

DRAFT



Bay Link

Miami • Miami Beach Transportation Corridor Study
Supplemental Draft Environmental Impact Statement

Conceptual Alternatives

March 2002

Prepared for:



**Miami-Dade Metropolitan
Planning Organization**



**Parsons Brinckerhoff
Quade & Douglas, Inc.**

MIAMI-MIAMI BEACH TRANSPORTATION CORRIDOR STUDY



Draft Conceptual Alternatives Report (Task 4.3)

March 2002

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2.0 ALTERNATIVES CONSIDERED

2.1 PROJECT HISTORY AND OVERVIEW

The East-West Multimodal Corridor Study (E-WMCS) was a direct outgrowth of prior transportation planning activities in Miami-Dade County including the Florida Department of Transportation (FDOT) Master Plan for SR 836 and the City of Miami Beach sponsored Miami Beach Light Rail Transit System Feasibility Study. In 1993 the Metropolitan Planning Organization (MPO) conducted the Corridor Transitional Analysis which identified six priority transit corridors in Dade County. The analysis combined the SR 836 Master Plan Corridor and the Miami-Miami Beach Connector into a priority corridor. Based on the recommendations of the Transitional Analysis, the Federal Highway Administration (FHWA) elected to pursue a Major Investment Study (MIS) for the East-West Corridor.

On October 10, 1995, the Draft Environmental Impact Statement (DEIS) for the E-WMCS was executed by the Division Administrator of the FHWA and was subsequently advertised and carried through the public hearing process in accordance with the National Environmental Policy Act (NEPA) of 1969, as amended.

During the Tier 1 and Tier 2 analyses conducted as part of the E-WMCS, alternatives were evaluated based on the following general criteria:

- Travel demand forecasting
- Capital cost estimating
- Operating and maintenance cost estimating
- Right of way assessment
- Cost-effectiveness analysis
- Equity evaluation

Several goals and their associated objectives were adopted for use in evaluating alternatives for the E-WMC. An evaluation matrix was developed based on the criteria outlined in the goals and objectives and was used to help select alternatives for further evaluation. Table 2-1 lists the set of goals and objectives that were previously developed for the E-WMCS. The E-WMCS alternatives, discussed in some detail below, were ranked based on their capacity to fulfill the requirements of each goal and objective.

As a result of input received from the public during the scoping process, input from the Citizen's Advisory Committee (CAC) and the Project Technical Team (PTT), the Goals and Objectives from the E-WMCS have been updated for application in the evaluation of alternatives for the Bay Link Project. The resulting recommended modifications to the goals and objectives that reflect the specific purposes of the Miami-Miami Beach Transit Corridor are presented in Table 2-2. It is important to note that the overall purpose of the original E-WMCS remains unchanged. The modifications are those necessary to evaluate the changes in the Miami-Miami Beach segment of the original E-WMCS alternatives.

**Table 2-1
East-West Multimodal Corridor Study
Goals and Objectives**

Goal No.	Goals	Objectives
Goal 1	Develop a multimodal transportation system	<ul style="list-style-type: none"> • Improve transportation system accessibility and connectivity. • Reduce the time necessary to travel to the job market around the Airport for all modes of transportation. • Improve transportation for socially, economically and physically disadvantaged groups. • Reduce dependency on automobiles. • Improve safety. • Minimize future travel delays and congestion.
Goal 2	Improve the efficiency and safety of existing highway and transit facilities.	<ul style="list-style-type: none"> • Accommodate the existing and future traffic demand. • Provide accessible and safe route in event of evacuation. • Provide direct connection from Miami Beach to downtown and MIA.
Goal 3	Preserve social integrity of urban communities	<ul style="list-style-type: none"> • Minimize traffic impacts on local streets within the study area. • Minimize impacts during construction. • Minimize right-of-way requirements.
Goal 4	Plan for transportation projects that enhance the quality of the environment.	<ul style="list-style-type: none"> • Improve air quality by reducing automobile emissions and pollutants. • Protect sensitive areas such as wildlife habitats, wetlands, historic, and cultural sites. • Reduce traffic congestion.
Goal 5	Define a sound funding base	<ul style="list-style-type: none"> • Provide equitable transportation services and benefits to all geographic areas and constituencies. • Involve the community in the decision-making process by providing opportunities for public input. • Provide for equitable sharing of the costs of transportation improvements among those who benefit from them.
Goal 6	Provide for and enhance the efficient movement of freight.	<ul style="list-style-type: none"> • Improve the people-carrying capacity of the existing roadway and transit system.

**Table 2-2
Modified Baylink Study Goals and Objectives**

Goal No.	Goals	Objectives
Goal 1	Develop a multimodal transportation system	<ul style="list-style-type: none"> • Improve transportation system accessibility and connectivity. • Reduce the time necessary to travel to the job markets in Miami, South Miami Beach, the Airport (MIA) and the region at-large for all modes of transportation. • Improve transportation options for socially, economically and physically disadvantaged groups. • Reduce dependency on automobiles. • Provide an alternative to highway travel delays and congestion.
Goal 2	Improve the efficiency and safety of existing transportation facilities.	<ul style="list-style-type: none"> • Provide direct transit connection from Miami Beach to Miami and MIA. • Provide area residents with enhanced transit options for a variety of trips within the corridor. • Provide a connection between two of South Florida's highest concentrations of residential and commercial activities. • Provide a safe, reliable, and secure transit service. • Add capacity to the MacArthur Causeway and an alternative mode for evacuation.
Goal 3	Preserve social integrity of urban communities	<ul style="list-style-type: none"> • Connect high volume pedestrian activity centers. • Serve existing and future high-density residential populations in Miami and Miami Beach. • Provide transit investment supportive of Miami and Miami Beach development and land use plans. • Minimize traffic impacts on local streets within the study area. • Minimize impacts during construction. • Minimize right-of-way requirements.
Goal 4	Plan for transportation projects that enhance the quality of the environment.	<ul style="list-style-type: none"> • Improve air quality by reducing automobile emissions and pollutants. • Protect sensitive areas such as wildlife habitats, wetlands, historic, and cultural sites. • Provide a transit option to mitigate the excessive parking demand in downtown Miami and Miami Beach.
Goal 5	Define a sound funding base	<ul style="list-style-type: none"> • Provide equitable transportation services and benefits to all geographic areas and constituencies. • Provide for equitable sharing of the costs of transportation improvements among those who benefit from them. • Provide a high quality connection between hotels, activity centers, transit attractions, and the Miami Beach Convention Center. • Maximize the economic benefits gained from transit capital investments.

2.2 ALTERNATIVES CONSIDERED UNDER EAST-WEST MULTIMODAL CORRIDOR STUDY

During the alternatives development phase of the E-WMCS, thirteen alternatives were identified. These alternatives consisted of six base alignments with a number of segment options as shown in Table 2-3. A three-tier evaluation process was used to assess the alternatives. As a result of the Tier 1 and Tier 2 evaluations, four alternatives and six segment options were identified for evaluation (Figure 2-1) in the DEIS, including the No-Build and Transportation System Management (TSM) alternatives. The selected alternatives include:

- Alternative 1: No-Build
- Alternative 2: TSM
- Alternative 3d: Expressway widening (6 general-purpose + 2 HOV lanes that extend to SR 112)
- Alternative 6a: SR 836 rail transit
- Alternative 6c(1): Base rail alignment + 2 HOV lanes to SR 112
- Alternative 6c(2): Through service to Miami Beach option + 2 HOV lanes to SR 112
- Alternative 6c(8): CSX/NW 7th Avenue option + + 2 HOV lanes to SR 112
- Alternative 6c(9): CSX/NW 22nd Street/FEC Railway option + + 2 HOV lanes to SR 112
- Alternative 6c(10): CBD tunnel option + 2 HOV lanes to SR 112
- Alternative 6c(13): Miami Beach loop option + 2 HOV lanes to SR 112

2.2.1 No-Build Alternative

The No-Build Alternative includes existing highway and transit facilities and services and those transit and highway improvements planned and programmed to be implemented by the study year. This alternative provides the baseline for establishing the environmental impacts of the project, and assumes the following projects will be completed:

- Extension of the Stage I Metrorail Line to a new station just west of the Palmetto Expressway with a new park-and-ride facility at that location.
- Extension of Tri-Rail to the MIC site including station improvements.
- Construction of the South Dade Busway.
- A new four-lane roadway and movable span bridge along NW 32nd and NW 37th Avenues between NW 21st Street and North River Drive.
- Extension of NW 12th Street on the north side of SR 836 from NW 87th Avenue to NW 104th Avenue including adding two lanes for a total of four lanes.
- Committed ramp improvement in the I-195 and NW 2nd Avenue interchange.

**Table 2-3
Alternatives and Options Evaluated in Each Tier**

Alternative	General Description	Initial Set	Tier 1	Tier 2	Tier 3
1	No-Build	1	1	1	No-Build
2	Transportation Systems Management (TSM)	2	2	2	
3a	Expressway Widening: 10 General-Purpose Lanes	3a	3a		
3b	Expressway Widening: 4 Barrier-Separated HOV Lanes		3b		
3c	Expressway Widening: 2 Buffer-Separated HOV Lanes To I-95		3c		
3d	Expressway Widening: 2 Buffer-Separated HOV Lanes To SR 112		3d	3d	
4a	Expressway Widening: 6 Elevated Express Multi-Use Lanes	4a	4a		
4b	Expressway Widening: 4 Elevated Express HOV Lanes		4b		
5	Rail Transit Via Earlington Heights + 2 Buffer HOV Lanes To I-95 + Highway Improvements	5	5		
6a	Rail Transit Via SR 836 + Highway Improvements	6	6a	6a	
6b	Rail Transit Via SR 836 + 2 Buffer-Separated HOV Lanes To I-95 + Highway Improvements		6b		
6c(1)	SR 836 Multimodal Alternative (Base Rail Alignment, 2 HOV Lanes To SR 112) + Highway Improvements		6c(1)	6c(1)	
6c(2)	SR 836 Multimodal Alternative (Base Rail Alignment With Through Service Via Downtown Connection, 2 HOV Lanes To SR 112) + Highway Improvements		6c(2)	6c(2)	
6c(3)	SR 836 Multimodal Alternative (Base Rail Alignment With 6th Street Option, 2 HOV Lanes To SR 112) + Highway Improvements		6c(3)		
6c(4)	SR 836 Multimodal Alternative (Base Rail Alignment With Miami River Option, 2 HOV Lanes To SR 112) + Highway Improvements		6c(4)		
6c(5)	SR 836 Multimodal Alternative (Base Rail Alignment With Culmer/I-95 Option, 2 HOV Lanes To SR 112) + Highway Improvements		6c(5)		
6c(6)	SR 836 Multimodal Alternative (Base Rail Alignment With 11th Street Option, 2 HOV Lanes To SR 112) + Highway Improvements		6c(6)		
6c(7)	SR 836 Multimodal Alternative (Base Rail Alignment With Civic Center Option, 2 HOV Lanes To SR 112) + Highway Improvements		6c(7)		
6c(8)	SR 836 Multimodal Alternative (Base Rail Alignment With CSX/NW 7th Avenue Option, 2 HOV Lanes To SR 112) + Highway Improvements		6c(8)	6c(8)	
6c(9)	SR 836 Multimodal Alternative (Base Rail Alignment With CSX/NW 22nd Street/FEC Railway Option, 2 HOV Lanes To SR 112) + Highway Improvements		6c(9)	6c(9)	
6c(10)	SR 836 Multimodal Alternative (Base Rail Alignment With CBD (Central Business District) Tunnel Option, 2 HOV Lanes To SR 112) + Highway Improvements		6c(10)	6c(10)	LPA (MOS)
6c(11)	SR 836 Multimodal Alternative (Base Rail Alignment With CSX/CBD Tunnel Option, 2 HOV Lanes To SR 112) + Highway Improvements		6c(11)		
6c(12)	SR 836 Multimodal Alternative (Base Rail Alignment With Government Cut Option, 2 HOV Lanes To SR 112) + Highway Improvements		6c(12)		
6c(13)	SR 836 Multimodal Alternative (Base Rail Alignment With Miami Beach Loop Option, 2 HOV Lanes To SR 112) + Highway Improvements		6c(13)	6c(13)	
7	Rail Transit Via Flagler Street + 2 Buffer-Separated HOV Lanes + Highway Improvements	7	7		
Minimum Operable Segment (MOS) A	Rail Transit Via SR 836 From SR 826 To Port + 2 Buffer-Separated HOV Lanes + Highway Improvements			MOS A	
MOS B	Rail Transit Via SR 836 From MIC To Port + 2 Buffer-Separated HOV Lanes + Highway Improvements			MOS B	



- 

Figure 2-1 E-WMCS Tier 2 Alternatives

- Addition of one lane in each direction on SR 826, north and south of SR 836, including modifications to the existing NW 25th Street interchange.
- Relocation of the southbound to westbound ramp at the Le Jeune Road interchange and addition of two new ramps at NW 45th Avenue.
- Widening of NW 36th Street to six lanes between NW 77th and NW 87th Avenues.
- Widening of NW 72nd Avenue to six lanes between NW 25th and NW 74th Streets.
- Widening of NW 7th Street to five lanes between NW 57th Avenue and NW 60th Court.
- Widening of NW 25th Street between SR 826 and NW 69th Avenue near the West Cargo area of MIA.
- Widening of SW 117th Avenue to four lanes from SW 40th to SW 8th Streets.

2.2.2 TSM Alternative

The TSM Alternative comprises low-cost, operationally oriented improvements to address the identified transportation problems in the corridor. It also provides a baseline against which all of the build alternatives are evaluated. Key elements in the TSM Alternative for the E-WMCS include improved bus transit services, new park-and-ride facilities, and relatively low-cost operational improvements on SR 836.

