

CITY OF MIAMI INITIAL STREETCAR CORRIDOR FEASIBILITY STUDY

FINAL REPORT—APRIL 2005

EXECUTIVE SUMMARY

Between 1925 and 1928, more than 11 million passengers per year boarded trolley cars in Miami.¹ Trolleys, or streetcars, were an integral part of the City's growth and development early in the 20th century. The Miami system of streetcars stopped operating in November 1940. Now, 65 years later, the City of Miami (the City) is evaluating the reintroduction of streetcar service with a modern technology counterpart. With this new transit service, the City seeks to provide its residents, businesses, and visitors with an attractive, convenient, comfortable urban mode of transit that is less expensive compared to light rail.

The proposed 6.75 mile (10.86 km) streetcar service would provide improved transit connections between Downtown Miami and the redeveloping areas of Wynwood/Edgewater, Midtown Miami, the Miami Design District and the Buena Vista East Historic District. The streetcar is electrically powered and would run, at grade, on rail, within the roadway. The service is

intended to link with Metrorail and Metromover as well as with other planned transportation systems. It would also guide and enhance new investment opportunities for commerce, housing, the arts, cultural attractions and recreation, bringing additional jobs and tax revenues to the City.

Study Context and Purpose

Miami is undergoing spectacular growth. Since 2001, the City has witnessed a 10% increase in population. Estimates suggest that by the end of this decade, Miami's population may expand as much as 30%. This surge is a stark contrast to the 1% growth experienced in the 1990s and the 7% total seen from 1970-2000. The City's renaissance includes significant new commercial and residential investments, new residents living in Downtown Miami, new major public facilities and parks, and numerous capital improvement projects now breaking ground. Miami's urban intensification, in part, reflects a national pattern, wherein young people and "empty nest baby boomers" are seeking an urban lifestyle and avoiding the daily commute on increasingly congested highways. There is more at work here, however, than national demographic patterns. The renaissance underway in Miami is also being fueled by its stunning physical setting, its rising economic strength and by its reputation as an international gateway.

These positive trends bring with them a question which Miami must prepare to face: will the existing transportation system be able to support and sustain a much denser and less automobile dependent urban Miami? Might streetcars, used so successfully in the improvement of other downtowns, be an ingredient in a

successful strategy for the world-class downtown that Miami seeks to become?

The existing downtown transportation system of transit and streets is no longer adequate to support the redevelopment growth. The street network is fixed in its number of lanes for carrying automobiles. The existing transit system consists of buses operating on those same streets and two fixed guideway systems, the Metrorail and Metromover, that are unsuited to the task of improving circulation for a multiplicity of short trips within the study area and do not reach many of the areas now experiencing large-scale redevelopment. All development, even its most urban forms, requires convenient access and circulation. So, how can Miami's dramatic transformation be effectively supported and sustained; how will all those additional residents, workers and visitors move around?

The subject of this study is not how the Miami-Dade urbanized area will improve its transportation system to meet regional needs, address congestion and improve air quality. The focus here is local, at the district or neighborhood scale. How will everyday trips, to the grocery store, to a lunch meeting, or to the entertainment, cultural and dining destinations in Downtown Miami be made for tens of thousands of new residents, workers and visitors? If the answer to that question is "by using their cars," the result will not be sustainable, livable urbanism. Excellent transit service to circulate people within Downtown Miami, aside from whatever is done to connect the downtown to the surrounding suburbs, is very important.

The *City of Miami Initial Streetcar Corridor Feasibility Study, Final Report, April 2005*, was conducted for a study area bounded by the Miami River, Miami Avenue (including Government Center), NE 79th Street and Biscayne Boulevard and found the following:

- The proposed project can effectively provide attractive, convenient and reliable transit connections between Downtown Miami and redeveloping areas.
- Streetcars are the most appropriate and readily available transit technology for the needs of the study area.
- The proposed project can efficiently increase the capacity and use of the City's local and regional public transportation system through integration with the existing and proposed enhanced Miami-Dade Transit (MDT) system.
- The proposed project can guide and sustain economic development and support a sustainable pattern of urban land use activities.
- The proposed project can feasibly operate on segments, of selected roadway corridors without adversely impacting traffic flow, parking facilities, business operations, and other corridor characteristics.
- The proposed project is financially feasible and can be implemented with existing and new revenue sources.

Study Funding and Management

This initial feasibility study was funded by the City of Miami's share of the Miami-Dade County People's Transportation Plan (PTP) transportation half-cent surtax of which twenty-percent of the annual collections provided to the City must be encumbered for transit

¹ *Biscayne Bay Trolleys: Street Railways of the Miami Area*, Edward Ridolph, Harold E. Cox publisher, 80 Virginia Terrace, Forty Fort, PA 18704, 1981., p. 51.

purposes or revert back to Miami-Dade County for redistribution.

