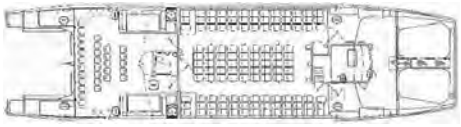
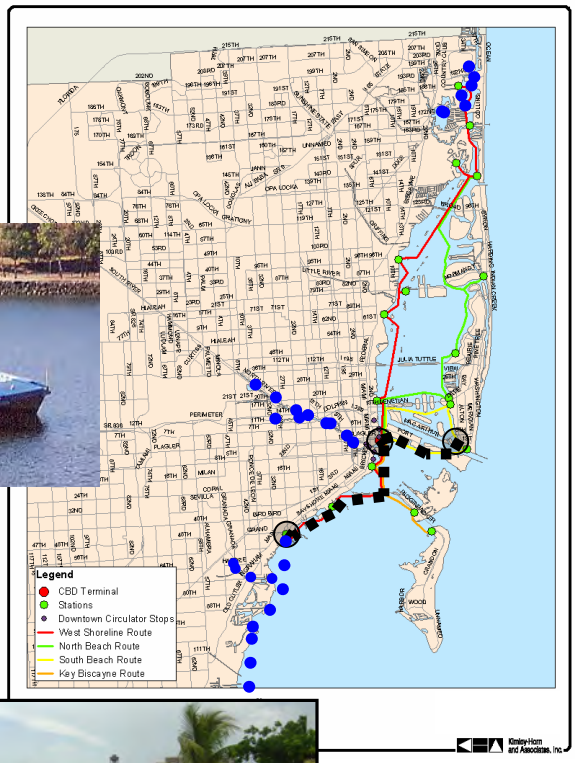


Development of a Service Plan for

Waterborne Transportation Service

in Miami-Dade County



Executive Summary

Prepared for:

Miami-Dade County
Metropolitan Planning Organization
(Miami-Dade MPO)

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EXECUTIVE SUMMARY

Miami-Dade County is privileged to be situated in an extraordinary geographic setting. Located in the subtropics at the southernmost end of the Florida peninsula, the area enjoys mild weather for all four seasons. Just as importantly, the mainland is sheltered by strings of offshore barrier islands that create Biscayne Bay. The County enjoys an extensive coastline and numerous inland waterways and the climate to take advantage of this magnificent marine environment throughout the year. The Bay, and these waterways, are vital resources that are extensively used for recreational purposes and commonly utilized for the commercial transportation of cargo. In recent years, as multimodalism has become more critical to improving travel and increasing the capacity and reach of urban area transportation systems, transportation planners have begun to research locally novel modes as potential supplements to the conventional car, truck, and transit landside surface modes to transport people and goods. Now, waterborne transportation services are being recognized as a potential alternative serving burgeoning travel demand by utilizing some of the extensive system of waterways available in Miami-Dade County.

Purpose of this Study

The Miami-Dade Metropolitan Planning Organization (MPO) initiated the *Development of a Service Plan for Waterborne Transit Services in Miami-Dade County* to develop a water transit service plan that would describe a potential system intended to meet mobility goals such as offering alternatives to local commuters driving single occupant private automobiles, and providing viable as well as attractive mobility options for tourists and other visitors. Development of the service plan was desired to perform an impartial review of the projected ability of the system to meet these mobility objectives, to reasonably estimate realistic ridership, to determine the expected implementation and operating costs of such a system, and to recommend a good approach to implement such a system locally.

Study Background

Several studies have been performed over the years by various local agencies, and some waterborne transportation services have been provided in the past, only to eventually be discontinued. Recently, the Miami-Dade MPO commissioned a study to examine the practicality of waterborne transportation for supplying additional capacity to the urban transportation network. The *Feasibility of Utilizing Miami-Dade County Waterways for Urban Commuter Travel* was completed in 2003. This study identified a potential waterway network on which commuter service could be provided by vessels similar in nature to those successfully providing service in other urbanized areas. Travel time comparisons found that waterborne transportation using conventional vessels could be competitive with the automobile along certain routes. Three potential routes for waterborne commuter transit service were identified including: (1) the Biscayne Bay Route, (2) the Miami River Route, and (3) the Coral Gables Waterway Route. More germane to this study's genesis, *The Feasibility of Utilizing Miami-Dade County Waterways for Urban Commuter Travel* recommended that additional service planning should be undertaken for the potential routes identified above.