A year 2020 bus service plan developed for the TSM Alternative included new transit centers, new express routes, new circulator routes in western Miami-Dade, and the retention of existing western Miami-Dade, Crosstown, and Miami Beach service with minimal modification. Such modification could include slight route deviations to feed into transit centers. Transit centers proposed under the TSM plan are as follows:

- Vicinity of SW 137th Avenue and SW 26th Street
- FIU
- International Mall
- Westchester Shopping Center
- Coral Gables Bus Terminal (existing)
- Mall of the Americas
- MIC
- Mt. Sinai Hospital on Miami Beach

Except for the Coral Gables, MIC, and Mt. Sinai locations, the centers will feature park-and-ride lots for transit patrons.

Highway operational improvements are included on SR 836 between NW 107th and NW 17th Avenues in order to correct existing geometric deficiencies. The additional lanes are considered auxiliary lanes to the existing six through lanes. These improvements,

plus the additional operational improvements presented under Alternative 3, are also included in the build alternatives (3d through 6c). Operational improvements on SR 836 included in the TSM Alternative include the improvements described in Table 2-4.

**Table 2-4
TSM Highway Improvements**

Study Description	Deficiency Addressed
NW 107th to NW 87th Avenue Add one westbound lane	Lane drop, weaving and lane balance problem
NW 87th Avenue Interchange Add one lane to the eastbound exit ramp; create triple left turn to northbound NW 87th Avenue	Accommodates high volume morning movement from west to north
NW 72nd to NW 57th Avenue Add one auxiliary lane in each direction	Eases major bottleneck caused by merging 5 eastbound lanes into 3
NW 57th to NW 45th Avenue Add 1 auxiliary lane in the eastbound direction	Joins on-ramp from NW 57th Avenue to new exit ramp to NW 45th Avenue
SR 836/Le Jeune Road Interchange Reconfigure northbound to westbound ramp to left side of SR 836 Combine eastbound to northbound exit ramp with southbound ramp to make a right side exit Extend eastbound entrance ramp from Le Jeune Road Reconfigure westbound to southbound exit ramp as right side exit Provide right side entrance ramp to SR 836 westbound	Removes left side entrance onto SR 836 Removes left side exit ramp from SR 836 Provides longer acceleration and merge distance Removes left side exit ramp from SR 836 Removes left side entrance onto SR 836

2.2.3 Base Rail Alignment

Alternatives 6c(2) and 6c(13) included service from Miami across MacArthur Causeway, to the Miami Beach Convention Center. The following is a description of the base rail alignment that was used for comparison of other options. The base East-West Line began at Florida International University (FIU) followed the east side of the Turnpike and generally paralleled the south side of SR 836 to Le Jeune Road. It then turned north along the west side of Le Jeune Road to the MIC. From the MIC, it followed the south side of the Miami River parallel to South River Drive and the east side of NW 27th Avenue before turning east along the north side of SR 836. At NW 22nd Avenue the alignment crosses SR 836 and transitions south to the south side of NW 7th Street. The alignment continues along the south side of NW 7th Street to the Miami River and shifts south to follow the south side of NW 5th Street to I-95, then transitions north to align with the Florida East Coast (FEC) Railway between NW 6th and NW 7th Streets. It continues

along the FEC right-of-way and crosses to the Port of Miami where it serves individual cruise ship terminals.

The Miami Beach Line began at Flagler Street on Biscayne Boulevard and followed the median of Biscayne Boulevard to the MacArthur Causeway. The line continued along the south side of the Causeway to Miami Beach where it turned south to 1st Street, then north on Washington Avenue to the Miami Beach Convention Center at 20th Street. A transfer between the East-West Rapid Rail and Miami Beach Light Rail lines was provided at Freedom Tower in downtown Miami.

2.3 SUPPLEMENTARY ALTERNATIVES TO BE CONSIDERED

The Miami-Miami Beach segment of the original E-WMCS is the focus of the current Miami-Miami Beach Transportation Corridor Bay-Link Study. The review, assessment and documentation of the differences in the original DEIS and the Bay Link Study alternative alignments is the purpose of this supplemental DEIS.

The following sections describe the current alignments and any significant differences in the Bay Link and E-WMCS alternatives. The design year for the E-WMCS was 2020 and will be extended to 2025 for this supplementary analysis.

2.3.1 No-Build Alternative

The No-Build Alternative includes the existing highway and transit facilities and services and those transit and highway improvements planned and programmed to be implemented by the study design year (2020). The electric powered buses (Electrowave) operating on Miami Beach as a local circulator system were specifically identified in the E-WMCS DEIS as a part of the No-Build Alternative.

The existing MDT bus system serving the study area will remain in tact. The majority of the MDT bus routes operate through the study area, following the grid system of the road network. Many of the routes feed into two transit hubs in the downtown Miami area – the Omni Bus Terminal and the Downtown Terminal at NW 1st Avenue and West Flagler Street. Table 2-5 provides a summary of the routes that operate in the corridor.

**Table 2-5
MDT Bus Routes in Study Area**

Route #	Frequency	Connects
2	<ul style="list-style-type: none"> • 15 min. during peak hours • 20 min. off-peak hours 	163 rd Street Mall to downtown bus terminal
3	<ul style="list-style-type: none"> • 20 min. during peak hours • 45 min. during off- peak 	Aventura to downtown bus terminal
6	<ul style="list-style-type: none"> • Hourly 	South Bayshore Drive to downtown Metromover
7	<ul style="list-style-type: none"> • 20 min. during peak hours • 30 min. off-peak 	Sweetwater to Overtown Station
8	<ul style="list-style-type: none"> • 15 min. during peak hours • 10 min. off-peak 	FIU to Government Center Station
9	<ul style="list-style-type: none"> • 10 min. during peak hours • 20 min. off-peak 	Aventura to downtown bus terminal
10	<ul style="list-style-type: none"> • 40 min. during peak hours • 30 min. off-peak 	North Miami Beach to downtown bus terminal
11	<ul style="list-style-type: none"> • 7 min. during peak hours • 15 min. during off peak 	FIU to Government Center station
16	<ul style="list-style-type: none"> • 20 min. during peak hours • 30 min. off-peak hours 	North Miami Beach to downtown bus terminal
21	<ul style="list-style-type: none"> • 30 min. all day 	Opa-locka to downtown bus terminal
24	<ul style="list-style-type: none"> • 30 min. all day 	SW 137th Avenue to Government Center Station
32	<ul style="list-style-type: none"> • 20 min during peak hours • 30 min during off-peak hours 	St. Thomas University to Omni bus terminal.
36	<ul style="list-style-type: none"> • 15 min during peak hours • 30 min. during off- peak hours 	Koger Office Park to Omni bus terminal
48	<ul style="list-style-type: none"> • Hourly 	South Miami to Mercy Hospital to Omni International Mall
62	<ul style="list-style-type: none"> • 15 min all day 	Hialeah to Omni to Miami Beach
77	<ul style="list-style-type: none"> • 10 min. during peak hours • 15 min off-peak 	Golden Glades to downtown bus terminal
95X	<ul style="list-style-type: none"> • 5 min. during peak period 	Golden Glades to downtown Miami
A	<ul style="list-style-type: none"> • 20 min. all day 	Lincoln Road to Omni bus terminal
B	<ul style="list-style-type: none"> • 30 min. all day 	Key Biscayne to Government Center station
C	<ul style="list-style-type: none"> • 20 min during peak hours • 30 min during off-peak hours 	Mt. Sinai Hospital to downtown bus terminal
H	<ul style="list-style-type: none"> • 20 min during peak hours • 30 min during off-peak hours 	Bal Harbor to South Beach
J	<ul style="list-style-type: none"> • 20 min. during peak hours • 30 min. during off- peak hours 	NW 36th Street to MIA to Miami Beach
K	<ul style="list-style-type: none"> • 20 min during peak hours • 30 min during off-peak hours 	Omni bus terminal to Haulover marina to Diplomat Mall (Broward County)
L	<ul style="list-style-type: none"> • 20 min. all day 	Hialeah Metrorail Station to Collins Avenue to Meridian Avenue
M	<ul style="list-style-type: none"> • 30 min. all day 	Civic Center Station to Omni bus terminal to Mt. Sinai Hospital
R	<ul style="list-style-type: none"> • Hourly 	Mt. Sinai Hospital to South Beach
S	<ul style="list-style-type: none"> • 10 min. all day 	Aventura to Miami Beach to downtown bus terminal
T	<ul style="list-style-type: none"> • 30 min. all day 	Haulover Marina to downtown bus terminal
W	<ul style="list-style-type: none"> • 24 min. all day 	South Beach to Miami Beach Convention Center
Biscayne Max	<ul style="list-style-type: none"> • 15 min. during peak periods 	Downtown Miami to Omni Metromover Station to Aventura Mall
Flagler Max	<ul style="list-style-type: none"> • 15 min. during peak periods 	Flagler Street to Government Center Station to Convention Center
Riverside Shuttle	<ul style="list-style-type: none"> • 15 min peak only 	Riverside Center to Government Center
Seaport Connection	<ul style="list-style-type: none"> • 15 min. weekdays • 30 min. weekends 	Downtown Miami (Government Center) to Seaport Terminal

The 2020 No-Build Alternative includes the following projects from the cost feasible portion of the Miami-Dade MPO 2025 Long Range Transportation Plan.

Priority 1 (Timeframe 2006-2010)

- Flagler Marketplace Passenger Activity center.
- Earlington Heights Airport Connection – Premium Transit.
- Construction of Express Lanes on SR 836 between NW 107th and NW 37th Avenue.

Priority 2 (Timeframe 2011-2015)

- Northeast Dade Transit Corridor – Premium Transit.
- North Miami-Dade Transit Corridor – Premium Transit from MLK to Broward County Line.
- Kendall Corridor – Premium Transit.

Priority 3 (Timeframe 2016-2020)

- I-95 Convert HOV to reversible HOV/HOT Lanes
- I-395 Add Lanes/C-D Roads
- I-95 – SR 836 Interchange Improvements
- Central Parkway Connect SR 826 to SR 112
- SR 826/ SR 836 Major Interchange Improvements

2.3.2 Baseline Alternative

The Bay Link Project connects the two densest activity centers in the region. Over 800 MDT buses, the Metrorail RRT, the Metromover AGT and the Miami Beach Electrowave buses provide transit service in the study area over an extensive network of streets, major arterials and highways. As a result the Baseline Alternative is proposed to be the same as the No-Build Alternative described in section 2.3.1 above.

At the time the DEIS was prepared for the E-WMCS, the TSM alternative consisted of highway improvements along SR 836. The improvements included:

- Adding a westbound lane to SR 836 between NW 87th Avenue and NW 107th Avenue.
- Adding a lane to the eastbound exit ramp at the NW 87th Avenue interchange.
- Adding a lane in both directions between NW 72nd Avenue and NW 57th Avenue.

These improvements have subsequently been completed and are now part of the No-Build Alternative.

As indicated by a comparison of the E-WMCS alternatives presented above and the graphics for the Bay Link alternatives incorporated in the descriptions that follow in this

section, there are some highlighted differences in the alignments. The differences are necessary to complete connections to the existing Metrorail and Metromover systems in downtown Miami, provide connections to a potential new sight for the yard and shop facility and provide some routing alternatives to accommodate changes in service needs in Miami and Miami Beach.

The resulting changes still reflect the application of basic at-grade LRT (or BRT) service that was analyzed and evaluated in the E-WMCS DEIS. The primary focus of the supplemental analysis will be in the areas of traffic impacts, parking impacts, impacts on any additional sensitive receptors, urban form and construction impacts.

2.3.3 Light Rail Alternatives

The Light Rail Alternatives are made up of a Downtown Miami and a Miami Beach segment and are connected by the MacArthur Causeway segment common to any alternative. The segments in downtown Miami and on Miami Beach were developed so that they could be joined in any combination. For identification purposes the segments between Metrorail and Bicentennial Station are identified as segment A with each of the three variations within downtown Miami identified as A-1 through A-3. Likewise, the portion of the line from just east of Terminal Island to the Miami Beach Convention Center is termed as segment B with the variations within the Miami Beach area identified as B-1 through B-3. The MacArthur Causeway Segment, which is common to the downtown Miami alternatives (A-1, A-2 and A-3) and Miami-Beach alternatives (B-1, B-2 and B-3), has been called C-1. The specific alignment layout and track placement for these light rail alternatives are shown in the Conceptual Engineering Drawings. Graphic representations of the segments are reflected in Figures 2-2 through 2-9.