This study was managed by staff of the Capital Improvement Program and Transportation Department, Office of the City Manager, for the City of Miami.

What is Streetcar Transit?

Streetcars are a mode of public transit that operates along a fixed rail guideway that is embedded within the surface of the roadway. While streetcars cannot deviate from the path of the guideway, the operator of the streetcar “drives” the vehicle, accelerating and braking to move along with traffic that may operate in the same lane as the streetcar. Streetcars are related to light rail transit; the difference is that streetcars are smaller, lighter, less expensive, and usually run in traffic, rather than in their own exclusive right-of-way. Powered by quiet electric motors, these vehicles use an overhead arm called a pantograph to collect power from an electrified wire that is suspended approximately 20 feet (6.10 meters) over the lane in which the streetcar runs. Streetcars can look contemporary or vintage with many body styles available and can be outfitted with numerous features.



Photosimulation of proposed streetcar - NE 2nd Avenue

Study Process

This initial feasibility study was conducted in two parts from February 2004 to April 2005. Part I of the Study (Concept Plan) included the following tasks:

- Evaluated 12 corridor segments for physical and economic feasibility.
- Conducted initial coordination and information meetings with several project area stakeholders to determine the compatibility and effectiveness of a proposed streetcar project with respect to governmental agency and district plans.
- Developed criteria for selection of a Phase I streetcar project.
- Applied the criteria to the alternative corridors examined.
- Identified any fatally flawed corridors (or corridor segments where physical, environmental or policy constraints would prohibit streetcar construction and use) in the study area.
- Identified corridors where streetcars would enhance and reinforce the objectives of redevelopment and revitalization efforts in the City of Miami.
- Developed a conceptual route with station locations for a series of streetcar lines which could serve major destinations, connect areas undergoing redevelopment, and provide access to other areas to improve their viability for redevelopment.

Part II of the Study (Planning, Analysis & Implementation) built on the Part I research; it addressed:

- Refinement of the conceptual route alignment to a Phase 1 recommended streetcar alignment.
- Coordination of the conceptual alignment with the proposed Bay Link project on the Downtown

Miami portion of the study area south of Interstate 395.

- Identification of the requirements for a maintenance and operations facility.
- Engineering and operational issues involved with the proposed streetcar line crossing the Florida East Coast Railway (FEC) in multiple locations along the alignment, including securing the cooperation of FEC for further development of the project.
- Preliminary capital and operating cost estimates for the initial phase of the project.
- Detailed analysis of the land use and economic development scenario throughout the study area.
- Potential environmental analysis requirements.
- Best practices in the revision of land use plans and ordinances in other cities which have developed streetcar systems.
- Options for financing construction and operation of the project and options for implementation and management of the service on an ongoing basis.

Initial Project Phase Recommendation

The study concluded that streetcar service is feasible and will be a key component in Miami’s transportation system and redevelopment strategies. A variety of analytical measures were used to evaluate the various Phase I corridors. Having applied these criteria and analyzed the 12 potential corridors, an initial Phase 1 alignment of a Miami streetcar system is recommended (see Figure ES.1). This system provides the best combination of physical compatibility, economic development opportunity, and integration with existing and planned transportation projects in the study area.

The recommended initial Phase I for streetcar service connects Downtown Miami to the Miami Design District and Buena Vista East Historic District, primarily via NE 2nd Avenue (Figure ES.1). The recommended alignment will provide streetcar service in both directions, with stops located approximately every two to five blocks. While streetcar service will be feasible and provide many advantages for the entire NE 2nd Avenue corridor, and while there are multiple possibilities for extending streetcar service to other city neighborhoods, it is critical to begin with the most compelling phase of what can become a system. That is, the project’s success is dependent on beginning with that section of the system that has the greatest intensity of economic development, projected ridership, financing capability, and connectivity with the existing Metrorail and Metromover and Miami-Dade Transit bus systems, as well as with additions and enhancements to the transit system now in the planning process such as the proposed Bay Link project.