Also in 2003, a proposal entitled *Rapid Mass Transit* was completed by Metro Aqua Cats, Inc. and submitted to the Miami-Dade MPO to introduce a waterborne transit service. Metro Aqua Cats outlined the need for additional transit services aimed at providing a potential solution to reduce commuter travel time in an efficient and cost-effective manner. The proposal promotes high speed ferry service in Biscayne Bay as the mode to fulfill that need. This proposal recommended implementing a water transit system based on a vessel specifically designed for traversing Biscayne Bay. The objective of Metro Aqua Cats' proposal was to provide a travel alternative to reduce commuter travel times experienced when using conventional land-

based highway and transit modes. A review of the Metro Aqua Cats proposal is provided in the report for this study. The proposal specifies that the catamaran would operate on bio-diesel fuel, have forward facing sonar for manatee awareness, be compliant with the Americans with Disabilities Act (ADA), and have a Class I Coast Guard rating. Four potential routes for waterborne commuter transit service were identified by Metro Aqua Cats, Inc. for Biscayne Bay including: (1) West Shoreline Route North, (2) "B" Miami Beach Route, (3) West Shoreline Route South, and (4) Key Biscayne Route.

In response to the recommendation of further study made in the *Feasibility of Utilizing Miami-Dade County Waterways for Urban Commuter Travel*, as well as the desire to evaluate the Metro Aqua Cats *Rapid Mass Transit* proposal, the Miami-Dade MPO initiated the *Development of a Service Plan for Waterborne Transit Services in Miami-Dade County*.

The Waterborne Service Plan Study was conducted in several phases, each of which is summarized below.

Data Collection

Data collection was performed for this study by further examining physical characteristics of waterways first identified in the *Feasibility of Utilizing Miami-Dade County Waterways for Urban Commuter Travel*. The objective of the data collection effort was to identify sections of waterways that exhibit restrictions to water travel mobility.

Miami-Dade County has many canals of varying characteristics. The primary deterrent to waterborne transit mobility within most canals is the presence of control structures such as salinity dams. These structures specifically and intentionally block connectivity with the saltwater of Biscayne Bay from the freshwater canals; this, of course, severely limits the potential for navigational mobility. Most canals also have numerous low bridges and pipeline crossings that render them impossible for use by waterborne transit vessels. The effect of the canal structure location on potential water transit mobility is to limit the length of trips that can be accommodated. Canals that exhibited short or intermittent segments of navigability were excluded from further study due to trip mobility constraints. As a result of the data collection portion of this study, the waterways that received further consideration for initial waterborne transit implementation include Biscayne Bay and canals downstream of the salinity dams.

Low Pipeline Crossing the Snake Creek (C-9) Canal

Existing Dock at Dinner Key Marina Adjacent to Coconut Grove Activity Center

Marinas and parks were inventoried to determine potential sites for terminals. Most marinas in Miami-Dade County are private facilities that are not likely candidates for a waterborne transit terminal, unless suitable arrangements with private entities can be reached. Public marinas may be used for waterborne transit stations, especially marinas near activity centers or parking facilities. Several parks contain existing marinas and/or docks that physically could be employed as water transit stops or stations.

However, utilizing park space for transportation terminals and potentially for providing additional parking facilities is antagonistic towards the recreational purposes of parks. Furthermore, certain rules, regulations, laws, and covenants governing park use may be violated by converting portions of parks to transportation uses. Transportation projects that require the conversion of public recreational space to transportation-related purposes are commonly required to replace the amount of park space that was lost due to the transportation project.

Data collected for Biscayne Bay include the location of manatee protection zones, sea grass habitats, reefs, and shipping channels, bathymetry, and bridge clearance information. Biscayne Bay is characterized by shallow waters, numerous sea grass habitats, and manatee protection zones. As a result, low draft vessels with minimal wake wash characteristics are appropriate for waterborne transportation purposes in Miami-Dade County. Manatee-detection equipment should be installed on the vessels as well. The Atlantic Intracoastal Waterway is a strategic navigation channel running through the western portion of Biscayne Bay, stretching the length of the county; this channel should be utilized where possible for the routing of waterborne transit vessels.

Patronage Estimation

In addition to the data collection described in the previous section, other data were collected to aid in estimating patronage for the potential water transit system and align proposed water transit routes to serve major travel flows within the study area. Demographic data from several metropolitan areas that currently offer waterborne transportation service were collected along with ridership data for these systems. A linear regression analysis was then performed to develop an equation that forecasts system ridership based on the demographic characteristics of the metropolitan area. When applied to the routes developed in later portions of this study, the projected water transit patronage based on the analysis performed for this study is approximately 1.7 million annual passengers for the proposed system, which is anticipated to require a 5-year maturity period. It is expected that at least one-half of these passengers would transfer from existing Metrobus routes; therefore, connections between Metrobus and the waterborne transit system are vital. Only approximately 35 percent of the projected ridership is expected to switch from private automobiles to waterborne transportation.