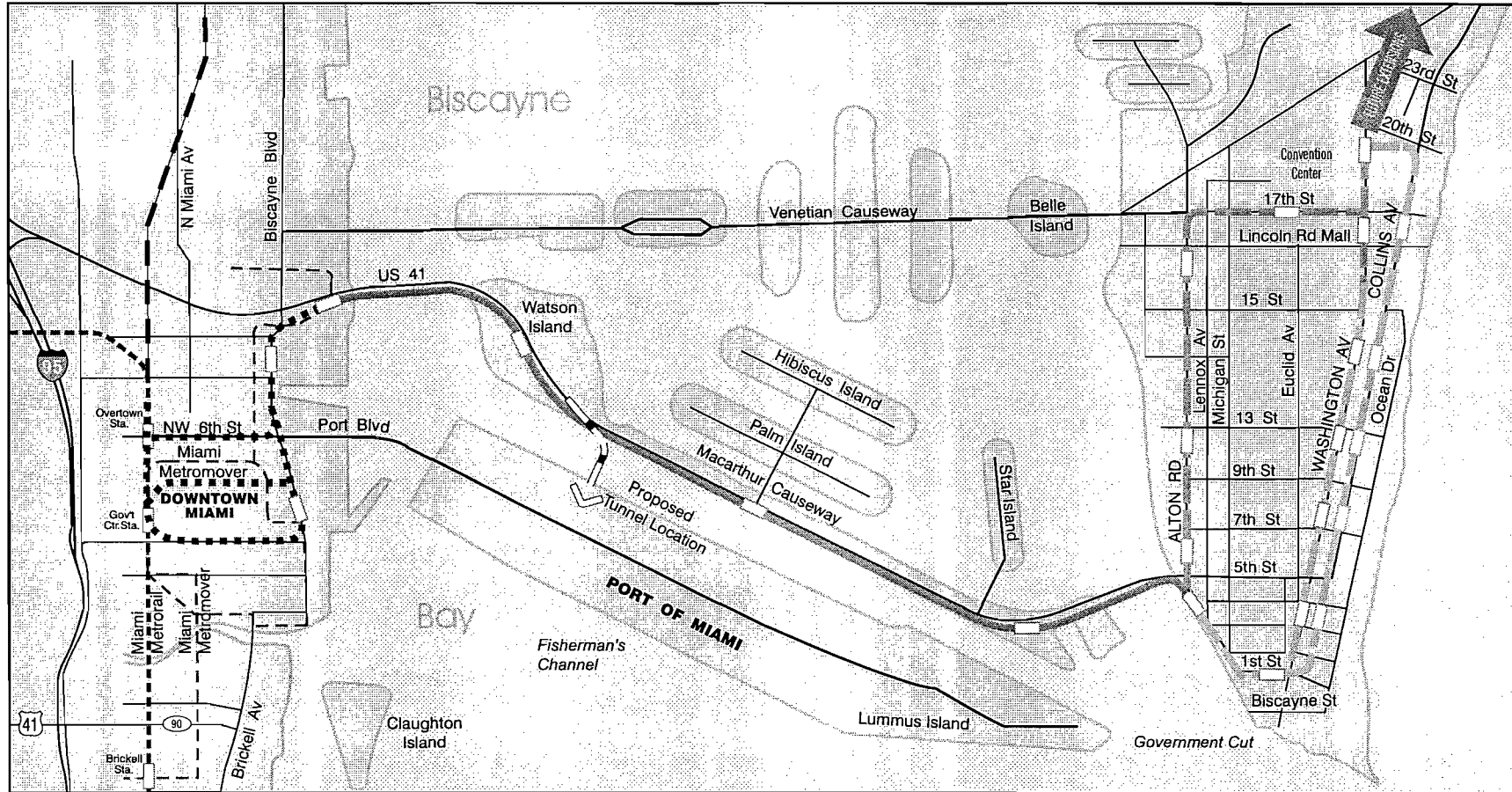
It is anticipated that the LRT system would operate in two car consist during the peak periods on 5-minute headways. Single car trains would be operated on 5-minute, or longer, headways during the middle of the service day with longer headways during off-peak periods. The operating plan assumptions will be modified as necessary to reflect the results of the patronage forecast.

Table 2-6 shows the combined travel times for the various combinations of alternative segments.

Table 2-6
Combined Travel Time ⁽¹⁾

From Government Center to Convention Center								
A-1 + B-1	A-1 + B-2	A-1 + B-3	A-2 + B-1	A-2 + B-2	A-2 + B-3	A-3 + B-1	A-3 + B-2	A-3 + B-3
22.45	25.6	23.3	22.95	26.1	23.8	21.45	24.6	22.3
From Convention Center to Government Center								
A-1 + B-1	A-1 + B-2	A-1 + B-3	A-2 + B-1	A-2 + B-2	A-2 + B-3	A-3 + B-1	A-3 + B-2	A-3 + B-3
22.45	23.95	23.3	21.65	21.65	21.0	20.75	21.4	20.75

(1) All combination inclusive of C-1



LEGEND

- Downtown Miami Alternatives (A-1, A-2, A-3)
- MacArthur Segment (C-1)
- Miami Beach Alternatives (B-1, B-2, B-3)
- Station Area
- Metro Rail
- - - Metro Mover



Figure 2-2
E-WMCS Miami - Miami Beach Segment

The proposed maintenance facility and storage yard site is located west of the FEC Railroad right-of-way to the north of Downtown Miami between NW 14th Street and NW 17th Street. The maintenance facility site is common to all the alternatives.

The differences in geographical coverage in this and the E-WMCS Alternative are the connections provided from Biscayne Boulevard to the Metrorail and Metromover stations at Government Center and Overtown. This connection was made by the RRT line from the airport to the Port of Miami in the E-WMCS. The supplement will address the potential impacts of extending the at-grade LRT segment from Biscayne Boulevard along Flagler Street, NW 1st Avenue and NE 8th Street as well as the connection to, and location of, the proposed yard and shop site(s).

2.3.3.1 Downtown Miami Light Rail Alternatives (A-1, A-2 and A-3)

The original Miami-Miami Beach segment of the E-WMCS terminated on Biscayne Boulevard at Bayfront Park on the west side of the Miami Central Business District. It was connected to the existing Metrorail and Metromover systems and airport by the proposed new East-West rapid rail line (Figure 2-2). The Bay Link Study proposes to complete the connection to Metrorail, the Metromover and the airport by extending the Biscayne Boulevard alignment and providing an at-grade connection to the existing services at Government Center. The Government Center Station will be served by a bus every 1.2 minutes during the peak period as well as a Metrorail train every 5 minutes and a metromover vehicle every 90 seconds. The alternative alignment segments and technology options for providing the services are described in detail in this section.

Alternative A-1

Alternative A provides two-way LRT operations between the Overtown Metrorail/Metromover stations and Miami Beach. As seen in Figure 2-3 the alignment appears to be a large hook. This alternative is approximately 5.2 route miles in length. It is estimated that the running time from Government Center to Terminal Island is 12.8 minutes and because this alternative is two-way, the running time from Terminal Island to Government Center is the same.

This alternative begins on dual tracks just north of the Miami Arena and east of the existing Metromover to continue southward within an exclusive right-of-way until an eastward turn takes the tracks onto Flagler Street. The tracks run eastward along the center of Flagler Street to Biscayne Boulevard where they take a northerly turn. Along Flagler Street the LRT system will operate in mixed traffic with automobiles and buses or in a transit/pedestrian mall with buses.

The following downtown stations will be fed by local bus service.

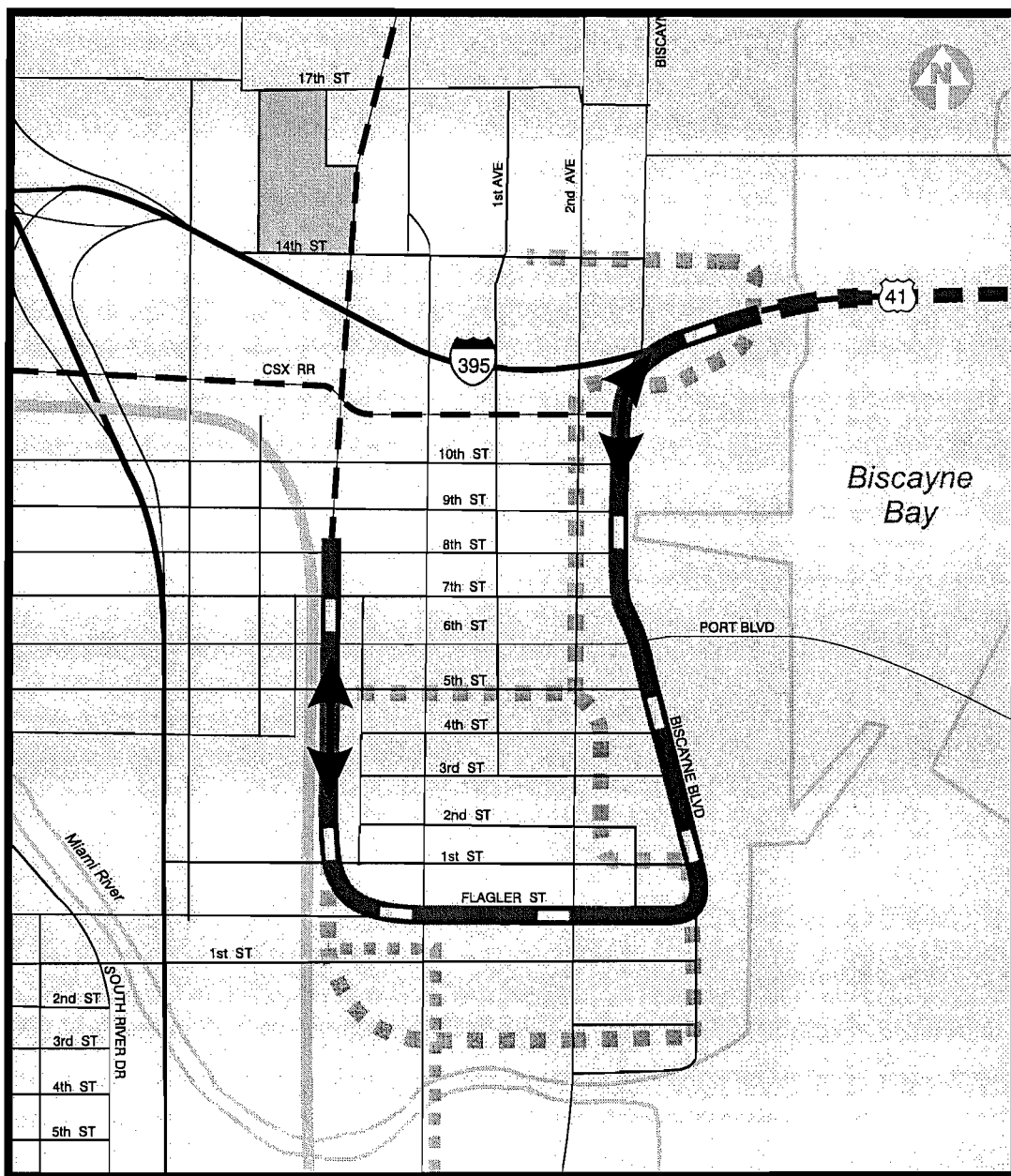
Station	Bus Routes
Overtown	7
Government Center	2, 3, 7, 8, 9, 10, 11, 16, 77, Biscayne Max, Flagler Max
Miami Avenue	6,

Bayside	48, 95X,
Arena	3, 16, 21, 24, Biscayne Max
Bicentennial Park	32, 36, F/M

Table 2-7 outlines the stations proposed for this alignment. The only local bus modification with this alignment is the Flagler Max, which is turned back at Government Center rather than continuing on to Miami Beach.



BAY LINK STUDY: SUPPLEMENTAL DEIS



LEGEND

- Segment A Alignment
- Segment C Alignment
- Metrorail
- Miami Metromover
- Station
- Yard & Shop Site

The following downtown stations will be fed by local bus service.

Station	Bus Routes
Overtown	7
Government Center	2, 3, 7, 8, 9, 10, 11, 16, 77, Biscayne Max, Flagler Max
Miami Avenue	6,
Bayside	48, 95X,
Arena	3, 16, 21, 24, Biscayne Max
Bicentennial Park	32, 36, F/M

**Table 2-7
LRT A-1 Stations**

NW 1st Avenue	<ul style="list-style-type: none"> • Overtown Station – Center platform north of NW 6th Street. Access to Metrorail. • Government Center Station – Center platform station north of NW 1st Street. Access to Metrorail and Metromover.
Biscayne Boulevard	<ul style="list-style-type: none"> • Bayfront Station - Curbside platform station on Biscayne Boulevard north of NE 1st Street. Walk access to Metromover. • Bayside Station - Curbside platform station on Biscayne Boulevard north of NE 4th Street. Walk access to Metromover. • Arena Station – Curbside platform station on Biscayne Boulevard north of NE 8th Street. Walk access to Metromover.
Flagler Street	<ul style="list-style-type: none"> • Miami Avenue Station – Curbside platform on Flagler Street west of Miami Avenue. Walk access to Metromover • 2nd Avenue Station – Curbside platform station on Flagler Street west of 2nd Avenue. • Bicentennial Park / Performing Arts Center Station - Center platform station north of NE 11th Street on the north end of Bicentennial Park. Pedestrian bridge from station over I-395 to Performing Arts Center. Access to Metromover.

The differences in geographic coverage in this and the E-WMCS Alternative are the connections provided from Biscayne Boulevard to the Metrorail and Metromover stations at Government Center and Overtown. The supplement will address the analysis of potential impacts along Flagler Street and the extension of the line to the north to reach the Government Center and Overtown stations as well as the proposed new yard and shop site.