This alignment effectively connects existing urban development in the downtown core with major destinations such as the Government Center, Miami-Dade College, Performing Arts Center, the Entertainment



Photosimulation of proposed streetcar - NE 1st Avenue

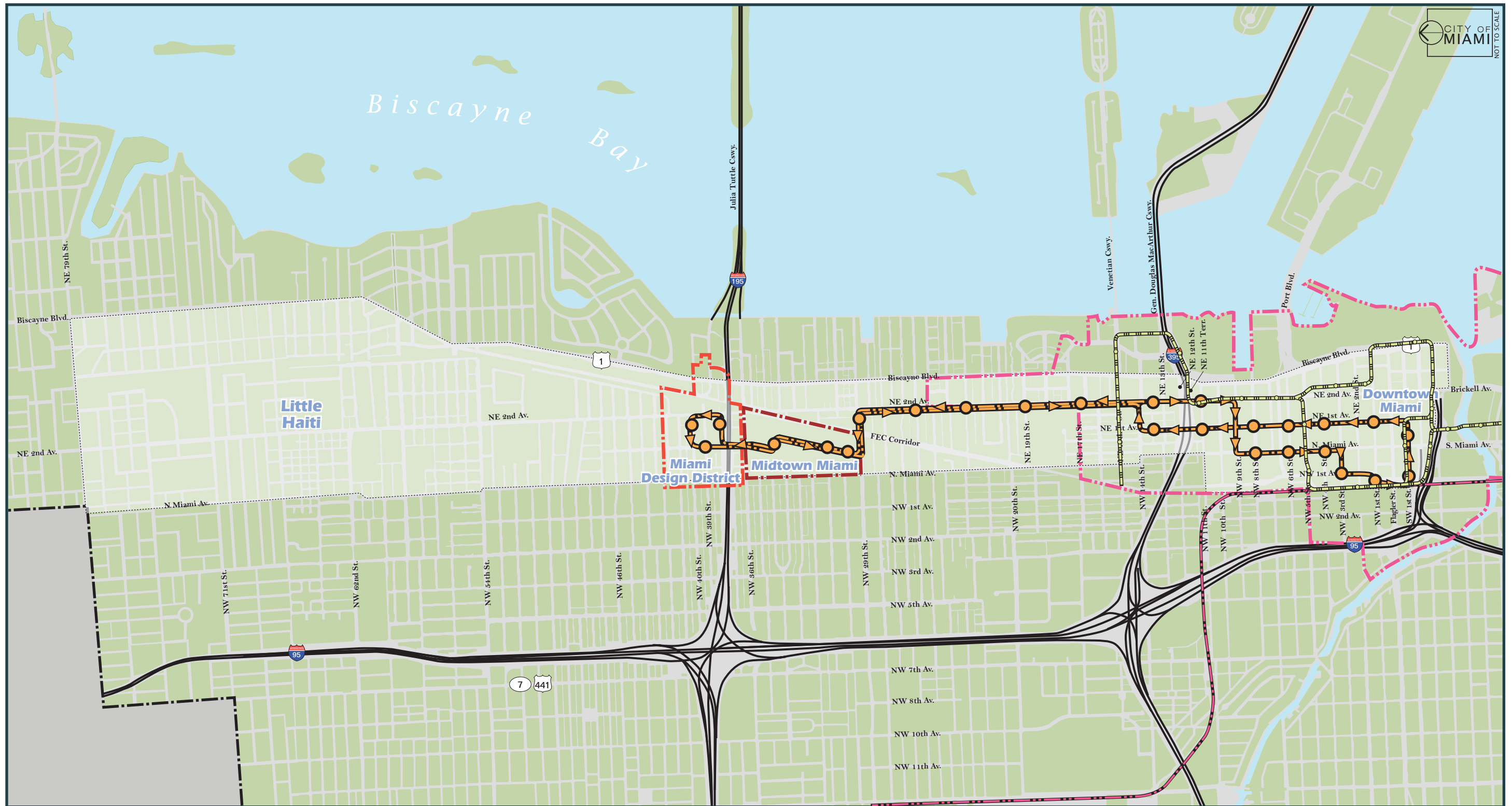


Figure ES.1 - Phase 1 Recommended Streetcar Project

LEGEND

- Study Area
- Recommended Phase I Streetcar Alignment
- Recommended Phase I Streetcar Station/Stop Locations
- Midtown Miami
- Miami Design District
- Miami Downtown Development Authority
- Metromover
- Metrorail



District, the planned Museum Park, Midtown Miami and the Miami Design District and Buena Vista East Historic District. It also links these destinations with a very large increment of recently completed, planned and anticipated development within ¼ mile of the alignment, as much as 2.64 million square feet (0.245 million square meters) of new office and retail construction and over 14,750 new residential units (see Figure ES.2).

The recommended alignment is fully integrated with the proposed Bay Link streetcar line being planned to connect Downtown Miami (see Figure ES.3) with Miami Beach to provide enhanced circulation within the downtown areas of both cities. By seamlessly expanding the possible trips which can utilize streetcars, the effectiveness and efficiency of both projects will be improved. The integration of these two projects will also allow the use of a joint maintenance and operations facility, again with cost and efficiency benefits.