System Needs and Characteristics

Waterborne transit system needs and characteristics were analyzed for the *Development of a Service Plan for Waterborne Transit Services* by examining probable terminal requirements, service characteristics, vessel characteristics, staffing requirements, and real estate characteristics of what is considered the initial needs of the potential waterborne transit system in Miami-Dade County. The purpose of the system needs chapter of the report is to provide guidance for the type of facilities and service characteristics that would be appropriate for offering water transit service that represents a true mobility option for residents and visitors of Miami-Dade County. This chapter of the report presents system characteristics from waterborne transit systems in other metropolitan areas that have been in place for at least five years. Many of the system examples are from Australia because modern technologies have been used there for waterborne transportation systems that are successfully serving as viable regional transportation alternatives for commuters, which is an objective that has been identified for the potential system in Miami-Dade County. Many of the system needs for Miami-Dade County are similar to the characteristics of these successful Australian water transit systems.

Water Transit Vessels

Vessel requirements for passenger-only transit ferry services on Biscayne Bay to serve Miami and its surrounding communities were researched using data from other locations around the world where these types of ferry services are operational. An appropriate vessel technology was synthesized to match the physical characteristics of the waterways presented in the Data Collection chapter and to meet the specific needs of navigating on generally shallow and environmentally sensitive Biscayne Bay.

Low-Wash Catamaran

The appropriate hull form for waterborne transit service in Miami-Dade County is a low wake wash catamaran with demi-hulls that exhibit a length-to-beam ratio of 20:1 or greater. A catamaran hull form, with its widely spaced demi-hulls, would provide appropriate stability in waves commonly experienced within Biscayne Bay. Passenger capacity should be in the range of 100 to 125 passengers per vessel to serve expected passenger demand and to utilize engines that require less power to operate at speeds of 22 to 24 knots than would be needed to power larger catamarans. The interior of the ferry's passenger cabin must be provided with air conditioning, with the system carefully chosen to minimize its weight. Due to the minimal depths of Biscayne Bay near its shorelines, the ferry vessel should have shallow draft properties in the range of 3 to 4 feet. It is recommended that vessels be designed to operate without the need to raise drawbridges, which would dictate a maximum air draft clearance of 12 feet to travel under the Venetian Causeway within the Intracoastal Waterway.

Routes and Terminals

System operating characteristics were developed with the intention of providing service convenient enough to attract commuters by offering travel times competitive with that of private automobiles for the same trips. Figure ES-1 presents a prospective route structure along with the proposed terminal sites for a system of water transit services in Miami-Dade County. A series of four water transit routes were developed along with a complimentary downtown circulator system to serve the Miami Downtown waterfront areas using smaller water buses. Headways of no more than 20 minutes during peak travel periods are desired for ferries in Miami-Dade County. Headways during non-peak portions of the day may range from 30 minutes to 60 minutes for the primary routes, much as is done with surface transit routes. The daily service span for the water transit system should ideally approximate the service spans of the other transit services in Miami-Dade County, especially Metrobus and Metromover, to provide true mobility options. A route prioritization analysis was performed that determined the "South Beach Route" to be the most effective initial route. This route should be considered for demonstration purposes.

If water transit in Miami-Dade County proves to be successful, the "Phase I" system presented in Figure ES-1 may be expanded to include other routes or extensions of existing routes, such as a possible primary route along the Miami River following construction of the Miami Intermodal Center (MIC); the Miami River water bus (employing smaller vessels) would also serve the Civic Center area and provide waterborne access to the Orange Bowl for special events. In addition, extending the Coconut Grove route to the south into less densely populated areas may provide access for commuters in those areas to major CBD and Brickell waterfront or adjacent employment centers in Downtown Miami. Limited stop routes, such as Aventura to Miami, could be introduced if warranted by ridership volumes and patterns.

Costs and Revenues

Capital costs, and operating and maintenance (O&M) costs, were estimated for the potential waterborne transit system in Miami-Dade County. Capital costs are primarily composed of vessel costs, terminal costs, and land/right-of-way costs. One advantage of most waterborne transportation systems is that the "guideway" already exists, so it does not have to be constructed, purchased, or leased. Therefore, waterborne transit systems generally incur much lower per mile capital construction costs than urban rail transit and light rail transit systems. The largest component of the capital costs is expected to be the land for terminals and ancillary facilities, such as park-n-ride lots. The capital cost estimate for the entire "Phase I" route network presented in Figure ES-1 is approximately $125 million to $150 million.