Alternative A-2

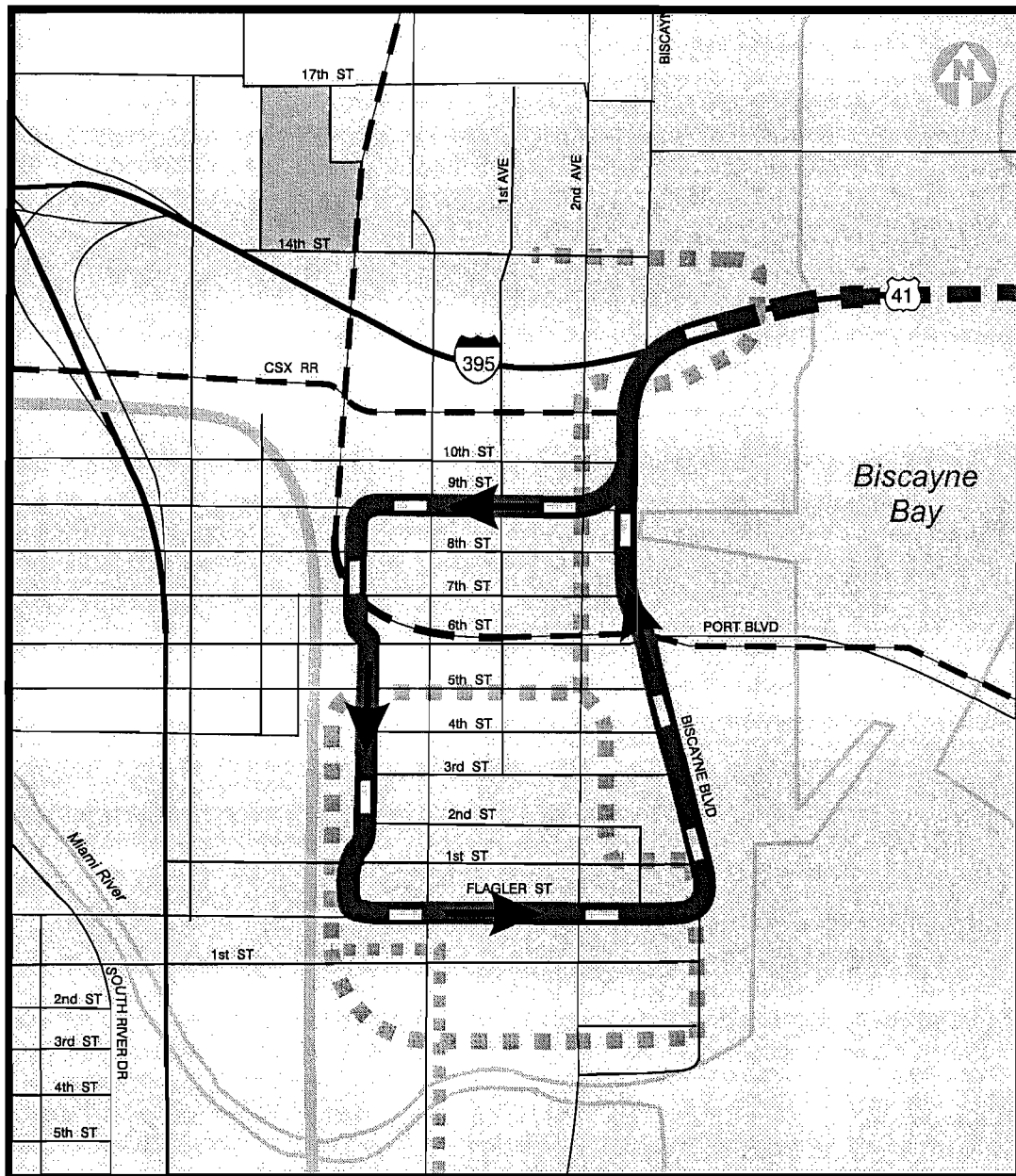
Alternative A-2 operates as a large counter-clockwise one-way loop through downtown Miami. The tracks converge south of the Bicentennial/Performing Arts Station and then run as a dual trackway across the MacArthur Causeway to Miami Beach (Figure 2-4). The alignment is 5.6 route miles in length. The running time from Government Center to Terminal Island is 13.3 minutes and the running time from Terminal Island to Government Center is 10.5 minutes. This alternative begins on a curve just north of NE 9th Street and east of Biscayne Boulevard with the single westbound track running along the north side of NE 9th Street. The track continues curbside along NE/NW 9th Street, then turns to the south on NW 1st Avenue.

The southbound track runs curbside until it crosses NW 8th Street to continue within an exclusive right-of-way for a short distance to the north of NW 6th Street, where it angles to the left for realignment with the curbside of NW 1st Avenue. The track continues in a southerly direction along the curbside of NW 1st Avenue until it turns east onto Flagler Street to travel curbside to Biscayne Boulevard. At Biscayne Boulevard, the track turns northward onto the eastern side of the Boulevard to travel north curbside until NE 9th Street where the track angles to the right to converge the west bound track in an exclusive right-of-way starting north of NE 9th Street and East of Biscayne Boulevard. Table 2-8 outlines the stations proposed for this alignment.

**Table 2-8
LRT A-2 Stations**

NE 9th Street	<ul style="list-style-type: none"> • Park West Station – Curbside platform west of NE 2nd Avenue. Walk access to Metromover. • 9th Street Station – Curbside platform west of Miami Avenue.
Biscayne Boulevard	<ul style="list-style-type: none"> • Bicentennial Park / Performing Arts Center Station - Center platform station north of NE 11th Street on the north end of Bicentennial Park. Pedestrian bridge from station to Performing Arts Center. Access to Metromover. • Bayfront Station - Curbside platform station on Biscayne Boulevard north of NE 1st Street. Walk access to Metromover • Bayside Station - Curbside platform station on Biscayne Boulevard north of NE 4th Street. Walk access to Metromover. • Arena Station – Curbside platform station on Biscayne Boulevard north of NE 8th Street. Walk access to Metromover
NW 1st Street	<ul style="list-style-type: none"> • Overtown Station – Side platform south of NW 7th Street. Access to Metrorail. • Government Center Station – Side platform station north of NW 2nd Street. Access to Metrorail and Metromover
Flagler Street	<ul style="list-style-type: none"> • Miami Avenue Station – Curbside platform on Flagler Street west of Miami Avenue. Walk access to Metromover. • 2nd Avenue Station – Curbside platform station on Flagler Street east of 2nd Avenue.

BAY LINK STUDY, SUPPLEMENTAL DEIS



LEGEND

- Segment A Alignment
- Segment C Alignment
- Metrorail
- Miami Metromover
- Station
- Yard & Shop Site

The only local bus modification with this alignment is the Flagler Max, which is turned back at Government Center rather than continuing on to Miami Beach.

The following downtown stations will be fed by existing local bus service operated in mixed flow traffic.

Station	Bus Routes
Overtown	7
Government Center	2, 3, 7, 8, 9, 10, 11, 16, 77, Biscayne Max, Flagler Max
Miami Avenue	6,
Bayside	48, 95X,
Arena	3, 16, 21, 24, Biscayne Max
Bicentennial Park	32, 36, F/M

Alternative A-3

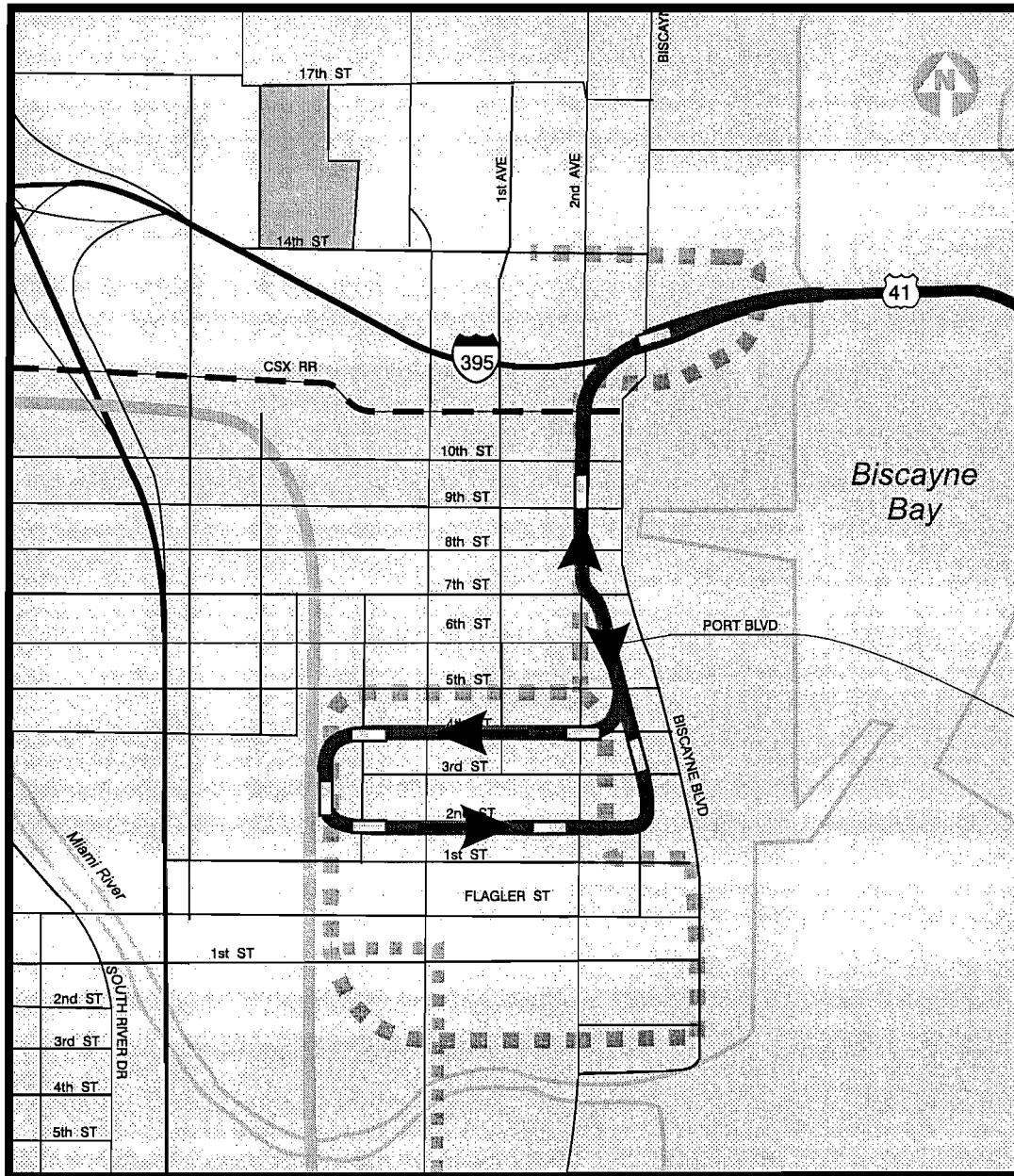
This alternative operates on a one-way loop counter-clockwise along NE 4th Street and NE 2nd Street with the remainder of the route operating bi-directional along Biscayne Boulevard to just east of the Bicentennial / Performing Arts Center Station (Figure 2-5). This alternative is approximately 5.3 route miles in length. The running time from Government Center to Terminal Island is 11.8 minutes and the running time from Terminal Island to Government Center is 10.3 minutes.

The alignment begins with a westerly curve from Biscayne Boulevard to NE 4th Street where the track runs to the west against the north side of 4th Street. The line continues one-way running and curves to south on NW 1st Avenue. The line curves to the east and runs one-way along the south side of 2nd Street to Biscayne Boulevard.

The northbound track runs along the eastern curb face between NE 2nd Street and NE 9th Street and the southbound track runs along the western curbface between NE 9th Street and NE 4th Street. North of 9th Street the tracks merge and run parallel on the east of Biscayne Boulevard following the perimeter of Bicentennial Park then along the south side of the MacArthur Causeway to Terminal Island. Table 2-9 outlines the stations proposed for this alignment.

The only local bus modification with this alignment is the Flagler Max, which is turned back at Government Center rather than continuing on to Miami Beach.

BAY LINK STUDY, SUPPLEMENTAL DEIS



LEGEND

- Segment A Alignment
- Segment C Alignment
- Metrorail
- Miami Metromover
- Station
- Yard & Shop Site

**Table 2-9
LRT A-3 Stations**

NE 4th Street	<ul style="list-style-type: none"> College Station – Curbside platform west of NE 2nd Avenue. Access to Metromover. Federal Center Station – Curbside platform west of Miami Avenue. Walk Access to Metromover.
NW 1st Avenue	<ul style="list-style-type: none"> Government Center Station – Side platform station north of NW 2nd Street. Access to Metrorail and Metromover.
NE 2nd Street	<ul style="list-style-type: none"> Miami Avenue Station – Curbside platform west of Miami Avenue 2nd Avenue Station – Curbside platform station east of 2nd Avenue. Access to Metromover.
Biscayne Boulevard	<ul style="list-style-type: none"> Bayside Station - Curbside platform station on Biscayne Boulevard north of NE 3rd Street. Walk access to Metromover Bicentennial Park Station - Center platform station north of NE 11th Street on the north end of Bicentennial Park. Provides pedestrian bridge across I-395 to serve the Performing Arts Center. Access to Metromover Arena Station – Curbside platform station on Biscayne Boulevard north of NE 8th Street. Walk access to Metromover

Station	Bus Routes
Government Center	2, 3, 7, 8, 9, 10, 11, 16, 77, Biscayne Max, Flagler Max
Miami Avenue	6,
Bayside	48, 95X,
Arena	3, 16, 21, 24, Biscayne Max
Bicentennial Park	32, 36, F/M

The differences in geographical coverage in this and the E-WMCS Alternative are the connections provided from Biscayne Boulevard to the Metrorail and Metromover stations at Government Center and Overtown. This connection was made by the RRT line from the airport to the Port of Miami in the E-WMCS. The supplement will address the impacts resulting from the proposed loop providing a connection to Government Center Station along NE 2nd Street and NW 1st Avenue and return to Biscayne via NE 45th street. In addition, the supplement assessment will analyze the connection to and site(s) proposed for the new yard and shop.

2.3.3.2 Miami Beach Light Rail Alternatives

Alternative B-1

This alternative is essentially the Base Rail Alignment on Miami Beach as defined in the previous E-WMCS DEIS (Figure 2-6). The LRT comes off of the south side of the MacArthur Causeway in a dual track configuration. After crossing the Alton Road intersection the tracks split to run curbside along 5th Street. At Washington Avenue the tracks turn north and run along the median to the Convention Center. This segment of the alignment is approximately 2.0 route miles in length. It takes 9.65 minutes from the Terminal Island station to the Convention Center and because the entire alignment is two-way track it has the same running time from the Convention Center to Terminal Island.

This alternative has several operational options.

- The northern terminus could be extended to Collins Avenue to serve the Bass Museum and the Library. To operate through the neighborhood the line would operate on a small one-way loop. After leaving the Convention Center station the northbound track would turn to the east on 19th Street, then north on Collins Avenue then back west on 21st Street and finally rejoining itself for the southward run down Washington.
- A second option would turn up Euclid Avenue from 5th Street where the tracks continue running curbside. The line turns on 16th Street and runs curbside for three blocks over to Washington Avenue where it turns and follows the main alternative to the Convention Center station.