The proposed Miami Streetcar project is configured to complement transit service which might utilize the current Florida East Coast (FEC) Railway. Several locations along the recommended streetcar alignment afford the opportunity for shared stops to connect with this potential future service. However, using this FEC right-of-way for the streetcar line itself is not feasible since streetcars are an urban transit mode and need to be placed in pedestrian-oriented areas and since streetcars are incompatible for operation together with the existing freight rail operations and potential commuter rail on the FEC Railway track that accesses the Port of Miami and Downtown Miami. As design of the proposed Miami Streetcar project proceeds, however,

consideration should be given to the most westerly section of the downtown streetcar loop, examining how it will connect with a downtown terminus for commuter rail, passenger rail and other transit services.



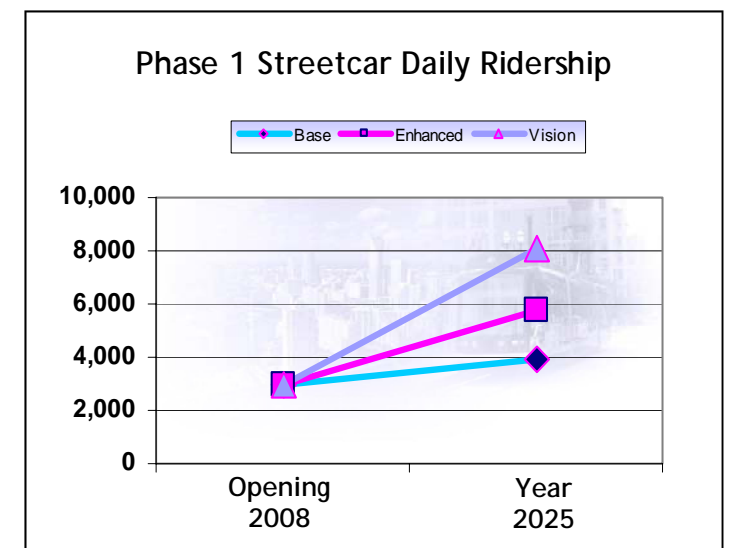
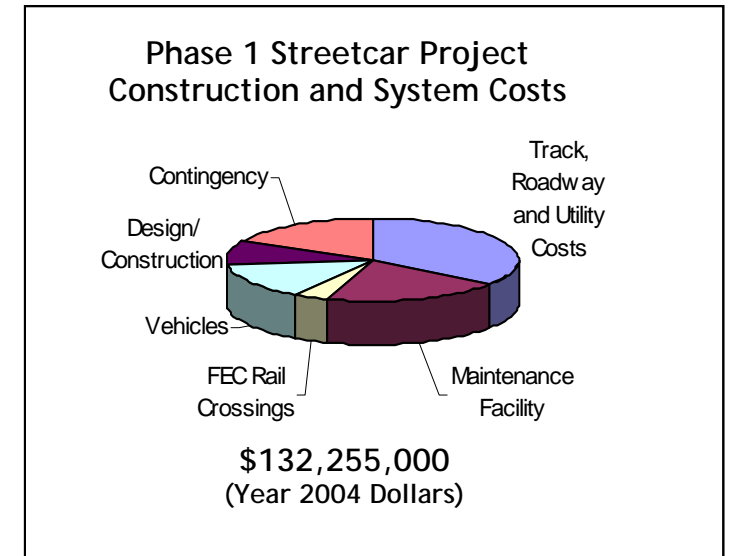
Portland Streetcar Rail Construction

Project Components

The initial Phase 1 of the Miami Streetcar project includes a 6.75 miles (10.86 km) round trip loop of trackway of which 3.15 miles (5.07 km) is single track where the streetcar runs one way on a given section of street and 1.8 miles (2.90 km) of double track where the streetcar runs in both directions in the same section of street. Approximately 33 stops will be provided along the route. The project will operate with an initial fleet of eight vehicles. Of this infrastructure, 2.42 miles (3.89 km) of the single track, 0.21 miles (0.34 km) of the double track and six of the stops will be potentially shared by the proposed Bay Link streetcar line in Downtown Miami. Other project elements, including the vehicle and operations maintenance facility and electric power substations, may also be shared by Bay Link.

It is recommended that Miami use modern European tram style vehicles for this project. In some contexts, like Tampa’s Ybor City Historic District, a vintage style vehicle is appropriate. Miami is by contrast a modern city, and this project is envisioned as equally modern. Thus the characteristics of modern streetcars (larger passenger capacity, large doors for quick boarding and exiting, compliance with the Americans with Disabilities Act) are best suited for this application. The Bay Link streetcar project is designed to be compatible with the same modern, Inekon/Portland-type vehicle proposed for the Miami Streetcar project.