The major operating cost components for waterborne transit systems will include personnel, fuels and expendables, maintenance, and administrative costs. Labor represents the largest operating cost component for urban waterborne transit systems. Annual operating costs for the "Phase I" route network presented in Figure ES-1 is approximately $22 million at 5-year system maturity.

In general, transit fares cover only a fraction of transit operating costs, and basically no capital costs are recovered by the farebox revenues. The Year 5 operating deficit is projected to be in the range of $11 million to $18 million for the "Phase I" system. Recent Federal legislation continues the trend of phasing out federal support for operating assistance. The availability of federal capital assistance stands in stark contrast to the lack of federal assistance provided for transit operations. A transit project sponsor's operating plan should demonstrate an ability to rely on sustainable, largely local, funding sources to operate and maintain the entire transit system after the proposed transit project is in revenue service. It is expected that multiple local funding sources, such as sales tax revenues, bond revenues, joint development arrangements, and turnkey procurement arrangements will need to be utilized to provide adequate funding for both capital and O&M costs for the proposed waterborne transit system in Miami-Dade County.

Business Model

A public/private business model presents the greatest opportunity for the facilitation of the implementation of the waterborne transportation system in Miami-Dade County described in this report. The role of local government would be to secure funding for initial capital investments for terminals and support facilities, and to provide oversight through a Management Agency. A private transportation provider would need to be attracted to provide waterborne transit vessels and to operate the service.

The major advantage of this model is that securing public funding would make it possible to offer lower fares for the waterborne transportation service, which would encourage residents and visitors to patronize the new service. Because the Management Agency would be responsible for securing funding for the initial capital investment, it may be easier to attract a ferry operator, as those costs would be borne by another source. By not having made significant capital investment, the ferry operator would have a lower exposure to the risk of a new service.

Summary and Conclusions

Waterborne transit services implemented in Miami-Dade County in the past have failed to become a viable public transportation option. A recent feasibility study, *Feasibility of Utilizing Miami-Dade County Waterways for Urban Commuter Travel*, concluded that by appropriately addressing a number of issues heretofore underaddressed, waterborne transportation might indeed be able to be successfully implemented and developed in Miami-Dade County.

The study described in this report provides a service plan that addresses many pertinent issues related to waterborne transit implementation and develops a route structure and service characteristics that are intended to provide service adequate to attract local commuters and provide visitors and tourists with an attractive transit alternative by offering a reliable, useful, and novel addition to the existing public transportation system. The service is proposed to integrate with Metrobus routes and in Downtown Miami, to integrate with Metromover. Shuttle buses associated with individual terminals are also recommended to provide additional connectivity. Integrating the potential waterborne transportation system into the County's larger transportation system is key.

The capital construction costs associated with implementing the full "Phase I" network are relatively high for a system that has not been locally proven to be effective for providing true mobility options for commuters, although the per mile construction cost for the water transit system is significantly less than urban heavy rail systems. However, operating costs and operating efficiency measures are even less favorable for waterborne transit when compared to existing forms of transit.

However, despite the cost of providing waterborne transit service, there are several intrinsic advantages that water transit may have over other existing components of the multimodal network. Many visitors may be more willing to use the system than traditional forms of public transit for tourist trip purposes and may even view the system as an extension of the local tourist activities. If routes are planned and implemented to serve major travel patterns and meet their needs, some commuters may be more willing to travel by waterborne transit if the travel times on routes are, as they are anticipated to be, competitive with peak period landside travel options, and service is seen as providing a different, "better" atmosphere than other forms of local transit. In addition, initial routes can be implemented relatively quickly since the guideway (in this case Biscayne Bay) already exists and if existing marinas with good access are used as terminals.

Therefore, this study recommends developing waterborne transit services for Miami-Dade County on Biscayne Bay through a public/private partnership if a waterborne transit demonstration project, or pilot program, is deemed successful by local leaders at attracting commuters and tourists.

