruise capacity for approximately the next 20 years based upon forecasts. Additional dollars would be required if a 9th berth and terminal were included in the long-term.

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

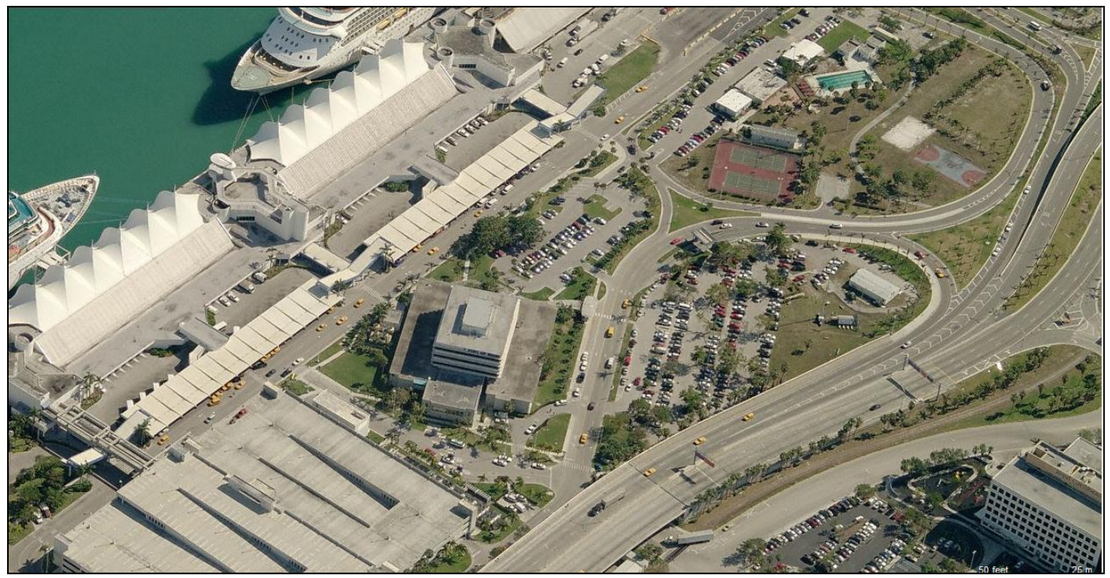


FIGURE 4.23: CENTRAL INTERMODAL CENTER AND CAMPUS COMMERCIAL ZONE

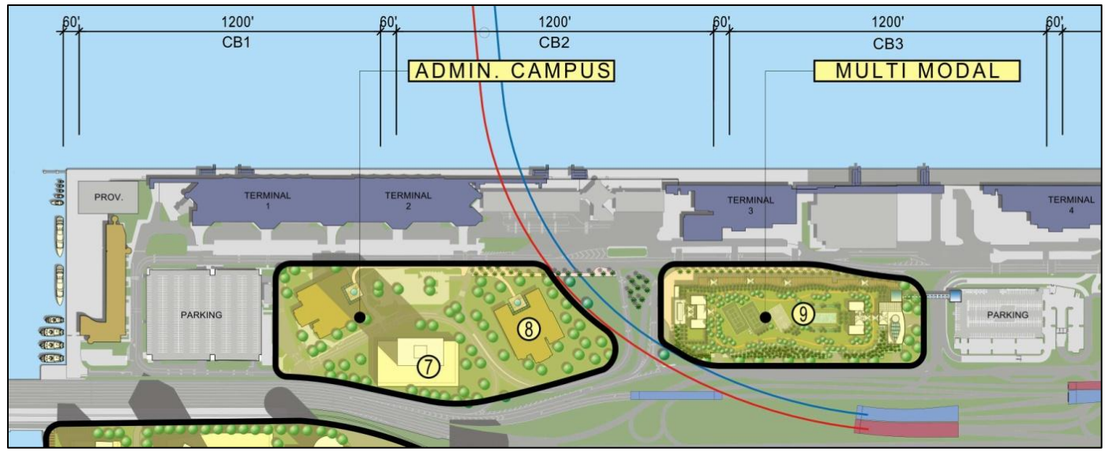


Table 4.10: Central Intermodal and Campus Commercial Development Zone					
BUILDING ID	**USE**	**BUILDING FOOTPRINT**	**BUILDING AREA PER FLOOR (sf)**	**NUMBER OF FLOORS**	**PARKING PODIUM PER FLOOR**
ADMINISTRATION CAMPUS					
7	OFFICE	120X120	14400	VARIES BETWEEN 6 and 30	MIN. 180'X300'= 54,000SF ~150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