The preliminary estimated construction and system costs for this initial Phase I are \$132,255,000 (year 2004 US dollars) which includes track, roadway and utility costs, a maintenance and operations facility, vehicles, Florida East Coast Railway crossings, design, construction and project contingencies. Annual operating cost, assuming streetcar arrival at any given stop (headways) every 10 minutes, is estimated at \$3,500,000 per year (year 2004 US dollars). Preliminary streetcar ridership projections estimate 3,000 at opening year and potentially 8,100 riders per day in year 2025 depending upon several variables which are unknown at this feasibility stage, such as; fare structure, service frequency, operating speed and corridor redevelopment. Environmental requirements facing the project at this feasibility stage appear to be minimal and are not likely to pose a significant hurdle for project advancement. The project is financially feasible to construct and operate; several possible scenarios for funding capital and operating costs have been developed.



There are a number of options for project implementation, including the formation of a new Authority similar to the Miami Downtown Development Authority (DDA) or the Miami Parking Authority. The project could also be advanced through a public-private partnership wherein the project would be owned by the City of Miami, but developed and managed through a nonprofit corporation similar to the partnership formed in Portland, Oregon. In any scenario, the active cooperation of Miami-Dade County, the Board of County

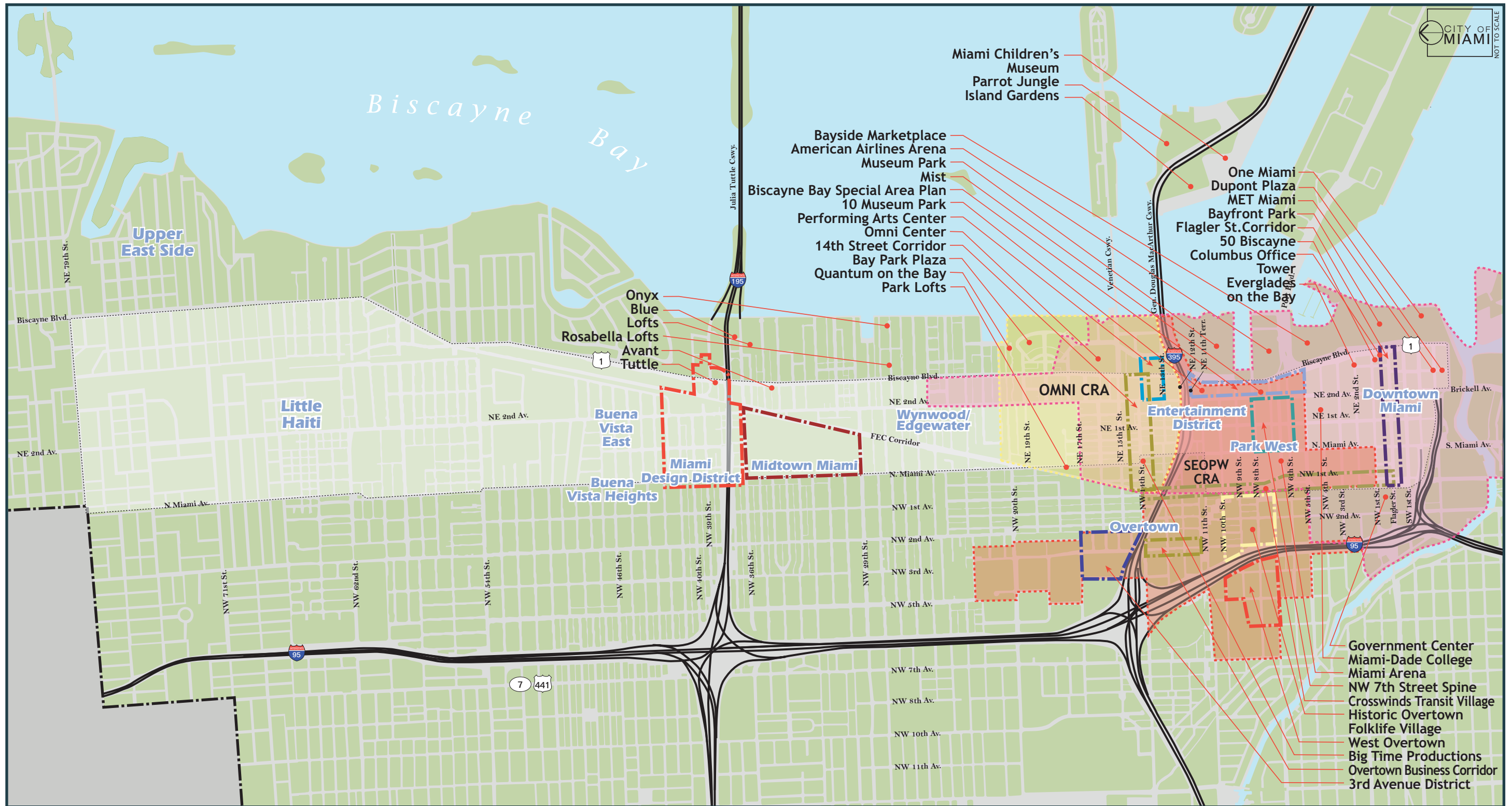


Figure ES.2 – Study Area Development
As of April 19, 2004

LEGEND

- Study Area
- Omni Community Redevelopment Agency (Omni CRA)
- Southeast Overtown Park West Community Redevelopment Agency (SEOPW CRA)
- Miami Downtown Development Authority
- Special Districts (Shown in various colors)