Table 2-10 outlines the stations proposed for this alignment.

Implementation of an Alternative utilizing segment B-1 and any of its options, would result in the following modifications to existing local transit service:

Route	Serving	Modification
C	Connects 41st Street/Alton Road to Government Center at 20-minute headways	Turnback at Miami Beach Convention Center
K	Connects Broward County along Collins Avenue to South Beach and Government Center at 20-minute headways	Turnback at Miami Beach Convention Center
S	Connects Aventura Mall via Collins to Alton Rd. to Government Center at 12-minute headways.	Turnback at Alton Road and 5th Street

The Miami Beach operated Electrowave system would be switched from its current routing to an east-west orientation feeding the LRT stations.

**Table 2-10
LRT B-1 Stations**

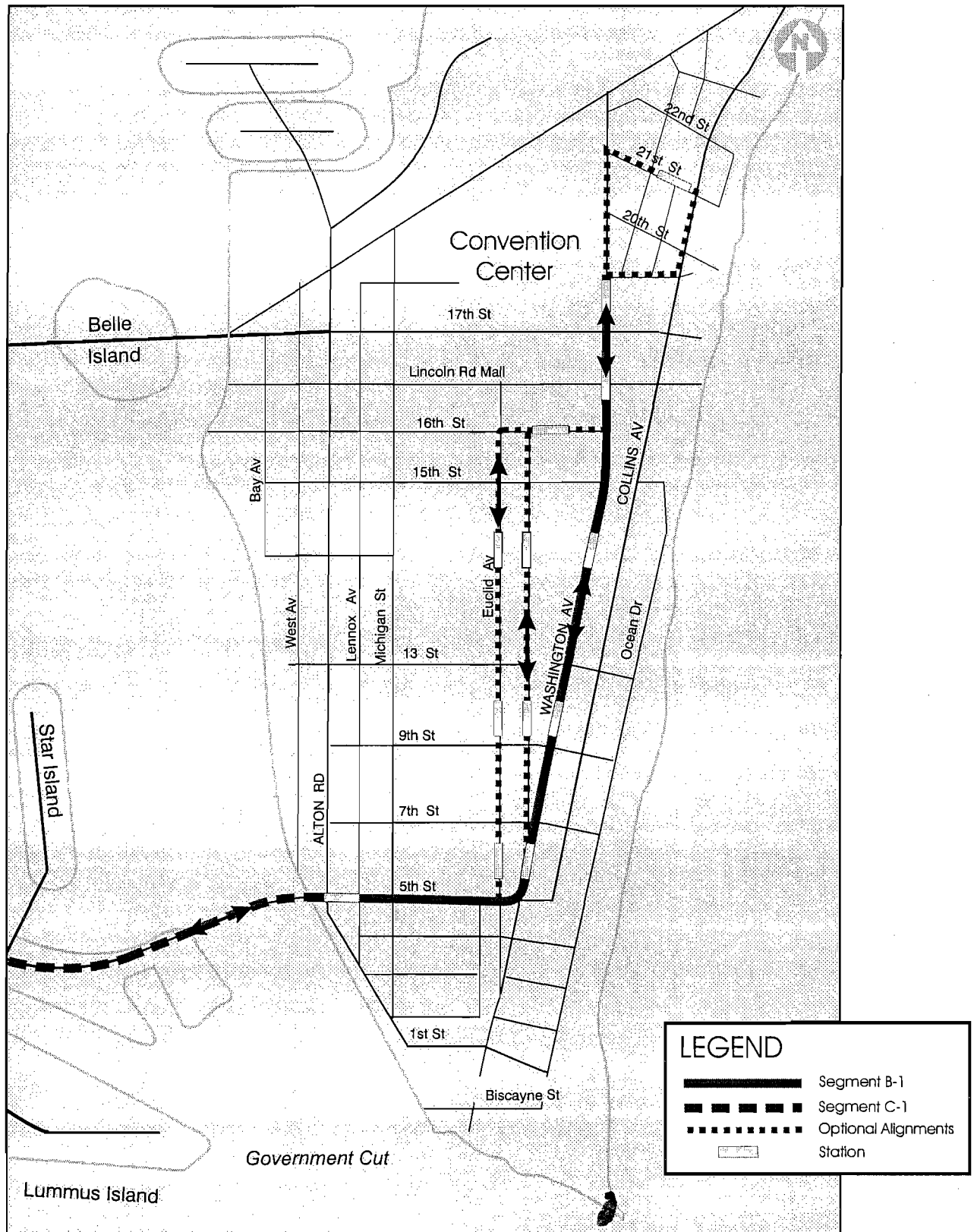
Washington Avenue Alternative	<ul style="list-style-type: none"> • 5th Street Station – Curbside platform east of Alton Road on 5th Street. • 6th Street Station – Split side platform station on Washington Avenue. • 10th Street Station - Split side platform station on Washington Avenue. • 14th Street Station - Split side platform station on Washington Avenue. • Lincoln Road Station – Split side platform station on Washington Avenue. • Convention Center Station – Center platform station between 18th and 19th Streets.
Euclid Option	<ul style="list-style-type: none"> • 5th Street Station – Curbside platform east of Euclid on 5th Street • 6th Street Station – Split curbside platform station on Euclid Avenue. • 10th Street Station - Split curbside platform station on Euclid Avenue. • 14th Street Station - Split curbside platform station on Euclid Avenue. • 16th Street Station - Curbside platform station between Pennsylvania and Drexel Avenue • Lincoln Road Station – Split side platform station on Washington Avenue. • Convention Center Station – Center platform station between 18th and 19th Streets.
Extension to Museum Option	<ul style="list-style-type: none"> • Museum Station – Curbside platform on 21st Street between Collins and Liberty Avenue.
Extension to Museum Option	<ul style="list-style-type: none"> • Museum Station – Curbside platform on 21st Street between Collins and Liberty Avenue.

The following bus routes would feed the Miami Beach Stations and would equate to one bus arriving every two minutes and one bus departing every two minutes.

Station	Bus Routes
Convention Center	A, C, H, K, L, F/M, R, S, T
5th & Alton	S



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There are essentially no significant differences in the alternatives analyzed during the E-WMCS and the Bay Link alternatives. A small segment along 5th Street will require some additional assessment.

Alternative B-2

This alternative (Figure 2-7), a variation on the loop alternative evaluated in the original E-WMCS DEIS, comes off of the south side of the MacArthur Causeway and turns south along Alton Road where the tracks split and run curbside to First Street. The tracks run curbside along 1st Street to Washington Avenue where the tracks run along the median to the Convention Center. After the southbound tracks come out of the Convention Center station the track turns west on 17th Street running along the curb then turning south on Alton Road before joining itself at 5th Street and Alton Road. The loop is two-way along both 1st Street and Washington Avenue and is one-way along 17th Street and Alton Road. Operationally all trains entering Miami Beach would run along Washington Avenue to the Convention Center. From the Convention Center, every other train would return along Washington Avenue with the alternating train returning to Miami via 17th Street and Alton Road. This segment of the alignment is 4.3 route miles in length. It requires a running time of 12.8 minutes between Terminal Island and the Convention Center station. The trip from the Convention Center to Terminal Island requires 11.2 minutes running time. Alternative B-2 could also be operated with the dual tracks on 17th Street and Alton Road and single track along Washington Road or dual track on both Alton Road and Washington Avenue.

This alternative has one operational option.

The northern terminus could be extended to Collins Avenue to serve the Bass Museum and the Library. To operate through the neighborhood the line would operate on a small one-way loop. After leaving the Convention Center station the northbound track would turn to the east on 19th Street, then north on Collins Avenue then back west on 21st Street and finally rejoining itself for the southward run down Washington.

BAY LINK STUDY: SUPPLEMENTAL DEIS

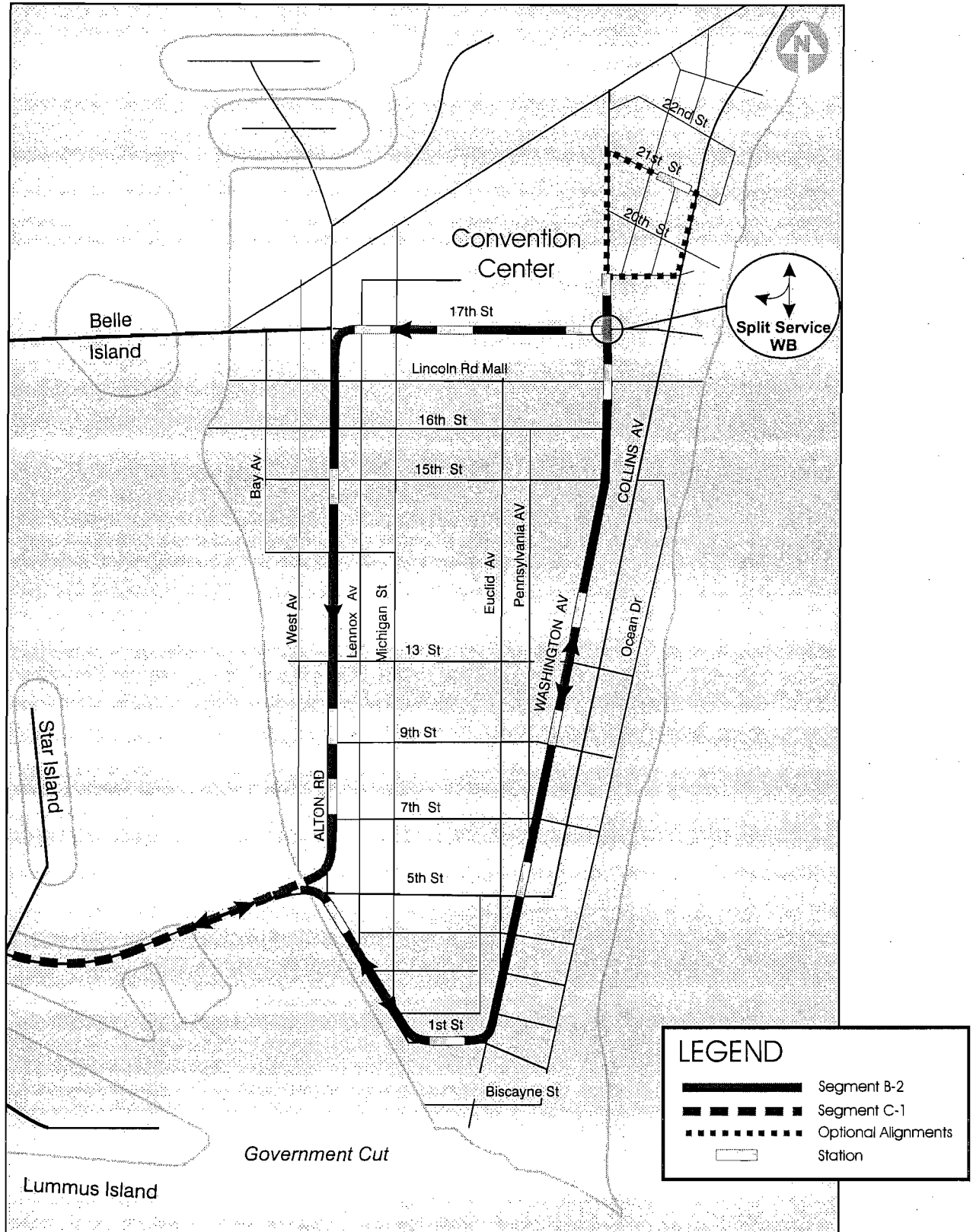


Table 2-11 outlines the stations proposed for this alignment.

**Table 2-11
LRT B-2 Stations**

Washington Avenue	<ul style="list-style-type: none"> • 5th Street Station – Curbside platform south of 5th Street on Alton Road • 1st Street Station – Curbside platform station between Alton Road and Washington Avenue • 6th Street Station – Split curbside platform station on Washington Avenue. • 10th Street Station - Split side platform station on Washington Avenue. • 14th Street Station - Split side platform station on Washington Avenue. • Lincoln Road Station – Split side platform station on Washington Avenue. • Convention Center Station – Center platform station between 18th and 19th Streets.
Alton Road	<ul style="list-style-type: none"> • Performing Arts Station – Curbside platform east of Washington on 17th Street • Meridian Station – Curbside platform station on 17th Street west of Meridian Avenue. • 17th Street Station – Curbside platform station on 17th Street west of Alton Road. • 15th Street Station – Curbside platform station at 15th Street. • 11th Street Station – Curbside platform station at 11th Street • 8th Street Station – Curbside platform station at 8th Street.
Extension to Museum Option	<ul style="list-style-type: none"> • Museum Station – Curbside platform on 21st Street between Collins and Liberty Avenue.

Implementation of this Alternative and any of its options would result in the following modifications to existing local transit service:

Route	Serving	Modification
C	Connects 41st Street / Alton Road to Government Center at 20-minute headways	Turnback at Miami Beach Convention Center
K	Connects Broward County along Collins Avenue to South Beach and Government Center at 20-minute headways	Turnback at Miami Beach Convention Center

W	Miami Beach Loop exactly matching the alternative	Delete
S	Connects Aventura Mall via Collins to Alton Rd. to Government Center at 12-minute headways.	Turnback at Miami Beach Convention Center

The Miami Beach operated Electrowave system would be switched from its current routing to an east-west orientation feeding the LRT stations. The following MDT bus routes would feed the Miami Beach Convention Center Station and would equate to one bus arriving every two minutes and one bus departing every two minutes.

Station	Bus Routes
Convention Center	A, C, H, K, L, F/M, R, S, T

The E-WMCS and the Bay Link B-2 alternative are essentially the same.