Demonstration Project

It is suggested that proceeding with a demonstration waterborne transit project that replicates service on the South Beach Route shown in Figure ES-1 would be most appropriate for judging short-term acceptance and gauging possibilities for long-term success for a full-fledged system in the future. For the Miami CBD water transit stop, a scaled-down version of the CBD Terminal recommended in this study could be utilized along Chopin Plaza or within Bayfront Park. Terminal infrastructure for a demonstration project can be as minimal as two to four weather shelters and a docking pier. The existing Miami Beach Marina may be utilized as a terminal in Miami Beach in lieu of a terminal facility being constructed at South Pointe Park. Coordination with Miami-Dade Transit and the City of Miami Beach is recommended to ensure that local bus service connects to the water transit station in Miami Beach. Alternatively, a dedicated shuttle bus route could be established to provide connectivity to popular destinations along Collins Avenue and the Lincoln Road Mall. Additionally, strong consideration should be given to extending the demonstration route to the Dinner Key Marina to serve Coconut Grove since an extensive public marina already exists within a two-block walk of an activity center popular with both locals and visitors. It is important to note that the demonstration project should be operated for enough time to allow a fair assessment of its performance. Experience from other metropolitan areas indicates ridership may build gradually over at least the first two to three years of operation.

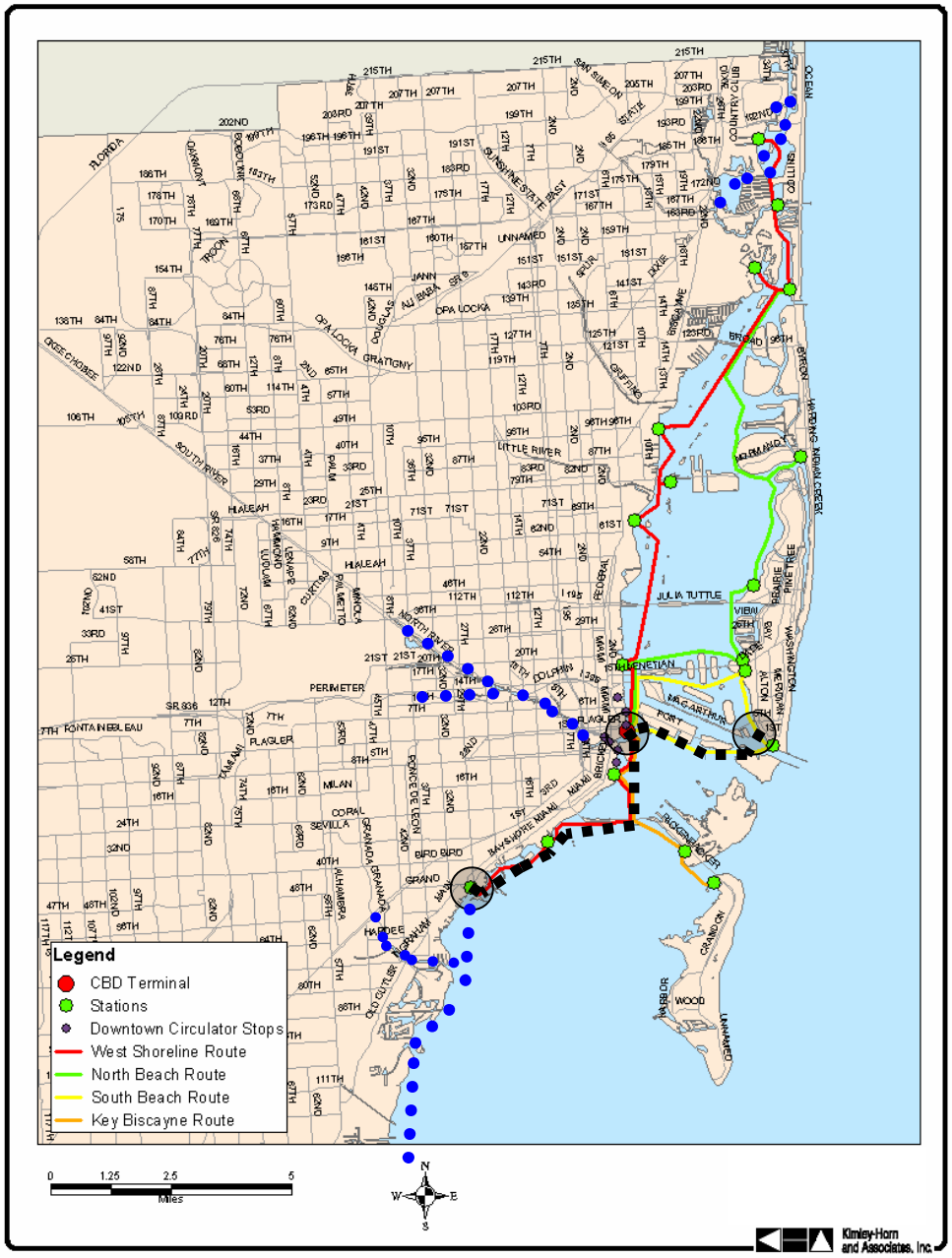

Figure ES-1. Potential Water Transit System in Miami-Dade