Source: Department of Planning & Zoning, City of Miami (April 19, 2004)





Figure ES.3 - Downtown Streetcar Alignment Shared with Proposed Bay Link Streetcar

Commissioners, the Miami-Dade Metropolitan Planning Organization, Miami-Dade Transit, the Miami-Dade Public Works Department, the Citizens' Independent Transportation Trust and other entities will need to be secured in order to build and operate the project. Other public agencies, including the Federal Transit Administration and the Florida Department of Transportation, will be key to implementation. Property owners and tenants along the alignment must be fully informed and enlisted as project supporters in order to implement the project and ensure success.



Photosimulation - Wolfson Campus Station

shows, there are many possibilities for future expansion of streetcar service, once an initial phase is implemented.

The Opportunity

Streetcar projects are being designed and built in a growing number of North American cities. Few of these locations possess the potential which Miami enjoys in the project study area. The combination of factors is formidable: an intense development boom and the project financing possibilities resulting from this economic momentum, great destinations like Government Center, Miami-Dade College the new Performing Arts Center and the planned Museum Park, corridor that is functionally and physically ideal for this form of transit, and a Miami-Dade County Transit system that could serve the community better if a local circulation component is provided. Based on this, the NE 2nd Avenue corridor is the place to begin in restoring this critical component of urban life to Miami. As Figure ES.4

A streetcar project in this corridor will serve many transportation purposes. It will allow choice riders to make many short commute and non-commute trips by means other than the automobile. The function and reach of the Miami-Dade Transit rail and bus system will be improved by circulating riders into adjacent areas. It will improve the attractiveness and convenience of Downtown Miami as a visitor destination by allowing visitors convenient access to the various attractions.

More than these commendable transportation benefits, the Miami Streetcar will have a powerful beneficial effect on the location, form and sustainability of development, redevelopment and conservation in the neighborhoods it serves. The project will be a catalyst,



Portland, Oregon - Transit Oriented Development Along an Existing Streetcar Route

enhancing smart growth inland from the bayfront properties, shaping the character of this development into a more pedestrian friendly, transit supportive environment.

Finally, the proposed Miami Streetcar will have great symbolic and functional value, demonstrating that Miami has the comprehensive multi-modal transportation system expected in a world-class city.

This initial feasibility study has been the first step in planning the Miami Streetcar project. The next steps

include consideration by the City of Miami Commission for the adoption of the *City of Miami Initial Streetcar Corridor Feasibility Study, Final Report, April 2005*; authorization to the City Manager to begin initial implementation of the Study recommendations providing that the initial implementation will consist of Alternatives Analysis to satisfy Federal Transit Administration requirements for fund eligibility; and, further, selection of a Design/Contractor team to provide conceptual engineering is support of the environmental approval process and financial support services in the development of a detailed financial plan