Alternative B-3

This alternative (Figure 2-8) comes off of the south side of the MacArthur Causeway where the tracks split for curbside running north under the flyover and up Alton Road . Once past the flyover ramp the tracks turn east and run up the median of Alton Road to 17th Street where the tracks run curbside to Washington Avenue. The tracks then turn north on Washington Road terminating at the Convention Center Station. This segment of the alternative is approximately 2.2 route miles in length. The running time is 10.5 minutes from Terminal Island station to the Convention Center station.

This alternative has several operational options.

- The northern terminus could be extended to up Washington Avenue to a station at the Convention Center at 19th Street then over to Collins Avenue to serve the Bass Museum and the Library. To operate through the neighborhood the line would operate on a small one-way loop. After leaving the Convention Center station the northbound track would turn to the east on 19th Street, then north on Collins Avenue then back west on 21st Street and finally rejoining itself for the southward run down Washington.
- A second option would create a one-way clockwise loop at the northern end of Alton Road. The north bound track would turn east on 16th Street and run curbside to Collins Avenue where the line turns north to 17th Street and runs east to Alton Road to turn south on Alton Road joining itself at 16th Street.



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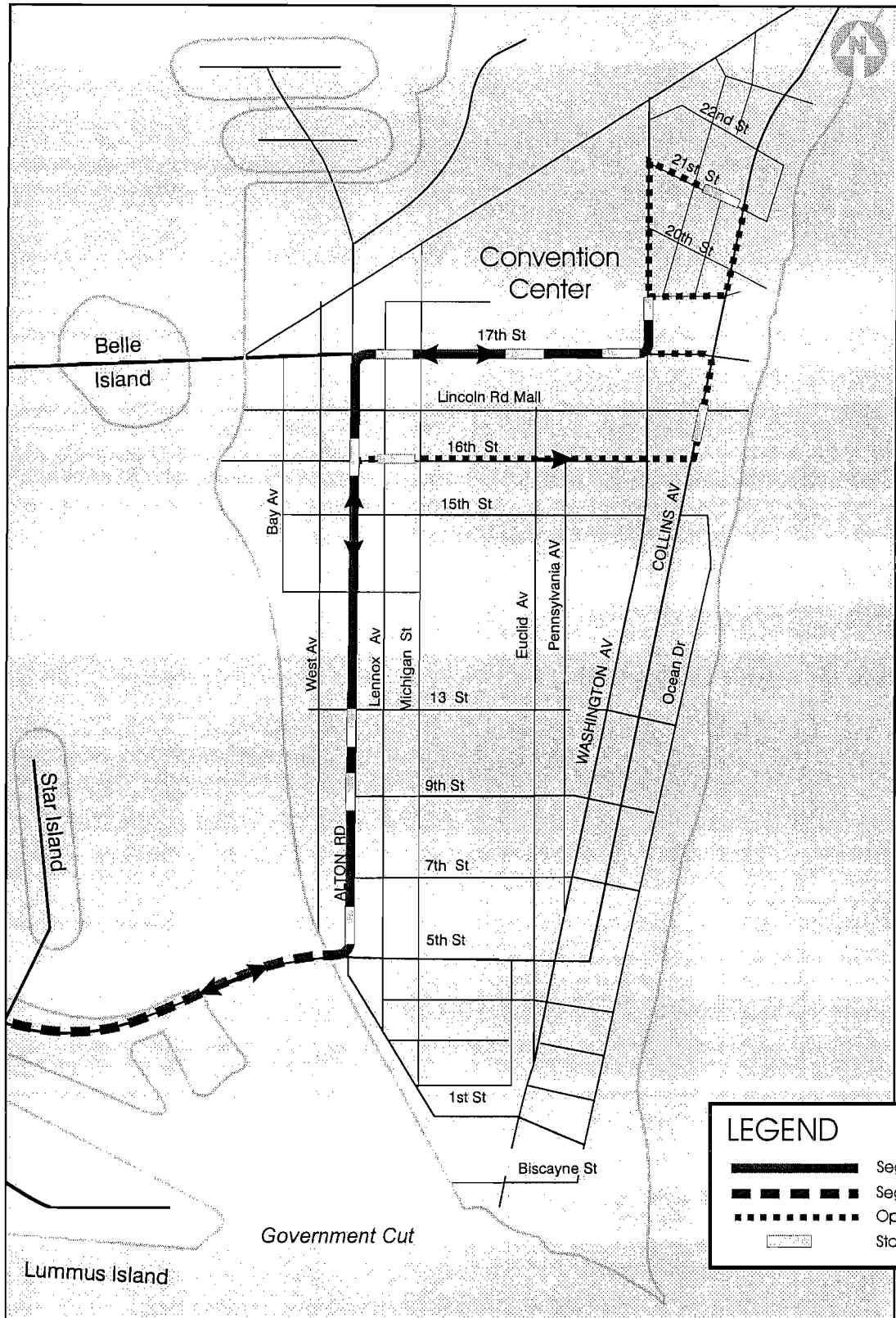


Table 2-12 outlines the stations proposed for this alignment.

**Table 2-12
LRT B-3 Stations**

Alton Road	<ul style="list-style-type: none"> • 5th Street station – Curbside platform north of 5th Street on Alton Road • 9th Street station – Split side platform station on Alton Road at 9th Street. • 12th Street station – Split side platform station on Alton Road at 12th Street. • 16th Street station - Split side platform station on Washington Avenue. • 17th Street station - Curbside platform station on 17th Street west of Alton Road • Meridian station – Curbside platform station on 17th Street west of Meridian Avenue. • Performing Arts station – Curbside platform east of Washington on 17th Street
Lincoln Road Loop	<ul style="list-style-type: none"> • 16th Street station - Curbside platform station on 16th Street east of Alton. • Euclid Avenue station - Curbside platform station at Euclid Avenue on 16th Street • Collins Avenue station- Curbside platform station on Collins Avenue at Lincoln Road. • Performing Arts station – Curbside platform east of Washington on 17th Street • Meridian station – Curbside platform station on 17th Street west of Meridian Avenue. • 17th Street station - Curbside platform station on 17th Street west of Alton Road.
Extension to Museum Option	<ul style="list-style-type: none"> • Convention Center station – Center platform station between 18th and 19th Streets. • Museum station – Curbside platform on 21st Street between Collins and Liberty Avenue.

Implementation of this Alternative and any of its options would result in the following modifications to existing local transit service:

Route	Serving	Modification
C	Connects 41st Street / Alton Road to Government Center at 20-minute headways	Turnback at Miami Beach Convention Center
K	Connects Broward County along Collins Avenue to South Beach and Government Center at 20-minute headways.	Turnback at Miami Beach Convention Center
S	Connects Aventura Mall via Collins to Alton Rd. to Government Center at 12-minute headways.	Turnback at Miami Beach Convention Center

The Miami Beach operated Electrowave system would be switched from its current routing to an east-west orientation feeding the LRT stations. The following MDT bus routes would feed the Miami Beach Convention Center Station and would equate to one bus arriving and departing approximately every two minutes.

Station	Bus Routes
Convention Center	A, C, H, K, L, F/M, R, S, T, W

The Bay Link alternatives have not changed significantly from those analyzed in the E-WMCS and will therefore not require substantial additional environmental analysis. Alternative B-3 will require some additional assessment of potential service on 16th Street if the loop is selected for additional analysis.

2.3.3.3 MacArthur Causeway (Common Segment)

Alternative C-1

The C-1 alignment is required to connect and is common to the downtown Miami LRT alternatives (A-1, A-2 and A-3) as well as the Miami-Beach LRT alternatives (B-1, B-2 and B-3). Figure 2-9 details the C-1 alignment.

From the Downtown Miami A-alternatives, the tracks continue eastward terminating just to the east of the Bicentennial / Performing Arts Station. The tracks continue to the south side of I-395 where they angle to run parallel to I-395. The alignment leaves grade to cross Biscayne Bay on a new bridge structure parallel to and south of the existing bridge for vehicular traffic. The track returns to grade at Watson Island where it travels southerly within an exclusive right-of-way to the south side of the MacArthur Causeway. The alignment continues along the causeway until it takes a northeastern turn at Terminal Island within an exclusive right-of-way to continue crossing the bay on another new bridge structures which travels parallel to, and to the south of, the existing vehicular bridge and ends just before going into Miami-Beach.

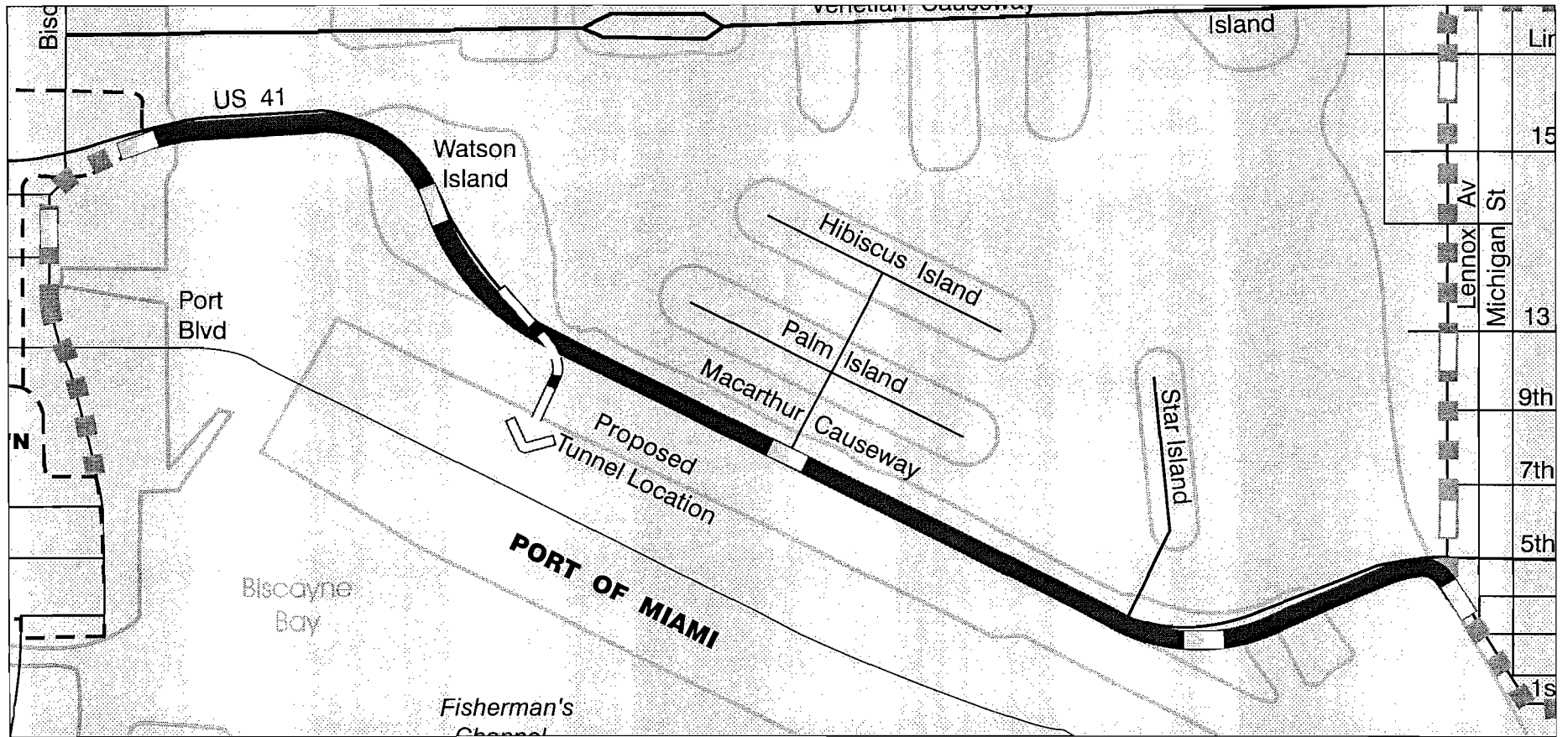
Table 2-13 outlines the stations proposed for this alignment.

**Table 2-13
LRT SEGMENT C-1 Stations**

MacArthur Causeway	<ul style="list-style-type: none">• Watson Island Station - Center platform station north of the MacArthur Causeway.• Palm Island Station - Center platform station west of Fountain Street parallel to the MacArthur Causeway.• Terminal Island Station - Center platform station west of Bridge Road and parallel to the MacArthur Causeway.
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BAY LINK STUDY; SUPPLEMENTAL DEIS



LEGEND

- Segment C-1
- Metromover
- Segment A
- Segment B
- Station Area



Figure 2.9
Segment C-1

2.3.4 Bus Rapid Transit

The Bus Rapid Transit (BRT) Alternative provides exclusive bus lanes along Biscayne Boulevard and the MacArthur Causeway. The BRT facilities would be constructed to allow operation of standard buses, buses utilizing overhead power distribution systems, heavy duty diesel electric motors, or alternative fuels. Stations along the bus lanes would be designed so that they can accommodate standard buses as well as large articulated vehicles. The busway would be equipped with vehicle sensing detectors to facilitate bus operations through the intersections on Biscayne Boulevard.

The bus lanes along Biscayne Boulevard would be split with the northbound lane against the easterly curbside and the southbound lane would be along the west curb. The bus lane would be separated from the general purpose lanes by a mountable curb, which would be discontinuous across intersections and major driveways. The bus lane would extend from Flagler to NE 11th Street. After the buses leave the Biscayne Boulevard bus lane they either continue north or turn right onto the MacArthur Causeway. Buses operate in mixed flow to the eastern end of Watson Island where they enter a bi-directional busway on the south side of the Causeway. Eastbound buses enter the busway directly and westbound buses would exit the busway via a flyover just south of Watson Island to access the westbound general-purpose lanes on the MacArthur Causeway. Eastbound buses continue in the busway to the intersection of Alton Road and 5th Street where they re-enter mixed flow traffic via the traffic signal. Westbound buses access the westbound general-purpose lanes of the MacArthur Causeway and enter the busway via a flyover. The buses will distribute passengers in downtown Miami and on Miami Beach.