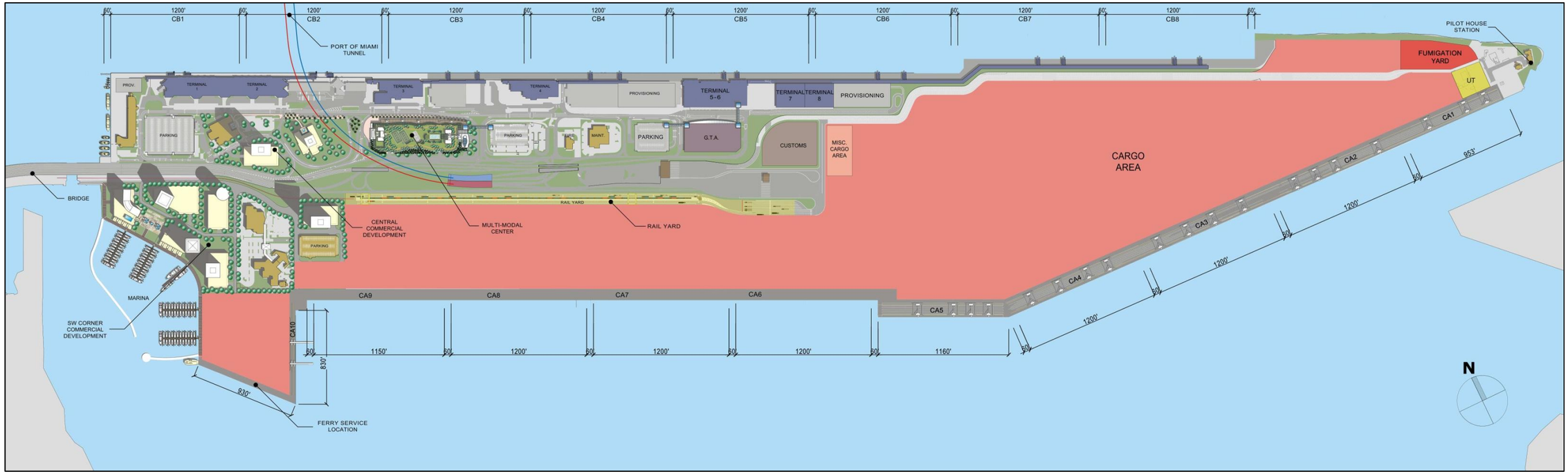


FIGURE 4.24A: ALTERNATIVE CRUISE TERMINAL PLAN

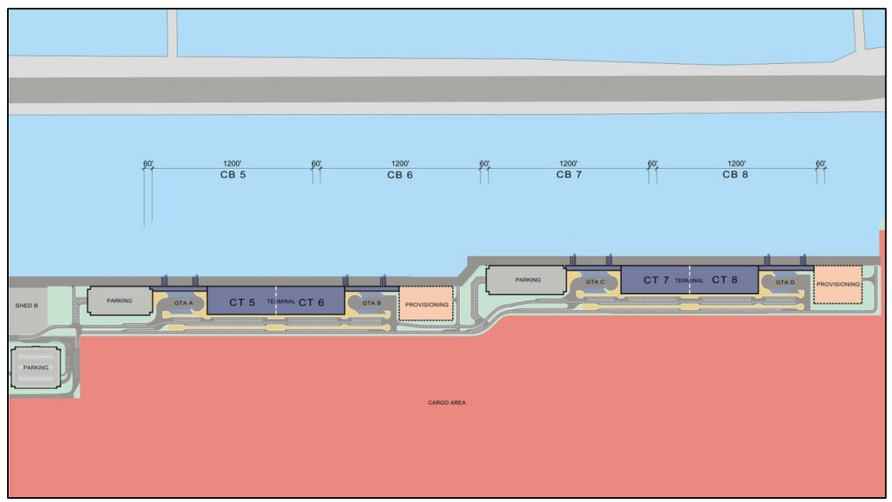


FIGURE 4.25: LONG-TERM PREFERRED CRUISE PLAN ALTERNATIVE