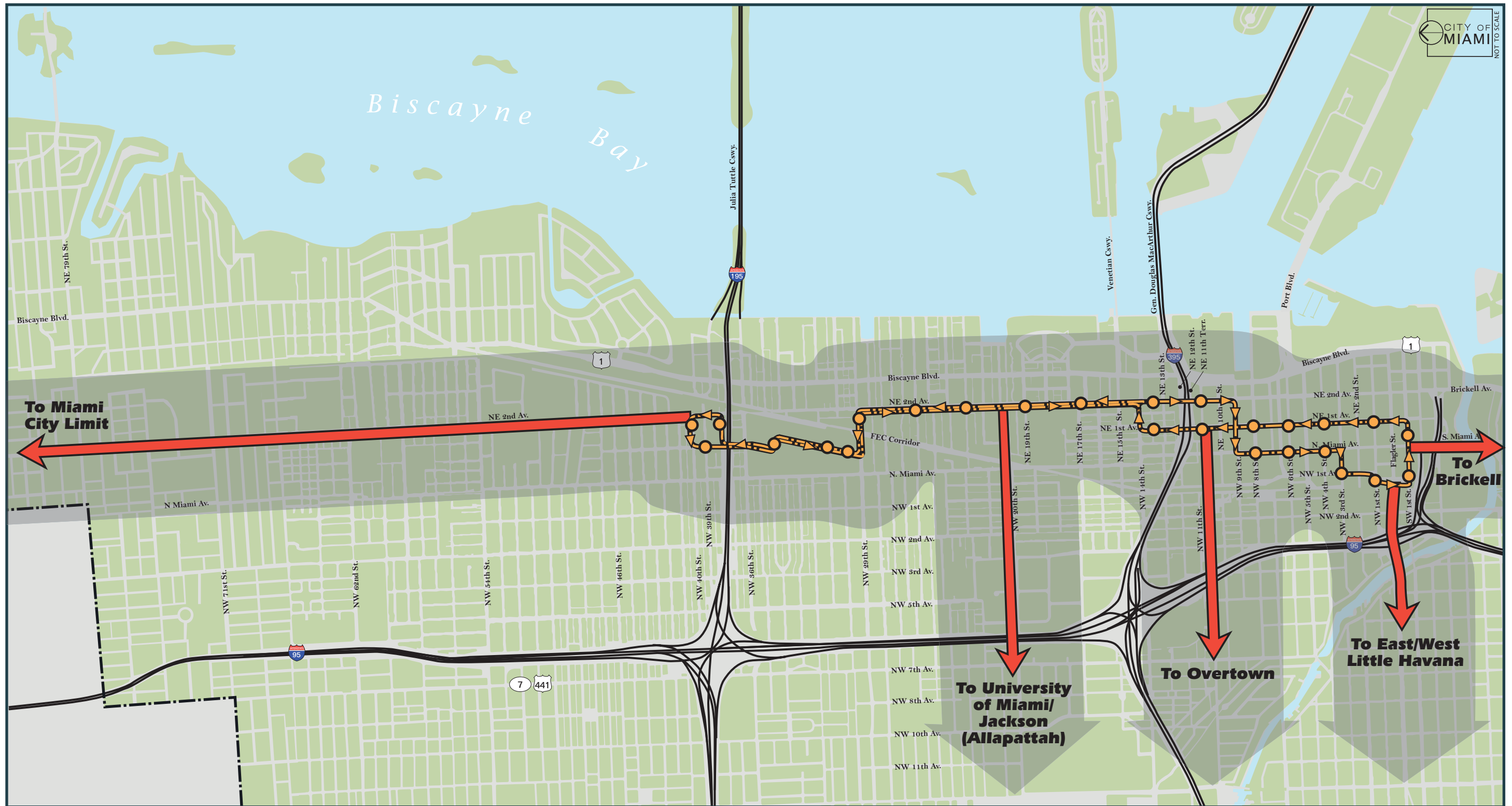


Figure ES.4 - Potential Corridor Extensions

- LEGEND**
- 1/4 mile (10 minute) walk to streetcar
 - Recommended Phase I Streetcar Alignment
 - Recommended Phase I Streetcar Station/Stop Locations
 - ➔ Potential Service Extensions

for project delivery of which the award of the work and agreement for project delivery of the Miami Streetcar project is to be brought back for future City of Miami Commission consideration and approval.

For additional information about the project, please contact:

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Frequently Asked Questions

Why does Miami need streetcar transit?

Up to August 2004, there were over 60 development projects at various stages of construction, permitting or planning within 1/4 mile of the alignment that the streetcar is planned to operate, creating over 14,000 residential units and over 2.64 million square feet (0.245 million square meters) of office and retail development. This intensification of urban life in core areas of Miami requires a more urban transportation system. Because most of the street network in this area is restricted from expanding due to limited right-of-way or existing development, the City must explore other non-automobile options to accommodate the increasing transportation needs of this fast growing area. The streetcar will help relieve the daily use of automobiles and the demand for parking for short trips within the project study area.

Why can't Miami-Dade Transit just add more buses?

Miami-Dade Transit will be adding more buses as their entire system expands over the next several years, but these additional buses will not satisfy the need for frequent and reliable circulation in the Downtown Miami area. There are two key reasons why adding more buses will not work as well as the streetcar to meet circulation needs. First, the number of buses required to equal the capacity of one streetcar makes buses more expensive to operate and maintain. Second, examples show that streetcars attract choice riders, people who otherwise would not ride a bus, because of the convenience, comfort, attractiveness and reliability of the streetcar and thus, the streetcar increases the number of people who will use transit.



Portland, Oregon—streetcar in mixed traffic.

Can't we just expand the existing Miami-Dade Transit Metromover or Metrorail?

Yes. However, the elevated structure and platforms for the Metromover and Metrorail make expanding these transit systems more costly and time consuming options than building the streetcar system. Also, these systems are less accessible and less convenient for the short trips that streetcars frequently serve.

What other North American cities are using this type of modern streetcar transit?

The best examples of the modern streetcar system proposed for Miami are in Portland, Oregon and Tacoma, Washington. Other successful systems include Tampa, Florida; Toronto, Canada; San Francisco, California; and San Diego, California. Many more systems are in planning or construction, including: Washington, D.C.; Seattle, Washington; Atlanta, Georgia; and Winston-Salem, North Carolina.