The following bus routes would operate on the Biscayne Boulevard portion of the busway: the 3, 16, 48, 95, C, S, K, T, Flagler Max, and the Biscayne Max. These routes will provide a combined peak hour directional headway of one bus every 1.4 minutes on the Biscayne Boulevard portion of the busway.

The following bus routes would operate on the MacArthur Causeway portion of the busway: the C, K, S, F/M, and the Flagler Max. These routes will provide a combined peak hour directional headway of one bus every 3.3 minutes on the Causeway portion of the busway.

The BRT alternative represents a new technology option for the corridor and will require a complete analysis and assessment of its potential impacts for it was not addressed in the E-WMCS DEIS.

2.3.5 Technologies Considered and Dropped

The LRT and BRT technology concepts were presented at the scoping meetings. During the scoping meetings, several additional alternatives were suggested by participating citizens. These technologies included Ferry Service, extension of the Metromover system to 5th Street and Alton Road, and the extension of the Metrorail system to 5th Street and Alton Road. All of the technology options were analyzed through a two-tier screening process in the Technology Assessment Report. The Ferry Service and extension of the Metrorail and Metromover systems fell out as a result of the

Tier 1 screening process. LRT and BRT were carried through the Tier 2 process. The results are summarized below.

2.3.5.1 Ferry Service

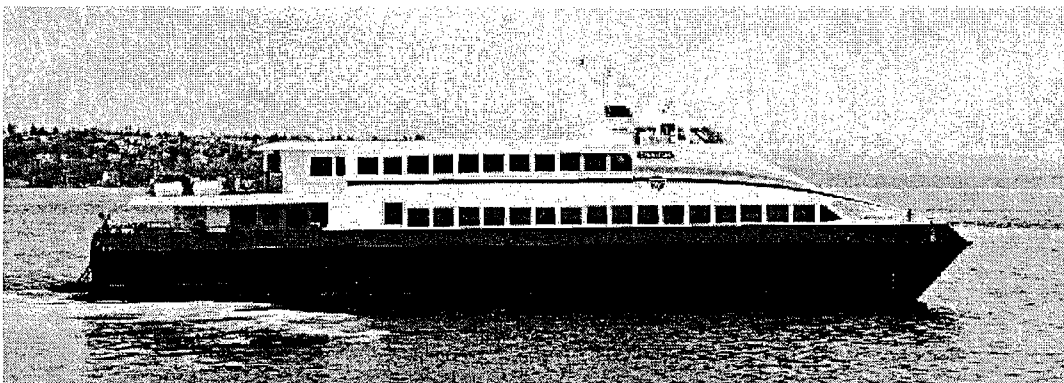
For the purposes of the technology assessment for the Bay Link application, it was assumed that there would be a terminal at the Bayfront Park marina and a terminal on Terminal Island. Service would be provided on 20-minute headways. The ferry service would provide an hourly capacity of 1,050 passengers. Access to and from the ferry terminals would be by walking and by MDT or Electrowave buses. The alignment of the Ferry Boat Alternative is shown in Figure 2-11.

The Florida Department of Transportation (FDOT) currently operates a passenger/vehicle ferry service over the 0.4 miles between Fort George and Mayport near Jacksonville. Twelve other states operate some form of passenger only or passenger/vehicle ferry service including Florida, Washington, Massachusetts, Ohio, Texas, Connecticut, California, Louisiana, New York, Virginia, Pennsylvania, Maine and Minnesota.

Figure 2-10 reflects one of the passenger only ferries operated by the Washington State Department of Transportation. The vehicle pictured is a Chinook class high-speed passenger-only vehicle. It is a steel hulled catamaran design. The boat was placed in service in 1998 and is 143 feet - 3 inches in length with a beam of 39 feet - 4 inches and a draft of 5 feet. The boat has a gross weight of 99 tons and a net weight of 67 tons. Cruise speed is 30 to 34 knots per hour. Total horsepower is 7,200 provided by four diesel-waterjet engines. Passenger capacity is 350. Hourly capacity is largely governed by the time required to dock, unload and load. For a single dock system, this boat would offer a capacity of a maximum of 1,050 passengers per hour. The boat requires a crew of five.

Capital outlays for ferryboat systems include the boats, docks, terminals, parking facilities and maintenance facilities. System capital cost would vary significantly depending on the number of boats and docks required. Based on a composite of the service operated nationally, the total operating expense is approximately \$120.90 per vehicle mile and \$886.75 per vehicle revenue hour. Corresponding cost per passenger mile and passenger trip are \$1.46 and \$11.52 respectively.

Figure 2-10 Passenger Ferry Boat





BAY LINK STUDY; SUPPLEMENTAL DEIS

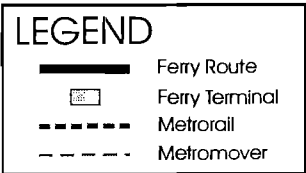
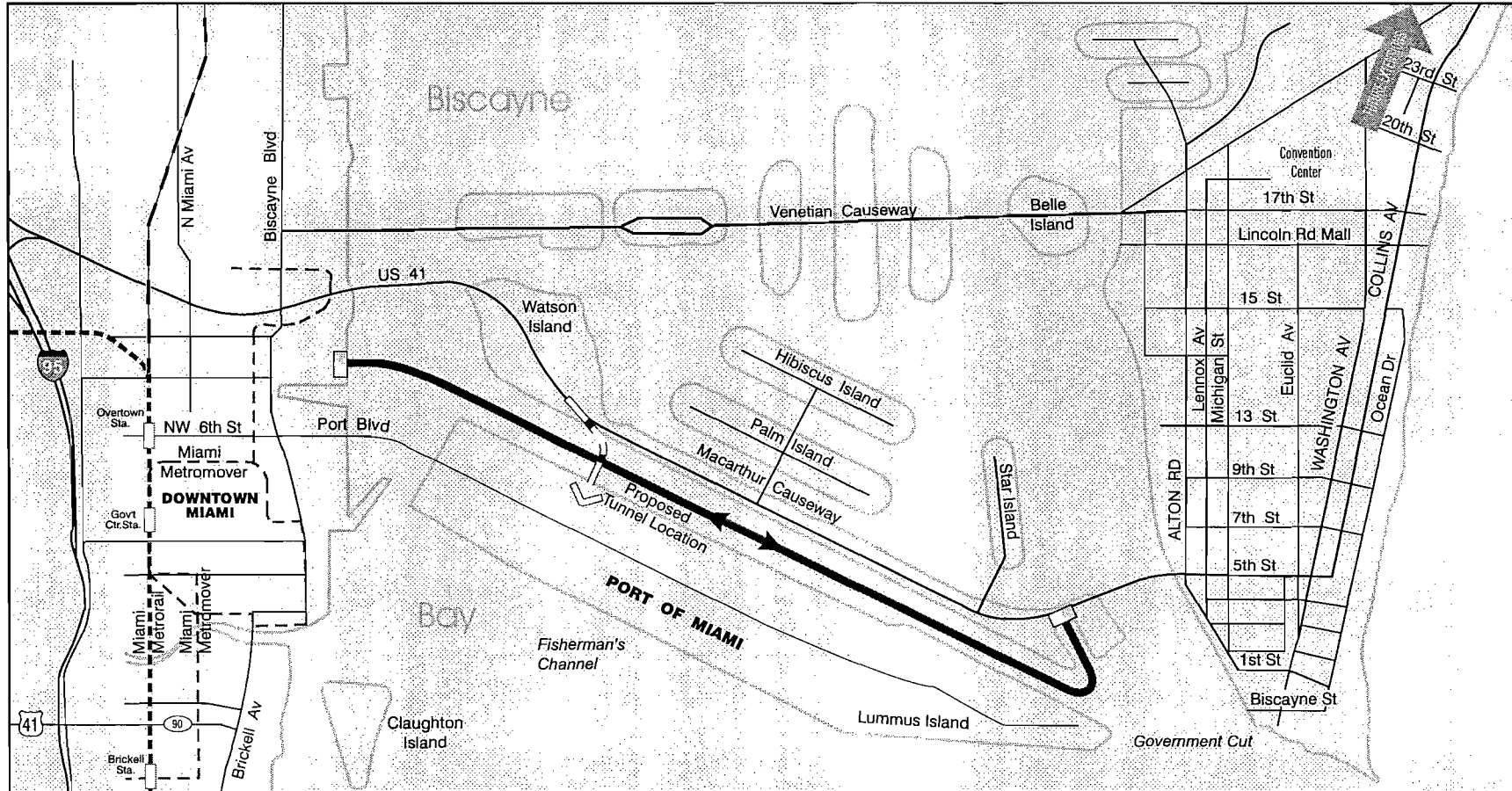


Figure 2-10
Ferry Boat Alternative

2.3.5.2 Automated Guideway Transit (Metromover)

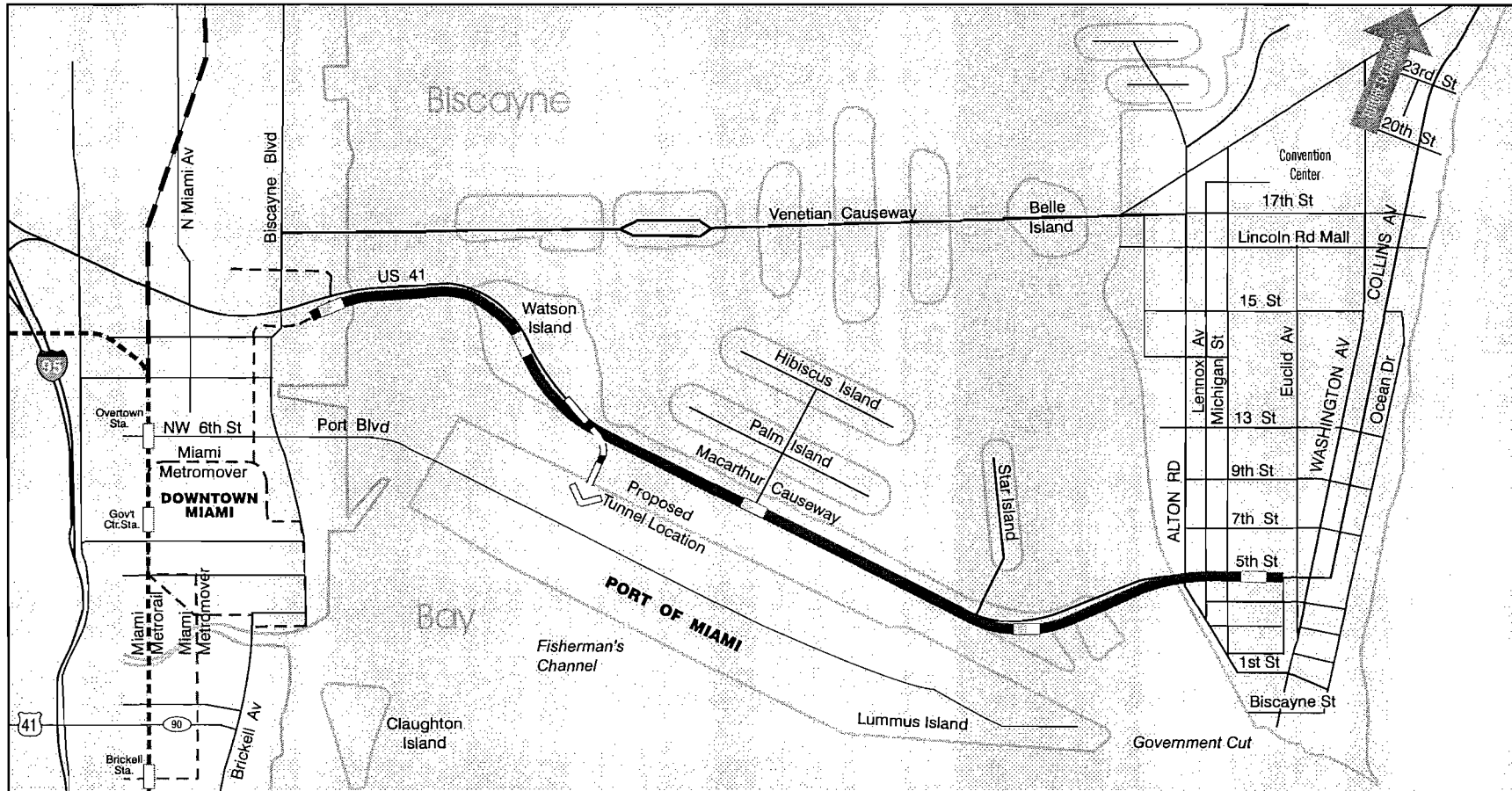
For the purposes of the technology assessment for the Bay Link application, it was assumed that the existing Metromover technology would be utilized for the service. The loop at Bicentennial Park would be extended over the intercoastal waterway on a new bridge to Watson Island where it would proceed on aerial structure across the MacArthur Causeway to 5th Street (Figure 2-12). The service would be bi-directional with stations at Watson Island, Palm Island, Star Island, and 5th Street. Passenger distribution at the 5th Street station would be by walking and MDT or Electrowave buses.

Automated guideway transit (AGT) refers to a broad range of fixed guideway technology in which the most prominent feature is automatic train operation. AGT technology includes a wide range of service levels—from proven "people mover" systems such as the downtown Miami Metromover and numerous airport circulators, to experimental systems such as the personal rapid transit (PRT) system once planned for a Chicago suburban commercial area.

At the present time, the majority of AGT systems usually operate as a local distribution system in an environment where there are many trips concentrated over short distances. They are typically found at airports (e.g., Atlanta, Miami, Dallas and Denver), zoos, amusement parks, and in major commercial centers or downtowns (e.g., Harbour Island in Tampa and the Metromover in downtown Miami).