Portland, Oregon—streetcar passengers.

How is this different from the Coral Gables Trolley?

The City of Coral Gables, Florida Trolley is a rubber tire, internal combustion mini-bus circulator with a vintage

exterior body style and interior appointments also consistent with the vintage styling, such as wooden bench seats. The proposed Miami Streetcar is a modern, overhead electrically powered rail vehicle. In addition to these external differences in size and appearance, the mini-bus circulator also has major differences in cost, passenger capacity, maintenance requirements and effect on economic development. Bus circulators like the Coral Gables Trolley service work very well in meeting modest transit demands in lower-intensity areas; for a more dense urban environment like Downtown Miami, a higher-capacity solution is needed.

Can the streetcar run along the Florida East Coast (FEC) Railway Corridor?

The streetcar vehicle does not meet the Federal Railroad Administration crash worthiness requirements that would allow it to operate on an active rail line such as the FEC Railway Corridor. In addition, the overhead power supply needs of the streetcar would also conflict with the vertical clearance requirements that the FEC establishes for overhead utilities. Although the proposed streetcar could run on the same sized rail as the freight trains that operate on the FEC Railway corridor, the foregoing factors preclude the operation of streetcar on the FEC Corridor. Most significantly, use of the FEC Railway Corridor is incompatible with the streetcar project since streetcars are an urban transit mode and need to be placed in pedestrian-oriented areas.

How will streetcars operate in mixed traffic? Won't this cause more traffic congestion?

The proposed streetcars will operate in a designated lane shared with other traffic in essentially the same manner that buses do today (buses will even be able to

use the streetcar stops, as shown in the photo). The driver of the streetcar can accelerate and brake to move along with traffic, but does not have to steer the vehicle because it runs along the rails embedded in the roadway surface. In addition, the driver will be provided with traffic signal controls, such as signal pre-emption that enables the streetcar to clear congested intersections and maintain schedule during heavy traffic. Streetcars will improve congestion because they can reduce the need for additional buses and will reduce automobile usage for short trips.



Portland, Oregon—bus at streetcar stop.

What impact will streetcars have on on-street parking?

On-street parking impacts will be minimal. Some existing on-street parking spaces may be needed to construct the loading platform at station stop locations. The size of the loading platform is equal to about two or three parking spaces for a single streetcar station stop such that the loss of parking is minimal.

Will the rails in the pavement be unsafe for bicyclists and pedestrians?

No. The typical concerns for bicyclists and pedestrians around the in-pavement rails are electric shock by the rail and wheel/foot entrapment in the pavement groove. The steel rails in the pavement are not electrified. The pavement groove that the streetcar wheel flange rides into is +/- 2 inches wide and does not present an issue for foot entrapment. The narrow groove does warrant caution to be exercised by bicyclists riding parallel with the track. There is potential for the front wheel of a bicycle to slip into the groove that could cause temporary loss of control. This issue is typically addressed with appropriate warning signage and the design of bicycle lanes to cross the tracks at an angle.

How much does streetcar transit cost compared to other types of transit options?

The capital cost for the proposed Miami Streetcar would fall between the costs of Bus Rapid Transit and Light Rail Transit at approximately \$26 million per mile (Capital) and \$110 per Revenue Service Hour (Operating) in year 2004 US dollars. It should be noted that the costs associated with any type of transit project vary by the size of the system, hours of operation and the complexity of physical and environmental issues that must be overcome to implement the system. Bus systems generally cost more to operate on a per passenger basis (since each bus carries fewer passengers per operator compared to rail systems), and have higher capital replacement costs, since the vehicles wear out much faster than rail vehicles.

How will the streetcar system be funded?

The detailed financial plan for funding capital and operating costs has not been fully defined at this initial feasibility stage. While several possible scenarios are feasible, it is anticipated that traditional state and federal transit funding sources, as well as locally generated funding sources will be used to fund the project. A next step in project implementation is a completed financial or business plan.

Will the overhead wires create visual clutter?

It is unlikely that overhead catenary wires would create visual clutter. This single wire can be obscured by landscaping and tree canopy along the roadway. In other cities where the streetcar corridor is established with buildings and landscaping, the overhead wires blend into the streetscape, and are not obtrusive on the downtown streetscape. Typically, the overhead power is supplied by a single electrified wire, and involves much less overhead hardware than is seen with electric trolleybus systems or light rail transit.



Portland, Oregon—streetcar at a stop.

How are the overhead wires affected by hurricane force winds?

All of the streetcar infrastructure is subject to the hurricane code requirements required for roadway utilities and would be affected similarly to any recently constructed above ground utility.