The service characteristics of AGT vary considerably. Urban, medium capacity systems can reach speeds of 50 miles per hour. People movers are generally operated at 35 miles per hour. Airport and local circulators typically reach speeds of 30 miles per hour. Passenger capacities are generally less than light or heavy rail systems. This decrease in passenger capacity is due to slower operation on AGT's tighter geometric allowances and shorter station spacing. All AGT systems are proprietary and can generally be distinguished by their suspension devices or their propulsion mechanisms. While some systems are suspended from an overhead "track" (somewhat similar to a cable car), most systems run on a track. Vehicles can be rubber tired or steel wheeled. Power is supplied by a high voltage contact rail located in the trackbed. Therefore, people mover systems must be isolated from other traffic and pedestrians, (i.e., these systems require fully grade-separated rights-of-way). The steel wheeled version requires conventional railroad-type steel rails to be affixed to the guideway, while the rubber-tired version requires a concrete or steel running surface and concrete or steel center or side rails for lateral guidance. The Miami Metromover (Figure 2-13) is an example of a rubber-tired AGT system.

BAY LINK STUDY, SUPPLEMENTAL DEIS



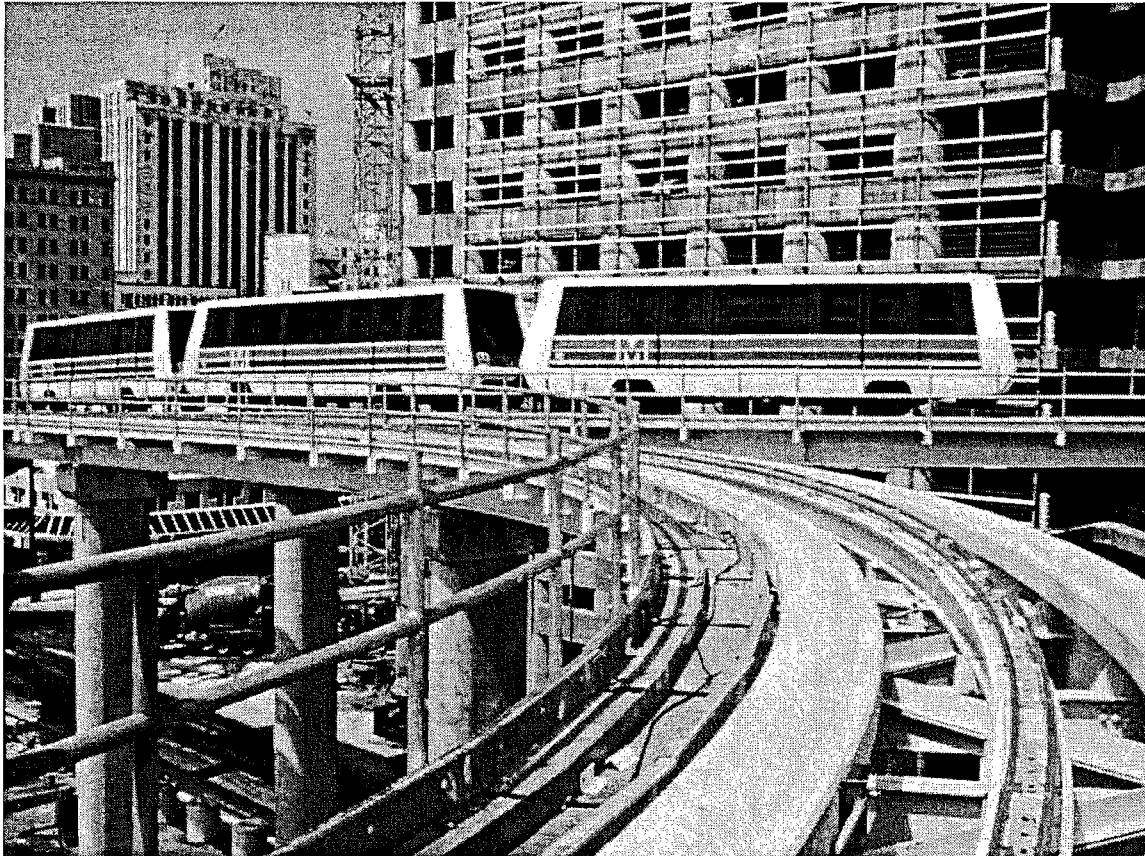
LEGEND

- Proposed Metromover Extension
- Station
- Existing Metromover
- Metrorail



Figure 2-12
Extended Metromover Alternative

Figure 2-13 Miami Metromover



- Fully grade-separated from all other traffic
- Is fully automated or remote controlled; and is typically unmanned.
- Trains of small cars, operating on rubber tires bearing on concrete guideway, steered and switched by follower on center guideway.
- Can operate up to 48 mph, make short radius turns; and climb grades up to 8%.
- Vehicles/systems are proprietary, thus limiting bid completion, but there are comparable designs offered by other supplies.
- System widely deployed in airports worldwide and in other circulator/distributor installations.
- High capital cost and very high O&M costs.

2.3.5.3 Rail Rapid Transit

For the purposes of the technology assessment for the Bay Link application, it was assumed that the existing Metrorail system and technology would be applied. A branch line would be extended from the vicinity of the Overtown station and proceed eastward across MacArthur Causeway to 5th Street on Miami Beach (Figure 2-14). The service would be bi-directional with stations at Bicentennial Park, Watson Island and 5th Street. Distribution on the Miami Beach side would be provided by Walking and MDT or Electrowave buses.

Rail Rapid Transit (RRT) (Figure 2-15) refers to heavy rail technology and provides the highest passenger capacity and fastest service possible, but one of the highest capital costs. Also referred to as rapid rail, metro or subway, heavy rail operates in an exclusive right-of-way which must be grade separated because of the high voltage (third) rail which provides electric power to the vehicles. Automobile or pedestrian crossing of the tracks is not permitted.

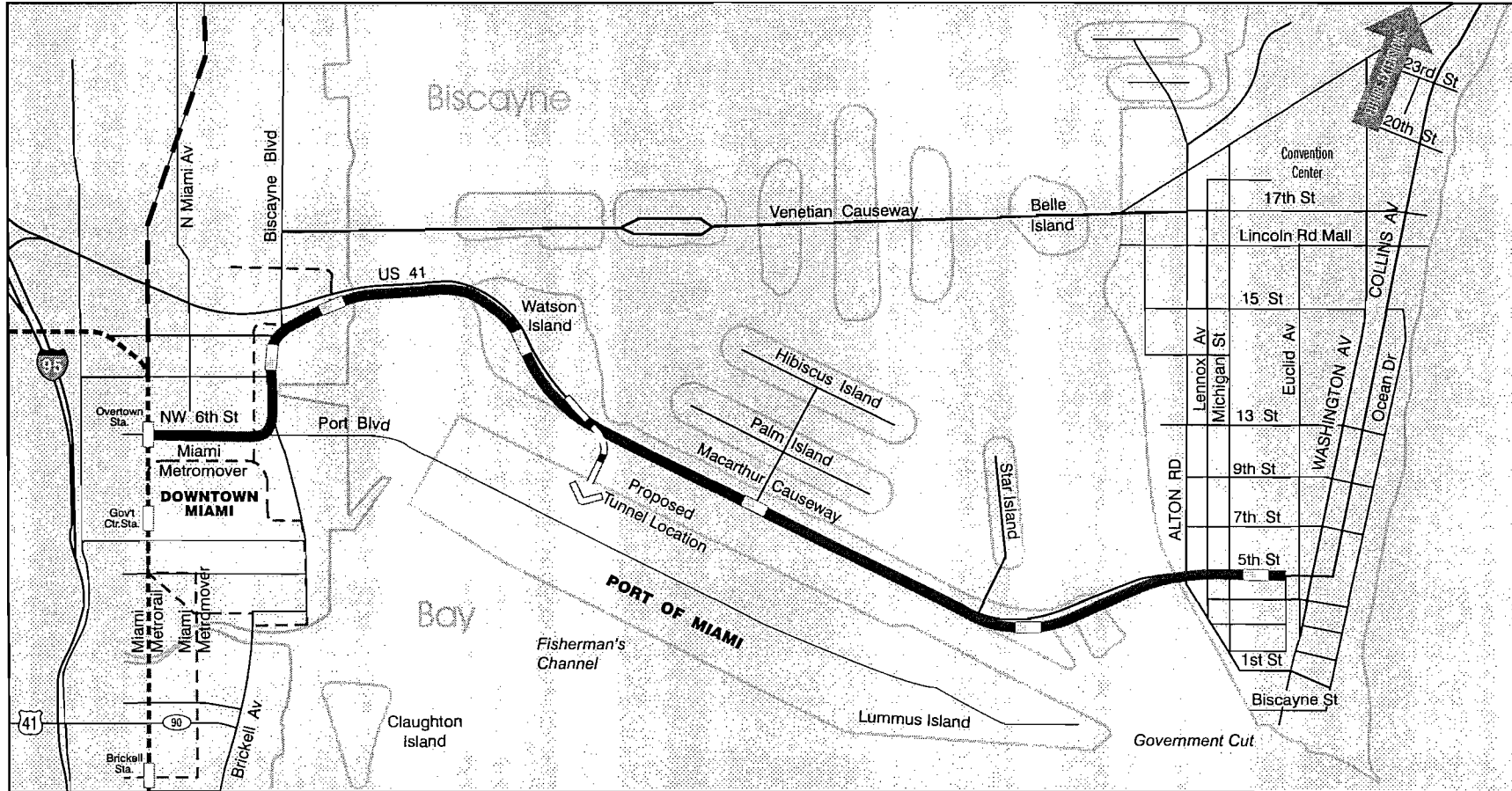
Besides the contact rail, heavy rail technology is characterized by its very high passenger carrying capacity (up to 40,000 passengers per hour per direction for multi-car trains) and operating speeds (up to 75 miles per hour). Individual cars can carry up to 170 passengers in normal loading situations. Therefore, heavy rail is best for high-density corridors in large cities.

Stations outside of densely developed areas need to be far enough apart to allow trains to take advantage of their high-speed capacity. RRT stations require high-level platforms.

Examples of heavy rail systems in the US include the Washington Metropolitan Area Transit Authority (WMATA) system, the New York City subway, MARTA in Atlanta, Chicago, SEPTA in Philadelphia, the Boston Red and Orange Lines, and Metrorail in Miami.

RRT typically consists of large four-axle rail vehicles (area up to 750 square feet) that operate in trains of up to ten cars on fully controlled right-of-way, which allows high speed, reliability of service, capacity and rapid boardings.

BAY LINK STUDY; SUPPLEMENTAL DEIS



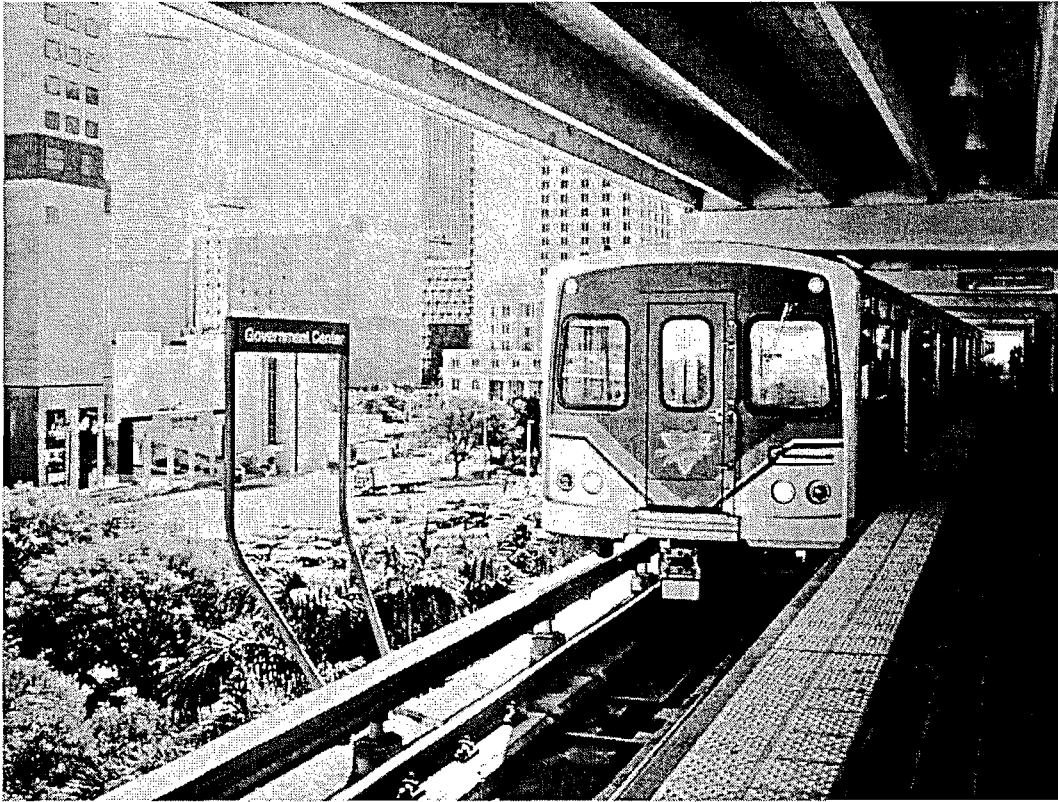
LEGEND

- Proposed Metrorail Extension
- Proposed Metrorail Station
- Existing Station
- Existing Metrorail
- Metromover



Figure 2-14
Extended Metrorail Alternative

Figure 2-15 Miami Metrorail



- Higher level of service (speed, reliability and comfort).
- Higher system performance (capacity due to long trains, productivity, efficiency).
- Greater safety (fail-safe signaling throughout system).
- Stronger image (separate right-of-way and rail technology).
- Higher maximum speed (up to 70 mph).
- Longer turning radius.
- The higher capital cost of the five modes.
- Lower ability to fit into an urban environment.
- Less conduciveness to stage construction.